Draft Environmental Impact Statement

Permanent Stationing of the 2/25th Stryker Brigade Combat Team

Prepared For

Headquarters, Department of the Army
Washington, DC

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Draft Environmental Impact Statement

Lead Agency: Department of the Army, Office of the Secretary of the Army, Washington, D.C.

Cooperating Agencies: None.

Title to Proposed Action: The Permanent Home Stationing of the 2/25th Stryker Brigade Combat Team (SBCT)

Affected Jurisdictions: Hawaii and Honolulu Counties, Hawaii; Anchorage and Southeast Fairbanks Boroughs, Alaska; El Paso, Pueblo, and Fremont Counties, Colorado

Review and Comment: Written comments on this DEIS may be submitted by July 30, 2007 to Public Affairs Office, U.S. Army Environmental Command, Building E4460, 5179 Hoadley Road, Attention: IMAE-PA, Aberdeen Proving Ground, MD 21010-5401, telephone: 410-436-2556, facsimile: 410-436-1693, email: publiccomments@aec.apgea.army.mil. The document is available on line at: www.sbct-seis.org.

Document Designation: Draft Environmental Impact Statement

Abstract: The Army's proposed action is to permanently home station the 2/25th SBCT in a location that meets national security and defense policy guidance, provides for SBCT training and operational requirements, provides a high quality of life for the 2/25th Soldiers and their Families, and facilitates the rapid deployment of the SBCT to meet U.S. national security and defense requirements. This EIS examines three alternative Army installations capable of supporting the permanent stationing of the 2/25th SBCT. These alternatives for implementing the proposed action were identified by the Army as reasonable alternatives capable of meeting the Army's need criteria described in Chapter 1 and screening criteria described in Chapter 2. The three alternatives include: (A) permanently stationing the 2/25th SBCT at Schofield Barracks Military Reservation (SBMR) while conducting required training at military training sites in Hawaii; (B) permanently stationing the 2/25th SBCT at Fort Richardson while conducting required training at military training sites in Alaska and replacing the SBCT in Hawaii with an IBCT from Alaska; and (C) permanently stationing the 2/25th SBCT at Fort Carson while conducting required training at military training sites in Colorado and replacing the SBCT in Hawaii with an IBCT from Colorado. In addition, the No Action Alternative was defined and evaluated in detail. The EIS includes analysis of all activities (equipment fielding, training, facilities construction, and Soldier and Family support) required to permanently station the 2/25th. This EIS will assist the Army in arriving at a decision for the permanent stationing of the SBCT in a location that can accommodate the SBCT's training and quality of life facility requirements while meeting the strategic needs of the United States, national security requirements, and environmental considerations. The Army has not identified a preferred alternative at this time.

Preface

An Environmental Impact Statement (EIS) usually is not read like a book — from chapter one to the end. The best way to read an EIS depends on your interests. You may be more interested in effects, whereas others might have more interest in the details of the proposed project or be more concerned about what opportunities were made available to the public to be involved in the environmental assessment process. Many readers probably just want to know what is being proposed and how it will affect them.

This document follows the format established in the National Environmental Policy Act's regulations (Title 40 Code of Federal Regulations Parts 1500 to 1508). The following paragraphs outline information contained in the chapters and appendices so readers may find the parts of interest without having to read the entire document.

- *Summary*: contains a short, simple discussion to provide the reader and the decision makers with a sketch of the more important aspects of the EIS. The reader can obtain additional, more-detailed information from the actual text of the EIS.
- *Chapter 1 — Purpose, Need, and Scope*: identifies the proposed action and describes the purpose of and need for the proposed action, decisions to be made by the Army, and the National Environmental Policy Act (NEPA) process.
- *Chapter 2 — Description of the Proposed Action and Alternatives*: describes the Proposed Action, the detailed alternative selection criteria used to assess whether a proposed site is a "reasonable" alternative to be carried forward for full evaluation in the DEIS, and alternatives that were carried forward for evaluation. Three alternatives for implementing the proposed action were identified by the Army as reasonable alternatives capable of meeting the Army's need criteria described in Chapter 1 and screening criteria described in Chapter 2. In addition, the No Action Alternative was defined for evaluation in detail.
- *Chapter 3 — Affected Environment*: describes the present condition of the environment that would be affected by implementation of the proposed action or any action alternative.
- *Chapter 4— Impact Methodology:* describes the methodology used to analyze the potential impacts (environmental consequences) on the affected environment resulting from implementation of the alternatives
- *Chapter 5— Environmental Consequences*: describes the probable direct, indirect, and cumulative effects to the human environment that would result from implementing the Proposed Action or alternatives. The discussion also addresses the short-term uses versus long-term productivity, unavoidable impacts, and irreversible or irretrievable impacts. Resources without significant effects or issues are not discussed.
- *Chapter 6 — Preparers and Contributors*: identifies the people involved in the research, writing, and internal review of the DEIS.
- *Chapter 7— Distribution and Review of the Draft EIS*: lists the agencies, organizations, and individuals who received a copy of the DEIS.
- *Chapter 8— References Cited*: lists the references cited in the DEIS.
- *Index*: contains cross references and identifies the pages where key topics can be found.

Acronyms and Abbreviations used in this EIS

A&M	artillery and mortar
AAFES	Army and Air Force Exchange Service
ACHP	Advisory Council for Historic Preservation
ACP	Army Campaign Plan
ACUB	Army's Collaborative Use Buffer
ADA	average daily attendance
ADEC	Alaska Department of Environmental Conservation
ADGT	Alaska Department of Game and Fish
ADT	average daily traffic
AFB	Air Force Base
AFS	Alaska Fire Service
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
AKDOT	Alaska Department of Transportation
ALISH	Agricultural Lands of Importance to the State of Hawaii
AMF	Army Modular Force
amsl	above mean sea level
APCD	Colorado Air Pollution Control Division
APE	area of potential effect
AQCC	Colorado Air Quality Control Commission
AR	Army Regulation
ARNG	Army National Guard
ARPA	Archaeological Resources Protection Act
ARTEP	Army Training and Evaluation Program
ASP	ammunition storage point
AST	aboveground storage tank
ATC	air traffic control
ATI	area of traditional interest
ATTACC	Army Training and Testing Area Carrying Capacity
BA	Biological Assessment
BAAF	Bradshaw Army Airfield
BAX	Battle Area Complex
BCT	Brigade Combat Team
BEA	Bureau of Economic Analysis
bgs	below ground surface
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
BO	Biological Opinion
BP	before present
BRAC	Base Realignment and Closure Act
BSA	Biologically Sensitive Area
BTEX	benzene, ethylbenzene, toluene, and xylene
CA	comprehensive agreement
CAA	Clean Air Act
CACTF	Combined Arms Collective Training Facility
CAL	Combat Assault Landing Strip
CALFEX	combined arms live-fire exercise
CCD	Census County Division

CDOT	Colorado Division of Transportation
CDOW	Colorado Department of Wildlife
CDPHE	Colorado Department of Public Health and the Environment
CEA	Cumulative Effects Analysis
CEMML-CSU	Center for Environmental Management of Military Lands-Colorado State University
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
CFA	Controlled Firing Area
CGS	Colorado Geological Survey
CHPPM	Army Center for Health Promotion and Preventive Medicine
CNHP	Colorado Natural Heritage Program
CNIPM	Committee for Noxious and Invasive Weeds Management
CO	carbon monoxide
COCOMs	Commanders of Unified Combatant Commands
CPQC	Combat Pistol Qualification Course
CRREL	Cold Regions Research and Engineering Laboratory
CTP	combat trail program
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DBCP	dibromochloropropane
DECAM	Fort Carson Directorate of Environmental Compliance and Management
DEIS	Draft Environmental Impact Statement
DMPRC	Digital Multipurpose Range Complex
DMR	Dillingham Military Reservation
DNT	dinitrotoluene
DoD	Department of Defense
DOL	Directorate of Logistics
DPTM	Directorate of Plans, Training, and Mobilization
DPW	Directorate of Public Works
DRMO	defense reutilization and marketing office
DTA	Donnelly Training Area
DU	depleted uranium
DuSMMoP	Dust and Soils Mitigation Monitoring Plan
EA	Environmental Assessment
EACH	Evans Army Community Hospital
ECO	Environmental Compliance Office
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
ENMP	Environmental Noise Management Program
EO	Executive Order
EOD	explosive ordnance disposal
ERF	Eagle River Flats
ESA	Endangered Species Act
ESMPR	Endangered Species Management Plan Report
F	Fahrenheit
FAA	Federal Aviation Administration
FCS	Future Combat Systems

FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FOPCO	Fuel Oil Polishing Company
FR	Federal Register
FRA	Fort Richardson Area
FTC	Fort Carson
FTCCTS	Fort Carson Comprehensive Transportation Study
FTI	fixed tactical internet
FUDS	formerly used defense site
FWA	Fort Wainwright
FY	fiscal year
GAO	U.S. Government Accountability Office
GDPR	Global Defense Posture Realignment
GIS	Geographic Information System
gpm	gallons per minute
GWOT	Global War on Terror
HAFB	Hickham Air Force Base
HAP	Hazardous Air Pollutant
HBCT	Heavy Brigade Combat Team
HDBEDT	Hawaii Department of Business, Economic Development, and Tourism
HDLNR	Hawaii Department of Land and Natural Resources
HDOH	Hawaii Department of Health
HDOT	Hawaii Department of Transportation
HELCO	Hawaiian Electric and Light Company
HINHP	Hawaii Natural Heritage Program
HMMWV	high-mobility multiple wheeled vehicle
HMR	Helemano Military Reservation
HMX	Octahydro-1357-tetranitro-1357-tetrazocine
HQDA	Headquarters, Department of the Army
HSDH	Hawaii State Department of Health
HWMP	Hazardous Waste Management Plan
HWSSP	Hazardous Waste Shop Storage Point
Hz	Hertz
I-25	Interstate 25
IAF	initial approach fix
IBCT	Infantry Brigade Combat Team
ICM	improved conventional munitions
ICRMP	Integrated Cultural Resources Management Plan
ICUZ	Installation Compatible Use Zone
IFR	instrument flight rules
IMC	instrument meteorological conditions
INRMP	Integrated Natural Resources Management Plan
IPBC	Infantry Platoon Battle Course
IRP	Installation Restoration Program
ISBC	Infantry Squad Battle Course
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildfire Management Plan
IWTP	industrial water treatment plan
JSCP	Joint Strategic Capabilities Plan

JSPS	Joint Strategic Planning System
KLOA	Kawailoa Training Area
km	kilometer
KMWP	Koolau Mountains Watershed Partnership
KTA	Kahuku Training Area
KvA	kilovolt ampere
LBP	lead-based paint
L_{dn}	day-night average sound level
L_{eq}	equivalent noise level
LM	lifestyle management
LOS	level of service
LPG	liquefied petroleum gas
Lpk	unweighted dB value
LRAM	Land Rehabilitation and Maintenance
LSV	logistic support vessel
LUST	leaking underground storage tank
MAC	Mount Assault Course
mcf	million cubic feet
MDF	Multiple Deployment Facility
MEDDAC	U.S. Army Medical Department Activity
MF	McCarthy Flats
mg/L	milligrams per liter
mgd	million gallons per day
MGS	mobile gun system
MILCON	Military Construction
MIM	maneuver impact mile
mm	millimeter
MMPA	Marine Mammal Protection Act
MMR	Makua Military Reservation
MOA	Military Operations Area
MOUT	Mission Operations on Urbanized Terrain
mph	miles per hour
MPM	most probable munitions
MPMG	Multipurpose Machine Gun Range
MPTR	Multipurpose Training Range
MRF	Modified Record Fire Range
MRPC	Multi-Purpose Range Complex
MRPC	Multi-Purpose Range Complex
MSR	Military Supply Route
MVCL	Maximum Contaminant Level
NAAQS	National Ambient Air Quality Standard
NAGPRA	Native American Graves Protection and Repatriation Act
NDAA	National Defense Authorization Act
NDS	National Defense Strategy
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFDRS	National Fire Danger Rating System
NHPA	National Historic Preservation Act
NMS	National Military Strategy
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration

NOE	Nap of the Earth
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSS	National Security Strategy
NVG	night vision goggles
NZ	noise zone
O_3	ozone
OD	open detonation
OIF	Operation Iraqi Freedom
OIP	Oahu Implementation Plan
ORRV	off-road recreational vehicle
OSHA	Occupational Safety and Health Administration
OU2	operable unit
OWS	oil/water separator
PA	Programmatic Agreement
PACOM	Commander of United States Pacific Command
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi/L	picoCuries per liter
PCMS	Piñon Canyon Maneuver Site
PDC	Pacific Disaster Center
PEA	Programmatic Environmental Assessment
PM	particulate matter
POL	Petroleum, Oils, and Lubricants
PPACG	Pikes Peak Area Council of Governments
ppm	parts per million
PRDA	Pole Line Road Disposal Area
PRG	Preliminary Remediation Goal
PSCU	Pacific Cooperative Studies Unit
PSD	prevention of significant deterioration
PTA	Pohakuloa Training Area
PTE	potential to emit
PTRCS	property of traditional, religious, or cultural significance
QDR	Quadrennial Defense Review
QTR	Qualification Training Range
QTR1	Multipurpose Qualification Training Area, McCarthy Flats
QTR2	Multipurpose Qualification Training Area, South Range Acquisition Area
RAWS	remote automated weather station
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RFMSS	Range Facility Management Support System
RMSSP	Recyclable Material Shop Storage Point
ROD	Record of Decision
ROI	Region of Influence
ROW	right-of-way
RRTS	Roosevelt Road Transmitter Site

RSTA	reconnaissance, surveillance, and target acquisition
RTLA	Range and Training Land Trust
RTV	rational threshold value
SAP	Satellite accumulation point
SAR	Species at Risk
SARA	Superfund Amendments and Reauthorization Act
SBCT	Stryker Brigade Combat Team
SBER	Schofield Barracks East Range
SBMP	Schofield Barracks Main Post
SBMR	Schofield Barracks Military Reservation
SDZ	surface danger zone
Se	Selenium
SEL	sound exposure level
sf	square feet
SH	State Highway
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMA	Special Management Area
SO_2	sulfur dioxide
SOP	Standard Operating Procedure
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SRA	Sustainable Range Awareness Program
SRAA	South Range Acquisition Area
SRTA	short-range training ammunition
SVOC	Semi-volatile Organic Compound
SWMU	Solid Waste Management Unit
TAMC	Tripler Army Medical Center
TAPS	Trans-Alaska Pipeline
TCE	trichloroethene
TCP	Traditional Cultural Property
TFTA	Tanana Flats Training Area
TIP	Transportation Improvement Plan
TLV	threshold level value
TMDL	total maximum daily load
TNC	The Nature Conservancy
TNT	2,4,6-trinitrotoluene
tpy	tons per year
TRI	training requirement integration
TSV	theater support vessel
UAC	Urban Assault Course
UAV	unmanned aerial vehicle
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USAGAK	U.S. Army Garrison Alaska
USAG-HI	U.S. Army Garrison – Hawaii
USARAK	U.S. Army Alaska
USARHAW	U.S. Army Hawaii
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency

USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UXO	unexploded ordnance
VEC	Valued Environmental Component
VFR	visual flight rules
VMC	visual meteorological conditions
VOC	volatile organic compound
WAAF	Wheeler Army Airfield
WPAA	West PTA Acquisition Area
YTA	Yukon Training Area
µg/g	micrograms per gram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic liter

EXECUTIVE SUMMARY

In May 2004, the Department of the Army (Army) released the Final Environmental Impact Statement (FEIS) for Transformation of the 2nd Brigade, 25th Infantry Division (Light) (referred to throughout this document as the 2/25th) to a Stryker Brigade Combat Team (SBCT). The SBCT is a maneuver brigade that includes approximately 4,000 Soldiers (infantry, artillery, engineers, and other Army specialties) and 1,000 vehicles (including about 320 Stryker Armored Wheeled Vehicles). In July 2004, the Army released a Record of Decision (ROD) documenting its decision to transform the 2/25th in place to an SBCT and permanently home station it in Hawaii.

The 2/25th began its transformation to an SBCT shortly after completion of the 2004 FEIS and signing of the ROD to proceed with the transformation. As of May 2007, the Brigade had completed approximately 90 percent of its training and equipment fielding in Hawaii. The Brigade is scheduled to fully complete training and equipment by Fall of 2007. By November of 2007, the Army requires that the SBCT be ready for deployment to meet the ongoing operational requirements.

In October of 2006, the Federal Court of Appeals for the Ninth Circuit determined that the Army had not fully complied with the National Environmental Policy Act (NEPA) for the transformation of the 2/25th because it did not adequately address or analyze potentially reasonable alternative locations for the transformation and training of this unit. In particular, the Court concluded that the Army had a duty under NEPA to consider locations other than Hawaii for the permanent stationing of the 2/25th SBCT, and it ordered the Army to prepare an Environmental Impact Statement (EIS) to address a full range of alternatives. The Army prepared this EIS in accordance with the Court's guidance to examine a fuller range of reasonable alternatives for permanently stationing the 2/25th SBCT.

This EIS examines several alternative Army installations capable of supporting the permanent stationing of the 2/25th SBCT. The EIS will provide the Army senior leadership with a hard look at environmental impacts associated with selecting a home station for the 2/25th and better inform its decision-making process for selecting the permanent stationing location. This effort includes analysis of all activities (equipment fielding, training, facilities construction, and Soldier and Family support) required to station the 2/25th. This EIS effort will assist the Army in arriving at a decision for the permanent stationing of the SBCT in a location that can accommodate the Brigade's training and quality of life requirements while meeting the strategic needs and national security requirements of the United States. The EIS will simultaneously allow the Army to consider the social and environmental impacts related to the 2/25th stationing action.

Need for the Permanent Stationing of the 2/25th SBCT

The need for action for permanently stationing the 2/25th SBCT centers on five primary areas of need that require the Army to take action. These areas of need include:

- adhering to national security and defense policy,
- furthering Army Transformation as directed by these policies,
- meeting training and operational requirements for the SBCT,
- providing for Soldier and Family quality of life requirements, and
- meeting strategic deployment requirements to ensure adequate defense assets can be deployed in a timely manner to critical areas of interest.

As discussed in the EIS, these areas of need are all explicitly or implicitly addressed throughout the guiding national security and defense policy documents and are non-discretionary elements of Army decision making for the permanent stationing of the 2/25th SBCT.

Purpose of the Proposed Action

The purpose of the proposed action is to station the 2/25th SBCT permanently at an installation that is able to meet the SBCT's training, Soldier, and Family quality of life, and operational and strategic deployment requirements. The installation must be capable of providing adequate training ranges for maneuver and live-fire training, and the installation must be able to provide the support infrastructure necessary to provide a sound quality of life for Soldiers and their Families and support garrison-based SBCT operations. In addition, the stationing action must provide for the National Security requirements outlined in the National Security Strategy (NSS), National Defense Strategy (NDS), and the Quadrennial Defense Review (QDR) and provide the necessary strategic response capabilities to satisfy national security requirements and obligations.

Scope of Analysis

This EIS has been developed in accordance with NEPA, the regulations issued by the Council on Environmental Quality (CEQ), 40 CFR Parts 1505-1508 and the Army's implementing procedures published at 32 CFR Part 651. This EIS is also designed to address the deficiencies in the 2004 FEIS identified by the Federal Court of Appeals for the Ninth Circuit. The purpose of the EIS is to inform Army decision-makers and the public of the likely environmental consequences of the Proposed Action and reasonable stationing alternatives to meet the purpose and need for permanently stationing the 2/25th SBCT. This EIS will assist Army decision-makers in more fully understanding the environmental issues and social concerns connected with the stationing action. To facilitate environmental comparison of viable alternatives, the Army has attempted to balance the amount of information available between sites carried forward as viable stationing locations. It should be noted that a full and detailed EIS has been carried out in its entirety to analyze the environmental impacts to Hawaii at a project-specific level of detail. Design and construction of 2/25th SBCT facility projects are underway or even completed in some cases. The purpose of this EIS is to present a comparative analysis of the proposed action and alternatives. It therefore includes the level of detail that is necessary to perform that analysis and to inform the decision maker of the environmental trade-offs among alternatives. This approach permits the decision maker to take a "hard look" at environmental impacts among alternatives prior to making a final decision selecting a home-stationing site for the 2/25th. If Army decision makers choose a site other than Hawaii for the permanent home stationing of the 2/25th SBCT, additional site-specific NEPA analysis will be prepared for those additional construction projects needed to support the SBCT. If an Infantry Brigade Combat Team (IBCT) moves to Hawaii under this action and additional facilities are required in Hawaii, additional NEPA documentation will be prepared.

Decisions to be Made

The Army Chief of Staff in concert with other Army decision-makers will review conclusions drawn in this EIS and decide on the permanent home station of the 2/25th SBCT. The decision will be based on the results of this EIS and on consideration of all relevant factors including mission, cost, technical factors, and environmental considerations. This EIS identifies and presents the full range of reasonable alternatives capable of meeting the purpose and need for permanently home-stationing and training of the 2/25th SBCT. Decisions regarding transformation, national security strategy, and other decisions made in the NSS, NDS, and QDR are not revisited in this document.

Public Involvement

The public's participation is essential to successful NEPA analysis. The CEQ and Army NEPA regulations provide several opportunities for the public to participate. These include issuing in the *Federal Register* a notice of intent (NOI) to prepare an EIS[1], a public scoping process, a 45-day public review period for the Draft EIS (DEIS), and publication of the FEIS, accompanied by a 30-day mandatory waiting period before a final decision is made and a ROD is issued.

Following publication of the NOI, public notices were published in the major newspapers on the Islands of Hawaii and Oahu announcing the times and locations of five public scoping meetings to solicit input and to obtain comments on the scope of the EIS. Public notices were also published in Colorado, Alaska, Washington, and Kentucky announcing the times and locations of nine public scoping meetings in these four states. The 45-day scoping period began on January 4, 2007 and ended on February 20, 2007. Fourteen scoping meetings were held between January 29 and February 16, 2007. For residents and groups in Hawaii, public scoping meetings were held in Waianae, Honolulu, Haleiwa, Waikoloa, and Hilo. For residents and groups in Colorado, public meetings were held in Colorado Springs, Trinidad, and La Junta. For residents and groups in Alaska, public meetings were held in Anchorage and Delta Junction. For residents and groups in Kentucky, public meetings were held in Shepherdsville and Radcliff. Finally, for residents and groups in Washington, public meetings were held in Lakewood and Yakima. A total of 284 people signed in at the 14 meetings.

At the public scoping meetings, 69 individuals and persons representing organizations provided oral comments via court reporters and video camera for the Army's consideration. The Army also received written comments from 199 individuals and organizations in the form of e-mails, faxes, and individual and form letters. The Army compiled a scoping report, identifying and assessing the issues brought forth through the scoping process. The major concerns and issues expressed during the scoping process that were determined to be within the scope of the EIS are as follows:

Hawaii

- Not enough resources (land area, water, housing, etc.) exist on Hawaii to support more troops.
- Contamination of air, soil, and water, especially depleted uranium (DU) concerns.
- Monitoring of air, soil, and water.
- Impacts to cultural sites.
- Impacts to natural resources, including sensitive geologic areas.
- Need to assess cumulative impacts of all military activities in Hawaii.
- Identification and impacts of actions on true landowners and tenants.
- Alternatives where armored units already train were not fully considered (Hood, Bliss, Benning, Stewart), also why not Korean peninsula?
- Better to put SBCT close to major airfields, larger than those on Hawaii. Proximity to airlift is more relevant than geographic location.
- Increase in wildfire risk.
- Expansion of Hawaiian facilities with the potential of inadequate training in the future when communities develop to the property line.

[1] The notice intent of for this EIS was published in the *Federal Register,* January 4, 2007 (76 FR 9717).

- Traffic and noise impacts.
- Mainland locations have more area and are more distant from communities.

Alaska

- The MOA between USARAK and Delta Junction needs to be considered.

Colorado

- Monitoring impacts to the restricted PCMS.
- Impacts to soil and grassland.
- Effects to historic aspects of the Santa Fe Trail.
- Natural resource and archeological resource concerns

The comments and concerns of the public and agencies were used to determine the focus of analysis and selection of alternatives. A summary of the comments received during the scoping process is included in the project record, organized by location, meeting date, and subject.

NEPA Process, including Tiering

NEPA is a federal law that directs the Army to disclose the effects of its proposed activities to the public and officials who must make decisions concerning the proposals. The NEPA process began when the Army published the NOI in the Federal Register. The Army sought public input to help identify environmental issues and concerns through the process called "scoping."

The regulations that implement NEPA encourage tiering EISs. Tiering is the process of referencing information presented in other previously prepared NEPA documents, such as EISs, to minimize repetition. This EIS is a stand-alone document that programmatically assesses stationing alternatives for the 2/25th SBCT to include Hawaii, which was analyzed in 2004. If an alternative other than Hawaii is selected by Army decision-makers upon reviewing the information contained within this EIS, a site-specific NEPA document tiered to this EIS will be prepared. If an IBCT moves to Hawaii under this action and additional facilities are required in Hawaii, additional NEPA documentation will be prepared.

In addition to the 2002 Programmatic EIS for Army Transformation and the 2004 FEIS for the Transformation of the 2nd Brigade, this EIS incorporates information from a variety of other sources. These sources are referenced in the document bibliography.

Proposed Action

The Army's Proposed Action is to home-station permanently the 2/25th in a location that meets national security and defense policy guidance, provides for SBCT training and operational requirements, provides a high quality of life for the 2/25th Soldiers and their Families, and facilitates the rapid deployment of the SBCT worldwide to uphold U.S. regional security objectives.

The federal district court allowed the 2/25th to complete its transformation and training in Hawaii to meet its requirement to be prepared for deployment in late 2007. The brigade is anticipated to deploy to Iraq or Afghanistan and return from that deployment around the end of 2008. Therefore, the brigade's permanent home station must be ready to receive the unit by the end of 2008.

Essential Activity Group Components of the Proposed Action

There are four primary activity groups that must be integrated and synchronized by the Army as critical elements of the Proposed Action and alternatives. These activity groups are necessary components of action for meeting the Army's requirements for permanently stationing the 2/25th SBCT. Primary activity groups and their impacts are separated out in this chapter and subsequent environmental analysis chapters for ease of comparison and understanding to ensure the full impacts of the proposed action at alternative sites can be understood. In addition, they are the primary activities resulting in effects to the human environment and their direct, indirect, and cumulative effects are considered in this document:

1) Cantonment Area Construction – This activity group includes the construction of administrative offices, housing, vehicle parking and maintenance, equipment storage, recreational, shopping and other quality of life facilities, and the utilities required to meet the training and operational requirements of the 2/25th SBCT and to support a high quality of life for its Soldiers and Families.

2) Training Facilities and Range Construction – This activity group includes the construction of training ranges and training facilities needed to support the 2/25th SBCT. The implementation of Army Transformation, as directed by the QDR has required the Army to overhaul and modernize its training range and training facilities infrastructure. Army Training Circular TC 25-8 *Training Ranges* describes the standard designs and requirements of the Army's Sustainable Range Program for training modular Army units to standard. In addition to a suite of upgraded ranges that all modular units now require, the SBCT, specialized for small-scale contingency and urban operations, also requires a range specially designed to test SBCT unit capabilities. That range, the BAX, is a 2.4 km by 4 km vehicle assault range. A detailed list and description of training range capabilities required to support the training requirements of the SBCT is provided in this section.

3) Live-Fire Range Use – Live-fire training is an essential component of Army training. To be operationally effective, Soldiers must have the skills and experience necessary to operate and maintain their weapons. Live fire involves both munitions and explosives that would be used in combat and non-explosive training rounds designed to meet Soldiers' training needs. Soldiers must "train as they fight" in order to ensure their safety in combat situations. At a minimum, all Soldiers in the 2/25th SBCT must qualify on individual and crew/vehicle weapons at least twice per year. In addition, platoons, companies, and battalions of the 2/25th must conduct collective live-fire training exercises on firing ranges to ensure they have rehearsed and coordinated battle procedures and are prepared to deploy to support wartime operations. Various weapons systems use different types of munitions. Where possible, some weapons systems use inert environmentally friendly training rounds as a substitute for the firing of live rounds. This section will present a more detailed description of live-fire training activities and munitions.

4) Maneuver Training Land Use – Army SBCTs and the units that comprise them must conduct regular "combined-arms" training certifications to ensure that all of the units' capabilities can be integrated and synchronized to execute missions under stressful operational conditions. Maneuver training consists of collective training of the constituent units of the SBCT working together to integrate their combined capabilities and skills. Modular SBCTs, including the 2/25th SBCT, must conduct and rehearse maneuver training at every echelon from platoon through brigade level to ensure it can accomplish its mission-critical tasks. Maneuver training requirements will be discussed in more detail in the following sections.

Alternatives Analyzed in Detail

Four alternatives were analyzed in detail. They include:

- Alternative A — Permanently stationing the 2/25th SBCT at Schofield Barracks Military Reservation (SBMR) while conducting required training at military training sites in Hawaii;
- Alternative B — Permanently stationing the 2/25th SBCT at Fort Richardson while conducting required training at military training sites in Alaska and replacing the SBCT in Hawaii with an IBCT from Alaska;
- Alternative C — Permanently stationing the 2/25th SBCT at Fort Carson while conducting required training at military training sites in Colorado and replacing the SBCT in Hawaii with an IBCT from Colorado; and
- Alternative D — No Action Alternative.

Alternative A — Permanently Stationing the 2/25th SBCT at Schofield Barracks Military Reservation (SBMR) while Conducting Required Training at Military Training Sites in Hawaii

Under this alternative, the Army would permanently home station the 2/25th SBCT in Hawaii. This action would include all of the activities needed to implement the Proposed Action including the training, garrison operations, deployment, Soldier and Family quality of life, and other needs for meeting the requirements of the 2/25th SBCT. The 2/25th SBCT would be stationed at SBMR and would conduct garrison operations at this location. Training would be conducted at and across a number of other training areas in Hawaii. SBMR includes Schofield Barracks Main Post (SBMP), South Range Acquisition Area (SRAA), and Schofield Barracks East Range (SBER). In addition, the SBCT would train at Dillingham Military Reservation (DMR), Kahuku Training Area (KTA), Kawailoa Training Area (KLOA), and Wheeler Army Airfield (WAAF) on Oahu. On the Island of Hawaii, the SBCT would train at Pohakuloa Training Area (PTA) and Bradshaw Army Airfield (BAAF). If available for maneuver and live-fire training, the SBCT would also use Makua Military Reservation (MMR) on Oahu to support its training requirements. These training resources include an assortment of live-fire and non-live-fire maneuver training facilities, fixed-position live-fire training facilities, infantry and engineer demolition training facilities, grenade training facilities, and an urban assault course.

Alternative B — Permanently Stationing the 2/25th SBCT at Fort Richardson while Conducting Required Training at Military Training Sites in Alaska

Under this alternative, the Army would permanently home station the 2/25th SBCT at Fort Richardson, Alaska. The 2/25th would return to Fort Richardson at the end of 2008 upon completion of its scheduled deployment. The 2/25th would conduct all activities needed to support the Proposed Action to include full training, garrison operations, deployment, providing for Soldier and Family quality of life and the strategic needs of the U.S. Army. Garrison operations, unit weapons qualifications, platoon training, equipment maintenance, and the housing and support of Soldiers and their Families would take place primarily at Fort Richardson. Because of the limited availability of training land, unit maneuvers and live-fire collective training events above the platoon level would primarily occur at DTA. As part of this alternative, the

modular 4/25th IBCT (Airborne), referred to as the 4/25th throughout this document, would exchange places with the 2/25th SBCT to be permanently stationed in Hawaii.

The stationing of the 2/25th SBCT in Alaska would result in a net increase of a projected 567 Soldiers to be stationed at Fort Richardson. Major differences between the modular 4/25th IBCT (Airborne) and the 2/25th SBCT in their equipment include approximately 320 Stryker vehicles, increased numbers of indirect fire systems to include 12 additional 155 mm cannon, 36 120mm Mortars, and 27 105mm direct fire cannon systems mounted on the Stryker Mobile Gun Systems (MGS).

Alternative C — Permanently Stationing the 2/25th SBCT at Fort Carson while Conducting Required Training at Military Training Sites in Colorado

Under this alternative the Army would permanently home station the 2/25th SBCT at Fort Carson, Colorado. The 2/25th would return from its scheduled deployment to Fort Carson at the end of 2008. The 2/25th would conduct all activities needed to support the proposed action to include full training, garrison operations, deployment, providing for Soldier and Family quality of life and the strategic needs of the U.S. Army. Garrison operations, unit weapons qualifications, platoon training, equipment maintenance, and the housing and support of Soldiers and their Families would take place primarily at Fort Carson. Because of the limited availability of training land, unit maneuvers above the platoon level would primarily occur at PCMS. Fort Carson, however, possesses all of the training range infrastructure that would be used to conduct CALFEX exercises for company and limited battalion live-fire qualifications. A vast majority of the 2/25th's live-fire training would occur at Fort Carson. As part of this alternative, the modular 4/4 IBCT (formerly designated the 2nd Brigade 2nd Infantry Division) would exchange places with the 2/25th SBCT to be permanently stationed in Hawaii.

The stationing of the 2/25th SBCT at Fort Carson would result in a net increase of a projected 567 Soldiers at the installation. Major differences between 4/4 and the 2/25th SBCT in their equipment include approximately 320 Stryker vehicles, increased numbers of indirect fire systems to include 12 additional 155 mm cannon, 36 120mm Mortars, and 27 105mm direct fire cannon systems mounted on the Stryker MGS.

Alternative D — No Action

CEQ regulations state that an EIS must evaluate a no-action alternative, to serve as a benchmark against which the potential effects of actions can be evaluated. The No Action Alternative represents what would occur if the Army were not to carry out the Proposed Action. The No Action Alternative is to return the 2/25th SBCT to its original structure as a non-modular infantry brigade as it existed prior to its transformation. The no action would not involve any organizational structure changes or stationing moves.

The no-action alternative presented here is not feasible to implement in Hawaii because the Army is well into the process of organization-wide transformation. This transformation was announced in the Army's ROD for transformation, which was signed in 2002. Every unit in the Army has either completed transformation or is in the process of transforming. The decision to transform has committed the Army to standard modular BCT configurations, and there are only three types of standardized BCTs in the Army. These include the modular Infantry BCT, the modular Heavy BCT, and the modular Stryker BCT. Each of these BCTs has revamped and upgraded its equipment and evolved its organizational structure to implement the nation's security and defense objectives better. Non-modular BCT configurations, such as the original brigade structure of the 2/25th Infantry Brigade, Light, are no longer fielded or logistically supported anywhere in the Army.

It is important to understand that the process of military transformation does not apply solely to units and their equipment, but also to the units' training strategies and training range infrastructure as well. The original EIS for transformation of the 2/25th Infantry Brigade specifically addressed transformation of the unit in Hawaii to an SBCT. This action, however, was taking place within the broader context of Army-wide transformation to include military construction transformation and training range modernization. Many of the training range projects identified in the original EIS are needed to implement Army transformation objectives that have occurred across the rest of the Army organization. Army military construction projects would have occurred regardless of the decision to transform the 2/25thto an SBCT, but would have been implemented to upgrade the capabilities of the 2/25th Infantry Brigade, Light. In addition, Army training strategies have changed to support upgraded capabilities and evolving training doctrine. Weapons qualification strategies have changed and now require all Soldiers, not just combat Soldiers, to meet more rigorous live-fire and maneuver training requirements. Because Army transformation has been implemented across the Army, training range projects and strategies to support more rigorous post transformational training doctrine have been included as part of the baseline condition analysis of the No-Action alternative. Action alternatives analyze the differences in Army actions required to support the permanent stationing of the SBCT specifically and not to implement Army transformation.

Affected Environment

The affected environment is highly variable. It ranges from the tropical environs of the Hawaiian Islands to the arctic environs of interior Alaska and the semi-desert environs of southeastern Colorado. Geology, soils, vegetation, wildlife, and water resources present at the various installations and facilities all reflect this high variability. Socioeconomic, transportation, air quality, and noise also reflect this variability to a somewhat lesser degree.

Environmental Consequences

The tables below provide a comparative summary of the potential impacts of implementing each alternative for the permanent stationing of the 2/25th SBCT. The tables exhibit the composite impact (direct and indirect impacts and cumulative impacts) for each Valued Environmental Component (VEC) resulting from implementation of each alternative.

The composite impact incorporates the impacts from four activity groups that were analyzed (Cantonment Construction, Range Construction, Live-Fire Training, and Maneuver Training) occurring in all specific areas that would be affected in Hawaii, Alaska, and Colorado. To summarize these impacts comparatively, the highest impact level to each VEC that would be realized from any of the four activity groups in any of the impacted areas is used as the single impact rating for each alternative. Likewise, for the No Action alternative (Alternative D), the composite impact rating incorporates the impacts that would occur in all three locations (Hawaii, Alaska, Colorado) under the No Action alternative.

Summary of Direct and Indirect Impacts to each VEC by Alternative

VEC	Alternative			
	A - Hawaii	B - Alaska	C - Colorado	D - No Action
Soil Erosion	⊗	⊘	⊗	⊘
Water Resources	⊘	⊙	⊙	⊘
Wildfire Management	⊗	⊗	⊗	⊘
Cultural Resources	⊗	⊗	⊗	⊘
Land Use and Recreation	⊘	⊙	⊘	⊙
Traffic and Transport	⊙	⊘	⊘	⊘
Socioeconomics	⊙	⊙	⊙	⊙
Hazardous Materials/ Hazardous Waste	⊘	⊘	⊘	⊙
Wetlands	○	⊘	○	⊙
Vegetation	⊙	⊘	⊘	⊙
Noxious Weeds	⊘	○	⊙	⊘
Threatened and Endangered Species	⊗	⊙	⊗	⊙
Wildlife and Habitats	⊙	⊙	⊙	⊙
Air Quality	⊘	⊙	⊙	⊙
Noise	⊗	⊙	⊙	⊙
Airspace	⊙	⊙	⊙	⊙
Energy Demand and Generation	⊙	⊙	⊙	⊙
Facilities	⊙	⊙	⊙	⊙
Subsistence	N/A	⊙	N/A	N/A

⊗ **= Significant**

⊘ **= Significant but mitigable to less than significant**

⊙ **= Less than Significant**

○ **= No Impact**

+ = Beneficial Impact

N/A = Not Applicable

Summary of Cumulative Impacts to Each VEC for Each Alternative

VEC	Alternative			
	A – Hawaii	**B- Alaska**	**C – Colorado**	**D – No Action**
Soil Erosion	⊘	⊘	⊘	○
Water Resources	⊘	⊘	⊘	○
Wildfire Management	⊗	⊘	⊘	○
Cultural Resources	⊗	⊘	⊘	○
Land Use and Recreation	⊗	⊙	⊙	○
Traffic and Transport	⊙	⊙	⊙	○
Socioeconomics	⊘	⊙	⊙	○
Hazardous Materials and Hazardous Waste	⊙	⊘	⊙	○
Wetlands	○	⊘	○	○
Vegetation	⊙	⊙	⊘	○
Noxious Weeds	⊗	○	⊘	○
Threatened and Endangered Species	⊗	⊙	⊘	○
General Wildlife and Habitat	⊙	⊙	⊘	○
Air Quality	⊙	⊙	⊘	○
Noise	⊙	⊘	⊙	○
Airspace	○	⊙	○	○
Energy	⊙	⊙	⊙	○
Facilities	⊙	⊙	⊙	○
Subsistence	N/A	⊙	N/A	○

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Contents

CHAPTER 1 PURPOSE, NEED, AND SCOPE 1-1
1.1 Introduction 1-1
1.2 Need For The Proposed Action 1-2
1.2.1 Need For The Permanent Stationing Of The 2/25th SBCT 1-2
1.3 Purpose Of The Proposed Action 1-10
1.4 Other Army Initiatives Requiring Consideration (BRAC, GDPR, Modularity) 1-11
1.4.1 BRAC 2005 1-11
1.4.2 Global Defense Posture And Realignment 1-11
1.4.3 Army Modular Force (AMF) 1-12
1.5 Scope Of Analysis 1-12
1.6 Decision(s) To Be Made 1-13
1.7 Cooperating Agencies 1-13
1.8 Public Involvement 1-13
1.9 NEPA Process, Including Tiering 1-15

CHAPTER 2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES 2-1
2.1 Introduction 2-1
2.2 Proposed Action 2-1
2.2.1 Essential Activity Group Components Of The Proposed Action 2-2
2.2.2 Cantonment Area Construction 2-3
2.2.3 Training Facilities And Range Construction 2-4
2.2.4 Live-Fire Range Use 2-6
2.2.5 Maneuver Training 2-7
2.3 Description Of The Modular Sbct 2-9
2.4 Application Of Screening Criteria: The Army's Alternative Selection Process 2-10
2.4.1 Limiting Factors Influencing Army Screening Criteria And Alternatives 2-11
2.4.2 Application Of Screening Criteria To Identify A Full Range Of Reasonable Alternatives 2-12
2.5 Alternative A: Permanently Station The 2/25th SBCT At Schofield Barracks Military Reservation (SBMR) While Conducting Required Training At Military Training Sites In Hawaii 2-18
2.6 Alternative B: Permanently Station The 2/25th SBCT At Fort Richardson While Conducting Required Training At Military Training Sites In Alaska 2-24
2.7 Alternative C: Permanently Station The 2/25th SBCT At Fort Carson While Conducting Required Military Training At Training Sites In Colorado 2-30
2.8 No Action Alternative 2-37
2.9 Alternatives Considered But Not Studied In Detail 2-41

CHAPTER 3 AFFECTED ENVIRONMENT 3-1
3.1 Alternative A – Hawaii 3-1
3.1.1 Geology, Soils, And Seismicity 3-1
3.1.2 Water Resources 3-17
3.1.3 Wildfire Management 3-28
3.1.4 Cultural Resources 3-32
3.1.5 Land Use And Recreation 3-38
3.1.6 Traffic And Transportation 3-44
3.1.7 Socioeconomics, Environmental Justice, And Protection Of Children 3-45

3.1.8 Hazardous Materials And Hazardous Wastes 3-50
3.1.9 Biological Resources 3-55
3.1.10 Air Quality 3-71
3.1.11 Noise 3-77
3.1.12 Airspace Resources 3-82
3.1.13 Energy 3-83
3.1.14 Facilities 3-84
3.2 Alternative B – Alaska 3-88
3.2.1 Geology, Soils, And Seismicity 3-88
3.2.2 Water Resources 3-94
3.2.3 Wildfire Management 3-98
3.2.4 Cultural Resources 3-101
3.2.5 Land Use And Recreation 3-106
3.2.6 Traffic And Transportation 3-108
3.2.7 Socioeconomics, Environmental Justice, And Protection Of Children 3-109
3.2.8 Hazardous Material And Hazardous Waste 3-112
3.2.9 Biological Resources 3-115
3.2.10 Air Quality 3-122
3.2.11 Noise 3-125
3.2.12 Airspace Resources 3-125
3.2.13 Energy 3-126
3.2.14 Facilities 3-126
3.2.15 Subsistence 3-129
3.3 Alternative C – Colorado 3-130
3.3.1 Geology, Soils, And Seismicity 3-130
3.3.2 Water Resources 3-136
3.3.3 Wildfire Management 3-139
3.3.4 Cultural Resources 3-142
3.3.5 Land Use And Recreation 3-149
3.3.6 Traffic And Transportation 3-152
3.3.7 Socioeconomics, Environmental Justice, And Protection Of Children 3-154
3.3.8 Hazardous Materials And Hazardous Waste 3-160
3.3.9 Biological Resources 3-164
3.3.10 Air Quality 3-168
3.3.11 Noise 3-170
3.3.12 Airspace Resources 3-171
3.3.13 Energy 3-171
3.3.14 Facilities 3-172

CHAPTER 4 IMPACT METHODOLOGY 4-1
4.1 Overview 4-1
4.1.1 Introduction to Impact Methodology 4-1
4.1.2 Impacts Common to More Than One Alternative 4-1
4.1.3 Standardized Impact Analysis and Significance Criteria 4-1
4.1.4 Presentation of Impacts 4-1
4.2 Definition of Key Concepts 4-2
4.2.1 Direct and Indirect Impacts 4-2
4.2.2 Short-term versus Long-term Impacts 4-2
4.2.3 Measure of Impacts 4-2
4.2.4 Cumulative Impacts 4-2
4.2.5 Magnitude of Impacts (context and intensity) 4-3

4.2.6 Significance Criteria (elements leading to a significance threshold) 4-3
4.2.7 Valued Environmental Components (VECs) 4-3
4.2.8 Institutional Programs 4-4
4.2.9 Mitigation 4-4
4.3 Geology, Soils, and Seismicity 4-4
4.3.1 Resource-specific Impact Analysis Methodology 4-4
4.3.2 Resource-specific Significance Criteria 4-7
4.4 Water Resources 4-7
4.4.1 Resource-specific Impact Analysis Methodology 4-7
4.4.2 Resource-specific Significance Criteria 4-8
4.5 Wildfire Management 4-9
4.5.1 Resource-specific Impact Analysis Methodology 4-9
4.5.2 Resource-specific Significance Criteria 4-9
4.6 Cultural Resources 4-9
4.6.1 Resource-specific Impact Analysis Methodology 4-9
4.6.2 Resource-specific Significance Criteria 4-11
4.7 Land Use and Recreation 4-11
4.7.1 Resource-specific Impact Analysis Methodology 4-11
4.7.2 Resource-specific Significance Criteria 4-11
4.8 Traffic and Transport 4-11
4.8.1 Resource-specific Impact Analysis Methodology 4-11
4.8.2 Resource-specific Significance Criteria 4-12
4.9 Socioeconomics, Environmental Justice, and Protection of Children 4-12
4.9.1 Resource-specific Impact Analysis Methodology 4-12
4.9.2 Resource-specific s Significance Criteria 4-13
4.10 Hazardous Materials and Hazardous Waste 4-13
4.10.1 Resource-specific Impact Analysis Methodology 4-13
4.10.2 Resource-specific Significance Criteria 4-14
4.11 Biological Resources 4-14
4.11.1 Resource-specific Impact Analysis Methodology 4-14
4.11.2 Resource-specific Significance Criteria 4-15
4.12 Air Quality 4-16
4.12.1 Resource-specific Impact Analysis Methodology 4-16
4.12.2 Resource-specific Significance Criteria 4-17
4.13 Noise 4-17
4.13.1 Resource-specific Impact Analysis Methodology 4-17
4.13.2 Resource-specific Significance Criteria 4-18
4.14 Airspace 4-18
4.14.1 Resource-specific Impact Analysis Methodology 4-18
4.14.2 Resource-specific Significance Criteria 4-18
4.15 Energy 4-19
4.15.1 Resource-specific Impact Analysis Methodology 4-19
4.15.2 Resource-specific Significance Criteria 4-19
4.16 Facilities 4-19
4.16.1 Resource-specific Impact Analysis Methodology 4-19
4.16.2 Resource-specific Significance Criteria 4-20
4.17 Subsistence 4-20
4.17.1 Resource-specific Impact Analysis Methodology 4-20
4.17.2 Resource-specific Significance Criteria 4-21

CHAPTER 5 ENVIRONMENTAL CONSEQUENCES 5-1
5.1 Summary Of Environmental Impacts By Alternative 5-1
5.2 Alternative A – Permanently Station The 2/25th SBCT At Schofiled Barracks Military Reservation (SBMR) While Conducting Required Training At Military Training Sites In Hawaii 5-2
5.2.1 Summary Of Consequences 5-2
5.2.2 Geology, Soils, And Seismicity 5-4
5.2.3 Water Resources 5-15
5.2.4 Wildfire Management 5-21
5.2.5 Cultural Resources 5-25
5.2.6 Land Use And Recreation 5-27
5.2.7 Traffic And Transport 5-31
5.2.8 Socioeconomics And Environmental Justice 5-34
5.2.9 Human Health And Safety Hazards 5-37
5.2.10 Biological Resources 5-41
5.2.11 Air Quality 5-51
5.2.12 Noise 5-54
5.2.13 Airspace Resources 5-61
5.2.14 Energy 5-62
5.2.15 Facilities 5-63
5.3 Alternative B – Permanently Station The 2/25th SBCT At Fort Richardson While Conducting Required Training At Military Training Sites In Alaska 5-65
5.3.1 Summary Of The Environmental Consequences Of Alternative B 5-65
5.3.2 Geology, Soils, And Seismicity 5-67
5.3.3 Water Resources 5-74
5.3.4 Wildfire Management 5-77
5.3.5 Cultural Resources 5-80
5.3.6 Land Use And Recreation 5-83
5.3.7 Traffic And Transport 5-86
5.3.8 Socioeconomics And Environmental Justice 5-89
5.3.9 Human Health And Safety 5-93
5.3.10 Biological Resources 5-96
5.3.11 Air Quality 5-105
5.3.12 Noise 5-107
5.3.13 Airspace Resources 5-109
5.3.14 Energy 5-111
5.3.15 Facilities 5-112
5.3.16 Subsistence 5-114
5.3.17 Impacts Of Relocating IBCT From Fort Richardson To Hawaii 5-116
5.4 Alternative C – Permanently Station The 2/25th SBCT At Fort Carson While Conducting Required Military Training At Training Sites In Colorado 5-117
5.4.1 Summary Of The Environmental Consequences Of Alternative C 5-117
5.4.2 Geology, Soils, And Seismicity 5-119
5.4.3 Water Resources 5-125
5.4.4 Wildfire Management 5-130
5.4.5 Cultural Resources 5-132
5.4.6 Land Use And Recreation 5-135
5.4.7 Traffic And Transportation 5-138
5.4.8 Socioeconomics And Environmental Justice 5-142
5.4.9 Human Health And Safety 5-145
5.4.10 Biological Resources 5-149

5.4.11 Air Quality 5-159
5.4.12 Noise 5-162
5.4.13 Airspace Resources 5-165
5.4.14 Energy Demand And Generation 5-166
5.4.15 Facilities 5-168
5.4.16 Impacts Of Relocating IBCT From FTC To Hawaii 5-170
5.5 Alternative D — No Action Baseline Condition Of Stationing Of The 2/25th ID Light 5-171
5.5.1 Summary Of The Environmental Consequences Of Alternative D 5-171
5.5.2 Geology, Soils, And Seismicity 5-172
5.5.3 Water Resources 5-178
5.5.4 Wildfire Management 5-183
5.5.5 Cultural Resources 5-186
5.5.6 Land Use And Recreation 5-190
5.5.7 Traffic And Transport 5-192
5.5.8 Socioeconomics 5-196
5.5.9 Human Health And Safety 5-199
5.5.10 Biological Resources 5-203
5.5.11 Air Quality 5-209
5.5.12 Noise 5-212
5.5.13 Airspace Resources 5-216
5.5.14 Energy Demand And Generation 5-219
5.5.15 Facilities 5-222
5.5.16 Subsistence 5-225
5.6 Cumulative Impacts 5-226
5.6.1 Alternative A – Hawaii 5-226
5.6.2 Alternative B – Alaska 5-235
5.6.3 Alternative C – Colorado 5-245
5.6.4 Alternative D – No Action 5-252

CHAPTER 6 PREPARERS AND CONTRIBUTORS 6-1

CHAPTER 7 DISTRIBUTION AND REVIEW OF THE DEIS 7-1

CHAPTER 8 REFERENCES CITED 8-1

CHAPTER 9 INDEX 9-1

Tables

Table 2-1 Critical Facility Requirements 2-3
Table 2-2 Estimated Stryker Brigade Combat Team Training Requirement and Ranges....2-4
Table 2-3 2/25th SBCT and IBCT Annual Authorization for Training Ammunition....2-7
Table 2-4 SBCT Training Land Requirement According to TC 25-1 Training Land....2-8
Table 2-5 Training Tasks for the SBCT (FM 7-1 Training the Force) 2-8
Table 2-6 Personnel and Equipment Breakdown 2-9
Table 2-7 Units in a Stryker Brigade 2-9
Table 2-8 Army Installations That Have Active Duty Training....2-13
Table 2-9 Active Duty Army Installations That Have an Infantry Brigade Combat Team to Exchange with Hawaii 2-14
Table 2-10 Remaining Installations After Special Mission Installations are Discarded....2-14
Table 2-11 Maneuver and Training Land Availability Assuming Stationing of the 2/25th at Each Installation 2-16
Table 2-12 Installations Capable of Meeting Minimum Maneuver Land Thresholds 2-16
Table 2-13 Comparison of Army Installation Stationing Locations 2-17
Table 2-14 Unit Equipment Comparisons....2-26
Table 2-15 Unit Equipment Comparisons....2-32
Table 2-16 Unit Equipment Comparisons....2-37
Table 2-17 No Action Alternative: Unit Stationing and Training Locations 2-38
Table 2-18 Facility Requirements for the No Action Alternative....2-38
Table 3-1 State and National Ambient Air Quality Standards Applicable in Hawaii 3-73
Table 3-2 A-Weighted Decibel Values for Example Noise Sources 3-78
Table 3-3 CHPPM Blast Noise Assessment Criteria 3-80
Table 3-4 Maximum Permissible Noise Levels in Unincorporated El Paso County 3-170
Table 5-1 Summary of Impacts by Alternative 5-1
Table 5-2 Summary of Potential Impacts from Alternative A 5-3
Table 5-3 Summary of Potential Soil Erosion Impacts from Alternative A 5-4
Table 5-4 Summary of Potential Water Resource Impacts from Alternative A....5-16
Table 5-5 Summary of Potential Impacts to Wildlife Management from Alternative A 5-22
Table 5-6 Summary of Potential Cultural Resources Impacts from Alternative A....5-25
Table 5-7 Summary of Potential Land Use and Recreation Impacts from Alternative A....5-28
Table 5-8 Summary of Potential Traffic and Transport Impacts from Alternative A....5-32
Table 5-9 Summary of Potential Impacts to Socioeconomics from Alternative A 5-35
Table 5-10 EIFS Construction Model Output for Honolulu County....5-35
Table 5-11 EIFS Construction Model Output for Hawaii County 5-36
Table 5-12 Summary of Potential Hazardous Material and Hazardous Waste Impacts from Alternative A....5-38
Table 5-13 Summary of Potential Biological Impacts from Alternative A....5-41
Table 5-14 Summary of Potential Impacts to Air Quality from Alternative A....5-51
Table 5-15 Summary of Potential Noise Impacts from Alternative A 5-55
Table 5-16 Summary of Potential Impacts to Airspace Resources from Alternative A....5-61
Table 5-17 Summary of Potential Energy Impacts from Alternative A....5-63
Table 5-18 Summary of Potential Facilities Impacts from Alternative A....5-64
Table 5-19 Summary of Environmental Consequences of Alternative B 5-66
Table 5-20 Summary of Potential Soil Erosion Impacts from Alternative B....5-67
Table 5-21 Summary of Potential Water Resource Impacts from Alternative B 5-74
Table 5-22 Summary of Potential Impacts to Wildfire Management from Alternative B 5-78
Table 5-23 Summary of Potential Cultural Resources Impacts from Alternative B 5-80
Table 5-24 Summary of Potential Land Use and Recreational Impacts from Alternative B 5-83

Table 5-25 Summary of Potential Traffic and Transport Impacts from Alternative B 5-87
Table 5-26 Summary of Potential Impacts to Socioeconomic Resources, Environmental Justice, and Protection of Children from Alternative B 5-89
Table 5-27 EIFS Construction Model Output for Fort Richardson, Alaska.....5-90
Table 5-28 Summary of Potential Human Health and Safety Impacts from Alternative B 5-93
Table 5-29 Summary of Potential Biological Impacts from Alternative B.....5-97
Table 5-30 Summary of Potential Impacts to Air Quality from Alternative B 5-106
Table 5-31 Summary of Potential Impacts to Noise from Alternative B 5-108
Table 5-32 Summary of Potential Impacts to Airspace Resources from Alternative B.....5-109
Table 5-33 Summary of Potential Energy Impacts from Alternative B.....5-111
Table 5-34 Summary of Potential Facilities Impacts from Alternative B.....5-112
Table 5-35 Summary of Potential Subsistence Impacts from Alternative B.....5-114
Table 5-36 Summary of Environmental Consequences of Alternative C 5-118
Table 5-37 Summary of Potential Soil Erosion Impacts from Alternative C.....5-119
Table 5-38 Summary of Potential Water Resource Impacts from Alternative C.....5-125
Table 5-39 Summary of Potential Impacts to Wildfire Management from Alternative C 5-130
Table 5-40 Summary of Potential Cultural Resources Impacts from Alternative C.....5-133
Table 5-41 Summary of Potential land Use and Recreation Impacts from Alternative C 5-135
Table 5-42 Summary of Potential Traffic and Transport Impacts from Alternative C 5-138
Table 5-43 Summary of Potential Impacts to Socioeconomics from Alternative C 5-142
Table 5-44 EIFS Construction Model Output for Fort Carson, Colorado.....5-142
Table 5-45 Summary of Potential Human Health and Safety Impacts from Alternative C 5-146
Table 5-46 Summary of Potential Biological Impacts from Alternative C.....5-150
Table 5-47 Summary of Potential Impacts to Air Quality from Alternative C 5-160
Table 5-48 Summary of Potential Impacts to Noise from Alternative C 5-163
Table 5-49 Summary of Potential Impacts to Airspace Resources from Alternative C.....5-165
Table 5-50 Summary of Potential Energy Impacts from Alternative C.....5-167
Table 5-51 Summary of Potential Facilities Impacts from Alternative C.....5-169
Table 5-52 Summary of the Environmental Consequences of Alternative D 5-172
Table 5-53 Summary of Potential Soil Erosion Impacts from Alternative D 5-173
Table 5-54 Summary of Potential Water Resource Impacts from Alternative D.....5-178
Table 5-55 Summary of Potential Impacts to Wildfire Management from Alternative D.....5-184
Table 5-56 Summary of Potential Cultural Resources Impacts from Alternative D.....5-186
Table 5-57 Summary of Potential Land Use and Recreation Impacts from Alternative D.....5-190
Table 5-58 Summary of Potential Traffic and Transportation Impacts from Alternative D.....5-193
Table 5-59 Summary of Potential Socioeconomic Impacts from Alternative D.....5-196
Table 5-60 Summary of Potential Impacts for Human Health and Safety from Alternative D 5-200
Table 5-61 Summary of Potential Biological Impacts from Alternative D.....5-204
Table 5-62 Summary of Potential Impacts to Air Quality from Alternative D.....5-210
Table 5-63 Summary of Potential Impacts to Noise from Alternative D.....5-213
Table 5-64 Summary of Potential Impacts to Airspace Resources from Alternative D.....5-217
Table 5-65 Summary of Potential Impacts to Energy from Alternative D.....5-219
Table 5-66 Summary of Potential Impact to Energy from Alternative D 5-222
Table 5-67 Summary of Potential Impacts to Subsistence from Alternative D 5-225
Table 5-68 Summary of Cumulative Impacts to Each VEC for Each Alternative.....5-227
Table 6-1 ARCADIS U.S. Inc.....6-1

Figures

Figure 2-1 Stryker Infantry Carrier Vehicle 2-10
Figure 2-2 SBCT Project Locations in Hawaii 2-19
Figure 2-3 SBCT Project Locations in Alaska 2-25
Figure 2-4 SBCT Project Locations in Colorado 2-31
Figure 3-1 ROI in Hawaii for Geology, Soils, Wildlife Management, Cultural Resources, Land Use and Recreation, Hazardous Materials and Hazardous Wastes, Energy, and Facilities 3-2
Figure 3-2 Region of Influence in Alaska for Geology, Soils, Wildlife Management, Cultural Resources, Land Use and Recreation, Hazardous Materials and Hazardous Wastes, Energy, and Facilities 3-89
Figure 3-3 Region of Influence in Colorado for Geology, Soils, Wildlife Management, Cultural Resources, Land Use and Recreation, Hazardous Materials and Hazardous Wastes, Energy, and Facilities 3-131

Chapter 1
Purpose, Need, and Scope

CHAPTER 1
PURPOSE, NEED, AND SCOPE

1.1 INTRODUCTION

The Army has embarked on a 30-year process to transform its forces. This transformation includes the modernization of its doctrine, equipment, leadership, organizational structure, facilities, business processes, and virtually every component of its operations. As part of the overall Army transformation effort, the Army has decided to transition to a modular, or standardized force structure. Organizationally, this means a transition of the Army from large powerful, fixed organizations constituted at the Division level (10,000 to 12,000 personnel) to an Army designed around smaller, standardized, self-contained, rapidly deployable Brigade Combat Teams (BCTs). In addition, this transformation has led the Army to develop and field the Stryker Brigade Combat Team (SBCT). The development and fielding of the SBCT is the Army's most significant action taken to date to upgrade its operational capabilities and modernize its force structure in response to a changing global security environment.

In April 2002, the Army completed an EIS for Army transformation. This included creation of an interim force equipped with an interim combat system. The 2nd Brigade, 25th Infantry Division (Light) was designated in this EIS as one of the units to transform to an interim BCT. In early 2002, the interim armored vehicle was renamed the Stryker after two recipients of the Congressional Medal of Honor.

In May 2004, the Department of the Army (Army) released the Final Environmental Impact Statement (FEIS) for Transformation of the 2nd Brigade, 25th Infantry Division (Light) (referred to throughout this document as the 2/25th) to an SBCT. The SBCT is a maneuver brigade that includes approximately 4,000 Soldiers (infantry, artillery, engineers, and other Army specialties) and 1,000 vehicles (including about 320 Strykers). In July 2004, the Army released a Record of Decision (ROD) documenting its decision to transform the 2/25th in place to an SBCT and permanently home station it in Hawaii.

The Stryker is an armored infantry wheeled combat vehicle that provides Soldiers and commanders with significant increases in combat power, maneuverability, and, most importantly, survivability in a combat environment. The increased maneuver capabilities of the SBCT allow it to operate across areas up to the size of the state of Delaware as was recently demonstrated in Operation Iraqi Freedom (OIF); an area that formerly would have required an entire Army division consisting of three brigades.

To be effective when operationally deployed abroad requires that the SBCT have the proper training and support facilities at home station. Such facilities include training ranges, housing, administrative, and quality of life infrastructure for the SBCTs Soldiers and their Families, vehicles and equipment. In addition, the SBCT requires the considerable training space necessary to support its increased maneuver capabilities. Without these resources, the SBCT cannot attain the readiness levels needed to ensure the successful accomplishment of its national defense and security missions.

The 2/25th began its transformation to an SBCT shortly after completion of the 2004 FEIS and signing of the ROD to proceed with the transformation. As of May 2007, the Brigade had completed approximately 90 percent of its training and equipment fielding in Hawaii. The Brigade is scheduled to fully complete training and equipment by Fall of 2007. By November of 2007, the Army requires that the SBCT be ready for deployment to meet the ongoing operational requirements of the requirements of global conflicts.

In October of 2006, the Federal Court of Appeals for the Ninth Circuit determined that the Army had not fully complied with the National Environmental Policy Act (NEPA) for the transformation of the 2/25th because it did not adequately address or analyze potentially reasonable alternative locations for the transformation and training of this unit. In particular, the Court concluded that the Army had a duty under NEPA to consider locations other than Hawaii for the permanent stationing of the 2/25th SBCT, and it ordered the Army to prepare an Environmental Impact Statement (EIS) to address a full range of alternatives. The Army prepared this EIS in accordance with the Court's guidance to examine a fuller range of reasonable alternatives for the proposed actions of permanently stationing the 2/25th SBCT.

This EIS examines several alternative Army installations capable of supporting the permanent stationing of the 2/25th SBCT. The EIS will provide the Army senior leadership with a hard look at environmental impacts associated with selecting a home station for the 2/25th and better inform its decision-making process for selecting the final stationing location. This effort includes analysis of all activities (equipment fielding, training, facilities construction, and Soldier and Family support) required to permanently station the 2/25th. This EIS effort will assist the Army in arriving at a decision for the permanent stationing of the SBCT in a location that can accommodate the Brigade's training and quality of life requirements while meeting the strategic needs and national security requirements of the United States. The EIS will simultaneously allow the Army to consider the social, economic, and environmental impacts related to the 2/25th stationing action.

1.2 NEED FOR THE PROPOSED ACTION

This section of the document presents and discusses the Army's needs for the permanent stationing of the 2/25th SBCT. This discussion references several underlying source documents that must be discussed in order to place the full need and purpose for the permanent stationing of the 2/25th in its proper context. Source documents referenced in this section include the National Security Strategy (NSS), the National Defense Strategy (NDS), the Quadrennial Defense Review (QDR) (2006), and the Army Campaign Plan (ACP). The permanent stationing of the SBCT must meet the requirements defined in these national defense policy documents, which lay the framework for national defense strategy and how the United States will deter conflict and protect the nation's strategic interests abroad. In addition, the action to permanently station the 2/25th SBCT must be considered in the context of several major ongoing transformation and stationing initiatives. These initiatives include Army modular transformation to standardized unit organizations and those moves directed by the Base Realignment and Closure Act of 2005 (BRAC) and Global Defense Posture Realignment (GDPR).

1.2.1 NEED FOR THE PERMANENT STATIONING OF THE 2/25TH SBCT

The need for action for permanently stationing the 2/25th SBCT centers on five primary areas of need that require the Army to take action. These areas of need include adhering to national security and defense policy, furthering Army Transformation as directed by these policies, meeting training and operational requirements for the SBCT, providing for Soldier and Family quality of life requirements, and meeting strategic deployment requirements to ensure adequate defense assets can be deployed in a timely manner to critical areas of interest. As discussed, these areas of need are all explicitly or implicitly addressed throughout the guiding national security and defense policy documents and are non-discretionary elements of Army decision making for the permanent stationing of the 2/25th SBCT.

1.2.1.1 National Security and Defense Policy

The Army is established as a land-based military force, and its forces are to be organized, trained, and equipped to represent the nation's global security and defense interests around the world. The Army does this primarily through prompt intervention and sustained combat, peacekeeping, and support and stability

operations in key regions of interest defined by national strategic policies and objectives. Key policy documents for national security and national defense include the NSS (March 2006), the NDS (March 2005), and the QDR (February 2006). As Commander and Chief of the Armed Services, the President of the United States, in conjunction with his security advisors, promulgates and defines national security and defense policy from within the executive branch of government. Using these policy documents for strategic guidance, military commanders conduct contingency planning to ensure that their forces are able to respond to crises, shape the global security environment, and implement security and defense policies in their regions of interest. The Army is responsible for the implementation of national security and defense policy as outlined in these over-arching security and defense policy documents by the executive branch of government.

1.2.1.2 National Security Strategy

The NSS sets forth several broad goals for the Department of Defense (DoD) and Army to assist in the shaping of the global security environment. These goals include:

1) Disrupting and destroying terrorist organizations with global reach.
2) Denying terrorist groups the support and sanctuary provided by rogue states.
3) Preventing and resolving regional conflicts.
4) Intervening in regional conflict to promote stability when necessary.
5) Assisting in post-conflict stabilization and reconstruction.
6) Preventing nuclear proliferation.
7) Preventing tyranny, oppression, and genocide.

These goals provide direction and guidance to inform DoD and DA Commanders and strategic planners to establish the NDS and plan for strategic mission requirements.

1.2.1.3 National Defense Strategy

The NDS outlines how DoD will support broader U.S. efforts to create conditions conducive to a secure international system as outlined in the NSS. The NDS strives to maintain international sovereignty, representative governance, peaceful resolution of regional disputes, and open and competitive markets. Specifically the NDS and the National Military Strategy (NMS), a policy document that supports it, seek to ensure the United States focuses its efforts on four strategic objectives. These objectives include:

1) **Secure the United States from Direct Attack:** This military objective includes the dissuasion, deterrence, and defeat of organizations and states who seek to harm the United States and its citizens directly.
2) **Secure and Retain Strategic Access for Global Freedom of Action.** Strategic access ensures the United States can access key regions of interest, access lines of communication and is able to promote and influence the global security environment and the goals outlined in the NSS for itself and its allies.
3) **Strengthen Alliances and Partnerships:** A secure international system requires collective action. The United States has an interest in broad based and capable partnerships with like-minded states. This objective seeks to strengthen security relationships with traditional allies and friends, developing new international partnerships, while working to increase the capabilities of our partners to contend with common challenges.

4) **Establish Favorable Security Conditions:** The objective directs the DoD counter aggression or coercion targeted at US partners and interests. Further, where dangerous political instability, aggression, or extremism threatens fundamental security interests, the United States will act with others to strengthen peace. Specifically the US military will conduct planning to create favorable international conditions and broad, secure, and lasting peace.

1.2.1.4 The Quadrennial Defense Review (2001, 2006)

Title 10, United States Code §118 requires that "the Secretary of Defense shall every four years... conduct a comprehensive examination (to be known as a "quadrennial defense review") of the national defense strategy, force structure, force modernization plans, infrastructure, budget plan, and other elements of the defense program and policies of the United States with a view toward determining and expressing the defense strategy of the United States and establishing a defense program for the next 20 years."

The QDR sets forth a specific series of recommendations for implementing the goals and objectives of the NSS and NDS. These recommendations are specific capabilities-based recommendations for each service of the DoD that integrate current military capabilities and future projected military requirements needed to implement the NSS, NDS, and provide for global security and the nation's strategic interests. Based on the QDR, the DoD reorients its capabilities to meet national security demands and current capabilities shortfalls. The QDR was presented to Congress in 2001. The report emphasized the need for the United States Army to transform to a more expeditionary force, capable of rapidly projecting force and deploying from stationing locations within the United States to disparate locations across the world. The report noted that the Army lacked critical deployment and staying power capabilities needed to influence national security and defense. The QDR in 2001 prescribed recommendations for the Army to transform its forces to become more relevant to shaping the 21st century global security environment. These recommendations provided a framework for Army transformation to become a more transportable, agile, maneuverable force with more firepower, technology, and logistical sustainability than the forces that then existed. The DoD and DA, informed by experiences in Afghanistan and Iraq, revised and submitted the QDR to Congress in 2006. The recommendations continue to emphasize the need for the transformation of US ground forces. The recommendations put forth in the QDR follow two major DoD imperatives. These imperatives include:

- Continuing to reorient the DoD's capabilities and forces to be more agile in the Global War on Terror[1] while preparing for broader asymmetric threats from unconventional enemies to hedge against uncertainty over the next 20 years.
- Implement enterprise-wide changes to ensure that organizations structures, processes, and procedures effectively support the DoD's strategic direction.

Specific QDR decisions direct the department of the Army to accelerate the transformation of joint ground forces capabilities. QDR decisions and directives to the Army include:

1) Transform Army Units and Headquarters to modular designs.
2) Continue to standardize brigades through Army Modularity in all three Army components (Active, Reserve, and National Guard).

[1] This includes the conflicts in Iraq and Afghanistan.

3) Incorporate technology improvements and Future Combat Systems (FCS) improvements through a phased development and fielding process to introduce new technologies as they develop.
4) Expand joint tactical air/ground operations and double the coverage capacity capability of unmanned aerial vehicles to include the Predator and Global Hawk.
5) Further increase the capability, capacity, and numbers of special operations force personnel and increase active duty special forces battalions by one-third.
6) Increase the Army's strategic reach through DoD investment in cargo transportability, strategic lift (C-17 and C-5 air transport), and pre-positioned stocks.
7) Pursue enabling technologies and innovative operational concepts such as sea-basing.
8) Improve joint intelligence, surveillance and reconnaissance technologies, information sharing capabilities, and joint command and control.
9) Achieve Net-Centricity and information connectivity on the battlefield by improving tactical satellite communications, strengthening network capability, and increasing communications capability and bandwidth.

The policies establish the strategic national security and defense framework that influences and directs the Army's decision of where to station the 2/25th SBCT permanently. Intensive analysis, assessment, and expertise from the nation's leading security and defense experts shape the goals, objectives, and directives that feed into these security and defense policy documents. Ultimately, the nation's top defense professionals, its senior military leadership, assess and balance defense policy to manage the structure of the Army to implement these policies. It is not within the scope of this document to revisit their decisions on the size of the Army force structure needed to implement security and defense policy. Therefore, discussion of elimination of the 2/25th or of other BCTs elsewhere to accommodate the 2/25th also is not within the scope of this document. Such actions would directly countermand defense decisions put forth in guiding policy documents, such as the QDR, and would prevent the Army from implementing its defense and security objectives as required.

1.2.1.5 Army Transformation

The implementation strategy for QDR decisions is outlined in the ACP. The ACP serves as the Army's roadmap to implementing the goals and objectives put forth in the QDR and is the overarching planning document that guides Army transformation. To implement decisions made in the QDR, senior Army leadership is responsible for developing and planning steps required to manage the Army's force structure. Since the publishing of the QDR in 2001 with its considerable recommendations for reorienting Army force structure and capabilities, senior military leadership has utilized the ACP to direct the implementation of many of the QDR recommendations to transform the nation's Army into a force that is more relevant to 21st century security needs and global defense realities. The ACP directs the detailed planning, preparation, and execution of a range of tasks necessary to build the campaign-quality Army that will be effective in the 21st century while providing capabilities necessary for combatant commanders to carry out missions to support the nation's defense. In particular, the QDR and ACP call for the transformation of the Army to a force that is well networked and can operate in a decentralized fashion. The ACP and QDR direct the Army to transform to a highly expeditionary force, or one that is capable of supporting itself in a combat environment without depending on continual supply and logistics support. This force should be able to sustain itself and its operations while being highly mobile, deployable, and agile in response to decentralized contingencies and unconventional enemy operations. In addition, the QDR directed the Army to integrate with US Air Force, Navy, Marine Corps, and Coast Guard capabilities to provide greater inter-operability and communication to enhance defense capability.

In April 2002, the Army completed an EIS and signed a ROD to proceed with a long-term initiative to transform its forces and operations in accordance with the vision of its leadership, the changing global security environment, and the defense and security policies of the nation. The EIS for Army transformation describes a formidable process spanning a projected 30-year time frame defined by three distinct phases. These phases were defined as the initial, interim capability, and objective capability phases. The initial phase of transformation began with the post cold-war Army of 2001 in its existing force structure while the Army began testing the capabilities of the first two interim BCTs, and their ability to fulfill the vision for defense forces articulated in the QDR. These BCTs were designed to provide greater deployability, battlefield mobility, protection communications capability, and firepower to U.S. ground forces in accordance with the recommendations of security and defense policy requirements. As part of the initial phase, the Army began the modularization or standardization of its conventional infantry and heavy BCTs, which was also directed by the QDR in 2001.

On 12 July 2001, Secretary of the Army Thomas White and Army Chief of Staff General Shinseki announced the tentative locations and units for the third through sixth interim BCTs. The decision was conditional upon completion of the programmatic EIS. The 2/25th in Hawaii was designated in this announcement. Secretary White stated that the objective was "to keep the Army forces [more] strategically responsive than we've been in the past and dominant at every point in the spectrum of military operations." General Shinseki added, "I would say if you look at the brigade identifications and locations, geographically they're postured towards the Asia Pacific theatre, but worldwide deployable. They could go in any direction. If you look at our experience coming out of the Cold War, we were very much postured forward in Europe and we continue to be that way. This is adding a little balance and looking at the importance, the growing interest and challenges in the Asia Pacific theater, and in the Pacific it's the tyranny of distances. So we think these are all good locations that we've picked."

The 2002 ROD selected the 2/25th in Hawaii as one of the units to transform to an interim BCT (later designated an SBCT). The reasons for the selection of the 2/25th are outlined in the 2004 2/25th Transformation FEIS. They include the fact that the 2/25th was located in an area critical to the interests of the United States. Hawaii was also a good site because it replicates the terrain and conditions found in many parts of the Pacific Rim, an area of critical concern. The Army also considered the proximity of the 2/25th to suitable air and sea transportation facilities. The Commander of United States Pacific Command (PACOM), the unified Combatant Command in the Pacific, specifically identified the criticality of SBCTs to fulfilling the PACOM missions in the Pacific. Finally, the choice of the 2/25th "provide[d] options that shape the global environment to benefit the United States and its allies." (U.S. Army Garrison, Hawaii [USAG-HI] 2004).

Following the initial phase of Army transformation where the Army validated the capabilities of the SBCT to meet the nation's near-term security and defense objectives, the Army proceeded with the interim phase of transformation. This interim phase was defined then as the fielding of up to eight SBCTs with the incorporation of more advanced digital command and control systems and technological upgrades. The end of the interim phase was defined as the time when all SBCTs were manned, equipped, and trained to support operational mission requirements. The Army currently remains in the interim phase of transformation as it continues to conduct SBCT stationing and fielding while completing the conversion of its units to standardized modular structure while simultaneously prosecuting actions in support of the Global War on Terror (GWOT) and operations in Iraq. Currently the Army is in the process of fielding its 7th SBCT. Transformation of the 2/25th, its permanent home stationing, and its training to achieve operational readiness are all vital components of the interim phase of Army transformation.

The final phase of Army transformation, the Objective Capability Phase, begins with the completion of the fielding of SBCT units and the fielding of units with the next generation of vehicles and futuristic systems known as FCS. These systems may include robotics, advanced weaponry, and communications sys-

tems designed to provide increased technological advantages over conventional and non-conventional forces. The phase will end when the Army has fully converted its forces and equipped and trained BCTs with the next-generation vehicles, systems, and equipment.

The SBCT, optimized with enhanced digital capability and designed for speed, transportability, agility, is the Army's interim answer to providing transformed ground-force military capabilities as directed by the QDR in 2001 and reaffirmed in 2006. It is designed for small-scale, non-contiguous contingencies and is ideally suited for urban conflict with unconventional enemies. Experience in Iraq has demonstrated that the SBCT has been exceptionally effective in Iraq in providing security to more people over a greater area, and providing better protection to US Soldiers than is afforded by conventional heavy and infantry units (LTG Lovelace, HQDA G-3 Army Declaration, 2006). Put simply, because of its increased maneuverability, firepower, and armored protection, more Army Soldiers who have deployed abroad as part of the operations supporting the GWOT have returned, and they have been able to be more effective in providing security and responding to conflict than conventional infantry and heavy BCTs.

The ACP and the Army's strategy for implementing transformation directives of the QDR also provide context for understanding why the Army is transforming and what the role of the SBCT is in national defense policy. The proposed action and alternatives assessed in this EIS do not include options to revisit the National defense and security decisions, including Army force structure, made by senior military leadership in the DoD and the Army.

1.2.1.6 Training and Operational Requirements

The mission of the SBCT is ultimately to deploy abroad to support the full spectrum of potential operations from waging the nation's wars to supporting peace and stability. While at home station, it is critical that the SBCT retain or develop those skills necessary to deploy and execute its mission. Effective training, carried out to a high doctrinal standard, is the cornerstone of operational success. High quality training, which prepares Soldiers for what will be encountered in the operational environment, is essential to ensuring the success of the nation's strategic defense objectives, national security, and the safety of those who serve.

A critical element of need for the permanent stationing of the 2/25th SBCT is the selection of a location where the unit can attain high levels of training proficiency to prepare for deployment abroad. Training and qualifying Soldiers and units typically requires three types of training facilities in the field: individual weapons qualification ranges, live-fire range complexes that allow units to conduct live fire training simultaneously as one team, and maneuver areas for units to rehearse and train on the full complement of mission essential tasks required by a units training doctrine. In addition to live training, the Army also augments its leader development and unit training strategies with virtual and battle simulations. The SBCT must be prepared to execute a full array of combat, stability, and peace support operations. Specific mission requirements of the SBCT are presented in Chapter 2 in greater detail.

1.2.1.7 Training Ranges

The level of combat readiness of an SBCT is directly related to the availability and capability of its supporting training infrastructure. Since the GWOT began, the Army has undergone a process to modernize and transform its training ranges radically to replicate operational conditions more closely. This transformation of training range infrastructure is closely aligned with QDR decisions, weapon system development, and conditions encountered in Iraq and Afghanistan. All modular BCTs require a full suite of supporting training infrastructure to meet individual, crew, and collective unit training requirements to be certified for operational deployments. In addition to the standard suite of modernized training ranges that have accompanied transformation, the SBCT requires a specialized training range. This range, the Battle

Area Complex, or BAX for short, provides collective live-fire training capability to all elements of the SBCT. SBCT crews and dismounted Soldiers test their ability to detect, engage, and defeat stationary and moving enemy targets in open and urban terrain. SBCT units may also train in the BAX with supporting vehicles in free maneuver. SBCT range requirements are fully articulated in Chapter 2 of this document. Range specifications and standard designs are based on Army Training Circular 25-8 *Army Training Ranges*, which serves as the definitive source document for Army training range requirements. The location selected for the permanent stationing of the SBCT must possess or be able to accommodate the construction of range requirements for the SBCT so that the unit can adequately train to meet doctrinal training readiness standards.

1.2.1.8 Maneuver Lands

In addition to adequate firing ranges, the SBCT requires a significant amount of maneuver space. In Iraq, a single SBCT has been given the mission to provide security across an area of influence that was larger than the state of Delaware (LTG Lovelace, HQDA G-3 Declaration, 2006). To stress the personnel and equipment capabilities of the SBCT adequately with its increased maneuver and communications capabilities requires large maneuver areas for greater training realism. The SBCT must be able to execute a full range of combat and peace support operations to ensure the mission success as they prepare for the full spectrum of wartime and peace support operations. At all levels, the units of the SBCT must have adequate maneuver training land to conduct and rehearse training operations to certify themselves as a deployable unit. Army Training Circular 25-1 *Training Land* serves as the definitive source document for requirements for maneuver land training.

1.2.1.9 Deployment Operations Facilities

As is highlighted in the NDS and QDR, transportability and the ability to project military power to provide deterrence and influence regional outcomes are critical elements of Army transformation. While this element of need will be addressed later in this chapter, the stationing of the 2/25th SBCT needs to be at a location with adequate deployment facilities to facilitate deployment training and provide for rapid real world deployment to areas of potential conflict. Facilities for training and operational deployment include rail transport facilities, seaport capability, and Stryker-transport-capable aircraft runways. Such facilities are important considerations in selecting a permanent station for the SBCT.

1.2.1.10 Maintenance and Garrison Operations Facilities

The SBCT has approximately 4,000 Soldiers, more than 300 Stryker vehicles, approximately 600 wheeled support vehicles, and all the equipment required to support their missions. When the 2/25th SBCT is not deployed for training or supporting mission requirements abroad, Soldiers, vehicles, and equipment require adequate garrison facilities to conduct routine operations and maintenance in order to sustain the vast array of equipment that accompanies the SBCT. Garrison operations ensure the SBCT is administratively prepared and functionally equipped to go to support deployment operations. Stationing of the SBCT requires dedicated administrative office space for its Soldiers, motor pools, vehicle maintenance facilities, weapons armories, and many other administrative facilities needed to ensure successful garrison preparation. The Army Corps of Engineers (USACE) has designed and implemented a program of standard facilities that are required to support Army modular BCTs. These standards are required to provide adequately for the garrison operations and maintenance of the SBCT and are described in more detail in Chapter 2 of this document. Stationing sites selected for the permanent stationing must be able to accommodate the SBCT's garrison operations as an essential component of need for the permanent stationing action.

1.2.1.11 Soldier and Family Quality of Life

Along with providing for the mission requirements of Soldiers, the Army is absolutely committed to providing the highest quality of life it can attain for the Soldiers and their Families who have endured multiple deployments supporting the GWOT and OIF. The Army has continued to emphasize this element in the NDS, QDR, ACP, and policy documents, and it is a non-negotiable component of the stationing decision for the 2/25th SBCT. Stationing locations considered for the permanent stationing of the 2/25th must have housing and living space, schools, medical facilities, and adequate recreational opportunities for the Soldiers and Families of the 2/25th SBCT. The Army remains firmly committed to maintaining a high quality all volunteer force with emphasis on taking care of its Soldiers and their Families as one of its top priorities. A critical component of achieving this objective is providing accessible community and recreational services and facilities needed to sustain a high quality of life. Providing for these needs of the Soldiers and Families of the 2/25th is a key element of need for the decision of where to station the SBCT.

At the SBCT's full strength, its 4,005 Soldiers are expected to have approximately 2,150 spouses. Of those, 189 would be married to other members of the military. Thus, 1,961 of the spouses would be civilians. In addition, the Soldiers of the 2/25th are expected to be accompanied by approximately 1,571 children. About 81 percent of these children would be of pre-school age (1 to 4) or elementary school age (5 to 11). The rest would be of middle school age (12 to 14) and high school age (15 to 18). These results are based on the number of children by grade of Soldiers in the Army, provided by the Office of Demographics, Assistant Chief of Staff, G-1, Headquarters, Department of the Army.

Meeting the stationing needs of the 2/25th SBCT means ensuring that the Soldiers and Family members of the 2/25th have access to schools, medical facilities, housing and ample access to recreational opportunities.

1.2.1.12 Strategic Deployment

The NSS, NDS, QDR, and ACP provide directives and explicit guidance for the Army to improve its capacity to project its power rapidly from locations within the US to prevent, deter, or defeat its enemies and support national security interests. The SBCT was designed to provide the Army with the capability to deploy the SBCT rapidly and to protect vital US security interests using its enhanced capabilities. The Army remains committed to its strategic goal of having the capability to deploy an SBCT anywhere in the world within 96 hours of its notification to deploy (U.S. Government Accountability Office [GAO] 2003). Rapid deployment capability specifically requires significant air transport assets to include heavy lift aircraft capable of transporting the Stryker vehicle and SBCT equipment and the runway capacity to accommodate the hundreds of sorties necessary to deploy the SBCT. Any permanent stationing location must have ample airfield and air deployment capacity to accommodate the airlift assets required to deploy the SBCT. In addition, as highlighted by the GAO in 2003, to achieve its deployment goals the Army must geographically distribute SBCTs more readily to influence different geographical areas of interest throughout the world. To implement these goals, the Army force managers have made decisions to station an SBCT in Europe to provide more rapid global reach. Currently, two SBCTs are stationed at Fort Lewis with a third to be organized there; one in Alaska; one transforming in Hawaii; and one in Europe. In addition to these SBCTs, an SBCT has been established within the Army National Guard at Fort Indiantown Gap, Pennsylvania.

While not a requirement for meeting the Army's 96-hour goal for SBCT deployment, sealift capacity is a critical component of strategic mobility and provides the Army with additional deployment flexibility. Sealift capability provides strategic planners with important advantages to airlift. While typically not used for rapid deployment, sealift capability provides the Army with a means to transport large quantities of equipment that comprise the SBCT. By virtue of the large size of cargo ships, sealift can move the most

equipment and supplies at the lowest cost. In addition, sealift deployment does not require the intensive coordination or percentage of available transport assets that airlift requires. In a large-scale conflict, strategic sealift facilities provide advantages when considering stationing locations for Army brigades (Hazdra 2001).

Commanders of Unified Combatant Commands (COCOMs) are responsible for stationing forces throughout the world in order to meet strategic and regional security objectives. They must have forces at their disposal to meet both conflict and humanitarian aid contingencies. Some of these forces must be stationed in the Commanders' areas of operation to provide quick response and to perform a "dissuade and deter" function.

In the Joint Strategic Planning System (JSPS), combatant commanders submit to the Joint Staff their force requirements to support their war plans and contingencies. The Joint Strategic Capabilities Plan (JSCP) and the "Forces for Unified Commands Memorandum" apportion available combat power to support COCOM requirements. The commanders also submit an annual integrated priority list, noting needs and shortfalls. These requirements go to services such as the Army and Navy that must respond by assigning the appropriate military resources. These requirements must be taken into account when the decision on where to station the 2/25th permanently is made.

Obviously, many of these force requirement documents are classified and cannot be released to the public. They identify contingency plans and security vulnerabilities.

1.2.1.13 Summary of Need

The need for action for permanently stationing the 2/25th Stryker Brigade Combat Team centers around the five primary areas of need discussed above. These areas of need include:

- Adhering to national security and defense policy.
- Furthering Army Transformation as directed by the QDR and ACP.
- Meeting training and operational requirements for the SBCT.
- Providing for Soldier and Family quality of life requirements.
- Meeting strategic deployment requirements to ensure adequate defense assets can be deployed in a timely manner to support national security requirements worldwide.

1.3 PURPOSE OF THE PROPOSED ACTION

The purpose of the proposed action is to station the 2/25th SBCT permanently at an installation that is able to meet the SBCT's training, Soldier, and Family quality of life, and operational and strategic deployment requirements. The installation must be capable of providing adequate training ranges for maneuver and live-fire training, and the installation must be able to provide the support infrastructure necessary to provide a sound quality of life for Soldiers and their Families and support garrison-based SBCT operations. In addition, the stationing action must provide for the National Security requirements outlined in the NSS, NDS, and QDR and provide the necessary strategic response capabilities to satisfy national security requirements and obligations within the Pacific region of interest.

1.4 OTHER ARMY INITIATIVES REQUIRING CONSIDERATION (BRAC, GDPR, MODULARITY)

As discussed in Section 1.2, the purpose and need for the permanent stationing of the 2/25th SBCT must also take into account previously announced Army initiatives and directed actions. In particular, actions that impact the range of alternatives that may be considered in this document are affected by BRAC legislation passed in 2005, GDPR, and Army directives to convert its forces to standardized modular structure. Each of these initiatives is discussed in greater detail below.

1.4.1 BRAC 2005

In 2005, Congress approved the recommendations of the BRAC Commission, pursuant to the BRAC law. This particular round of realignment and closures was designed to provide the necessary infrastructure to support Army transformation, including GDPR, the ACP, and conversion to a modular force structure. This in turn is designed to transition the Army from a force capable of countering Cold War Era threats to one that is responsive to a broad range of contingency threats that represent the range of security threats facing the nation today.

BRAC directs the Army to close excess installations with the intention of disposal while realigning and reconfiguring the Army's infrastructure. This allows the Army to reallocate resources from closed installations to other high-priority locations. It also allows the Army to optimize the operational capacity necessary to support warfighting capabilities and enhance the opportunities for joint activities. Among other things, BRAC will optimize military value, advance the Army Modular Force (AMF) conversion, accommodate the re-stationing of overseas units, enable the transformation of both the active and reserve components, rebalance the force structure, and contribute to joint operations.

In terms of impacts on Army infrastructure, BRAC affects 74 Army installations, directing the closure of 13 active facilities, the realignment of 53 active facilities, and the closure of 211 National Guard and 176 Reserve facilities. BRAC is inextricably tied to Army transformation. The closure and realignment of forces are directed by Congress through legislation and are, therefore, non-discretionary. Installations closing or realigning are preparing separate site-specific NEPA documentation to implement BRAC directives, but the Congressional decision with regard to the list of installations to be closed or realigned is not subject to NEPA as a matter of law. BRAC legislation affects the number of sites available for home stationing of the 2/25th and this EIS has taken into account its mandates and effects when considering alternative stationing locations for the 2/25th SBCT.

1.4.2 GLOBAL DEFENSE POSTURE AND REALIGNMENT

The United States' global defense posture is characterized by the size, locations, types, and roles of forward military forces. In the past, the Army has depended heavily on its forward based presence in the Pacific and Europe to project power and undertake military actions overseas. Transformation and QDR directives provide guidance to restructure the military for rapid deployment from within the United States while reducing the presence in, and reliance of US forces on, foreign nations. As part of the overall transformation effort, the Army is in the process of realigning 44,500 Soldiers back to the United States between 2004 and 2011 and downsizing overseas facilities to support the expeditionary vision contained within the QDR.

Although the United States will retain transformed, forward-positioned forces in Europe and Korea, most Soldiers and their units will be realigned to Army installations in the United States. This realignment will create a greater demand on training ranges and facilities at these installations. The strategy will enable the Army to restructure in a manner that enhances the efficiency and effectiveness of response to emerging

threats. The decisions of the GDPR are assumed to be part of the baseline environment for alternatives analysis conducted within this document.

1.4.3 ARMY MODULAR FORCE (AMF)

The Army has embarked on a 30-year process to transform its forces. This transformation includes the modernization of its doctrine, equipment, leadership, organizational structure, facilities, business processes, and virtually every component of its operations. As part of the overall Army transformation effort, the Army has decided to transition to a modular or standardized force structure at all levels of its organization. This process of modular standardization means a transition of the Army from large powerful, fixed organizations constituted at the Division level (10,000 to 12,000 personnel) to an Army designed around smaller, self-contained, logistically supportable BCTs. The units within these BCTs will be identical in their equipment and manning. The modular initiative allows for greater levels of planning and organizational efficiency.

There are three primary types of BCTs, each with a unique mission. The Infantry BCT (IBCT) consists of approximately 3,400 to 3,500 Soldiers and 950 wheeled vehicles. The Heavy BCT (HBCT) is a heavily armored unit consisting of approximately 3,800 Soldiers, M1 Abrams tanks, M2 Bradley fighting vehicles, and a host of supporting armored tracked and wheeled vehicles. The final modular BCT is the SBCT. The modular SBCT, and its increase capabilities based around the Stryker family of wheeled vehicles, represent a significant step in the direction of transforming the Army's forces.

As discussed, the SBCT provides levels of deployability, maneuverability, firepower, and armament to offset the strategic gaps between the IBCT and HBCT. The SBCT ensures the Army can rapidly respond with a force that is maneuverable, provides significant levels of protections, and can counter an enemy force with increased firepower. Modularity creates brigade-based combat and support formations of common organizational designs that can be easily tailored to meet the varied needs of Geographic Combatant Commanders, reducing joint planning and execution complexities. Since the initial publication of the 2/25th transformation EIS in 2004, all active and reserve component BCTs in the Army have already or are in the process of transforming to standard modular BCTs. Because of this, all action alternatives analyzed in this document consider alternatives that involve BCTs of modular configuration.

1.5 SCOPE OF ANALYSIS

This EIS has been developed in accordance with NEPA, the regulations issued by the Council on Environmental Quality (CEQ), 40 CFR Parts 1505-1508 and the Army's implementing procedures published at 32 CFR Part 651[2]. This EIS is also designed to address the deficiencies in the 2004 FEIS identified by the Federal Court of Appeals for the Ninth Circuit. The purpose of the EIS is to inform Army decision-makers and the public of the likely environmental consequences of the Proposed Action and reasonable stationing alternatives to meet the purpose and need for permanently stationing the 2/25th SBCT. This EIS will assist Army decision-makers in more fully understanding the environmental issues and social concerns connected with the stationing action. To facilitate environmental comparison of viable alternatives, the Army has attempted to balance the amount of information available between sites carried forward as viable stationing locations. It should be noted that a full and detailed EIS has been carried out in its en-

[2] Council on Environmental Quality: Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR Parts 1500-1508 and Army implementing regulations contained in 32 CFR Part 651.

tirety to analyze the environmental impacts to Hawaii at a project-specific level of detail. Design and construction of 2/25 SBCT facility projects are underway or even completed in some cases. The purpose of this EIS is to present a comparative analysis of the proposed action and alternatives. It therefore includes only the level of detail necessary to perform that analysis and to inform the decision maker of the environmental trade-offs among alternatives. This approach permits the decision maker to take a "hard look" at environmental impacts among alternatives prior to making a final decision selecting a home-stationing site for the 2/25th. If Army decision makers choose a site other than Hawaii for the permanent home stationing of the 2/25th SBCT, additional site-specific NEPA analysis will be prepared for those additional construction projects needed to support the SBCT. If an IBCT moves to Hawaii under this action and additional facilities are required in Hawaii, additional NEPA documentation will be prepared.

1.6 DECISION(S) TO BE MADE

The Army Chief of Staff in concert with other Army decision-makers will review conclusions drawn in this EIS and decide on the permanent home station of the 2/25th SBCT. The decision will be based on the results of this EIS and on consideration of all relevant factors including mission, cost, technical factors, and environmental considerations. This SEIS identifies and presents the full range of reasonable alternatives capable of meeting the purpose and need for permanently home-stationing and training of the 2/25th SBCT. Decisions regarding transformation, national security strategy, and other decisions made in the NSS, NDS, and QDR are not revisited in this document.

1.7 COOPERATING AGENCIES

CEQ defines the rights and responsibilities of cooperating agencies in Section 1501.6 of the CEQ regulations and in Question 14 of *The 40 Most Asked Questions* (about NEPA) (CEQ 1981). Upon request of the lead agency, any other federal agency that has jurisdiction by law or that has special expertise with respect to any environmental issue, shall be a cooperating agency. CEQ issued new guidance on cooperating agencies on February 5, 2002, which includes factors for determining whether to invite, decline, or end cooperating agency status (CEQ 2002). This guidance also urges federal agencies to set time limits, identify milestones, and specify the scope and detail of a cooperating agency's contributions. No federal agencies were entitled to act as a cooperating agency, the Army did not formally request any agency to serve in the capacity, and neither has any federal or state agency requested this status.

1.8 PUBLIC INVOLVEMENT

The public's participation is essential to successful NEPA analysis. The CEQ and Army NEPA regulations provide several opportunities for the public to participate. These include issuing in the *Federal Register* a notice of intent (NOI) to prepare an EIS[3], a public scoping process, a 45-day public review period for the Draft EIS (DEIS), and publication of the FEIS, accompanied by a 30-day mandatory waiting period before a final decision is made and a ROD is issued.

Following publication of the NOI, public notices were published in the major newspapers on the Islands of Hawaii and Oahu announcing the times and locations of five public scoping meetings to solicit input and to obtain comments on the scope of the EIS. Public notices were also published in Colorado, Alaska, Washington, and Kentucky announcing the times and locations of nine public scoping meetings in these

[3] The notice intent of for this EIS was published in the *Federal Register,* January 4, 2007 (76 FR 9717).

four states. The 45-day scoping period began on January 4, 2007 and ended on February 20, 2007. Fourteen scoping meetings were held between January 29 and February 16, 2007. For residents and groups in Hawaii, public scoping meetings were held in Waianae, Honolulu, Haleiwa, Waikoloa, and Hilo. For residents and groups in Colorado, public meetings were held in Colorado Springs, Trinidad, and La Junta. For residents and groups in Alaska, public meetings were held in Anchorage and Delta Junction. For residents and groups in Kentucky, public meetings were held in Shepherdsville and Radcliff. Finally, for residents and groups in Washington, public meetings were held in Lakewood and Yakima. A total of 284 people signed in at the 14 meetings.

At the public scoping meetings, 69 individuals and persons representing organizations provided oral comments via court reporters and video camera for the Army's consideration. The Army also received written comments from 199 individuals and organizations in the form of e-mails, faxes, and individual and form letters. The Army compiled a scoping report, identifying and assessing the issues brought forth through the scoping process. The major concerns and issues expressed during the scoping process that were determined to be within the scope of the EIS are as follows:

Hawaii

- Not enough resources (land area, water, housing, etc.) exist on Hawaii to support more troops.
- Contamination of air, soil, and water, especially depleted uranium (DU) concerns.
- Monitoring of air, soil, and water.
- Impacts to cultural sites.
- Impacts to natural resources, including sensitive geologic areas.
- Need to assess cumulative impacts of all military activities in Hawaii.
- Identification and impacts of actions on true landowners and tenants.
- Alternatives where armored units already train were not fully considered (Hood, Bliss, Benning, Stewart), also why not Korean peninsula?
- Better to put SBCT close to major airfields, larger than those on Hawaii. Proximity to airlift is more relevant than geographic location.
- Increase in wildfire risk.
- Expansion of Hawaiian facilities with the potential of inadequate training in the future when communities develop to the property line.
- Traffic and noise impacts.
- Mainland locations have more area and are more distant from communities.

Alaska

- The MOA between USARAK and Delta Junction needs to be considered.

Colorado

- Monitoring impacts to the restricted PCMS.
- Impacts to soil and grassland.

- Effects to historic aspects of the Santa Fe Trail.
- Natural resource and archeological resource concerns

The comments and concerns of the public and agencies were used to determine the focus of analysis and selection of alternatives. A summary of the comments received during the scoping process is included in the project record, organized by location, meeting date, and subject.

1.9 NEPA PROCESS, INCLUDING TIERING

NEPA is a federal law that directs the Army to disclose the effects of its proposed activities to the public and officials who must make decisions concerning the proposals. The NEPA process began when the Army published the NOI in the Federal Register. The Army sought public input to help identify environmental issues and concerns through the process called "scoping."

The regulations that implement NEPA encourage tiering EISs. Tiering is the process of referencing information presented in other previously prepared NEPA documents, such as EISs, to minimize repetition. This EIS is a stand-alone document that programmatically assesses stationing alternatives for the 2/25th SBCT to include Hawaii, which was analyzed in 2004. If an alternative other than Hawaii is selected by Army decision-makers upon reviewing the information contained within this EIS, a site-specific NEPA document tiered to this EIS will be prepared. If an IBCT moves to Hawaii under this action and additional facilities are required in Hawaii, additional NEPA documentation will be prepared.

In addition to the 2002 Programmatic EIS for Army Transformation and the 2004 FEIS for the Transformation of the 2nd Brigade, this EIS incorporates information from a variety of other sources. These sources are referenced in the document bibliography.

Chapter 2

Description of the Proposed Action and Alternatives

CHAPTER 2
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the Proposed Action and several different alternatives for implementing the Proposed Action that are evaluated by the Army in this EIS. The Purpose and Need described in Chapter 1 sets forth a rational context in which to analyze the viability of alternatives. The Purpose and Need, while setting necessary elements, allows consideration of a broad range of sites for home stationing the 2/25th. Based on the stated Purpose and Need, Chapter 2 identifies more detailed alternative selection criteria to assess whether a proposed site is a "reasonable" alternative that will be carried forward for full evaluation in the DEIS.

After reviewing several potential Army installations, three alternatives for implementing the proposed action have been identified by the Army as reasonable alternatives capable of meeting the Army's need criteria described in Chapter 1 and screening criteria described in this chapter. These alternatives and the "no action" alternative are carried forward for evaluation throughout the remainder of the document. Alternatives for the proposed action include: (1) permanently stationing the 2/25th SBCT at Schofield Barracks Military Reservation (SBMR) while conducting required training at military training sites in Hawaii; (2) permanently stationing the 2/25th SBCT at Fort Richardson while conducting required training at military training sites in Alaska; and (3) permanently stationing the 2/25th SBCT at Fort Carson while conducting required training at military training sites in Colorado. This chapter also describes the no action alternative to serve as a baseline to fully assess and consider the impacts of action alternatives.

In addition to presenting the Army's screening process for arriving at the three reasonable action alternatives carried forward, this section provides the rationale for those alternatives that were discarded and dismissed from detailed consideration. An element common to selecting either the U.S. Army Alaska (USARAK) or Colorado as an alternative is that the USAG-HI would home-station and train the IBCT stationed there in exchange for the 2/25th SBCT that would be stationed at either Fort Carson or Fort Richardson. The need for this BCT exchange is explained in Section 2.5. Therefore, the comparative environmental effects associated with stationing and training with either unit in Hawaii are considered in Chapters 4 and 5.

2.2 PROPOSED ACTION

The Army's proposed action is to permanently home station the 2/25th in a location that meets national security and defense policy guidance, provides for SBCT training and operational requirements, provides a high quality of life for the 2/25th Soldiers and their Families, and facilitates the rapid deployment of the SBCT to uphold U.S. security objectives and interests.[1]

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[1] If the 2/25th were to be permanently stationed at a place other than in Hawaii, it is likely that it would be renamed. This is because the 2/25th Infantry Division headquarters is in Hawaii and is expected to remain there. The reference

The federal district court allowed the 2/25th to complete its transformation and training in Hawaii to meet its requirement to be prepared for deployment in late 2007. The brigade is anticipated to deploy to Iraq or Afghanistan and return from that deployment around the end of 2008. Therefore, the brigade's permanent home station must be ready to receive the unit by the end of 2008.

2.2.1 Essential Activity Group Components of the Proposed Action

There are four primary activity groups that must be integrated and synchronized by the Army as critical elements of the Proposed Action and alternatives. These activity groups are necessary components of action for meeting the Army's requirements for permanently stationing the 2/25th SBCT. Primary activity groups and their impacts are separated out in this chapter and subsequent environmental analysis chapters for ease of comparison and understanding to ensure the full impacts of the proposed action at alternative sites can be understood. In addition, they are the primary activities resulting in effects to the human environment and their direct, indirect, and cumulative effects are considered in subsequent chapters of this document:

1) Cantonment Area Construction – This activity group includes the construction of administrative offices, housing, vehicle parking and maintenance, equipment storage, recreational, shopping and other quality of life facilities, and the utilities required to meet the training and operational requirements of the 2/25th SBCT and to support a high quality of life for its Soldiers and Families.

2) Training Facilities and Range Construction – This activity group includes the construction of training ranges and training facilities needed to support the 2/25th SBCT. The implementation of Army Transformation, as directed by the QDR has required the Army to overhaul and modernize its training range and training facilities infrastructure. Army Training Circular TC 25-8 *Training Ranges* describes the standard designs and requirements of the Army's Sustainable Range Program for training modular Army units to standard. In addition to a suite of upgraded ranges that all modular units now require, the SBCT, specialized for small-scale contingency and urban operations, also requires a range specially designed to test SBCT unit capabilities. That range, the BAX, is a 2.4 kilometer (km) by 4 km vehicle assault range. A detailed list and description of training range capabilities required to support the training requirements of the SBCT is provided in this section.

3) Live-Fire Range Use – Live-fire training is an essential component of Army training. To be operationally effective, Soldiers must have the skills and experience necessary to operate and maintain their weapons. Live fire involves both munitions and explosives that would be used in combat and non-explosive training rounds designed to meet Soldiers' training needs. Soldiers must "train as they fight" in order to ensure their safety in combat situations. At a minimum, all Soldiers in the 2/25th SBCT must qualify on individual and crew/vehicle weapons at least twice per year. In addition, platoons, companies, and battalions of the 2/25th must conduct collective live-fire training exercises on firing ranges to ensure they have rehearsed and coordinated battle procedures and are prepared to deploy to support wartime operations. Various weapons systems use different types of munitions. Where possible, some weapons systems use inert environmentally friendly training rounds as a substitute for the firing of live rounds. This section will present a more detailed description of live-fire training activities and munitions.

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to the unit as the 2/25th throughout this document is not meant to imply that permanent location outside Hawaii is not being seriously considered.

4) Maneuver Training Land Use – Army SBCTs and the units that comprise them must conduct regular "combined-arms" training certifications to ensure that all of the units' capabilities can be integrated and synchronized to execute missions under stressful operational conditions. Maneuver training consists of collective training of the constituent units of the SBCT working together to integrate their combined capabilities and skills. Modular SBCTs, including the 2/25th SBCT, must conduct and rehearse maneuver training at every echelon from platoon through brigade level to ensure it can accomplish its mission-critical tasks. Maneuver training requirements will be discussed in more detail in the following sections.

The sections that follow provide the specific details for the cantonment and range construction, live-fire training, and maneuver requirements that the Army has defined as necessary for supporting modular SBCTs.

2.2.2 CANTONMENT AREA CONSTRUCTION

The USACE plans and programs for standard sets of facilities which are needed to support the garrison operations of the Army's modular BCTs. The 2/25th SBCT with more than 4,000 Soldiers, 3,500 family members, 1,000 vehicles and all accompanying equipment has a considerable facilities requirement for conducting garrison administrative and maintenance operations. As discussed in Chapter 1, garrison operations ensure the successful preparation of the unit for operational deployment. These operations and supporting facilities are an integral component of the Army's need for action. Critical facilities required by the 2/25th SBCT include office space for the brigade, battalion and company Headquarters units, barracks space for single enlisted Soldiers, a brigade dining facility, maintenance shops, parking for vehicles, and storage space. The specific number of buildings and square footage/yardage of facilities space has been determined by Army facilities planners to represent the requirements for the SBCT and is detailed in **Table 2-1**. In addition to the types of facilities required, supporting facilities and utilities requirements are also identified below. Alternatives will analyze the extent to which these facilities are available for the permanent stationing of the 2/25th and the extent to which impacts may result from the construction of facilities that are not on hand to support the garrison operations of the 2/25th.

Table 2-1 Critical Facility Requirements

Garrison Facilities	IBCT	SBCT	SBCT Difference
Vehicle Fuel Storage (gallons)	151,660	199,400	+47,740
Brigade Offices (sf)	39,495	39,495	0
Battalion Offices (sf)	77,741	80,172	+2,431
Company Offices (sf)	366,971	421,482	+54,511
Organization Classroom (sf)	12,348	12,348	0
Ammunition Storage (sf)	1,715	4,075	+2,360
Unit Storage Buildings (sf)	41,600	47,550	+5,950
Family Housing (sf)	2,868,750	3,257,550	+388,800
Barracks Space (sf)	517,158	595,482	+78,234
Combat Vehicle Parking (sf)	1,395,252	1,347,696	-47,556
Unmanned Aerial Vehicle Facility (sf)	22,500	9,000	-13,500
Vehicle Maintenance (sf)	162,690	75,558	-87,102

In addition to garrison operation and maintenance facilities for the 2/25th SBCT, the Soldiers and their Families will also require housing, schools, medical, recreation, shopping and other quality of life facilities. The EIS will examine the capacity of existing family housing and quality of life facilities for each alternative and assess capacity problems and potential construction requirements.

2.2.3 TRAINING FACILITIES AND RANGE CONSTRUCTION

As previously discussed in this section, the Army has modernized and standardized the inventory of ranges available at stationing locations that are required to support modular BCTs. This standardization emphasizes the availability of a suite of modular BCT training ranges to ensure that all BCTs have access to critical training infrastructure and can meet pre-deployment training certification requirements. These modernized ranges incorporate increased levels of digital technology and are designed to replicate situations and scenarios encountered in the contemporary operating environments of Iraq and Afghanistan. Army Training Circular 25-8, *Training Ranges*, is the Army's definitive source for range requirements and range design Army Training Circular 25-8 specifically defines the ranges required by a modular SBCT. **Table 2-2** details the exact training range and training facilities requirements needed to support the SBCT. In order to meet the need for the proposed action, the permanent stationing location for the 2/25th SBCT must either have or be able to construct the ranges in **Table 2-2**.

Table 2-2 Estimated Stryker Brigade Combat Team Training Requirement and Ranges

Number	Ranges	
	Primary	Alternate
1	25m Zero Range	None
1	Modified Record-Fire Range	QTR
1	Combat Pistol Qualification Course	25m Alternate Pistol Course; QTR
1	Multipurpose Machine Gun & Sniper Field Fire	QTR
1	Grenade Launcher Range	None
1	Sniper Field Fire Range	SPMG/MPTR/MPRC/QTR
1	MK-19 Range (for Anti-Tank (AT)-4, Javelin training also)	QTR
1	Hand Grenade Qualification Course	None
1	Anti-Armor Tracking Range	MPTR/DMPTR
1	Mortar	None
1	Multipurpose Training Range	None
1	Digital multipurpose Training Range	BAX
1	Battle Area Complex (BAX)	Digital Multipurpose Range Complex (DMPRC)
1	Infantry Squad Battle course	None
1	Infantry Platoon Battle Course	None
1	Urban Assault Course (contains Live-fire Breach Facility and Live-fire Shoot House)	None
1	Combined Arms Collective Training Facility	None

The requirements listed above were developed by the Army's Training and Doctrine Command, and were accepted by Headquarters, Department of the Army as the official range requirements for the SBCT following an extensive vetting and review process. Descriptions and the intent of SBCT range facilities are provided below.

2.2.3.1 Individual/Crew Qualification Ranges

Qualification Training Range (QTR): This range is a multi-functional range that can meet the weapons qualifications requirements for multiple SBCT weapons systems. This range combines the capabilities of the Modified Record Fire Range, Sniper Field Fire Range, Combat Pistol Qualification Course, MK-19 Range, and the Multipurpose Machine Gun Range.

25 Meter Zero Range: This range is used to train Soldiers in basic marksmanship. This range teaches Soldiers techniques to engage stationary targets and sighting adjustment techniques. It can support M16 or M4 rifle firing as well as that of crew served machine guns.

Modified Record Fire Range (MRF): This range is used to train support unit Soldiers in basic marksmanship tasks. The range teaches Soldiers to quickly aim and engage stationary infantry targets.

Combat Pistol Qualification Course (CPQC): This combat pistol range is used to train Soldiers to identify, engage, and defeat an array of targets using the 9mm, .38 calibre, or .45 caliber pistol.

Multipurpose Machine Gun Range (MPMG): This range is designed to train Soldiers to engage stationary infantry and mobile vehicular targets with the full range of Army machine guns to include the M249, M60, M240, and .50 caliber machine guns.

Grenade Launcher Range: This range is used to train Soldiers on targeting and use of grenade launcher systems against stationary infantry and vehicular targets.

Sniper Field Fire Range: This range is used to train Soldiers to identify and engage stationary and moving targets with a sniper rifle.

MK-19 Range: This range is used to train Soldiers on the operation and use of the MK-19 40 mm grenade launcher. In addition, this range can be used to train Soldiers in the stationary targeting of armored vehicles using AT-4 and Javelin antitank weapon systems.

Hand Grenade Qualification Course: This range is used to train Soldiers on techniques for employing hand grenades in close combat.

Anti-Armor Tracking Range: This range complex is designed to meet training requirements for medium and heavy anti-armor weapons systems. This range is used to train Soldiers in identifying, tracking, targeting, engaging, and defeating moving armor targets individually or in tactical array.

Mortar Range: This range is used to train mortar crews on the operation and use of 80 and 120 mm mortar systems. Soldiers learn to acquire and destroy stationary targets using indirect fire mortar techniques.

2.2.3.2 2/25th SBCT Collective Training Range Requirements

Multi-purpose Training Range (MPTR): This live-fire range is used to test crews and dismounted squads on the skills necessary to detect, engage, and defeat stationary and moving enemy infantry and armor targets. This range trains squads and prepares them for platoon live-fire collective training on the Multi-Purpose Range Complex (MRPC).

Battle Area Complex (BAX): This range provides collective live-fire training capability to all elements of the SBCT. SBCT crews and dismounted Soldiers test their ability to detect, engage, and defeat stationary and moving enemy targets in open and urban terrain. SBCT units may train in the BAX with supporting vehicles in free maneuver.

Infantry Squad Battle Course (ISBC): The ISBC is a collective squad or crew range designed to train and test infantry squads or crews, either mounted or dismounted, on the skills necessary to conduct tactical movement techniques and detect, identify, engage and defeat stationing and moving infantry and armor targets in tactical array.

Infantry Platoon Battle Course (IPBC): The IPBC is a collective range designed to train and test infantry platoons, either mounted or dismounted, on the skills necessary to conduct tactical movement techniques and detect, identify, engage and defeat stationary and moving infantry and armor targets in a tactical array.

Urban Assault Course (UAC): This facility is used to train individual Soldiers, squads, and platoons on tasks necessary to operate within a built-up/urban area. All Active Component and Reserve Soldiers are required to train on this range.

Digital Multipurpose Range Complex (DMPRC): This range includes multiple lanes for armored vehicles, numerous targets, obstacles, and battle positions. It is used to train and test armor and infantry platoons (four tanks per platoon) on skills necessary to detect, identify, engage and defeat stationary and moving infantry and armor targets in a tactical array. Combined Arms Live-Fire Exercises (CALFEX) will also be conducted on this facility. It also supports dismounted infantry platoon tactical live-fire operations either independently of, or simultaneously with, supporting vehicles. This is the culminating range for individual crews that have qualified on the Digital Multipurpose Training Range. In the case of the SBCT the range requirement for a DMPRC may also be met by a BAX.

Combined Arms Collective Training Facility (CACTF): This facility teaches the skills and unit cohesiveness necessary to conduct clearing, breaching, offensive and defensive operations in an urban setting. It may be 1.5 km by 1.5 km, depending on design, and provides a small city that would be available for combined arms and collective training.

In summary, TC-25-8 clearly defines the training range infrastructure required to ensure the SBCT can adequately prepare itself for operational deployment. Access to the proper training range infrastructure is a critical component of need for the proposed action. It should be noted above, that for all of the training ranges required by the SBCT only one such range, the BAX, is explicitly designed and required for the SBCT. When needed, the DMPRC can serve as an alternate range capable of substituting to meet SBCT training requirements. Modular Army units interchangeably require the other modernized family of Army training ranges listed above, and they are not specific to the SBCT. For the alternatives carried forward for evaluation in this EIS, installation range infrastructure capacity to support the 2/25th SBCT was analyzed on a case-by-case basis.

2.2.4 LIVE-FIRE RANGE USE

The 2/25th will conduct semi-annual individual and crew served weapons qualifications, in accordance with Army policy for maintaining trained and ready units. Crews, squads, and platoons will also conduct collective training qualifications at least once every six months. In addition, larger units at the company and battalion level that comprise the SBCT would also conduct combined arms live-fire training exercises to ensure proper integration and synchronization of its different types of units in combat scenarios.

The SBCT conducts its live-fire training on the ranges described in the previous section. The 4,000 Soldiers of the SBCT are authorized in excess of 13 million blank and live-training rounds of ammunition and explosives. **Table 2-3** below describes the different types of ammunition that will be used to support the training of the 2/25th SBCT.

As noted in the **Table 2-3**, the SBCT is authorized considerably more training munitions than the IBCT. Approximately 70 percent of this increase in training ammunition is attributable to increased ammunition requirements for 5.56 mm caliber ammunition used to qualify Soldiers on their M-16 and M-4 rifles. This difference stems from 2 major factors. First the SBCT has more total Soldiers than the IBCT. In addition to the increase in Soldiers the SBCT is currently authorized ammunition to train on advanced rifle

marksmanship tasks of close quarters reflexive firing qualifications. This qualification requires an additional 870 M-16/M-4 training rounds which are used to certify SBCT Soldiers in close combat tasks. While not part of the official ammunition authorization currently, it is anticipated that reflexive fire qualification will soon become a part of the IBCT standard requirements in the near future, as well. In addition to increased rifle rounds, the SBCT fires more machine gun rounds as well because each Stryker vehicle is accompanied by a .50 caliber machine gun or other weapon system. All rounds and munitions are fired on approved Army ranges.

Table 2-3 2/25th SBCT and IBCT Annual Authorization for Training Ammunition

Training Ammunition (number of rounds)	IBCT	SBCT	SBCT Difference
105MM	5,277	3,186	-2,091
120MM	3,740	5,988	+2,248
155MM	0	3,260	+3,260
40MM	90,376	213,152	+122,760
5.56MM	5,374,304	9,511,262	+4,136,958
50CAL	356,276	1,252,220	+895,944
60MM	4,578	3,060	-1,518
7.62MM	914,232	1,853,686	+939,454
81MM	2,616	2,040	-576
9MM	75,452	89,376	+13,924
Boosters, Charges, Caps, Detcord	74,184	77,817	+3,633
Grenades	41,616	51,309	+9,693
Mines	394	465	+71
Rocket, missile	128	133	+5
Shotgun/rifle	13,980	12,222	-1,758
Signal, smoke, flare, sims	14,384	29,148	+14,764
Total	**6,971,537**	**13,108,324**	**+6,136,787**

2.2.5 MANEUVER TRAINING

Maneuver training is a critical component of the SBCT collective training plan that trains units on how to synchronize the execution of battle tasks and shoot, move, and communicate on the battlefield. Large-scale battalion and brigade maneuver training events are often the capstone training exercise that tests and certifies units for operational deployments abroad. Maneuver training builds on all of the individual skills that Soldiers possess and tests each echelon of command of the SBCT. Platoons, companies, and battalions of the SBCT as well as the entire SBCT itself will conduct maneuvers to ensure unit proficiency at each successive level of Command. Small unit maneuvers at the platoon and company level typically may occur at home station. Larger unit maneuvers at the battalion and brigade level will typically occur at a satellite maneuver training area or at a combat training center. **Table 2-4** depicts the size of the unit of the SBCT and the maneuver training area it requires to conduct training to doctrinal standard. Army Training Circular 25-1 *Training Land* (Army 2004) is the Army's definitive source for defining maneuver training land requirements. These requirements were staffed by the Army Training and Doctrine command and approved and accepted by Headquarters department of the Army.

The Army uses a standardized methodology for comparing maneuver impacts of different units. This methodology takes the weights and authorized yearly mileages for unit vehicles and converts them to a unit of measure called the Maneuver Impact Mile (MIM). The MIM is a unit of measure that the Army uses to anticipate maneuver damage and required repair costs for its training areas. To calculate MIMs,

the Army converts all unit vehicles into the equivalent of M1 Abrams tanks. The Army applies different physical characteristics of unit vehicles (weight, tire/track pressure etc.) to make the conversion to M1 tank mile equivalents. The SBCT must execute 104,898 tank mile equivalents of maneuver training to carry out its doctrinal maneuver requirements in comparison to the 49,576 MIMs needed to currently support the doctrinal training of the IBCT.

Table 2-4 SBCT Training Land Requirement According to TC 25-1 Training Land

Type of Unit	Soldiers	Vehicles	Land Requirement
Platoon	18 – 39	4 – 6	6x4 km
Company Team	150 – 240	40 – 60	17x6 km
Battalion	800 – 1200	300 – 450	20x14 km
Brigade Combat Team (BCT)	4000 – 5200	1000 – 1400	50x50 km

To support SBCT training each platoon, company, battalion and brigade must conduct maneuver events to ensure the operational capabilities of the SBCT. Each platoon and company must train up to 5 weeks per year to meet maneuver training requirements. In addition, each battalion must conduct semi-annual maneuvers lasting approximately 4 to 6 weeks per year to certify its subordinate units and each brigade must conduct maneuvers every 12 to 18 months and in advance of operational deployments, as required. **Table 2-5**, taken from FM 7-1 *Training the Force* (Army 2002), illustrates the operations that must be rehearsed by the SBCT in combat maneuver training.

Table 2-5 Training Tasks for the SBCT (FM 7-1 Training the Force)

Alert and Deploy the Brigade	
▪ Draw and Upload Basic/Operational Loads ▪ Conduct Soldier Readiness/Administrative/ Logistic Preparation for Overseas Movement ▪ Deploy Advance Parties Or Liaison Officers	▪ Move by Road or Rail to Aerial Port of Embarkation (APOE) or Seaport of Embarkation (SPOE) ▪ Upload Equipment at APOE or SPOE
Conduct Attack	**Conduct Defense**
▪ Attack a Moving Enemy ▪ Attack a Stationary Enemy ▪ Movement to Contact	▪ Conduct a Mobile Defense ▪ Conduct an Area Defense
Conduct Support Operations	**Conduct Stability Operations**
▪ Domestic Support Operations ▪ Foreign Humanitarian Assistance	▪ Peacekeeping Operations ▪ Combat Terrorism ▪ Support Counter-Drug Operations
Conduct Sustainment Operations	
▪ Provide Medical Treatment and Evacuation (air and ground) ▪ Move by Air/Surface Transportation ▪ Manage Terrain	▪ Recover and Evacuate Disabled Equipment ▪ Control Reconstitution of Subordinate Units ▪ Conduct Mortuary Affairs Operations

2.3 DESCRIPTION OF THE MODULAR SBCT

An SBCT has approximately 4,000 Soldiers, 317 Stryker combat vehicles, 588 wheeled support vehicles, 18 155 mm howitzers, and numerous trailers and other pieces of equipment (**Table 2-6**). Each major unit of the SBCT is composed of a number of smaller constituent units, including battalions, companies, platoons, and squads. About half of the 4,000 Soldiers would be assigned to Infantry Battalions (**Table 2-7**). The rest would be distributed among the other battalions, companies, and platoons that comprise an SBCT (**Table 2-7**).

Table 2-6 Personnel and Equipment Breakdown

Type	Number
Soldiers	4,000
Intelligence, Surveillance, and Reconnaissance	
Unmanned aerial vehicles	4
Vehicles	
Wheeled support vehicles	588
Combat vehicles	317
Tracked	0
Major Direct Fire Systems	
Mobile gun systems	27
Javelins (Shoulder Mounted Anti-Armor Systems)	121
Anti-Tank Guided Missiles	9
Indirect Fire Systems	
Mortars	
120 mm	36
81 mm	12
60 mm	18
Howitzers	
M777	18

Table 2-7 Units in a Stryker Brigade

Unit	Assigned Personnel
Brigade Headquarters, HQ and HQ Company	131
Infantry Battalion (3 each)	2,094
Support Battalion	621
Reconnaissance, Surveillance, and Target Acquisition (RSTA) Battalion	436
Field Artillery Battalion	393
Engineer Company	127
Military Intelligence Company	79
Signal Company	70
Anti-Tank Company	54
Total	4,000

An SBCT is a rapidly deployable unit designed for early entry into operational scenarios. The SBCT is capable of deploying with all combat gear and equipment loaded on the vehicle so that it can begin supporting military operations immediately upon its arrival. The increased mobility and speed of the SBCT allows the unit to quickly respond, prevent, contain, stabilize, or resolve small-scale conflicts. An SBCT

participates in major wartime operations as a subordinate component within a division or corps, in a variety of possible roles. To deploy rapidly, the SBCT's design uses a highly mobile, medium-weight armored combat/combat support platform, which requires a minimum of logistical support so that the SBCT can act as more of an expeditionary type of unit. Preconfigured in ready-to-fight combined arms packages, the entire SBCT is designed to be rapidly deployed anywhere in the world in a few days time.

The SBCT is organized primarily as a combined arms, mounted infantry organization. The Stryker Infantry Carrier Vehicle (**Figure 2-1**) serves as the platform for infantry carriers, mobile gun systems, mortars, reconnaissance, surveillance, and target acquisition elements, anti-tank carriers, engineer mobility support vehicles, nuclear/biological/chemical reconnaissance, as well as many of the command and control carriers within the brigade. The SBCT extends the tactical mobility of Commanders in the operational theaters of war and increases the firepower available to support dismounted infantry assaults.

Figure 2-1 Stryker Infantry Carrier Vehicle

The Stryker vehicle is a combat vehicle that would traverse terrain and obstacles to ensure protected delivery of infantry squads to their dismount points. Because of the high-speed capability of the SBCT, most mounted movement takes place on roads or unrestricted terrain so that the SBCT units can fully leverage the speed of the vehicle. The Stryker can maneuver across a slope that is less than 30 percent, up a slope that is less than 60 percent, and over trees less than five inches (13 centimeters) in diameter.

The SBCT uses many of the weapon systems of traditional Army brigades. In addition to these systems, the SBCT incorporates upgraded technologies and more advanced systems including the mobile gun system, the M777 lightweight howitzer, and reconnaissance and target acquisition systems.

2.4 APPLICATION OF SCREENING CRITERIA: THE ARMY'S ALTERNATIVE SELECTION PROCESS

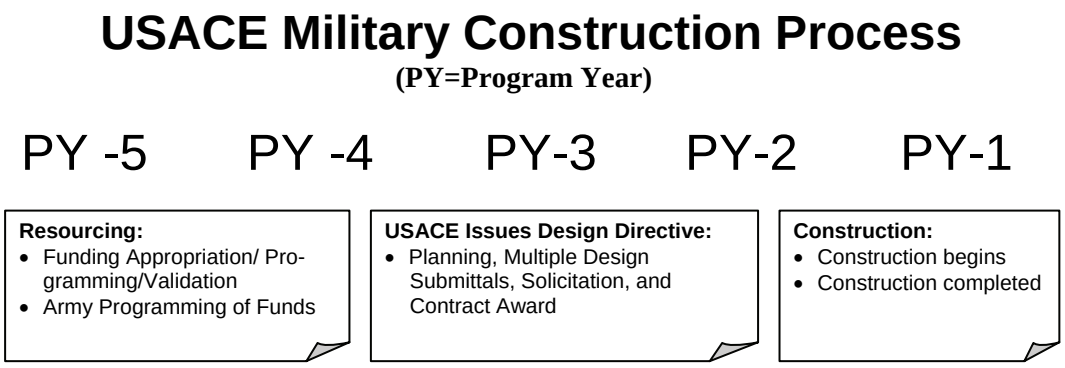
Headquarters, Department of the Army (HQDA) has spent considerable time and effort to develop the screening process for selecting installation alternatives that can adequately meet the needs of the 2/25th SBCT. All alternatives that can reasonably meet the Army's needs for transforming and permanently stationing the SBCT have been carried forward for analysis in this document. Screening criteria, which exclude installation alternatives from further consideration, are based upon the five primary areas of need for the Army to take action. These areas of need that were described in Chapter 1 include adhering to national security and defense policy, furthering Army Transformation as directed by these policies, meeting training and operational requirements for the SBCT, providing for Soldier and Family quality of life requirements, and meeting strategic deployment requirements to ensure adequate defense assets can be deployed in a timely manner around the world. The foregoing discussion further elaborated on the essential elements necessary to implement the Proposed Action based on the stated Purpose and Need in Chapter 1. Without those elements, the 2/25th cannot be home-stationed at a site that will sustain the unit and support

the needs of Soldiers and their Families. This section initially discusses factors limiting available home-station sites and then applies the screening criteria to arrive at a full range of reasonable alternatives.

2.4.1 LIMITING FACTORS INFLUENCING ARMY SCREENING CRITERIA AND ALTERNATIVES

U.S. Army Force Structure: The force structure, or types and numbers of units in the Army, is carefully deliberated, analyzed, and determined by the executive branch of government with careful consideration and input from senior national defense officials, defense planners, and senior military officers. The size and structure of the Army is modified in accordance with national security and defense policy and balanced with the realities of a changing global environment. It is not within the scope of authority of the Army to unilaterally change its prescribed force structure. This includes both the number and types of BCTs that the Army mans, equips, and trains. As part of screening analysis assumptions therefore, the number and type of BCTs in the Army cannot change, nor can the 2/25th simply not transform as it has been directed by the QDR. At this time, seven SBCTs have been determined to be required to meet national security and defense requirements and the 2/25th will be the fifth of those seven BCTs as detailed in the ACP (see Section 1.2.1.12 for discussion on the locations of the other SBCTs). The only decision that is within the scope of Army influence is the location at which it will permanently station the 2/25th SBCT upon completion of its transformation. The Army has established the appropriate balance of units between IBCTs, HBCTs, and SBCTs. The Proposed Action cannot alter that established balance by either reducing the number or type of established BCTs in favor of another type of BCT. The balance is established and cannot be revisited by this document or the decision it supports.

Military Construction (MILCON) Limitations: This chapter has already discussed the need for specific facilities to support Soldiers and their Families. If these facilities do not exist, they must be constructed in a timely manner to support the 2/25th after it returns from scheduled deployment at the end of 2008. The Army military construction process for installation facilities and ranges is executed by the USACE. USACE follows a standard construction process for both range infrastructure and garrison construction projects. Funding appropriation and programming must begin more than 5 years before the start of a given construction project. Submitting project requests and subsequent congressional appropriation, budget validations and Army programming of funds typically requires 2 years within the MILCON process. It normally takes USACE an additional 3 years or more, following the programming of funds, to plan, design, review, award, and construct military construction projects. This process includes site-specific planning, multiple design reviews, award of the contract, and construction. The diagram below details the 5-year military construction planning process for Army projects. This timeline is used by USACE for garrison support projects, to include Soldier housing, administrative offices, vehicle maintenance and parking facilities, and training range construction.



Facilities for training, garrison operations, and Soldiers and their Family quality of life are critical for supporting the operations of the 2/25th SBCT and the need for the Proposed Action. Not having the adequate facilities for housing, training, administering, and maintaining the 2/25th SBCT is not an option, nor can the 2/25th afford to wait several years for the facilities to become available. To maintain its combat readiness and support operational requirements, the 2/25th SBCT must have the facilities and ranges available for use directly following the unit's arrival at its permanent stationing location. The time required for this will be when the unit returns from its initial combat mission. For planning purposes, this date is assumed to be the end of 2008. The time frame of the MILCON process will not meet the need for action if necessary projects have not been planned, programmed, and budgeted. Because military construction will not adequately address the permanent stationing needs of the SBCT, the installation where the 2/25th is permanently stationed must currently have a majority of the training ranges and facilities it requires to support its Soldiers, Families, vehicles, and equipment or they must have already been planned for near-term construction. Installations not capable of meeting the immediate near-term range and/or garrison facilities to include Soldier and Family housing requirements of the 2/25th SBCT will not meet the Purpose and Need for the stationing action.

Currently, the Army has extremely limited excess facilities capacity to support the stationing of Soldiers because of GDPR, BRAC 2005, and AMF initiatives. No installation currently has the excess capacity to accommodate a full SBCT without significantly relying on MILCON to address large shortages in required facilities. As previously stated, the programming, budgeting, and construction process of MILCON does not adequately address the near-term needs of the SBCT and would require a minimum of 5 years to implement. Therefore, the only viable alternatives involve the exchange of a BCT from another installation so that its vacated facilities can accommodate a majority of 2/25th SBCT requirements. While this solution does not provide for the exact facility requirements of the SBCT, it would adequately support a majority of the needs of the 2/25th in a timely manner that would allow it to maintain its operational readiness. Alternatives to conduct an exchange of BCT from the 2/25th's current location at SBMR are therefore the only viable courses of action that can be carried forward to meet the Purpose and Need for stationing of the 2/25th SBCT.

It should be noted that the Army is currently engaged in an effort to analyze potential Army growth. This growth however, is planned and the necessary facilities will be programmed with congressional approval through the military construction process. This growth requires new construction and would not occur within the time frame required to meet the needs of the stationing of an existing unit, such as the 2/25th.[2]

2.4.2 APPLICATION OF SCREENING CRITERIA TO IDENTIFY A FULL RANGE OF REASONABLE ALTERNATIVES:

The Army used the elements of need for the proposed action in conjunction with other external limiting factors to narrow the field of installations to those capable of supporting the requirements of the 2/25th SBCT. This section describes the Army's decision-making process for selecting and analyzing viable al-

[2] The Army is operating under FY07 National Defense Authorization Act (NDAA). The FY07 NDAA amended 10 U.S.C. § 619(b). As amended, 10 U.S.C. § 619(b) states that unless otherwise provided for by law, the Army's permanent minimum active duty end-strength may not be less than 512,400. The FY07 NDAA also authorized the Secretary of Defense to increase the Army active duty end-strength up to 532,400 for FY08 and FY09. The Army's intent is to continue to increase the strength in accordance with Congressional authorizations in order to meet the manning requirements as defined in current force structure documents.

ternatives that could meet the Purpose and Need for the stationing of the 2/25th. The screening criteria include: training infrastructure, garrison support infrastructure, special mission requirements, maneuver training land, and regional strategic considerations. These screening criteria were applied to the full range of reasonable alternatives to determine the installation locations that meet the five primary areas of need for the implementation of the proposed action. The Army did not arbitrarily exclude or eliminate any potential alternatives from consideration in its assessment of alternatives for permanently stationing the 2/25th. The Army initially considered the full spectrum of Army installations as potential sites. Many Army facilities, such as Army ammunition production facilities and Army National Guard or Reserve Component training sites were eliminated for the reasons discussed below because they did not meet one or more of the screening criteria. The installations that were ultimately determined to be reasonable alternatives met all of the screening criteria. These reasonable alternatives for permanently stationing the 2/25th SBCT are Hawaii, Colorado, and Alaska.

1) **Training Infrastructure:** As previously discussed in Chapters 1 and 2, the ability to support the training of the SBCT is an essential element of need for the Proposed Action. As part of the transformation process, the Army has conducted an ambitious modernization program for its training ranges and infrastructure. To maintain its training proficiency the SBCT must have access to the standardized set of modernized ranges and digital training facilities to maintain its required training proficiency. Because of resource limitations, the Army has only been able to conduct range modernization fully at the major Active Duty training installations. In general, National Guard and Army Reserve installations have not yet been able to complete the full measure of range modernization that is required to test the combat capabilities of the SBCT fully. The few National Guard and Reserve installations that have undergone a significant level of modernization, such as Fort Dix, New Jersey and Camp Shelby, Mississippi, are fully engaged with missions to mobilize, train, and deploy National Guard and Reserve Soldiers, and these installations do not have the extra range capacity to support the 2/25th. Those installations that have not undergone significant training and range modernization activities have been eliminated as potential stationing alternatives. **Table 2-8** excludes reserve component facilities, installations with a munitions testing mission, administrative installations, and industrial production facilities. **Table 2-8** depicts those installations which have undergone range modernization and could support many of the requirements of the 2/25th.

Table 2-8 Army Installations That Have Active Duty Training

Camp Bullis	Fort Campbell	Fort Huachuca	Fort Lewis	Fort Sam Houston
Fort A.P. Hill	Fort Carson	Fort Irwin	Fort Polk	Fort Sill
Fort Belvoir	Fort Drum	Fort Jackson	Fort Richardson	Fort Stewart
Fort Benning	Fort Eustis	Fort Knox	Fort Riley	Fort Story
Fort Bliss	Fort Gordon	Fort Lee	Fort Rucker	Fort Wainwright
Fort Bragg	Fort Hood	Fort Leonard Wood	Schofield Barracks Mil. Reservation	

2) **Garrison Support Infrastructure:** The Proposed Action to permanently station an SBCT requires numerous garrison facilities, housing, and quality of life infrastructure as referenced as primary screening number 1 earlier in this chapter. These facilities support the maintenance and operations of the SBCT are required for the unit's Soldiers and Families. Facilities that are required to support the SBCT include administrative offices, vehicle parking, dining facilities, housing, medical facilities, schools, and gymnasiums to list a few. As discussed, new unprogrammed military construction is not an option that can be executed swiftly enough to satisfy the garrison or training infrastructure requirements of the SBCT. In addition, eliminating a modular brigade from the Army's approved force structure is also not an alternative that would allow the Army to continue to meet all of its national security and defense responsibilities. The only way to meet the majority of garrison facilities re-

quirements for the permanent stationing of the 2/25th is to swap a unit currently stationed at an existing installation with the 2/25th. This would allow the 2/25th to use the facilities vacated by the previous BCT to support a majority of its garrison facility needs.

Under transformation, the Army only possesses three types of modular BCTs. These include the Infantry or IBCT, the Heavy or HBCT, and the SBCT. The Army has determined that the stationing of an HBCT in Hawaii, with mechanized infantry, M1 Abrams tanks, and heavily armored forces would not meet compatible land use training objectives or training land sustainability goals. The Army has therefore ruled out exchanging the SBCT with installations where only HBCTs are currently stationed, as this would entail exchanging an HBCT back to SBMR. Installations that accommodate only HBCTs that were screened from further consideration include Fort Stewart, Fort Bliss, Fort Hood, and Fort Benning. In addition, installations where only SBCTs are currently stationed, including Fort Lewis and Fort Wainwright, were also discarded because there are only SBCTs available to exchange with the 2/25th, which defeats any point in exchanging units. When examining the remaining candidates that can exchange a modular BCT with the transformed 2/25th to provide the necessary infrastructure for the 2/25th in a timely manner, the remaining viable options are active duty installations that are currently stationing an IBCT. This subset of Army installations currently stationing IBCTs are the only subset of stationing locations that can provide a majority of garrison and quality of life facilities needed to support the 2/25th in the time frame required for the permanent stationing action. While it is possible to execute multiple BCT stationing moves to exchange the HBCT for the 2/25th and send an IBCT to SBMR, the disruption of multiple sets of BCTs and their Families during times of such frequent deployment violates the Army's stated need for action of providing a high quality of life for its Soldiers and their Families. **Table 2-9** below depicts the remaining installations that remain viable possibilities for meeting the Purpose and Need for the transformation and permanent stationing of the 2/25th.

Table 2-9 Active Duty Army Installations That Have an Infantry Brigade Combat Team to Exchange with Hawaii

Fort Richardson	Fort Carson	Fort Knox
Fort Polk	Fort Drum	Fort Bragg
Fort Riley	Fort Campbell	Schofield Barracks Mil. Res.

3) **Installations with Special Mission Requirements (Airborne, Air Assault):** Select Army installations support unique strategic mission requirements and capabilities. Some of these capabilities include the 101st Air Assault Divisions (Fort Campbell) unique requirement to be air assault capable, or the 82nd Airborne Divisions (Fort Bragg) requirements for airborne qualification of all of its Soldiers and the need for the units of the 82nd to conduct rapid early entry deployments. These special divisions must maintain their operational capabilities and integrity as air assault and airborne divisions. In addition, these units have special deployment requirements which include special deployment timeframes and parachute and helicopter transportable equipment. The SBCT could not be integrated with the 101st or 82nd in an effective manner when exchanging one of its BCTs back to Hawaii and it does not possess the equipment which meets airborne or air assault specifications. **Table 2-10** depicts the installations that remain viable stationing locations following these considerations.

Table 2-10 Remaining Installations After Special Mission Installations are Discarded

Fort Richardson	Fort Carson	Fort Knox
Fort Polk	Fort Drum	Fort Riley
Schofield Barracks Mil. Res.		

4) **Maneuver Training Land Requirements**: With its increased speed and maneuverability, the SBCT requires the use of considerable maneuver land resources. Maneuver lands must be capable of supporting the training tasks required to rehearse the full spectrum of war and peacetime support operations. The presence of adequate maneuver space is critical to allowing the SBCT to train to the full capability of its vehicle, weapon, reconnaissance, and communication systems. Without adequate training land, the SBCT cannot train to doctrinal standards and properly prepare itself for missions in operational theaters abroad. The standard doctrinal maneuver land requirements for the SBCT are defined in Army Training Circular 25-1 *Training Land* (Army 2004). The SBCT doctrinally requires in excess of 140,000 acres of maneuver space to train to doctrinal maneuver standards. Of the installations remaining, installations that do not possess maneuver training lands of at least 75 percent of the total doctrinally required training lands (105,000 acres) to support the 2/25th SBCT have been excluded from further analysis. These installations would not be able to adequately support the dispersed maneuver training concepts and training doctrine of the SBCT, and the lack of training land would limit the overall ability of the SBTC to achieve a state of training readiness for operational deployment.

In addition to having adequately sized maneuver space within which to operate, scheduling availability of training lands for unit maneuvers and land sustainability are key factors for consideration. Installations supporting multiple units and the many subordinate units within the SBCT may have difficulty meeting all of the maneuver training demands for these units. These installations may also have difficulty maintaining maneuver lands to support training activities if severe training land shortfalls exist. HQDA has conducted an analysis to determine the total land shortfall that would exist for the installations that remain in consideration for the stationing of the 2/25th SBCT. A critical limit has been determined to exist for which scheduling of maneuver land for training and sustainment reach critical thresholds. If an installation training land deficit is twice as large as the training land the installation has available to support all of its supported units maneuver space requirements, then the installation was determined to be incapable of supporting the SBCT's maneuver training requirements without significant impairment to SBCT maneuver training. Installations that did not meet this critical threshold were excluded from further consideration on the grounds that lack of available maneuver lands would lead to scheduling conflicts, an inability to maintain the maneuver lands for training, and an overall impairment of SBCT maneuver training.

Table 2-11 provides the amount of maneuver land available at remaining candidate installations, their total land requirement to support all unit maneuver training activities for units stationed there, and the total deficit of maneuver training land that would be experienced at the installation. These calculations assume the 2/25th has been exchanged for the IBCT for all installation locations with the exception of Hawaii. Those installations whose training land deficit is twice as large as the amount of training land available have been determined to be unable to meet the increased maneuver training requirements of the SBCT. The total maneuver land deficit factor is presented below as a ratio of land deficit to maneuver land available for training. Any deficit less than -2.00 has been excluded from further analysis as a viable alternative on the grounds that scheduling conflicts and the ability to maintain the land for training would become significant issues.

The only installations remaining in the alternatives selection process are those installations that have access to satellite maneuver training areas to meet the maneuver requirements of the SBCT. The sites remaining for analysis possess a minimum of 105,000 acres (75 percent of the doctrinal requirement) of maneuver training land required for the 2/25th and are not experiencing major training land deficit ratios of less than -2.00 for their supported units. Viable installations that remain candidates for the stationing of the 2/25th SBCT include SBMR and Hawaiian training sites, Fort Richardson in conjunction with Donnelly Training Area (DTA), and Fort Carson in conjunction with the Piñon Canyon Maneuver Site (PCMS). Fort Riley, Fort Drum, Fort Polk, and Fort Knox are all considerably short of

the minimum 105,000 acres of maneuver land required to train the SBCT, and all of these installations have maneuver land deficit ratios of less than -2.00 for the training lands that would be needed to support the increased maneuver training land requirements of the 2/25th SBCT. **Table 2-12** below depicts the installations that remain as viable stationing locations for the 2/25th SBCT.

Table 2-11 Maneuver and Training Land Availability Assuming Stationing of the 2/25th at Each Installation

	Ft. Richardson and Donnelly TA	Ft. Carson and Piñon Canyon MS	U.S. Army Garrison Hawaii	Fort Knox	Fort Riley	Fort Polk	Fort Drum
Current Training Acre (acres)							
Total	563,830	305,617	121,702[1]	46,045	70,118	136,776	74,996
Stationed Units (with the addition of the 2/25th SBCT)							
HBCT	0	3	0	0	2	0	0
IBCT	0	0	1	0	0	2.5 (JRTC)	2
SBCT	2	1	1	1	1	1	1
Land Deficit							
Maneuver Land Deficit (acres)	0	535,848	159,225	96,789	395,630	351,291	344,024
Land Deficit Factor[2]	0	-1.75	-1.31	-2.10	-5.64	-2.57	-4.59
Land Status[3]	Green	Amber	Amber	Red	Red	Red	Red

[1] This figure includes the ranges at Makua Military Reservation. Live-fire training is not currently allowed at this location. If Makua's 4,227 acres were excluded, the resulting Hawaii deficit would be lower.
[2] Land Deficit Factor: Higher number is better; negative numbers indicate less land is available than what is required
[3] Green – Meets full SBCT training requirement
Amber – SBCT training requirements can be met with significant adjustments
Red – Incapable of meeting SBCT maneuver training requirements, less than 50 percent of doctrinal training lands

Table 2-12 Installations Capable of Meeting Minimum Maneuver Land Thresholds

Fort Richardson and Donnelly Training Area	Fort Carson and Piñon Canyon Maneuver Site	Schofield Barracks Military Reservation

5) **Regional Strategic Considerations:** The installations that remain as viable stationing locations for the 2/25th SBCT are all capable of rapidly deploying to support contingency operations in regional areas of interest around the globe as are required by the national security and defense policy. All of these installations have access to considerable air transport capabilities and, in the case of SBMR and Fort Richardson, sea deployment facilities are also readily available to provide greater strategic flexibility. While there are considerable geographic differences in the locations of the installations that present strategic advantages, the capacity of large-scale modernized air deployment facilities at each of the remaining alternatives serves to mitigate the differences in geographic location. Because of this, all three remaining installations remain viable alternatives for analysis as stationing locations for the 2/25th SBCT.

Army Screening Process Summary: In selecting the permanent stationing location for the 2/25th SBCT, the Army is evaluating the ability of alternative locations to support the needs and requirements of the 2/25th SBCT while taking environmental, social, and public considerations into account. Sections 1.2 and 1.3 define the Army's need and purpose for stationing the 2/25th SBCT, and these needs have been broken

out for further consideration in **Table 2-13** below. The table below provides a consolidated qualitative comparison of installation stationing alternatives and summarizes discussion of the ability of these locations to support the requirements of the 2/25th SBCT.

Table 2-13 Comparison of Army Installation Stationing Locations

	Alternative A – Hawaii	Alternative B – Alaska	Alternative C – Colorado
Training Ranges	**Adequate** Supports the range requirements of the 2/25th. Would require the construction or modification of 3 or more training ranges, however because most ranges are already programmed ranges would be available in a shorter timeframe to support the 2/25th.	**Highly Favorable** Supports range requirements of the 2/25th. Would require the construction of less than 3 training ranges (Urban Assault Course, Multi-purpose Machine Gun Range). BAX at DTA will be ready for operations in 2009.	**Adequate** Would require the construction of 3 or more ranges. A BAX would not be able to be constructed because of space limitations at Fort Carson and above ground gas pipelines located on Piñon Canyon. 2/25th would need to be forced to use existing Digital Multi-purpose Range Complex as a substitute to meet training requirements.
Maneuver Training Land	**Adequate** Land resources are capable of supporting maneuver training of the 2/25th, though shortfalls exist in meeting the full doctrinal maneuver training requirement of the SBCT.	**Adequate** Land resources are fully capable of supporting the full maneuver land requirement of the 2/25th. However, long spring/fall melt seasons and wet conditions limit maneuver training.	**Adequate** Land resources are capable of supporting maneuver training requirement of the 2/25th, but maneuver land shortfall exists for all units stationed at Fort Carson.
Garrison Support Infrastructure	**Highly Favorable** Garrison possesses necessary parking, office space and garrison infrastructure to support the 2/25th.	**Adequate** Outdated temporary facilities initially available to support garrison requirements of 2/25th. Space available and projects are programmed to renovate these facilities.	**Significantly Constrained** Limited availability of combat vehicle parking space and outdated office space. No space within the BCT area for expansion of facilities. Some elements of the 2/25th would need to park on unimproved surface separated from the unit maintenance area.
Soldier and Family Quality of Life	**Highly Favorable** Family Housing and Single Soldier Barracks will be available to meet the requirements of the 2/25th.	**Adequate** Outdated temporary facilities are initially on hand to support single Soldier housing. Surrounding community has adequate capacity to accommodate Families off-post as new housing is constructed.	**Significantly Constrained** Some single enlisted Soldiers would be required to live off-post. Shortfalls in Family and Single Soldier housing would occur until additional facilities could be constructed. Off-post shortfalls exist in Family Housing availability.
Strategic Deployment Capability	**Highly Favorable** Alternative has capacity for C-17 airlift and sealift capability. Installation location facilitates deployment to key regions of interest to include the Pacific Rim.	**Highly Favorable** Alternative has capacity for C-17 airlift and sealift capability. Installation location facilitates deployment to key regions of interest to include the Pacific Rim.	**Significantly Constrained** Alternative has strategic airlift capability, but would require rail transport to reach major sea port facilities for deployment and mobilization. Significant numbers of C-17 aircraft are not collocated with the SBCT.

Qualitative ratings provided below include "Significantly Constrained"; meaning conditions are not supportive of the needs of the 2/25th SBCT. "Adequate" indicates the requirements of the 2/25th would not be hindered by the conditions at the alternative stationing location, but conditions are less than ideal. "Highly Favorable" indicates the conditions at the alternative installation stationing location are highly supportive of the needs of the 2/25th SBCT. A summary discussion is provided that articulates the rating given for each area of need under each alternative considered.

2.5 ALTERNATIVE A: PERMANENTLY STATION THE 2/25TH SBCT AT SCHOFIELD BARRACKS MILITARY RESERVATION (SBMR) WHILE CONDUCTING REQUIRED TRAINING AT MILITARY TRAINING SITES IN HAWAII

Summary Description: Under this alternative, the Army would permanently home station the 2/25th SBCT in Hawaii. This action would include all of the activities needed to implement the Proposed Action including the training, garrison operations, deployment, Soldier and Family quality of life, and other needs for meeting the requirements of the 2/25th SBCT. The 2/25th SBCT would be stationed at SBMR and would conduct garrison operations at this location. Training would be conducted at and across a number of other training areas in Hawaii (**Figure 2-2**). SBMR includes Schofield Barracks Main Post (SBMP), South Range Acquisition Area (SRAA) and Schofield Barracks East Range (SBER). In addition, the SBCT would train at Dillingham Military Reservation (DMR), Kahuku Training Area (KTA), Kawailoa Training Area (KLOA), and Wheeler Army Airfield (WAAF) on Oahu. On the Island of Hawaii, the SBCT would train at Pohakuloa Training Area (PTA) Keamuku parcel and Bradshaw Army Airfield (BAAF). SBCT training requirements are not dependent on the use of Makua Military Reservation (MMR). While the MMR is an integral part of USAG-HI training capabilities and historically used by other services, SBCT units could perform dismounted CALFEX training at other ranges. SBCT may use MMR if the range were available and only after completion of the Makua EIS and ROD. The Makua EIS will analyze the potential environmental impacts associated with dismounted CALFEXs for both current forces and SBCT; therefore, this SBCT EIS does not analyze training impacts of SBCT at MMR. These training resources include an assortment of live-fire and non-live-fire maneuver training facilities, fixed-position live-fire training facilities, infantry and engineer demolition training facilities, grenade training facilities, and an urban assault course.

It should be noted that a majority of the facilities projects required to implement the Proposed Action that are discussed as part of Alternative A are not specific to the SBCT. Many of these projects would be needed to support the exchange of a modular IBCT back to Hawaii if Alternatives B or C were chosen and the 2/25th SBCT is stationed in Alaska or Colorado. Certain projects discussed in Alternative A are Stryker specific; however, and are not carried forward as part of Alternatives B or C in Hawaii. These projects are discussed in more detail as part of those alternatives.

Since the 2004 FEIS for transformation of the 2/25th to an SBCT in Hawaii, many of the cantonment support projects detailed in the EIS have been completed or are currently in their final stages of completion. These projects are being used by USAG-HI to support its units and have not been enjoined by court order. These projects and their use have been incorporated into the no-action alternative and baseline conditions for analysis. Projects proposed in 2004 that are complete or are in there final stages of completion and are part of the baseline condition for this analysis include:

1) The Urban Assault Course (SBMR)

2) Motor Pool and Maintenance Shops (SBMR)

3) Tactical Vehicle Wash Facility (SBMR- East Range)

4) Qualification Training Range 1 (SBMR)

5) Multiple Deployment Facility

6) Upgrade of Firing Range 11T for Mobile Gun System qualifications (PTA)

Figure 2-2 SBCT Project Locations in Hawaii

In addition, several projects from the 2004 EIS have been completed or are partially complete though their use is currently enjoined. The baseline conditions used for analysis and comparison of alternatives in this document include current existing conditions. Construction projects that have begun and are nearing completion include:

1) Qualification Range 2 (South Range Acquisition Area) – 80 percent construction complete

2) Battle Area Complex (SBMR) – partial construction complete

3) Installation Information Infrastructure (PTA) – partially complete

4) Fixed Tactical Internet (SBMR and PTA) – complete

In addition to these projects, several land easement and acquisition projects have already taken place though use of the land by the 2/25th is currently enjoined. These land easement and acquisition projects that are included as part of the baseline condition since the original 2004 EIS include:

1) The South Range Acquisition Area

2) The west PTA maneuver training land acquisition area

3) Land easement for Schofield to Helemano trail construction.

These projects that have been completed and are discussed above set the baseline conditions for analysis for what is required to support action alternatives.

Cantonment Construction: In order to implement the Proposed Action, USAG-HI would undertake some limited garrison support facilities construction to provide for the cantonment requirements of the 2/25th SBCT. Currently, SBMR has the required barracks space for single enlisted Soldiers to support the increased Soldier housing requirements of the SBCT. In addition, military vehicle parking and maintenance facilities to accommodate the SBCT are 60 percent complete and scheduled for completion in March of 2008. These facilities would meet the increased vehicle parking and vehicle maintenance requirements of the SBCT. Office space is also available to support the administrative requirements of the SBCT and a majority of family housing needs can be met on post and in the surrounding community, though some of the family housing on SBMR is in need of renovation.

Training Range and Training Support Infrastructure Construction: Training projects that are required to implement the proposed stationing action are listed below. Projects that are underlined include those projects that are needed to support the unique needs of a Stryker unit specifically. Projects below that are not underlined are needed to support the stationing of the 2/25th but are not projects that are unique to the needs of an SBCT. Projects that would be conducted as part of alternative A include:

1) Range Control/Training Support Facility (SBMR)
2) <u>The Battle Area Complex (SBMR)</u> – Construction would be completed
3) Completion of Qualification Training Range, QTR2 (South Range Acquisition Area)
4) Upgrade of Wheeler Army Airfield
5) <u>Land Easement and Road Construction between SBMR and DMR</u>
6) Tactical Vehicle Wash Facility (KTA)

7) Combined Arms Collective Training Facility (KTA)
8) Land Easement and Road Construction for SBMR to Helemano
9) The Battle Area Complex (PTA)
10) Anti-armor Live Fire Tracking Range (PTA)
11) Land Easement and Military Vehicle Trail Construction between PTA and Kawaihae
12) Ammunition Storage Building (PTA)
13) Tactical Vehicle Wash Facility (PTA)
14) Range Maintenance Facility (PTA)
15) Runway Upgrade and Extension of Bradshaw Army Air Field (PTA)
16) Completion of Installation Information Infrastructure Architecture (PTA)

The completion of these 16 projects is critical for supporting the training requirements of the 2/25th and providing the facilities needed to support required training events. These projects were described in detail in the 2/25th Infantry Division (Light) transformation EIS, which was completed in 2004. Of these 16 projects, only five are specific to the requirements of the SBCT. These projects include the two BAX projects planned for construction at SBMR and PTA. The BAX is a critical range for training and testing the SBCT's capabilities. This 4 km by 2.4 km range area stresses integration of SBCT units in their ability to conduct synchronized unit combat training tasks. These facilities would be constructed at PTA and SBMR as part of the alternative to station these units in Hawaii. The range maintenance facility at PTA would be needed to store targetry and equipment to support the PTA BAX and is therefore is specifically required by the SBCT. In addition to these projects, other Stryker specific projects include road construction and grading would need to take place to allow the Stryker vehicles to traverse the SBMR road network to access DMR and other training areas using the Dillingham and Helemano trails. The road to DMR would require construction of a 15-foot wide gravel shoulder to allow for its use by the Stryker and construction of the Helemano trail would be required to allow Stryker units to access additional training areas from SBMR.

In addition to Stryker-specific training range and training infrastructure support projects, many other projects are needed to support the general training requirements needed to support Army transformation and QDR decisions. To support the air deployment requirements the 2/25th will require the upgrade of the C-130 Airfield at WAAF and the extension of Bradshaw Army air field to allow for additional aircraft of larger cargo capacity to facilitate rapid deployment. QTR 2 on the SRAA of SBMR will require completion to ensure Soldiers can conduct necessary weapons qualification in a time efficient manner. Furthermore, the anti-armor live fire tracking range scheduled for construction at PTA and the combined arms collective training facility at KTA to allow Soldiers to practice and rehearse urban combat tasks would need to be constructed. The PTA Kawaihae vehicle trail would be built to allow military vehicles to access PTA. In addition to these facilities, tactical vehicle wash facilities will be needed at KTA and PTA to maintain and clean vehicles following training events and a facility that can store ammunition for the 2/25th at PTA would be required. Finally, a range operations center would be needed to serve as a training support center at SBMR to coordinate the multiple training activities scheduled to take place there.

Live-Fire Range Use: In order to implement the Proposed Action, the SBCT would use new and existing live-fire ranges and firing points to satisfy its training requirements. Use of ranges on the SRAA, such as QTR 2, and the use of new ranges such as the CACTF and BAX, would be required to support the 2/25th SBCT. At a minimum, all Soldiers in the 2/25th SBCT would qualify on individual and crew/vehicle weapons at least twice per year. In addition, platoons and companies of the 2/25th would conduct collec-

tive live-fire training exercises on firing ranges to ensure they have rehearsed and coordinated battle procedures and are prepared to deploy to support wartime operations. The SBCT would conduct CALFEX up to the company level, battalion, and Brigade level. SBCT CALFEXs would occur at several ranges throughout Hawaii. These ranges include company level capability at the BAX planned at SBMR and potentially brigade level live-fire capability at PTA. MMR would be used to support company level live-fire training of the 2/25th SBCT if available. In addition to conducting coordinated live-fire training exercises using the BAX, the 2/25th would also conduct 105 mm Mobile Gun System (MGS) qualifications on PTA range 11T.

Use of pyrotechnics, obscurants, and simulators is anticipated to be similar to current force use. All SBCT training would be planned and conducted in accordance with established USAG-HI range and training land regulations and standard operational procedures (SOPs). The SBCT would use the same weapons and munitions as the 2/25th Infantry Brigade (Light) had used, with the addition of the 105 mm mobile gun system on the Stryker and the 120 mm mortar and a change from 12 105 mm howitzers to 18 155 mm howitzers. While a majority of the weapons systems and munitions are the same, the level of live-fire training activity and number of rounds fired would increase. The SBCT is authorized more than 13 million rounds of training ammunition to conduct its live-fire qualifications in comparison to the IBCT's training requirements to fire approximately 6.9 million training rounds and munitions. As discussed, majority of this ordnance is small arms ammunition used for the weapons qualification of Soldiers on their individual and crew served weapons on designated live-fire training facilities. **Table 2-3** defines the ammunition that is authorized for an IBCT under the No Action alternative and the SBCT.

As discussed above, the SBCT would meet its individual, crew served (multi-person), and collective unit live-fire training requirements. Live-fire training facilities would be located at different training sites in Hawaii as part of this alternative. A vast majority of the increase in live-fire activities would occur at SBMR and PTA, because these are the primary locations where Soldiers conduct weapons qualifications. The descriptions below capture where a majority of increased live-fire qualifications will occur.

<u>25 Meter Zero Range:</u> The SBCT would use this range to train Soldiers in basic marksmanship. It would be used to support M16 or M4 rifle firing as well as that of crew served machine guns. This range is currently located at SBMR.

<u>Qualification Training Range (QTR):</u> The SBCT would use two QTRs to maintain proficiency in basic marksmanship skills. The QTR is a multi-functional range that can also meet the training requirements of the MRF when land may not be readily available for several different types of ranges. The QTRs would be used to qualify Soldiers on pistol qualification and basic rifle marksmanship, machine gun qualification. Because USAG-HI lacks a MK-19 range, the MK-19 would be fired on the QTR1. The 2/25th would train on the QTR at SBMR and SBMR (South Range).

<u>Hand Grenade Qualification Course:</u> The Soldiers of the 2/25th would train on techniques for employing hand grenades in close combat at SBMR.

<u>Anti-Armor Tracking Range:</u> The SBCT would use this range complex to meet training requirements for medium and heavy anti-armor weapons systems. This range is used to train Soldiers in identifying, tracking, targeting, engaging, and defeating moving armor targets individually or in tactical array. The 2/25th would engage in live-fire qualification requirements for anti-armor tracking at PTA.

<u>Battle Area Complex (BAX):</u> SBCT crews and dismounted Soldiers would use the BAX constructed at PTA and SBMR to test their ability to detect, engage, and defeat stationary and moving enemy targets in open and urban terrain. The BAX would be used for company CALFEXs at SBMR and up to battalion or

brigade CALFEXs at PTA. The BAX would be used by the MGS for gunnery training and it would be used by Stryker reconnaissance and infantry units for conducting collective operations.

Urban Assault Course (UAC): The 2/25th would use this facility to train its individual Soldiers, squads, and platoons on tasks necessary to operate within a built-up/urban area. Some stations of the UAC involve live-fire training while others involve training with simulated and blank rounds. The UAC live-fire training would take place at SBMR.

Combined Arms Collective Training Facility (CACTF): The 2/25th would use this facility to conduct clearing, breaching, offensive and defensive operations in an urban setting. It provides an urban environment for the SBCT to practice combat skills. SBCT live-fire CACTF training would occur at KTA. Simulated munitions are used to accomplish urban training at KTA.

Impact Areas: The impact areas within USAG-HI would be impacted by the increased firing activities of SBCT Artillery, mortars and indirect fires. The SBCT would use existing firing points to conduct increased levels of indirect fires training. The SBCT comes equipped with 155 mm howitzers, which are a larger caliber than the 105 caliber howitzers used by the 2/25th Brigade Light.

Increased live-fire training activities would occur at SBMR to support Soldier and Crew qualifications while a greater frequency of company and battalion CALFEXs would increase the live-fire training activities at PTA. In addition, more blank rounds and simulated munitions or short range training ammunition (SRTA) would be used at KTA to support urban operations training. If MMR is available for live-fire training, it would also experience increased frequency of live-fire activity to support company level CALFEX and other combined arms training events. All required uses of MMR are being addressed in a separate NEPA document.

Maneuver Training: The stationing of the 2/25th SBCT would involve a considerable increase in the amount and scale of maneuver training that takes place in Hawaii. To implement fully the maneuver training of the 2/25th in Hawaii, the SBCT would need to train and access parcels of land acquired or otherwise used to support its increased requirements. The SBCT would require the use of Dillingham Road and would need to widen and upgrade the road to support the SBCT so that it could access training ranges of DMR using the Road instead of public roads, and the 2/25th would require the use of the Helemano Trail for its units. In addition, the SBCT would require use of the West PTA acquisition area (WPAA) to provide for brigade maneuver and live-fire operations, the use of the SRAA to conduct training range qualifications. The PTA Kawaihae trail would be needed to provide military vehicle access to PTA.

Units at all levels would conduct maneuver training across the full spectrum of maneuver operations to be properly prepared for operational deployment. Small unit maneuvers at the squad, platoon, and company level would typically take place at SBMR and the SRAA. Platoons would be anticipated to train up to 5 weeks each at SBMR to support doctrinal maneuver requirements. The SBCT has 27 infantry platoons and additional reconnaissance platoons that would be required to conduct maneuver training for up to 5 weeks each at SBMR. This represents a 50 percent increase in the frequency of small unit training maneuvers that are anticipated from would be required to support current maneuver training requirements for the 2/25th Infantry Brigade Light and its 18 maneuver and reconnaissance platoons.

The companies of the 2/25th are also required to conduct up to 5 weeks of maneuver training per year. Training frequencies to support the increased number of SBCT's 12 maneuver companies versus the previous requirements for the eight companies of the 2/25th Light would also be expected to increase by as much as 50 percent. Maneuver training for larger units at the battalion level would be anticipated to increase from 6 annual events to 8 events to support the semi-annual maneuver training requirements of

2/25th infantry and reconnaissance battalions. The frequency of Brigade level maneuver rotations every 12 to 18 months would not differ between the 2/25th SBCT and the previous infantry brigade.

A majority of these larger unit maneuvers at the company level and above would take place at PTA, as it is the largest maneuver training site and can best support doctrinal training requirements. An increase in the frequency of maneuver training rotations of up to 50 percent would be required to support the maneuver training requirements of the 2/25th. In addition, the land acquired by the Army to augment the size of PTA would be needed to support brigade-level maneuvers effectively. The 2/25th SBCT is projected to execute approximately 75 percent of its maneuver training miles to support company, battalion, and brigade requirements. PTA would be the primary site for the execution of maneuver training at these levels of training. SBMR and the SRAA would support a majority of the remaining 25 percent of the SBCT's maneuver requirements with additional urban maneuver training taking place at KTA. **Table 2-4** depicts the doctrinally required maneuver land areas needed to support different echelons of SBCT training. The SBCT will use available maneuver training resources in a manner which best allows them to meet doctrinal standards.

As described in the Proposed Action, the Army uses a standardized methodology for comparing maneuver impacts of different units. This methodology takes the weights and authorized yearly mileages for unit vehicles and converts them to MIMs, which is the number of M1 tank mile equivalents. The 2/25th SBCT would execute the full range of doctrinally required maneuver training tasks and events to support its operational deployment requirements. To do this the BCT would be anticipated to execute 104,898 MIMs or tank mile equivalents. This represents a 211 percent increase in maneuver mile equivalents that would be executed by the SBCT in Hawaii compared to the IBCTs requirements to execute 49,576 MIMs.

2.6 ALTERNATIVE B: PERMANENTLY STATION THE 2/25TH SBCT AT FORT RICHARDSON WHILE CONDUCTING REQUIRED TRAINING AT MILITARY TRAINING SITES IN ALASKA

Summary Description: Under this alternative, the Army would permanently home station the 2/25th SBCT at Fort Richardson, Alaska (**Figure 2-3**). The 2/25th would return to Fort Richardson at the end of 2008 upon completion of its scheduled deployment. The 2/25th would conduct all activities needed to support the Proposed Action to include full training, garrison operations, deployment, providing for Soldier and Family quality of life and the strategic needs of the U.S. Army. Garrison operations, unit weapons qualifications, platoon training, equipment maintenance, and the housing and support of Soldiers and their Families would take place primarily at Fort Richardson. Because of the limited availability of training land, unit maneuvers and live-fire collective training events above the platoon level would primarily occur at DTA. As part of this alternative, the modular 4/25th IBCT (Airborne), referred to as the 4/25th throughout this document, would exchange places with the 2/25th SBCT to be permanently stationed in Hawaii.

The stationing of the 2/25th SBCT in Alaska would result in a net increase of a projected 567 Soldiers to be stationed at Fort Richardson. Major differences between the modular 4/25th IBCT (Airborne) and the 2/25th SBCT in their equipment include approximately 320 Stryker vehicles, increased numbers of indirect fire systems to include 12 additional 155 mm cannon, 36 120mm Mortars, and 27 105mm direct fire cannon systems mounted on the Stryker MGS. **Table 2-14** compares the manning, vehicles, and equipment of the 4/25th IBCT (Airborne) following the completion of its transformation at Fort Richardson to that of the 2/25th SBCT.

Figure 2-3 SBCT Project Locations in Alaska

Table 2-14 Unit Equipment Comparisons

	Fort Richardson 4/25th IBCT	2/25th SBCT
Boots on the ground		
Soldiers	3,438	4,000
Intelligence, Surveillance, & Reconnaissance		
Unmanned aerial vehicles (UAVs)	16	4
Vehicles		
Wheeled Support Vehicles	926	588
Combat Vehicles	0	317 Strykers (27 MGS incl.)
Tracked Vehicles	2	0
Direct Fire Systems		
Mobile Gun Systems	0	27
Javelins	58	121
Anti-Tank Guided Missile	12	9
Indirect Fire Systems		
Mortars: 120mm/81mm/60mm	0/12/18	36/12/18
Howitzers: M777	18	18

Cantonment Construction: Facilities vacated by the 4/25th would initially support a majority of the garrison support requirements of the 2/25th SBCT. As discussed under the Proposed Action, the 2/25th facilities support requirements are considerably greater than the IBCT's for unit headquarters administrative offices, and motor pool space. Fort Richardson currently has administrative office buildings and relocatable facilities that are being used to support the 4/25th. While these facilities are outdated and smaller than the square footage of standard BCT space required, they would support the administrative garrison operations of the 30 companies that comprise the 2/25th. In addition, Fort Richardson possesses the extra enlisted barracks space initially required to accommodate the 200 to 300 extra single Soldiers of the 2/25th SBCT that are projected to require living space as part of this alternative. The existing facilities are outdated and smaller than standard facilities, but they would meet the initial stationing requirements of the 2/25th. Due to a lack of on-post family housing to support the additional families of the 2/25th, it would be anticipated that a majority of single officers and married enlisted Soldiers would live off-post where there is more than adequate housing availability in the surrounding area for the 300 to 400 additional Soldiers and their Families requiring housing.

Currently, projects are programmed and planned for the construction of new unit office space and renovated barracks. The stationing of the SBCT would require the programming of a larger barracks space and one to two additional administrative office buildings, above what is currently planned. Fort Richardson currently has 121,000 square yards of military vehicle parking space. This is the most considerable facilities shortfall that would need to be addressed to accommodate the permanent stationing of the SBCT. As discussed in the proposed action, the SBCT would require approximately 149,000 square yards of vehicle parking. There is no short-term solution to finding an additional 28,000 square yards of paved vehicle parking space at Fort Richardson. One or more battalions of the SBCT would be required to park on unimproved surface, which is available next to the existing military vehicle parking area. The 2/25th would be required to do this for several years until an extension of the motor pool facility could be completed.

Training Range Construction: Fort Richardson currently possesses most of the training ranges and facilities required to support the live-fire training activities of the 2/25th SBCT. Fort Richardson training infrastructure includes the full suite of training ranges required to maintain SBCT training readiness stan-

dards with the exception of the BAX, the MPMG, and the UAC. These ranges and their training function were described previously in the proposed action. Fort Richardson would use its MPTR as a substitute for the anti-armor tracking range, which is an acceptable substitute under Army training doctrine (TC 25-8 *Training Ranges*). As Fort Richardson does not have the required training space to accommodate BAX construction, the 2/25th would use the BAX at DTA, which has already been programmed to support the training of the 1/25th SBCT stationed at Fort Wainwright. A CACTF is being constructed at DTA. Construction of the BAX and CACTF, which are critical for testing SBCT unit capabilities in both open and urban environments, is slated for completion in 2009. These ranges have the capacity to meet both the 1/25th SBCT and the 2/25th SBCT training requirements, though scheduling would need to be tightly managed to allow both units to meet all of their necessary training requirements.

To accommodate the full measure of SBCT training requirements of the 2/25th SBCT, the MPMG range and the UAC would need to be constructed for the 2/25th SBCT's eventual use. These training range projects would not be ready to support the requirements of the SBCT until 2013, and the SBCT would need to use outdated ranges at Fort Richardson as an interim solution. There is no range currently at Fort Richardson that replicates the urban training environment like the UAC. The MPMG would be planned for construction on top of an existing small arms range. The UAC, a 2- to 3-acre urban training complex, would be sited on previously undisturbed land. In addition to firing ranges, Fort Richardson's virtual training and simulations center used to train leaders on battle command tasks would need to be expanded to support SBCT units and their commanders.

Live-Fire Training Activities: The 2/25th would conduct semi-annual individual and crew served weapons qualifications in accordance with Army policy for maintaining trained and ready units. Crews, squads, and platoons would also conduct collective training qualifications at least once every six months. Almost all of these live-fire training activities would take place on Fort Richardson's training range complexes. In addition, larger units at the company and battalion level would also conduct combined arms live-fire training exercises (CALFEXs) to ensure proper integration and synchronization of its different types of units in combat scenarios. As part of this alternative, the 2/25th would conduct up to brigade level CALFEXs at DTA.

The SBCT would conduct its live-fire training on the ranges described in the previous section. The 4,000 Soldiers of the SBCT require approximately 13 million blank and live-training rounds of ammunition and explosives to fully implement and meet live-fire training requirements. The 4/25th required approximately 6.9 million munitions to execute its training strategies. This represents an 88 percent increase over the IBCT in the number of ammunition rounds required for annual qualification. A vast majority of this increase is needed for the SBCT's increased numbers Soldiers to qualify on small arms and crew-served weapons systems. In addition to small arms training, the SBCT would conduct 105mm MGS qualification on Fort Richardson's MPTR. Indirect fire mortar training capability is only available at Fort Richardson in the winter months, and DTA would support additional indirect fire training that could not be accommodated at Fort Richardson as part of this alternative. **Table 2-3** shows the differences in Annual ammunition authorizations between the 2/25th SBCT and the 4/25th.

Maneuver Training: The stationing of the 2/25th SBCT in Alaska would involve a considerable increase in the amount and scale of maneuver training that takes place there. Units at all levels must conduct maneuver training across the full spectrum of maneuver operations to be properly prepared for operational deployment. Small unit maneuvers at the squad and platoon level would typically take place at Fort Richardson. Fort Richardson, with less than 70,000 total acres to accommodate all SBCT requirements, lacks the space for large maneuver areas above the platoon level. Because of this, all maneuvers above the platoon level for the 2/25th would occur at DTA and would involve the transport of the companies, battalions and the BCT to DTA to conduct required maneuvers training.

Platoons and Companies of the SBCT would conduct up to 5 weeks of small unit maneuver training each annually. The SBCT has 27 infantry platoons compared to the modular IBCT's 18 infantry platoons. The number of platoon and company training rotations could be anticipated to increase by 50 percent because of the increased numbers of platoons and companies.

The frequency of large unit maneuver training events would increase slightly for the SBCT. The SBCT with three infantry battalions, compared to the IBCT's two infantry battalions would be anticipated to increase the number of battalion maneuver rotations occurring at DTA. Each infantry battalion is anticipated to conduct at least two maneuver training rotations per year at the battalion level for a total number of six rotations for the SBCT and four for the IBCT. An additional two battalion maneuver rotations would be anticipated to occur at DTA because of stationing the 2/25th at Fort Richardson. The number of Brigade rotations is not anticipated to change. Both the 2/25th and 4/25th would be required to conduct one brigade level maneuver rotation every 12 to 18 months, The size of the maneuver area and intensity of maneuver area use, particularly of roads and trails, would increase substantially, however. **Table 2-4** depicts the doctrinally required maneuver land areas need to support different echelons of SBCT maneuver training events and their doctrinal land requirements (Army 2004).

While the frequency of platoon, company, and battalion maneuver training events increases by 50 percent when comparing the 2/25th to the 4/25th, the maneuver impacts from training maneuvers are projected to approximately double. The Army methodology to quantify MIMs was discussed in the description of the Proposed Action. The 2/25th SBCT is projected to generate 104,898 MIMs compared to the 4/25th projected total of 49,576 MIMs. This represents a 211 percent increase. Qualitatively, a greater percentage of vehicle mileage is anticipated to be executed on roads and just off-road, in accordance with SBCT training doctrine and capabilities. Approximately 25 percent of the MIMs would be expended at Fort Richardson to support squad and platoon maneuvers. The remaining 75 percent of these MIMs would be executed by the 2/25th while performing maneuver training tasks at DTA.

Several considerations need to be incorporated into the execution of maneuver training at Fort Richardson and DTA. The shortage of maneuver land available at Fort Richardson is not an ideal solution for the SBCT, given the large transport distances required to ship units and their equipment to DTA to quality maneuver training events. In addition to this shortfall, the long spring melt and fall thaw and freeze cycles cause the soils to be saturated for up to 5 months per year. During these times, mud and slick terrain limit the full mobility of the Stryker. In addition, the increased weight and tire pressure of the Stryker vehicle in wet conditions creates greater levels of maneuver impacts during these times of year. To remediate maneuver damage and rehabilitate training lands, Fort Richardson and DTA would need to conduct a considerable re-evaluation of Integrated Training Area Management (ITAM) and environmental stewardship programs.

Return of the 4/25th to Hawaii: Successfully meeting the needs of the SBCT in Alaska means the simultaneous exchange of the 4/25th IBCT (Airborne) back to Hawaii to vacate the garrison facilities and housing necessary to support the 2/25th. Those transformation projects that were not Stryker specific would be required to support the modular 4/25th IBCT. As detailed previously, the IBCT currently is authorized 567 fewer Soldiers than the SBCT, though the modular IBCT consists of approximately 400 more Soldiers than the previous 2/25th light infantry brigade that was stationed in Hawaii prior to transformation. In addition, the IBCT operates and trains using only light and medium vehicles as primary modes of transport and does not possess 105 mm direct fire cannon systems or the increased artillery of the SBCT. The stationing of the 4/25th IBCT in Hawaii would involve the same intensities and kinds of activities that would have taken place to support the 2/25th had it converted to a modular IBCT. Most vehicles, weapons systems, and equipment would be the same when comparing the 4/25th to the 2/25th prior to its transformation. One of the few differences in equipment is the 16 Unmanned Aerial Vehicles (UAVs) that the modular IBCT possesses. It should also be noted that while the 4/25th has transformed to

the modular IBCT structure, with the same equipment and manning as every IBCT. The unit is designated as an airborne unit; however, because it is not part of a specialized division airborne/air assault division and is a single Brigade, it could be exchanged to Hawaii without detracting from a divisional mission capability. This airborne capability would be retained within U.S. Army Pacific in the unit's move to SBMR. Senior Army leadership has determined that this capability is required for the Pacific theater of operations and it would be retained to support regional security and national defense requirements. The return of the IBCT to Hawaii would require the construction and use of transformation projects that are not specific to the SBCT but are required to support Army transformation.

Cantonment Construction: Given the reduced manning, vehicles, and equipment possessed by the 4/25th in comparison to the 2/25th SBCT, there are anticipated to be no cantonment facilities construction requirements needed to support the 4/25ths move to Hawaii. The unit will be adequately supported by those existing cantonment projects that have been completed or have been planned for completion in the near future, and those facilities which would be vacated by the 2/25th SBCT.

Training Range and Support Infrastructure Construction: Most required ranges are currently available to support the live-fire training requirements of the 4/25th IBCT in Hawaii. Those projects that are not specific to the SBCT but that support Army transformation would need to continue to take place in Hawaii to support the 4/25th IBCT if the 2/25th is stationed in Alaska. In addition to these range facilities, additional facilities to support airborne training would need to be constructed. These include rigging facilities, airborne deployment facilities, and parachute training areas and drop zones. At this time the Marine Corps is investigating the feasibility of constructing some of these airborne facilities in Hawaii and these facilities could potentially be leveraged in the future by the 4/25th IBCT (airborne). Facilities that would need to be constructed in Hawaii as part of alternative B include:

1) Range Control / Training Support Facility (SBMR)
2) Completion of Qualification Training Range, QTR2 (South Range Acquisition Area)
3) Upgrade of Wheeler Army Airfield
4) Tactical Vehicle Wash Facility (KTA)
5) Combined Arms Collective Training Facility (KTA)
6) Anti-armor Live Fire Tracking Range (PTA)
7) Land Easement and Military Vehicle Trail construction between PTA and Kawaihae
8) Ammunition Storage Building (PTA)
9) Tactical Vehicle Wash Facility (PTA)
10) Runway Upgrade and Extension of Bradshaw Army Air Field (PTA)
11) Completion of Installation Information Infrastructure Architecture (PTA)

Live-Fire Range Use: The 4/25th would be required to conduct semi-annual individual and crew-served weapons qualifications. In addition, companies, battalions potentially the BCT would conduct CALFEX exercises to ensure smooth execution of combat tasks requiring considerable coordination among different types of units. In comparison to the SBCT, the number of munitions fired would be considerably less. The 4/25th would fire approximately 6.9 million rounds of munitions in comparison to the SBCT's approximately 13 million. This represents an 88 percent decrease in the numbers of training munitions fired on USAG-HI training ranges. Most of these rounds are for individual weapons qualification and machine gun qualification and most of these rounds would be used on SBMR qualification ranges. The firing activities of the 4/25th IBCT would be comparable to those that would have occurred had the 2/25th re-

mained an IBCT and conducted qualifications to the current doctrinal standards. New ranges such as the QTR 2 on the South Range Acquisition Area of SBMR and the CACTF at KTA would be used to support the training requirements of the 4/25th IBCT.

Maneuver Training: In accordance with Army training doctrine, the 4/25th would conduct maneuver training to train on the full range of combat, stability, and peace support operations. The 4/25th would conduct up to 5 weeks each of platoon and company small unit maneuver training. This training constitutes about 50 percent of the total maneuver training that the 4/25th would conduct and most of this training would occur at SBMR and KTA on the Island of Oahu. The remaining 50 percent of the total maneuver training requirement would be conducted at PTA on the Island of Hawaii.

The number of MIMs required to support the 4/25th would increase from the maneuver mileages that were required to support the 2/25th prior to its transformation, but are significantly less than would be required for the SBCT. Given the existing shortfall of maneuver acreage being experienced in Hawaii, the SRAA and WPAA would need to be used by the 4/25th to support maneuver training requirements at the brigade and battalion level. The 4/25th would need to execute 49,576 MIMs, or tank mile equivalents, or maneuver training to meet its doctrinal maneuver requirements.

2.7 ALTERNATIVE C: PERMANENTLY STATION THE 2/25TH SBCT AT FORT CARSON WHILE CONDUCTING REQUIRED MILITARY TRAINING AT TRAINING SITES IN COLORADO

Summary Description: Under this alternative the Army would permanently home station the 2/25th SBCT at Fort Carson, Colorado (**Figure 2-4**). The 2/25th would return to Fort Carson at the end of 2008 upon completion of its scheduled deployment. The 2/25th would conduct all activities needed to support the Proposed Action to include full training, garrison operations, deployment, providing for Soldier and Family quality of life and the strategic needs of the U.S. Army. Garrison operations, unit weapons qualifications, platoon training, equipment maintenance, and the housing and support of Soldiers and their Families would take place primarily at Fort Carson. Because of the limited availability of training land, unit maneuvers above the platoon level would primarily occur at PCMS. Fort Carson, however, possesses all of the training range infrastructure that would be used to conduct CALFEX exercises for company and limited battalion live-fire qualifications. A vast majority of the 2/25th's live-fire training would occur at Fort Carson. As part of this alternative, the modular 4/4 IBCT (formerly designated the 2nd Brigade 2nd Infantry Division) would exchange places with the 2/25th SBCT to be permanently stationed in Hawaii.

The stationing of the 2/25th SBCT at Fort Carson would result in a net increase of a projected 567 Soldiers at the installation. Major differences between 4/4 and the 2/25th SBCT in their equipment include approximately 320 Stryker vehicles, increased numbers of indirect fire systems to include 12 additional 155 mm cannon, 36 120mm Mortars, and 27 105mm direct fire cannon systems mounted on the Stryker MGS. **Table 2-15** below compares the manning, vehicles and equipment of the 4/4 IBCT to that of the 2/25th SBCT.

Figure 2-4 SBCT Project Locations in Colorado

Table 2-15 Unit Equipment Comparisons

Unit	Fort Carson 4/4th IBCT	2/25th SBCT
Boots on the ground		
Soldiers	3,438	4,000
Intelligence, Surveillance, & Reconnaissance		
Unmanned aerial vehicles (UAVs)	16	4
Vehicles		
Wheeled Support Vehicles	926	588
Combat Vehicles	0	317 Strykers (27 MGS incl.)
Tracked Vehicles	2	0
Direct Fire Systems		
Mobile Gun Systems	0	27
Javelins	58	121
Anti-Tank Guided Missiles	12	9
Indirect Fire Systems		
Mortars: 120mm/81mm/60mm	0/12/18	36/12/18
Howitzers: M777	18	18

Cantonment Construction: Facilities vacated by the 4/4th would initially support a majority of the garrison support requirements of the 2/25th SBCT. With the proposed ongoing Army Transformation at Fort Carson, 25 construction projects are planned. These projects include 18 cantonment area projects and 1 project to upgrade Butts Army Airfield (USACE 2007). Cantonment projects that will be completed for transformation include medical facilities, child development centers, dining facilities, barracks upgrades and a physical fitness center, to name a few. One thousand four hundred and sixty renovated barracks spaces will be available in the 2009 to 2010 time frame and unit office building space is planned for completion and renovation in 2011 and 2012. In addition, the 4/4th ID motor pools are scheduled for renovation to 130,500 square yards of parking space in 2013. These projects, which were planned to support the 4/4th ID, would continue as planned to support the increase requirements of the 2/25th.

Currently, the 4/4th IBCT is using temporary facilities to support its garrison operations. Because Fort Carson is in the midst of planning to support the approximately 8,500 additional Soldiers being stationed there as part of BRAC 2005 legislation and GDPR realignments, garrison facilities and space are in short supply. The 4/4th IBCT is using 11 renovated barracks that were originally constructed in the 1960s. These barracks have a capacity to accommodate 1,200 single Soldiers. In addition, the 4/4th is currently supported by 31 unit administrative office buildings, also built in the 1960s and scheduled for renovation. The 4/4th military vehicle parking facilities, or motor pools, were also originally constructed in the 1960s. The 4½ motor pools used by 4/4th ID currently provide 123,000 square yards of parking space. These facilities initially would be used to support the 2/25th SBCT under this alterative, as they are the only facilities that would be immediately available upon arrival of the 2/25th.

These facilities do not meet the full permanent stationing requirements for supporting the garrison operations of the 2/25th, but they would meet the near-term requirements necessary to support the continued function and operational readiness of the 2/25th. While there would be enough temporary office space for the 30 companies of the 2/25th provided by the 31 unit administrative buildings in existence, these facilities are extremely small and outdated, providing only 2,300 square feet of office space per 100 plus man company. This is significantly smaller than the standard facilities designs required by the Army's modular units. In addition, the 1,200 barracks spaces currently available and 1,460 barracks spaces planned would

not meet the SBCT's requirements for approximately 1,700 to 1,800 single enlisted Soldiers. While 1,200 single enlisted Soldiers could be initially accommodated, and 1,460 when renovations are completed in 2010, the additional 200 to 300 single enlisted Soldiers of the 2/25th would be required to find accommodations off-post in the local housing market. While Army policy often provides for officers and accompanied enlisted Soldiers to be housed off-post, the Army typically houses single enlisted Soldiers in installation barracks to promote unit cohesion and allow Soldiers to live close to their administrative offices and workspace. This eliminates transportation requirements and other quality of life concerns. In the near term, the housing of additional single Soldiers of the SBCT off-post would be the only solution for accommodating the additional personnel and this would cause those single Soldiers to commute between off-post housing and the unit garrison area.

Even more challenging, is the shortfall in military vehicle parking space. The 2/25th would require 149,744 square yards of improved surface military vehicle parking space to maintain its vehicle fleet. Initially only 123,000 square yards of military vehicle parking and maintenance space would be available, representing an approximate 27,000 square yard shortfall. While planning is in place to upgrade military vehicle parking facilities to 130,500 square yards, there is no connected acreage available near the unit garrison area that could support the extension of the parking facilities to provide for the long-term requirements of the 2/25th. One of the battalions of the 2/25th initially would be required to park its vehicles in a temporary unimproved area several miles from the rest of the battalion. Over time, a project would have to be submitted to improve this vehicle parking and maintenance area.

To support the unplanned requirements of the additional Soldiers and equipment of the 2/25th, non-standard solutions would need to be found to address their needs while awaiting completion of military construction projects that were planned to support the 4/4th and additional projects that will be needed to support the 2/25th as part of this action. Soldiers would initially work and maintain their equipment in undersized and outdated facilities. In addition, the increase by 567 Soldiers of the 2/25th would increase the burden on Soldier and Family quality of life infrastructure causing some additional crowding as new facilities are constructed. Despite these limiting factors, Fort Carson possesses enough infrastructure to support the garrison operations and Soldier and Family quality of life of the 2/25th in the near-term and would be able to plan additional projects in the long term.

Training Range Construction: Fort Carson currently possesses most of the training ranges and facilities required to support the live-fire training activities of the 2/25th SBCT. Fort Carson training infrastructure includes the full suite of training ranges required to maintain the training readiness standards of the 2/25th with the exception of the BAX, the MPMG, and the UAC. These ranges and their training function were described previously in the proposed action.

Fort Carson does not have the required training land available to accommodate the construction of a BAX, which is 2.4 km by 4 km in dimension. Because of an above ground oil pipeline that bisects PCMS, PCMS is also not currently capable of supporting the training space required for the construction and operation of a BAX. The ballistics safety zones of the range along with the range footprint itself cannot be sighted in a way that does not potentially jeopardize the oil pipeline and compromise the maneuver operations required to support all of Fort Carson's units.

The BAX is a critical range capability that is needed to support CALFEX training and the integrated combined arms training at higher echelons of operations within the SBCT. As stated in TC 25-8 *Training Ranges*, a DMPRC, which also provides for combined arms training, can also serve as an alternate range for the SBCT to meet these training requirements. Fort Carson currently possesses a DMPRC that can be used to support the 2/25th live-fire training requirements. However, this solution has limitations, as the DMPRC will be heavily scheduled by the three HBCTs that would be stationed at Fort Carson as part of BRAC realignments. This range has limited capacity to support the collective live-fire requirements of the

SBCT and the three HBCTs to meet all unit training requirements and range scheduling would need to be tightly managed to allow units to meet all of their necessary training requirements. Even then, it would be difficult for all units to meet their collective live-fire training requirements.

To accommodate the full measure of SBCT training requirements of the 2/25th SBCT, the MPMG range and the UAC would also need to be constructed. These training range projects would not be ready to support the requirements of the SBCT until 2013 at the earliest, and the SBCT would need to use outdated ranges as an interim solution to qualify its Soldiers in machine gun proficiency. In addition, the 2/25th would be required to use non-standard urban operations facilities located at PCMS to train a limited range of urban non-live-fire tasks until the UAC was completed. There is no range currently at Fort Carson that replicates the urban training environment like the UAC. The MPMG would be planned for construction on top of an existing but outdated machine gun range. The UAC, a 2- to 3-acre urban training complex, would be sited on previously undisturbed land that has been previously studied as part of range planning efforts and found to be compatible with UAC range activities.

Live-Fire Training Activities: The 2/25th would conduct semi-annual individual and crew served weapons qualifications, in accordance with Army policy for maintaining trained and ready units. Crews, squads, and platoons would also conduct collective training qualifications at least once every six months. Almost all of these live-fire training activities would take place on Fort Carson's training range complexes. In addition to weapons qualifications, larger units at the company and battalion level would also conduct combined arms live-fire training to ensure proper integration and synchronization of its different types of units in combat scenarios. As part of this alternative, the 2/25th would conduct Company and Battalion CALFEXs at the DMPRC located at Fort Carson.

The SBCT would conduct its live-fire training on the ranges described in the previous section. The 4,000 Soldiers of the SBCT require approximately 13 million blank and live-training rounds of ammunition and explosives to fully implement and meet live-fire training requirements. The 4/4th required approximately 6.9 million munitions to execute its training strategies. This represents an 88 percent increase over the IBCT in the number of ammunition rounds required for annual qualification that would be fired on approved training ranges in accordance with Army and Fort Carson safety policies and procedures. A vast majority of this increase is needed for the SBCT's increased numbers Soldiers to qualify on small arms and crew-served weapons systems. In addition to small arms training, the SBCT would conduct 105mm MGS qualification on Fort Carson's MPTR and DMPRC. Indirect fire training on Fort Carson's mortar range and into its impact areas would increase when compared to the IBCT. The overall increase in munitions and live-fire training activities would increase minimally when analyzing the total training requirements of Fort Carson, however. Given the similar training requirements and larger caliber more frequent munitions firing activities of the three HBCTs that would be stationed at Fort Carson, the increase in SBCT firing activities compared with the IBCTs would present negligible differences in their overall effect. **Table 2-3** shows the differences in Annual ammunition authorizations between the 2/25th SBCT and the 4/4th.

Maneuver Training: The stationing of the 2/25th SBCT at Fort Carson would involve a slight increase in the overall amount of required maneuver training that is scheduled to take place at Fort Carson and PCMS following the implementation of BRAC legislation and GDPR. To support doctrinal maneuver training requirements, a majority of training above the platoon level would have to occur at PCMS because of training land availability constraints present at Fort Carson. Prior to the stationing of the 2/25th, Fort Carson was going to support up to 5 weeks of platoon training for the 131 combat maneuver and reconnaissance platoons of the 3 HBCTs and the 4/4th scheduled to be stationed there. Following the stationing of the 2/25th SBCT at Carson the number of combat maneuver platoons conducting maneuvers would increase to 140 platoons. This represents an overall projected increase in the maneuver training activities at Fort Carson of approximately 7 percent of the total maneuver requirement.

The frequency of company and large unit maneuver training events would increase at PCMS, as well. There are an additional four maneuver companies and one maneuver battalion in the SBCT when compared to the IBCT. This equates to up to an additional 20 company maneuver rotations and 2 additional battalion maneuver rotations per year that would be conducted at PCMS that are required to support the maneuver training certifications of the SBCT. With eight companies and two battalions able to conduct training at PCMS simultaneously this represents an increased requirement for the utilization of PCMS by 5.5 weeks per year. PCMS is already experiencing a shortfall in its capacity to support the doctrinal training load of its existing units and the 4/4th. The total training load for PCMS was 77.5 weeks of continuous training. This represents a 50 percent shortfall in its capacity to meet the doctrinal training requirements of Fort Carson's units. The addition of the 2/25th increases the 77.5-week doctrinal maneuver training requirement for PCMS by an additional 5.5 weeks of company and battalion training for a total of 83 weeks worth of maneuver training required per year. This increase represents a 7 percent increase in the utilization of PCMS to meet the doctrinal maneuver requirements of the SBCT. **Table 2-4** depicts the doctrinally required maneuver land areas need to support different echelons of SBCT maneuver training events and their doctrinal land requirements (Army 2004).

The Army methodology to quantify MIMs was discussed in the description of the Proposed Action. The 2/25th SBCT is projected to generate 104,898 MIMs compared to the 4/4th projected 49,576 MIMs. This represents an overall 211 percent increase in unit MIMs. Given that the frequency of maneuver rotations increases at both Fort Carson and PCMS by approximately 7 percent under this alternative and the SBCT requires twice as many MIMs as the IBCT, the overall effect would lead to a 10 to 15 percent increase in anticipated impacts from maneuvers at both Fort Carson and PCMS. Qualitatively, a greater percentage of vehicle mileage is anticipated to be executed on roads and just off-road, in accordance with SBCT training doctrine and capabilities. Approximately 25 percent of the MIMs would be expended at Fort Carson to support squad and platoon maneuvers. The remaining 75 percent of these MIMs would be executed by the 2/25th while performing maneuver training tasks at PCMS.

Several considerations need to be incorporated into the execution of maneuver training at Fort Carson and PCMS. The shortage of maneuver land available at PCMS is not an ideal solution for the SBCT, given the need also to provide for the sustainment of these training resources. The Fort Carson garrison commander would work with professional environmental staff and training land management staff to ensure the sustainment of the training land at Fort Carson and PCMS. To remediate maneuver damage and rehabilitate training lands, Fort Carson and PCMS would need to conduct and adjust institutional training land and environmental stewardship programs to provide for the continued use of their training land resources.

Return of the 4/4th IBCT to Hawaii: Successfully meeting the needs of the SBCT in Colorado means the simultaneous exchange of the 4/4th IBCT back to Hawaii to vacate the garrison facilities and housing necessary to support the 2/25th. As detailed previously, the IBCT currently is authorized 567 fewer Soldiers than the SBCT, though the modular IBCT consists of approximately 400 more Soldiers than the previous 2/25th light infantry brigade that was stationed in Hawaii prior to transformation. In addition, the IBCT operates and trains using only light and medium vehicles as primary modes of transport and does not possess 105 mm direct fire cannon systems or the increased artillery of the SBCT. The stationing of the 4/4th IBCT in Hawaii would involve the same intensities and kinds of activities that would have taken place to support the 2/25th had it converted to a modular IBCT. Most vehicles, weapons systems, and equipment would be the same when comparing the 4/4th to the 2/25th prior to its transformation. One of the few differences in equipment is the 16 UAVs that the modular IBCT possesses. To support the stationing of the 4/4th IBCT in Hawaii would require the completion of those transformation construction projects which were not specific to the needs of the Stryker unit, but are required to implement Army transformation.

Cantonment Construction: Given the reduced manning, vehicles, and equipment possessed by the 4/4th in comparison to the 2/25th, there are anticipated to be no cantonment facilities construction requirements needed to support the 4/4th's move to Hawaii. The unit should be adequately supported by those cantonment projects which are in existence and will be vacated by the 2/25th SBCT in its move to Colorado or those facilities currently planned and scheduled for renovation.

Training Range and Support Infrastructure Construction: Most required ranges are currently available to support the live-fire training requirements of the 4/4th IBCT in Hawaii. Those projects that are not specific to the SBCT but which support Army transformation in general would need to continue to take place in Hawaii to support the 4/4th IBCT if the 2/25th is stationed in Colorado. Facilities that would need to be constructed in Hawaii as part of Alternative C to support 4/4th IBCT in Hawaii would include:

1) Range Control / Training Support Facility (SBMR)
2) Completion of Qualification Training Range, QTR2 (South Range Acquisition Area)
3) Upgrade of Wheeler Army Airfield
4) Tactical Vehicle Wash Facility (KTA)
5) Combined Arms Collective Training Facility (KTA)
6) Anti-armor Live Fire Tracking Range (PTA)
7) Land Easement and Military Vehicle Trail construction between PTA and Kawaihae
8) Ammunition Storage Building (PTA)
9) Tactical Vehicle Wash Facility (PTA)
10) Runway Upgrade and Extension of Bradshaw Army Air Field (PTA)
11) Completion of Installation Information Infrastructure Architecture (PTA)

Live-Fire Range Use: The 4/4th would be required to conduct semi-annual individual and crew-served weapons qualifications. In addition, companies, battalions potentially the BCT would conduct CALFEX exercises to ensure smooth execution of combat tasks requiring considerable coordination among different types of units. In comparison to the SBCT, the number of munitions fired would be considerably less. The 4/4th would fire approximately 6.9 million rounds of munitions in comparison to the SBCT's approximately 13 million. This represents an 88 percent decrease in the numbers of training munitions fired on USAG-HI training ranges. Most of these rounds are for individual weapons qualification and machine gun qualification and most of these rounds would be used on SBMR qualification ranges. The firing activities of the 4/4th IBCT would be comparable to those that would have occurred had the 2/25th remained an IBCT and conducted qualifications to the current doctrinal standards. New ranges such as the QTR 2 on the South Range Acquisition Area of SBMR and the CACTF at KTA would be used to support the training requirements of the 4/4th IBCT.

Maneuver Training: In accordance with Army training doctrine, the 4/4th would conduct maneuver training to train on the full range of combat, stability, and peace support operations. The 4/4th would conduct up to 5 weeks each of platoon and company small unit maneuver training. This training constitutes about 50 percent of the total maneuver training that the 2/25th would conduct and most of this training would occur at SBMR and KTA on the Island of Oahu. The remaining 50 percent of the total maneuver training requirement would be conducted at PTA on the Island of Hawaii.

The number of MIMs required to support the 4/4th would increase from the maneuver mileages that were required to support the 2/25th prior to its transformation, but are significantly less than would be required

for the SBCT. In total, the differences in MIMs required to support the 2/25th Infantry Brigade Light training to current doctrinal standards and the 4/4th IBCT would be considerably different. Given the existing shortfall of maneuver acreage being experienced in Hawaii, the South Range Acquisition Area and West PTA acquisition area would need to be used by the 4/4th to support maneuver training requirements at the brigade and battalion level. The 4/4th would need to execute 49,576 MIMs, or tank mile equivalents, or maneuver training to meet its doctrinal maneuver requirements

2.8 NO ACTION ALTERNATIVE

CEQ regulations state that an EIS must evaluate a no-action alternative, to serve as a benchmark against which the potential effects of actions can be evaluated. The No Action Alternative represents what would occur if the Army were not to carry out the Proposed Action. The No Action Alternative is to return the 2/25th SBCT to its original structure as a non-modular infantry brigade as it existed prior to its transformation. The no action would not involve any unit stationing moves and would not include any actions to transform the structure of the 2/25th to an SBCT. **Table 2-16** below details the organization of the 2/25th Infantry Brigade, Light as it existed and the organizational structure of modular infantry brigades at Fort Richardson, Alaska and Fort Carson, Colorado.

Table 2-16 Unit Equipment Comparisons

Unit	2/25th Infantry (Light)	IBCT
Boots on the ground		
Soldiers	3,008	3,438
Intelligence, Surveillance, & Reconnaissance		
Unmanned aerial vehicles (UAVs)	0	16
Vehicles		
Wheeled Support Vehicles	659	926
Combat Vehicles	0	0
Tracked Vehicles	0	2
Direct Fire Systems		
Mobile Gun Systems	0	0
Javelins	36	58
Anti-Tank Guided Missiles	12	12
Indirect Fire Systems		
Mortars: 81mm/60mm	12/18	12/18
Howitzers	18 (105 calibre)	18 (155 calibre)

Under the No Action Alternative, the Army will incorporate only those projects from 2004 to the extent that they are already constructed, built, and being used. Projects identified in the 2004 transformation EIS that have not been allowed to move forward or the use of which has been enjoined are not included in the No Action Alternative or baseline condition.

The No Action Alternative presented here is not feasible to implement in Hawaii because the Army is well into the process of organization-wide transformation. This transformation was announced in the Army's ROD for transformation that was signed in 2002. Every unit in the Army has either completed transformation or is in the process of transforming. The decision to transform has committed the entire Army to standard modular BCT configurations, and there are only three types of standardized BCTs in the Army. These include the modular IBCT, the modular HBCT, and the modular SBCT. Each of these BCTs has revamped and upgraded its equipment and evolved its organizational structure better to imple-

ment the nation's security and defense objectives. Non-modular BCT configurations, such as the original brigade structure of the 2/25th Infantry Brigade, Light, are no longer fielded or logistically supported anywhere in the Army.

The No Action Alternative assumes the stationing and training of the units listed below at the locations as outlined in **Table 2-17** below. In addition to the stationing, the no action alternative assumes the training of these infantry units at available satellite training sites in Hawaii, DTA in Alaska, and PMCS in Colorado, respectively.

Table 2-17 No Action Alternative: Unit Stationing and Training Locations

Location	Unit
Schofield Barracks Military Reservation (SBMR) and US Army Garrison Hawaii Training Sites	2/25th ID Light
Fort Richardson and DTA, Alaska	4/25th IBCT Modular (Airborne)
Fort Carson and PMCS, Colorado	4/4th IBCT Modular

It is important to understand that the process of military transformation does not apply solely to units and their equipment, but also to the units' training strategies and training range infrastructure as well. The original EIS for transformation of the 2/25th Infantry Brigade specifically addressed transformation of the unit in Hawaii to an SBCT. This action, however, was taking place within the broader context of Army-wide transformation to include military construction transformation and training range modernization. Many of the training range projects identified in the original EIS are needed to implement Army transformation objectives that have occurred across the rest of the Army organization. Army military construction projects would have occurred regardless of the decision to transform the 2/25thto an SBCT, but would have been implemented to upgrade the capabilities of the 2/25th Infantry Brigade, Light. In addition, Army training strategies have changed to support upgraded capabilities and evolving training doctrine. Weapons qualification strategies have changed and now require all Soldiers, not just combat Soldiers, to meet more rigorous live-fire and maneuver training requirements.

Cantonment Area Construction: Under the No Action alternative many projects and facilities are currently in existence or have been programmed to support the modular transformation of the IBCT at Fort Carson and Fort Richardson. Given that the IBCT is a standardized unit with standardized facility requirements needed to support the garrison operations, alternative locations in Colorado and Alaska have the facilities listed in **Table 2-18** in existence or programmed as part of the no-action alternative. SBMR in Hawaii has these existing facilities on hand as part of the no-action alternative to support these IBCT requirements for the 2/25th Infantry Brigade, Light as part of the baseline conditions for analysis.

Table 2-18 Facility Requirements for the No Action Alternative

Garrison Facilities	IBCT Requirement
Vehicle Fuel Storage (gallons)	151,660
Brigade Offices (sf)	39,495
Battalion Offices (sf)	77,741
Company Offices (sf)	366,971
Vehicle Maintenance (sf)	162,690
Ammo Storage (sf)	1,715
Unit Classrooms (sf)	41,600
Family Housing (sf)	2,868,750
Barracks Space (sf)	517,158
Combat Vehicle Parking (sf)	1,395,252

Range and Supporting Infrastructure Construction: Training Range Construction projects under the No Action Alternative assume that existing USAG-HI, Fort Richardson and DTA, and Fort Carson and PCMS facilities that are currently in existence are part of the No Action Alternative. Projects have been included in this complete or close to completion, are included in the baseline condition for analysis in their current existing condition in 2007. Since the 2004 FEIS for transformation of the 2/25th to an SBCT in Hawaii, many of the cantonment support projects detailed in the EIS have been completed or are currently in their final stages of completion. These projects are being used by USAG-HI to support its units and have not been enjoined by court order. These projects and their use have been incorporated into the No Action Alternative and baseline conditions for analysis in Hawaii. Projects proposed in 2004 that are complete or are in there final stages of completion and whose use is assumed as part of the baseline condition for this analysis include:

1) The Urban Assault Course (SBMR)

2) Motor Pool and Maintenance Shops (SBMR)

3) Tactical Vehicle Wash Facility (SBMR- East Range)

4) Qualification Training Range 1 (SBMR)

5) Multiple Deployment Facility

6) Upgrade of Firing Range 11T for Mobile Gun System qualifications (PTA)

In addition, several projects from the 2004 EIS have been completed or are partially complete though their use is currently enjoined. The baseline conditions used for analysis and comparison of alternatives in this document include current existing conditions. As such, it is important to note that construction of several projects was completed or partially completed in Hawaii before their use was enjoined. Projects that have begun and are nearing completion include:

1) Qualification Range 2 (South Range Acquisition Area) – 80% construction complete

2) Battle Area Complex (SBMR) – partially construction complete

3) Installation Information Infrastructure (PTA) – partially complete

4) Fixed Tactical Internet (SBMR and PTA) – complete

In addition to these projects, several land easement and acquisition projects have already taken place though use of the land by the 2/25th is currently enjoined. These land easement and acquisition projects are included as part of the no-action baseline condition since the original 2004 EIS although use of these acquisition areas is not. Projects included as part of the no-action alternative include:

1) The South Range Acquisition Area

2) The west PTA maneuver training land acquisition area

3) Land easement for Schofield to Helemano trail construction.

These projects that have been completed and are discussed above set the baseline conditions for analysis for what will be required to accommodate the permanent stationing of the 2/25th SBCT.

At other installations analyzed in this EIS, existing facilities and construction plans for BRAC, GDPR, and Army transformation are used for the baseline assessment of construction impacts, prior to the requirements generated by the stationing of the SBCT.

Live-Fire Training: The No Action Alternative includes the live-fire training activities at facilities currently in existence and being used by the 4/4th IBCT, 4/25th IBCT and projects that would have been used in Hawaii to support the 2/25th IBCT light. Current quantities and numbers of munitions that must be fired to meet the training strategies are outlined by Army transformation. Army transformation has standardized the live-fire training requirements for infantry brigades across the Army. Live-fire training strategies ensure that all Soldiers, not just combat Soldiers, meet and qualify to a more rigorous set of qualification standards. Army Transformation has brought about significant changes in live-fire training standards for the IBCT. These changes require increased munitions and more rigorous and complex live-fire standards. These changes have been incorporated Army-wide. The respective Infantry Brigade Combat Teams in Hawaii (2/25th ID Light), Alaska (4/25th IBCT) and Colorado (4/4th IBCT) would qualify using the same modular IBCT weapons qualifications standard for live-fire to complete doctrinal live-fire training requirements. **Table 2-3** lists the annual live-fire munitions requirements for an infantry brigade that would be required to meet the Army's doctrinal training standards for the 2/25th Infantry Brigade, Light, the 4/25th IBCT, and the 4/4th IBCT as part of the no-action alternative.

Live-fire training is a non-negotiable component of Army training. To be operationally effective, Soldiers must have the skills and experience necessary to operate and maintain their weapons. At a minimum, all Soldiers in the 2/25th Infantry Brigade (Light), the 4/25th IBCT (Airborne), and the 4/4th ID must qualify on individual and crew/vehicle weapons at least twice per year. In addition, platoons, companies, and battalions of these infantry brigades must conduct collective live-fire training exercises on firing ranges to ensure they have rehearsed and coordinated battle procedures and are prepared to deploy to support wartime operations. As part of the No Action alternative, live-fire training activities would take place on existing training range facilities that support the live-fire training activities of an IBCT training to the current doctrinal standards. The live-fire training activities include the use of approximately 7 million rounds of training ammunition per year.

Maneuver Training: The No Action Alternative includes the maneuver training activities required to meet current Army transformation training strategies required to support the operational proficiency of an IBCT. Army transformation has standardized the doctrinal maneuver training requirements for infantry brigades across the Army. Army Transformation has brought about significant changes in maneuver training standards for the IBCT, which have been incorporated Army-wide. Under the No Action Alternative, the respective IBCTs in Hawaii (2/25th ID Light), Alaska (4/25th Infantry Division) and Colorado (4/4th Infantry Division) would conduct maneuver training rotations in accordance with current doctrinal standards for the IBCT. Army Training Circular 25-1, Training Land, is the Army's definitive source for defining maneuver training land requirements (Army 2004). The IBCT conducts maneuver training at the crew/squad, platoon, company, battalion, and BCT levels. Each successive level builds on the maneuver training capabilities of the previous smaller sized unit and requires a larger amount of maneuver land to support the unit. **Table 2-4** depicts the doctrinal maneuver space requirements for each unit of the IBCT.

The maneuver of squads, platoons, and companies takes place frequently throughout the year. These maneuvers typically take place at the home stationing location of the IBCT. These small unit training maneuvers are doctrinally required up to 5 times per year for each type of unit. Small unit training events will by in large take place at SBMR, Fort Richardson, and Fort Carson, respectively. Large unit maneuver training of the IBCT at the battalion and brigade level cannot be accommodated at the home stationing sites. Current doctrinal maneuver training requirements specify that the battalions of the IBCT should conduct 2 to 3 maneuver rotations per year. The BCT itself is also required to conduct a maneuver certification every 12 to 18 months. These large unit maneuver rotations would occur at PTA, DTA, and PCMS,

respectively, under the no-action alternative. The IBCT consists of 26 maneuver platoons, 8 maneuver companies, 3 maneuver battalions, and 1 BCT, all of which must train on a full spectrum of combat maneuver and peace support tasks throughout the year.

The Army uses a standardized methodology for comparing maneuver impacts of different units. This methodology takes the weights and authorized yearly mileages for unit vehicles and converts them to a unit of measure called MIMs. The MIM is a unit of measure that the Army uses to anticipate maneuver damage and required repair costs for its training areas. To calculate MIMs, the Army converts all unit vehicles into the equivalent of M1 Abrams tanks. The Army applies different physical characteristics of unit vehicles (weight, tire/track pressure etc.) to make the conversion of all of a unit's vehicles to M1 tank mile equivalents. The No Action Alternative assumes the baseline number of MIMs required to support the current doctrinal maneuver training strategy for an IBCT. HQDA has calculated the IBCT to require 49,569 MIMs of training when analyzing the maneuver training tasks that must be conducted by the IBCT.

No Action Alternative Summary: The No Action alternative does not support the requirements of Army Transformation or defense and national security policy directives as outlined in the QDR. In addition, this alternative does not provide for the regional security requirements as outlined in these policies. Furthermore, the No Action alternative is no longer feasible, as the Army has converted all of its units to a modular force structure as a part of Army transformation. Returning to the existing organizational structure of the 2/25th Infantry Brigade, Light is no longer possible. The No Action alternative, however, does serve as an informative baseline condition for comparative analysis from which to compare the impacts of the permanent stationing of the 2/25th SBCT.

2.9 ALTERNATIVES CONSIDERED BUT NOT STUDIED IN DETAIL

Through this EIS process, the Army considered more than 160 stationing locations for meeting the permanent stationing needs of the 2/25th SBCT before arriving at the three locations that are able to meet the SBCTs requirements. The screening criteria and the process to arrive at these three locations are articulated in Section 2.4 of this Chapter. This section will provide further elaboration on some alternatives that were considered but not carried forward for full analysis, because they were not reasonable.

A) Permanently Home Station the SBCT at Fort Lewis – Under this alternative, the Army would permanently home station the 2/25th at Fort Lewis upon completion of its deployment readiness window at the end of 2008. This alternative was screened out of the Army's decision-making process for further consideration for several reasons that were articulated in the screening criteria section of this document. However, because of the receipt of a considerable number of public comments inquiring as to the suitability of Fort Lewis as a potential stationing location, further elaboration and greater detail are provided.

Fort Lewis is currently home to two of the Army's seven SBCTs, with a third in the process of standing up there. Fort Lewis was the first location to test and train an SBCT, and it possesses most of the training facilities to accommodate the training requirements of the SBCTs currently stationed there. The addition of a fourth SBCT however would not be possible by the end of 2008. Fort Lewis lacks the necessary garrison facilities, training infrastructure, and the Soldier and Family quality of life accommodations needed to support a fourth SBCT.

As described earlier in this Chapter, the Army has extremely limited excess facilities capacity to support any new brigade anywhere in the United States because of BRAC 2005 legislation, the return of 44,500 Soldiers to the U.S. from overseas, and increases in Army size brought about by Army modularity and authorized growth. There are no locations that currently have the excess facilities on-hand

that could accommodate a 4,000-person SBCT and its vehicles and equipment. In addition, the Army does not have the discretion to eliminate one of its BCTs from the Army Force structure and use that location for the 2/25th. The Army's force structure is based on national security and defense policy and carefully deliberated and adjusted to meet the requirements of these policies. The Army must therefore maintain the number of BCTs required to implement these policies. As previously articulated, construction of new facilities would take 5 years or more to plan for, fund, design, and build the necessary facilities. That does not meet the required time frame for this action. The only locations that are able to provide for a majority of SBCT facilities required to support the 2/25th are those that can exchange an existing BCT. The exchange of a BCT frees up a majority of the training and garrison facilities required by the SBCT and preserves the Army's required force structure. Fort Lewis does not have a BCT to exchange back to Hawaii and is, therefore, not a viable alternative for the stationing of the 2/25th SBCT.

In addition to this primary reason, there are several other secondary reasons why Fort Lewis is not suitable for the stationing of the 2/25th SBCT. Fort Lewis will be at its maximum capacity in supporting the three SBCTs to be permanently stationed there. Accommodating the full requirements of an additional SBCT would require an additional 192 acres of space within the cantonment area, temporarily discounting the fact that facilities could not be constructed in time to meet the needs of the Proposed Action. To accomplish the necessary facilities construction, Fort Lewis would be required to demolish an existing housing area, as there is no unused buildable space in the cantonment area. Fort Lewis is currently experiencing a 1,100-unit shortfall in family housing and the surrounding community is critically short on housing availability to meet these needs. An additional SBCT would increase the requirement for married and family housing by approximately 2,000 units while reducing the housing currently available. That demand would place considerable stress on the ability of Soldiers and Families to find suitable available housing. This would in turn degrade quality of life for all of the units at Fort Lewis to unacceptable levels.

Training infrastructure availability at Fort Lewis also becomes an issue with the addition of a fourth SBCT. Many of the existing training ranges and facilities would not have the scheduling capacity to support an additional SBCT. The Army conducted initial analysis into what would be required to accommodate the training infrastructure requirements of the 2/25th, on top of those requirements of units already stationed there. While USAG-HI, Fort Carson, and Fort Richardson all have a majority of the training range infrastructure and scheduling capacity required to support the 2/25th, Fort Lewis would require seven additional training ranges to meet its requirements. This shortfall in training range capacity would not allow the 2/25th and other units at Fort Lewis to meet their training requirements as required by Army Doctrine. Range shortfalls brought on by the permanent stationing of the 2/25th would include Rifle Marksmanship Zero Range, Sniper Qualification Range, MPMG, MPTR, BAX, ISBC, and an UAC.

Finally, in order to meet the Army's rapid deployment intent to deploy a Stryker anywhere in the world in 96 hours would require some geographic distribution of the stationing locations of Stryker units. Stacking four Stryker units at one location would tie up deployment facilities allowing only one SBCT to deploy at a time. This lack of geographic distribution and limitation on the capability of deployment facilities would not be an optimal situation for supporting the strategic needs of the Army.

B) Permanently Station the SBCT at an Installation in Exchange for a Heavy Brigade Combat Team – Under this alternative, the Army would permanently station the SBCT at an installation such as Fort Bliss, Hood, or Stewart and return a HBCT to Hawaii. While this alternative would preserve the force structure and number of BCTs in the Army and provide for most of the necessary facilities, it is not tenable from either training or sustainability perspectives. The separate training sites of Hawaii are not ideal for conducting HBCT maneuvers and training exercises. Logistically, transporting

tanks and heavy armored vehicles between sites could only be done at considerable cost and time to the Army and at the expense of available training time for the unit and Soldiers. Transportation networks would have to be reengineered to accommodate larger and heavier equipment transportation vehicles. In additional, several of the training areas are not conducive to cross-country HBCT training because of topographical constraints. This would increase the concentration of HBCT training in select areas that would limit its availability to meet continued training maneuver requirements.

C) **Permanently Station the SBCT at a National Guard or Reserve Installation-** Under this alternative the Army would station the 2/25th at an Army National Guard (ARNG) or Reserve installation. ARNG and Reserve installations are designed to accommodate the needs of National Guard and Reserve Army units and Soldiers. The 2/25th SBCT is an Active Duty unit with the full measure of active duty requirements for garrison operations, deployment, training, and permanent housing and quality of life facilities for Soldiers and their Families. These requirements, and the facilities needed to support them are considerably different for Active versus Reserve component forces. As discussed in Section 2.2, the Army is in the process of conducting significant modernization of its training range infrastructure. Because of resource limitations, only select a select few ARNG and reserve mobilization sites have undergone significant range modernization that could support the training requirements of an active duty SBCT. These installations, such as Camp Shelby and Fort Dix, are fully engaged in training and mobilizing Soldiers for on-going operations. Furthermore, these mobilization facilities provide only basic temporary housing and dining facilities for reservist to conduct predeployment training. These facilities are designed to different standards and do not meet Active Duty stationing requirements for permanently stationed Soldiers and their families. While the 56th BCT did transform to an SBCT in Pennsylvania, this ARNG SBCT does not require permanent housing, garrison support, utilities the full range of facilities required to support the Soldiers and Families of an active duty BCT such as the 2/25th. Any conversion of an ARNG or Reserve facility would require hundreds of millions of dollars in infrastructure expenditure and five to ten years to complete to meet the full measure of permanent facilities required for the 2/25th SBCT. Because this set of alternatives is not capable of meeting the permanent stationing for the 2/25th SBCT, they have not been carried forward for detailed analysis.

D) **Permanently Home Station the SBCT with an Overseas Host Nation.** Under this alternative, the Army would permanently station the 2/25th at an overseas installation on foreign soil. National Security and Defense policy has prescribed through the NDS, QDR, and other documents that the United States should rely on the rapid projection and deployment of units from within the United States. In such a way, the United States can fully control the availability and readiness of its units without having to rely on host nation support. In accordance with this defense policy guidance, the Army is in the process of bringing 44,500 Soldiers home from overseas stationing locations in Europe and Korea. Stationing the 2/25th at a foreign overseas location is not in accordance with security and defense policy directives and decisions of the NDS and QDR. The consideration of overseas stationing locations is therefore not included in this document.

E) **Acquire land to support the training requirements of the SBCT.** Under this alternative, the Army would acquire land at Fort Knox, Fort Drum, Fort Riley, or Fort Polk to mitigate land shortfalls to meet the training needs of the SBCT. The military land acquisition process is a lengthy process that is very similar to military construction. To complete the process would take a minimum of between five to ten years. A military land acquisition project must first be approved and funding must be appropriated. In addition, the DoD must submit a waiver authorizing land acquisition, because a moratorium exists that bans the DoD from acquiring new lands authorization. Environmental surveys and studies must be completed before any real estate transaction may begin. The entire process would take too long to meet the permanent stationing needs and requirements of the 2/25th SBCT. In addition to the time constraints of the process, there are land availability constraints. Discounting the fact that the

land acquisition process takes too long to support the maneuver training needs of the 2/25th, land availability would likely preclude land acquisition as a viable solution to meet the training space needs of the 2/25th SBCT. Because of these limitations, land acquisition at installations such as Fort Knox, Fort Polk, Fort Drum, and Fort Riley are not considered as viable alternatives to carry forward for analysis.

F) **Permanently headquarter the 2/25th in Hawaii but conduct all Stryker-specific maneuver and live-fire training at locations other than Hawaii.** These locations could include training centers such as Fort Irwin, California and Fort Polk, Louisiana. This alternative would require very frequent movements of Soldiers and equipment. This would be both time-consuming and expensive. The deployment would also be very disruptive to Soldiers and their Families. Finally, alternative training areas are heavily used by other Army units, making it difficult to schedule the 2/25th requirements. For these reasons, this alternative does not meet the purpose and need for the purposed action. It was therefore not carried though for full evaluation as a reasonable alternative.

G) **Station the 2/25th in Hawaii temporarily, and then permanently station the 2/25th SBCT in another location when facilities construction is completed.** Under this alternative, the 2/25th would deploy to support on-going operations as scheduled and return to Hawaii for a period of several years while an additional set of SBCT facilities were constructed at an alternate location. As discussed as part of the proposed action, the 2/25th will need to be stationed in a location that provides for the full measure of SBCT training and operational requirements. It would take approximately 5 years or more through the military construction process (described in Section 2.4.1) to appropriate funding to build additional SBCT facilities at another installation location. It would not meet the purpose and need for action to provide for only a subset of SBCT training requirements for the 2/25th and not fully prepare the SBCT for operational deployment. To ensure the proper training of the 2/25th in the interim time period before it were permanently stationed at another location would require that all of the projects under Alternative A of this document proceed in Hawaii as they are discussed. A second set of SBCT facilities would then be built at another location to support the eventual permanent stationing of the SBCT. The construction of a duplicated set of SBCT facilities in Hawaii and in another location would represent a redundant use of DoD project dollars and time to support the same needs of the 2/25th . Given the inefficiencies inherent in such an alternative, it is not carried forward as a reasonable alternative for analysis in this document.

Chapter 3
Affected Environment

CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the affected environment for the project alternatives. The affected environment is the portion of the existing environment that could be affected by the project. In instances where the affected environment is thoroughly described in previous NEPA documents, a summary is included here and the original document is referenced for further details.

The affected environment varies for each resource and location. Both the nature of the resource and components of the proposed project and alternatives dictate this variation. The following sections concentrate on providing only the specific environmental information necessary to assess the potential effects of the Proposed Action and alternatives.

3.1 ALTERNATIVE A – HAWAII

3.1.1 GEOLOGY, SOILS, AND SEISMICITY

The geologic history of the formation of the Hawaiian Islands, and the physiography, geology, soils, and seismicity of the applicable military installations associated with Alternative A are presented below as they pertain to the existing conditions used later in Chapter 5 to assess the potential effects of implementation of Alternative A. The soils potentially affected are summarized with attention paid particularly to areas covered by soils exhibiting rapid runoff, severe erosion potential, high compaction or shrink-swell potential, or other soil hazards that associated activities could exacerbate or that could impact infrastructure related to associated activities. Similarly, chemical constituents in soils and geologic hazards and seismicity associated with the potentially affected applicable installations.

The region of influence (ROI) for geologic and soil impacts of the project is all areas in which project-related activities may occur, including the footprint of each training and construction area and the corridors of the military vehicle roads. It also includes adjacent areas that may be affected by geologic processes in the project area. An example would be downslope areas adjacent to a roadcut or embankment that might be affected by slope failure. The ROI studied for the purpose of this analysis is defined by the legal boundaries of the applicable military reservations associated with each alternative, as shown in **Figure 3-1**.

3.1.1.1 Schofield Barracks Military Reservation

Physiography

Schofield Barracks Main Post. Most of the SBMP is in the Schofield Plateau geomorphic province, which is a broad interior highland that lies between the Waianae Range and the Koolau Range. The western side of the SBMP lies within the Waianae Range geomorphic province (USAG-HI 2004). The SBMP is bounded on the east by Kaukonahua Stream, Wahiawa Reservoir, the town of Wahiawa, and Route 750, and it extends westward to the ridgeline of the Waianae Range. **Figure 3-1** shows the location of SBMR and some of the other major features discussed in this section. Elevations in the SBMP range from about 660 feet above mean sea level (amsl) along the eastern boundary to about 3,000 feet amsl on the ridgeline of the Waianae Range.

Figure 3-1 ROI in Hawaii for Geology, Soils, Wildlife Management, Cultural Resources, Land Use and Recreation, Hazardous Materials and Hazardous Wastes, Energy, and Facilities

Wheeler Army Airfield. WAAF is near the southern edge of the Schofield Plateau, between SBMP and the East Range. It is bounded by Waikele Stream on the south and by Wahiawa Reservoir on the north. The land is relatively flat, with a gentle southward slope over most of the installation, and elevations range from about 860 feet amsl near Wahiawa Reservoir, to about 790 feet amsl on the south edge of the plateau. Along the southern boundary of the installation, the slope breaks sharply in steep gullies that drain to the channel of Waikele Stream, about 80 to 100 feet below the level of the runways.

Schofield Barracks East Range. SBER is on the east side of the Schofield Plateau geomorphic province, an area created by the lapping of basalt flows from the Koolau Volcano against the remnants of the older Waianae Volcano to the west. The eastern side of SBER lies within the Koolau Range geomorphic province.

The southern boundary of SBER is the boundary between the Kaukonahua watershed and the Waikele watershed. The northern boundary of SBER, east of Wahiawa, corresponds to the boundary between the Kaukonahua watershed and the Poamoho watershed. SBER is on the leeward slope of the Koolau Range. The landscape is geologically young and undergoing rapid erosion. Streams cut deep V-shaped valleys in volcanic flow deposits that have deeply weathered in place, leaving the remnant structure of the volcanic flows but reducing their original permeability.

The upper surface of SBER slopes at an average rate of about 10 percent, dropping from an elevation of about 2,681 feet amsl on the Koolau Ridge at Puu Kaaumakua to about 850 feet amsl at Highway 99. The slope increases to the east. The western third of the range slopes at about half that rate, while the eastern third slopes at nearly twice that rate. The terrain is very rugged; the walls of the stream valleys in the eastern two-thirds of the range typically have slopes of 30 to more than 100 percent.

South Range Acquisition Area. Most of the SRAA is south of Waikele Stream, and consists of a generally east-sloping upland that slopes from an elevation of about 1,200 feet amsl in the southwest to about 850 feet amsl near Wheeler Army Airfield on the east. The upland surface is deeply dissected by Waikele Gulch and gulches of several north-draining tributaries to Waikele Stream. The channel of Waikele Stream is more than 100 feet below the rim in some areas.

Geology

Schofield Barracks Main Post. SBMP is underlain by the Koolau Basalt member of the Koolau formation, which butts up against the older eroded surface of the Kamaileunu and Lualualei (lower and middle) members of the Waianae formation (USAG-HI 2004). The Koolau Basalt flowed in thin, nearly horizontal layers, on which soils developed and alluvial sediments were deposited between flows during the various eruptions of the Koolau Volcano. The Koolau basalts are overlain by recent alluvial sediments eroded from the Waianae Range, which account for the surficial deposits that cover most of the SBMP (Oki 1998).

The thickness of the alluvial sediments generally increases toward the center of the Schofield Plateau. Beneath that is soil that developed in place on the surface of the Koolau basalts. This soil surface is underlain by saprolite (basalt that has been intensely weathered in place but retains many of the features of the original rock), which is exposed in some stream channels and grades with depth into less weathered basalt. Thus, relatively soft materials are found at depths of 100 to 200 feet below the ground surface (Harding Lawson Associates 1992).

Wheeler Army Airfield. WAAF is adjacent to the east side of the SBMP and is underlain by a thick 100-foot or greater sequence of saprolite, as described above, over which has developed a layer of clay-rich soil that is approximately 10 feet thick.

Schofield Barracks East Range. The geology of SBER is similar to that described above for the SBMP. Stearns and Vaksvik (1935) estimated the thickness of the Koolau deposits (depth to the underlying Waianae volcanic deposits) to be about 1,500 feet under the east side of SBMR. The thickness increases to the east. The eastern side of SBER is part of the Northwest Rift Zone of the Koolau Volcano. This is an area of greater dike intensity. The eruptive center of the Koolau Volcano was probably to the east of the ridge of the Koolau Range near Kaneohe Bay.

South Range Acquisition Area. The geology underlying the SRAA is dominated by lava flows of the lower and middle members of the Waianae Volcanic Series, which crop out along the uplands on the east side of the SBMP and underlie WAAF (USAG-HI 2004). The channel of Waikele Stream is incised 80 to 120 feet below the surface of the plateau, meaning that the stream channel has eroded through softer alluvium, soil, and saprolite deposits and rests near the depth of the underlying weathered basalt. The stream channels are covered by sediments eroded from the uplands and from the side slopes of the channels.

Soils

Schofield Barracks Main Post. Four of the seven soil associations found on Oahu occur within SBMP (USAG-HI 2004). Soils of the Tropohumults-Dystrandepts association occur in largely inaccessible deep V-shaped drainages and narrow ridges on very steep east-facing slopes above an elevation of about 1,500 feet amsl, and serve primarily as a watershed (Foote et al. 1972). These are thin, well-drained, light soils derived from volcanic ash that are high in organic matter, can contain more water than soil when saturated, and are strongly to extremely acid. The surface layer is generally dark-colored silty clay (friable in the case of Dystrandepts), while the subsoil has a strong blocky structure underlain by saprolite. Because of their occurrence on steep slopes, potential friability at the surface, and fine silty texture, the soil erosion hazard by wind and water is high for this association, especially in areas where vegetation has been depleted. Kolekole silty clay loam and Manana silty clay loam are two major soil groups found on the lower gently to moderately steep slopes of the range at elevations ranging from 500 to 1,200 feet amsl. Kolekole soils are moderately rapidly permeable to the depth of about 2 to 3 feet. Runoff is slow, and erosion hazard is slight.

Kunia silty clay is found on the flatter lands of SBMP, on nearly level ground in upland terraces and fans at elevations of 700 to 1,000 feet amsl. Kunia soils are well drained and moderately permeable, exhibiting slow runoff and slight erosion hazard. Soils of the Helemano and Kawaihapai series are found in the gulches and drainageways on alluvial fans. Helemano soils are well-drained silty clays that exhibit severe to very severe erosion potential. Kawaihapai soils are well drained, and the erosion hazard is slight.

A study conducted for the Army in 1979 (Walter Lum Associates, Inc. 1979) identified soil erosion problems in the Central and South Ranges of SBMP. The study concluded that erosion of the walls of gulches, mainly affecting Helemano soils, primarily occurs naturally during heavy rainfall/runoff. The study also identified soil erosion problems associated with unstable or poorly drained road cuts, mainly at gulch crossings and in areas with steep slopes, and bare soil surfaces where vehicle traffic and other military activities caused the removal of vegetative cover. The study found that about 1.3 percent of the total study area was undergoing high rates of erosion due to natural conditions, while about 3.5 percent was undergoing a high rate of erosion due to military activities. Erosion rates in denuded upland soil areas were estimated at between 28 and 80 tons per acre per year, while erosion on vegetated surfaces was estimated at 1.7 tons per acre per year. The erosion rate from soils at the tops of gulches in denuded areas was estimated at more than 400 tons per acre per year, compared to a rate of 8.1 tons per acre per year in areas where the tops of gulches were vegetated. Most of the erosion was caused by precipitation and runoff, but wind erosion was also a factor in bare soil areas. The study identified revegetation coupled with improving road cut drainage as the principal management measure to address the erosion problems in SBMP.

Wheeler Army Airfield. Most of the flat lands on WAAF are underlain by Wahiawa silty clay soils. Slopes range from 0 to 8 percent. These soils are well drained, about 4 feet thick, and developed on alluvium underlain by weathered basalt. Runoff is slow, and the erosion hazard is slight. The gully slopes adjacent to Waikele Stream are underlain by Helemano soils. As described above, Helemano soils have a high erosion hazard.

Schofield Barracks East Range. The eastern half of SBER, above about 1,200 feet amsl, contains thin soils classified as "rough mountainous land." The soils range from 1 to 10 inches thick over saprolite. The saprolite is typically soft enough for roots to penetrate. Annual rainfall ranges from 70 to more than 400 inches. On the narrow ridge tops, the soils are similar to Olokui and Amalu soils of Maui and Molokai. Amalu soils are poorly drained, peaty silty clays on slopes up to 20 percent. Olokui soils are shallow poorly drained soils that are high in organic matter content (many roots) and found on slopes of up to 30 percent. A thin, impermeable iron-cemented layer (ironstone) is found just above weathered rock at depths of 6 to 20 inches. Roots and infiltration of rainwater are limited by the ironstone, so vegetation must have a flat, shallow rooting system. These soils are always wet, with very slow to moderate runoff, and slow to moderately rapid permeability. Ponding is common in depressions. Because of the high moisture, high clay, peat, and organic content, slow runoff and permeability, poor drainage, and thin surface, these soils likely have a slight to moderate erosion hazard, but high compaction potential.

Farther downslope, at elevations below about 1,200 feet amsl, the predominant soil is Helemano silty clay on 30 to 90 percent slopes. These are well-drained soils formed on alluvial fans or on the colluvium deposited along the walls of gulches. Colluvium is a loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope. The surface soil is dark reddish-brown silty clay, about 10 inches thick, which is underlain by about 50 inches of similar soil with a blocky structure. The soil is developed on soft, highly weathered basalt. Runoff is medium to very rapid, and the erosion hazard is severe to very severe. On the gentler slopes of ridge tops below an elevation of about 1,200 feet amsl are silty clay soils of the Leilehua and Paaloa series. Leilehua soils are about 48 inches thick over gravelly parent material weathered from basalt. Permeability is moderately rapid, runoff is slow to moderate, and the erosion hazard is slight to moderate, depending on slope. Paaloa soils are silty clays or clays. Permeability is moderately rapid, runoff is slow to medium, and the erosion hazard is slight to moderate. At the lowest elevations of SBER, near Wahiawa, the predominant soil is Wahiawa silty clay, which is described above as well drained with slow runoff and slight erosion hazard. Slopes range from 0 to 8 percent. These soils are well drained, about 4 feet thick, and developed on alluvium underlain by weathered basalt. Runoff is slow, and the erosion hazard is slight.

South Range Acquisition Area. Most of the SRAA is underlain by Kunia Silty Clay. Uplands on the east side of the South Range are underlain by soils similar to those at the same elevations on the Main Post, including Kolekole Silty Clay Loam and Mahana Silty Clay Loam. Both soils were described above as having slow runoff and slight erosion hazard. Soils in the SRAA are classified by the State of Hawaii as "important farmland" because they support unirrigated pineapple culture.

Erosion Management

USAG-HI conserves and manages soil resources on Oahu by managing for natural rates of runoff, erosion, and sedimentation. The Integrated Natural Resources Management Plan (INRMP) for Oahu for 2002 to 2006 identifies installation-specific goals and management objectives of the ITAM Program for Oahu (U.S. Army Hawaii [USARHAW] 2001a). The Army-wide goal for ITAM is to achieve optimum sustainable use of training lands by inventorying and monitoring land condition, integrating training requirements with land capacity, educating land users to minimize adverse impacts, and providing for land rehabilitation and maintenance.

The ITAM has four major component programs: Range and Training Land Assessment (RTLA), Land Rehabilitation and Maintenance (LRAM), Training Requirements Integration (TRI), and Environmental Awareness. The RTLA Program is a long-term program that evaluates current land conditions and trends on Army lands and the capability of those lands to support long-term multiple-use, including military training. Information gathered by this program is used to help prioritize potential LRAM projects. Data collected by the program includes topographic features, soil characteristics, and surface disturbance, which is used to estimate soil erosion, ground cover and disturbance, and monitor land restoration projects. Soil erosion and sediment control is managed through the LRAM program projects, which consist of strategies and resource allocations for resting and repairing training lands on a rotational basis as well as repairing damaged training areas as the need arises. LRAM seeks to stabilize soils and provide long-term vegetative cover to support military land use. The program involves using cost-effective technologies such as revegetation, erosion control structures, site hardening, blockades, and dust palliatives to prevent training site degradation, soil erosion, and excessive road damage. Routine road maintenance is a function of DPW; however combat trails and range ingress/egress roads are the responsibility of Range Maintenance and may be included in LRAM projects, including effective erosion control practices on roadways, which result in reduced future road maintenance needs. Hardening sites refers to the application of crushed rock, coral, and other material to stabilize soil and minimize runoff. Minimization of impacts is achieved through institutional procedures, including the ITAM TRI program, ITAM Environmental Awareness Program, range regulations, and training policies provided by Directorate of Public Works (DPW) Environmental Division.

Chemical Constituents in Soils

USACE conducted a surface soil investigation at SMBR between November 8 and November 10, 2002 (USACE 2002d). Samples were taken to collect data in order to establish baseline conditions for human health assessments for range exposure. The investigation was not intended to be a comprehensive study of the distribution of contaminants on the ranges. The results of the investigation as they relate to concentrations of natural and introduced substances in soils are summarized in this section.

The constituent concentrations detected in the soil investigation were compared to the U.S. Environmental Protection Agency's (USEPA) preliminary remediation guidelines (PRGs) for industrial soils (see http://www.epa.gov/region09/waste/sfund/prg/files/02userguide.pdf for more information on PRGs). PRGs are not regulatory standards, but rather goals designed to be protective of health under a wide range of conditions. The guidelines for the use of PRGs allow users to adjust the exposure assumptions to better reflect site-specific conditions; although, this was not done for the 2002 soil investigation. The Army used the industrial soil PRGs in order to establish a basis of comparison for the concentrations of contaminants observed on the training ranges. However, these PRGs are based on exposure assumptions that are substantially higher than could be expected for military personnel using the applicable range areas. Industrial soil PRGs assume adult outdoor worker exposures for a period of 25 years. Most military personnel use the training ranges only for brief periods, totaling days or weeks, so that actual exposures are generally far lower than assumed in the industrial soil PRGs (USAG-HI 2004).

Results of the study identified three general classes of compounds: metals, explosives, and semi-volatile organic compounds (SVOCs). Metals occur naturally in Hawaiian soils because of the weathering of minerals contained in the volcanic rock from which the soils were derived. Training activities may contribute additional metals concentrations to the natural background concentrations present in soils, such as lead that is present in bullets and some explosives. In cases where constituents are detected at concentrations that significantly differ from the average natural background concentrations, human activities, such as military training activities, may be considered a contributing factor.

Explosives. The sampling detected four explosives: 2,4,6-trinitrotoluene (TNT), Octahydro-1357-tetranitro-1357-tetrazocine (HMX), Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), and nitroglycerin.

Two samples of RDX and one sample of nitroglycerin exceeded their respective industrial PRGs (USAG-HI 2004). Based on these results, it appeared that traces of explosive compounds are present in areas where high explosives have been used or where munitions demolition occurred including the Engineering Demolition Range, the Mount Assault Course (MAC), and the KR8 Anti-Armor Range. Explosives were not detected in samples collected from the North Firebreak Road Impact Area or from the firing point area for 105mm and 155mm mortars in the South Range.

Metals. High concentrations of a number of metals, including aluminum, manganese, iron, chromium, and others, occur naturally in Hawaiian soils as major constituents of the minerals in the basalt lavas. Although several concentrations exceeded industrial soil PRGs, they showed near average distribution, with disproportionately few samples containing concentrations significantly lower or higher than the average concentration of all of the samples collected (USAG-HI 2004). While arsenic occurs naturally in Hawaiian soils, it is one of several metals known or suspected to cause cancer in humans; therefore, the cancer risk PRG must also be considered. The average arsenic concentration detected was well below the non-cancer industrial soil PRG, but exceeded the cancer industrial soil PRG and was the largest contributor to the total carcinogenic risk among the metals and explosives detected (USAG-HI 2004). Only a few metals (possibly arsenic, lead, cadmium, and vanadium) at sporadic sample locations appeared to be present at concentrations attributable to human activities. With the exception of the discussion of arsenic above, all of the concentrations of these metals detected in samples from the ranges were below industrial soil PRGs. It was unclear whether concentrations of arsenic could be attributed to natural or human-made sources.

Semi-volatile Organic Compounds. SVOCs were detected only in samples collected from the Infantry Demolition Area, none of which contained concentrations above industrial soil PRGs (USAG-HI 2004).

Depleted Uranium. In August 2005, during the cleanup of unexploded ordnance from a range complex on Schofield Barracks, the Army identified 13 tail assemblies to the M101 spotting round for the Davy Crockett Weapons System. The spotting rounds, which contained DU, were fired for training purposes in order to determine the proper trajectories for the Davy Crockett warhead. The Army confirmed these items to have low-level radioactivity.

The Davy Crockett Weapons System consisted of a recoilless rifle, a spotting rifle, and a small nuclear warhead. Recently declassified records indicate the M101 spotter round was used in Hawaii from 1961 to 1968. Until the initial discovery of the tail assemblies in 2005, current Army staff was unaware of the existence of the items in Hawaii. There is no evidence indicating that the warhead was ever fired or stored in Hawaii.

A ground survey of the immediate and surrounding area detected no readings above background levels. A subsequent survey of the area with more sophisticated equipment again detected no readings above background levels.

In October 2006, a third survey of the area was conducted in areas made more accessible by a successful prescribed burn of the impact area. The survey consisted of visual reconnaissance, handheld field instrument scans for the detection of low energy radiation, uranium analysis, and alpha/gamma spectroscopy. During this survey, several areas were found with DU particles on top of the ground and several 20mm tail fin sections were located and left in place. Forty-five separate locations showed Gamma levels higher then background. All of these locations were recorded by GPS and marked with orange flags. In total nine samples were collected (six soil samples and three fragments) and sent to an offsite laboratory for analysis. Laboratory analyses indicated that three soil samples exhibited uranium-238 above background levels. Additionally, spectroscopy analyses confirmed that the three fragments collected are comprised of DU.

To date, the Army has found no records or other information to indicate that the weapons system was used for training exercises at MMR, PTA, or other locations in Hawaii. However, the Army is still reviewing historical records to determine if there is potential that the M101 spotter rounds were used at these locations, and the Army plans to survey ranges with appropriate characteristics to have been used with the weapons system at MMR and PTA.

Currently, Army policy prohibits the use of DU ammunition for training worldwide (AR 385-62).

Geologic Hazards and Seismicity

Schofield Barracks Main Post. Steep slopes, slopes weakened by road cuts, and slopes supported by poorly consolidated materials are subject to failure. Several soil conditions or situations can induce slope failure in such areas, including soils saturated from heavy precipitation, overloading heavy machinery or structures on weak soils, or seismic shaking. Failure can also occur on gentle slopes for similar reasons. Areas of steep slopes that may be particularly susceptible to landslides or slope failure, usually considered slopes greater than 30 percent, are located primarily in the western portion of SBMP along the ridgeline of the Waianae Range (USAG-HI 2004).

The potential for strong ground shaking at SBMP is relatively low due to its distance from the south coast of the Island of Hawaii, where most modern Hawaiian earthquakes originate. The U.S. Geological Survey (USGS) has prepared maps showing the horizontal ground acceleration in firm rock, as a percentage of the acceleration of gravity, for a given probability of exceedance within a given number of years. The severity of ground shaking depends on the local geologic conditions. Soft sediments (alluvium for example) may amplify seismic waves, while wave energy tends to be transmitted efficiently through hard rock. According to the USGS National Seismic Hazard Mapping Project there is only about a 10 percent chance that ground accelerations of more than 12 percent of gravity would occur in firm rock areas within the southeastern three quarters of Oahu over the next 50 years (USAG-HI 2004). The intensity and magnitude of an earthquake are other measures of earthquake severity. Intensity is estimated at points where the shaking is felt, while magnitude is measured at the source of the earthquake. Ground accelerations of more than 12 percent of gravity roughly correlate with earthquakes of magnitude 5.0 to 5.9 on the Richter Scale and intensity of VI to VII on the Modified Mercalli Scale, which can cause negligible to slight damage in specially designed structures, slight to considerable damage in well-built ordinary structures, and considerable damage to poorly built structures, and can potentially cause slope failure or landslides.

Wheeler Army Airfield. Geologic hazards at WAAF are similar to those described above for SBMP, and the potential for earthquakes and ground motion is the same. The steep slopes of Waikele Gulch are underlain by erodible soils and soft saprolite deposits, which are vulnerable to slope failure.

Schofield Barracks East Range. SBER contains many areas of steep slopes and deeply weathered rock, particularly in the eastern portion of the range, on the leeward slope of the Koolau Range (USAG-HI 2004). Erosion tends to prevent the accumulation of alluvium and colluvium, but slope failure remains a potential hazard in many areas. Similar to SBMP, there is little risk of strong ground shaking in areas underlain by firm rock in SBER. However, site-specific conditions, such as the thickness of loose geologic deposits and the depth of the water table, may intensify ground shaking. Earthquakes may also trigger landslides in areas of unstable slopes, although the risk of seismically induced slope failure and landslides is significantly lower than slope failure and landslides resulting from water and erosion.

South Range Acquisition Area. The SRAA is dissected by the channels of Waikele Stream and its tributaries. The streams have incised steep-sided gullies, 80 to 120 feet deep, into the relatively gently northeast-sloping surface of the plateau. The floors of the gullies are relatively wide and flat, and the Waikele Stream meanders within this incised channel. The slopes of the plateau surface are stable, while the walls

of the gullies are subject to collapse due to erosion at the base of the slopes from migration of the streams within their channels. This situation is similar to what occurs in stream channels on SBMP. Seismic hazards are the same as those described above for SBMP.

3.1.1.2 Dillingham Military Reservation

Physiography

DMR is on Oahu's Waialua Plain and extends inland to the foot of the Waianae Range. Elevation ranges from near sea level on the northern boundary to 200 feet near the southern boundary. The proposed Dillingham Trail would connect DMR and SBMR. From DMR to Ranch Camp at Waialua, the proposed trail would be on the coastal plain inland of the Farrington Highway. The proposed route would cross several small streams, the largest of which is Makaleha Stream, near Dillingham Ranch. At Ranch Camp, the trail would head south up to an elevation of about 250 feet amsl, where it would cross a tributary of Kaukonahua Stream. Here it would head east, below the Ito Ditch, which runs approximately along the contour of the hillslope for about 0.25 mile. Then the trail would turn upslope and follow a ridge up to an elevation of about 1,800 feet amsl. The proposed trail would turn east again and descend gradually along the contour of the mountain to an elevation of about 1,500 feet amsl, where it would round the shoulder of a prominence called Maili. The trail would continue south along the contour of the mountain at an elevation of about 1,200 feet amsl and then descend steeply to SBMR, crossing both Haleanau Gulch and Mohiakea Gulch.

Geology

DMR is on the north slope of the Waianae Range and is underlain by chronologically alternating basaltic flows and eroded volcanic rocks of the Waianae and Koolau volcanoes (USAG-HI 2004). Exposed rocks on the north slope of the Waianae Range, south of DMR, are remnants of the dike complex belonging to the northwest-trending rift zone of the Waianae dome. Along the coast, the volcanic rocks alternately have submerged below and emerged above sea level over recent geologic time. The coastline is underlain by an ancient coral reef, which subsequently has been overlain by dune sand deposits.

Soils

Soils at DMR are developed on beach sand deposits, with various mixtures of finer and coarser sediments. Most of the area is underlain by Jaucas sand, which has been disturbed or filled to construct the airstrip, roads, and building sites. DMR also contains boggy seasonal wetlands, which are underlain by Lualualei clay, and marginal sloping uplands predominantly underlain by Kaena very stony clay or other stony or rocky soils. The Jaucas sand is highly susceptible to wind erosion. Kaena very stony clay exhibits moderate to severe water erosion (USAG-HI 2004).

Dillingham Trail would use existing unpaved farm roads over most of the proposed alignment, some of which would require modification, such as hardening the roads, improving drainage to prevent damage to the road surface, and improvements or modifications to existing stream crossings to ensure passibility and prevent environmental damage. The soils over which the proposed trail passes are summarized below with attention paid primarily to soils exhibiting rapid runoff, severe erosion potential, high compaction or shrink-swell potential, or other soil hazards.

From the east edge of DMR to just east of Waialua, Dillingham Trail crosses relatively flat lands of the coastal plain, underlain by soils of the Kaena-Waialua association, which are deep, poorly drained to excessively drained with a fine- to coarse-textured subsoil on coastal plains and talus slopes. Except for the clay soils, most of the soils make good road fill. The Pearl Harbor clay, Kaena stony clay, and Waialua

clays have a moderate to high shrink-swell potential, poor workability, and high water table (USAG-HI 2004).

The portion of the trail upstream of Kaheaka Reservoir crosses soils belonging to the Helemano-Wahiawa association, which are deep, well-drained soils on uplands. The trail then continues south, leaving the paved road, and skirts the southern edge of the cultivated farmlands along the north rim of Poamoho Stream, which consists of rock land soils, 25 to 90 percent of the surface of which is exposed rock, transitioning to Helemano soils further upstream. The soil between the rock outcrops is clayey, has a high shrink-swell potential, and is susceptible to sliding. Helemano soils have rapid runoff and very severe erosion hazard. At the rim of the gulch, the trail traverses soils suitable for road fill, including Wahiawa silty clay, then continues gradually upslope across Manana silty clay and Kolekole silty clay loam, skirting the Wahiawa silty clay soils that underlie the adjacent farmlands. The trail crosses Poamoho Stream (near Poamoho Camp) again, in Helemano soils with 30 to 90 percent slopes. The portion of the trail between Poamoho Camp and the gate at SBMR on Wilikina Drive crosses Wahiawa silty clays. Wahiawa silty clays were described previously as well drained, with slow runoff and slight erosion hazard.

Erosion Management

As described previously for SBMR, soil resources management on DMR is mandated by and detailed in the USAG-HI INRMP and ITAM Five Year Management Plan for Oahu (USARHAW 2001a).

Geologic Hazards and Seismicity

Steep slopes (greater than 30 percent) within DMR are limited to the southern margin of the installation, which abuts the steep slopes of the northern extension of the Waianae Range (USAG-HI 2004). Rock falls would be the most common mechanism of failure because the slopes contain relatively little soil cover.

The northwest part of Oahu is within an area that has about a 10 percent probability of experiencing ground accelerations of more than 10 percent of gravity due to earthquakes during the next 50 years (Klein et al. 2001). Liquefaction is the sudden loss of strength of saturated soil or sediment that results from increased pore pressure caused by vibration or seismic shaking. Loose sandy sediments with a high water table are particularly susceptible to liquefaction. The combination of loose beach and dune sands and a shallow water table present at DMR make liquefaction a potential hazard at the installation.

3.1.1.3 Kahuku Training Area and Kawailoa Training Area

Physiography

The KTA ROI is on the northeastern part of the Koolau Mountains (including portions of KLOA), inland of the Kamehameha Highway and does not extend to the shoreline of Oahu. Elevations range from near sea level to about 1,860 feet amsl. The topography varies from relatively flat on the coastal plains to nearly vertical bluffs on the cliffs to the east (USAG-HI 2004).

Geology

KTA lies on the northernmost exposure of the Northwest Rift Zone of the Koolau Volcano (USAG-HI 2004). Most of the area is underlain by Koolau basalts that were deposited at the end of its eruptive cycle. The Northwest Rift Zone contains dense volcanic dike intrusions, most of which are aligned in the same direction as the rift zone, on a northwest trend. The dike orientation tends to parallel the flow direction of

streams and gulches in the northern part of KTA, but is perpendicular to the surface drainage and erosion patterns on the east and west (USAG-HI 2004).

Soils

Kahuku Training Area. Almost the entire southern (upland) half of KTA is classified as Kapaa silty clay at 40 to 100 percent slopes (USAG-HI 2004), which formed in weathered volcanic rock materials and occur on steep drainages, gulches, and ridgelines in mountainous areas with high rainfall. Kapaa silty clay soils are deep and well drained, with fine to moderately fine subsoil on gentle slopes; however, runoff is very rapid and erosion potential is very severe on steep slopes, where most of the surface layer has been removed by erosion (USAG-HI 2004).

Paumalu-Badland Complex soils are found in a broad band north of the Kapaa soils (USAG-HI 2004). Paumalu soils, which make up about 40 to 80 percent of the acreage in this complex, exhibit medium to rapid runoff and moderate to severe erosion potential. Badland, which consists of nearly barren land that remains after the Paumalu soils are eroded away by wind or water, includes rocky and stony land with rapid runoff and very severe erosion potential.

Kemoo-Badland Complex soils dominate the band to the north of Paumalu-Badland soils. Kemoo silty clay accounts for about 40 to 80 percent of the area covered by Kemoo-Badland Complex soils. Kemoo silty clay soils are well-drained red to dark reddish-brown blocky soils found on elevations between 300 and 1,200 feet amsl, where the rainfall ranges from 35 to 60 inches. On steep slopes, runoff is medium to rapid, and the erosion hazard is moderate to severe. On gentle slopes (2 to 6 percent slopes), runoff is slow to medium and the erosion hazard is slight.

Preliminary Army Training and Testing Area Carrying Capacity (ATTACC) modeling results reported in 2004 FEIS for the Transformation of the 2nd Brigade 25th Infantry Division (Light) to an SBCT in Hawaii (USAG-HI 2004) indicated that land condition at KTA is adversely affected by current training activities and that soil loss exceeds sustainable rates.

Kawailoa Training Area. The ROI of Alternative A for geologic resources within KLOA is contiguous with the ROI of the Drum Road portion of the alternative; therefore, the discussion on the Drum Road route includes the portion of KLOA that would be affected by Alternative A for this EIS. The soils within the corridor along Drum Road, which runs through KLOA, between KTA and Helamano Military Reservation (HMR), are summarized below.

Drum Road follows narrow ridges between watersheds along most of its route, occasionally crossing steep gulches to cross streams. The road is paved from Kamehameha Highway to just east of Mount Kawela. A project is underway to improve the road, including constructing tunnels in areas where sharp curves on steep slopes are otherwise unavoidable, using bridges and viaducts to widen the roadway in narrow areas, installing box culverts designed to accommodate a 10-year storm, and realigning the road to provide a maximum 9 percent grade (slope). The improved road would generally follow the existing alignment. The road surface would be gravel, with compacted gravel shoulders. In some areas, it would be paved with asphalt to protect from erosion and formation of ruts (USAG-HI 2004).

Along the 6-mile segment where the road follows the northern boundary of KLOA, the road passes initially over a small area of Paumalu silty clay, and then crosses quickly into Paumalu-Badland complex. Above an elevation of about 1,000 feet amsl, it is in Kapaa silty clay on 40 to 100 percent slopes and Helemano silty clay in many ridge top areas, steep sides of V-shaped gulches, and rock outcrops (USAG-HI 2004). The Paumalu series soils are well-drained, gently rolling, silty clays developed in old alluvium and colluvium, with runoff and erosion hazard increasing as slope increases. The Paumalu-Badland com-

plex occurs on 10 to 70 percent slopes and consists of 20 to 60 percent Badland. The erosion hazard is very severe (USAG-HI 2004). As described in the section on KTA, Kapaa silty clay soils exhibit very rapid runoff and very severe erosion potential, with most of the surface soil having been removed by erosion. As described in the section on SBMP, Helemano silty clays are moderately rapidly permeable, with rapid runoff and very severe erosion potential.

The road continues south, following closely along the boundary of KLOA toward Puukapu, crossing Helemano silty clay soil to rock land, both described previously as having severe runoff and erosion hazard. After crossing the Kaiwikoele Stream, the road passes over some broader ridges underlain by Paaloa silty clay and Paaloa clay, used primarily for pasture and formerly for sugarcane. The Paaloa soils are well-drained, formed on narrow upland areas bounded by steep, smooth-sloped gulches, and exhibit moderately rapid permeability, slow to medium runoff, and slight to moderate erosion potential (USAG-HI 2004).

As the road continues south, it passes again across rock land, alternating with Helemano silty clay on 30 to 90 percent slopes. It also passes over a few narrow ridges underlain by Leilehua silty clay on 2 to 6 percent slopes. The Leilehua soil is similar to the Paaloa soils in its occurrence on narrow ridges bounded by steep gulches, but it is developed on a more gravelly substratum. Runoff is slow, permeability is moderately rapid, and the erosion hazard is slight.

As the road continues south, it bends dramatically to avoid deep gulches and cultivated farmlands. As a result, the road follows along the rim of the gulches, crossing over steep slopes underlain by Helemano silty clay or rock land, alternating with gentler slopes on ridges underlain by Leilehua silty clay. It follows a course west along the north ridge of Opaeula Stream and dips down from the rim elevation of about 1,200 feet amsl into the stream gulch to cross the stream at an elevation of about 800 feet amsl. The gulch is underlain by Helemano silty clay. The remainder of the route to HMR traverses similar soils, alternating between rock land, Helemano silty clay in gulches, and either Leilehua silty clay soils or Paaloa soils on ridges.

Erosion Management

As described previously for SBMR, soil resources management on KTA is mandated by and detailed in the USAG-HI INRMP and ITAM Five Year Management Plan for Oahu (USARHAW 2001a).

Geologic Hazards and Seismicity

Kahuku Training Area. The high rainfall and runoff from the Koolau Mountains has created many deep, nearly vertical gulches that are susceptible to rockslides, which are separated by long narrow ridges that radiate from the Koolau Mountains toward the sea. KTA is dominated by slopes that are greater than 30 percent, with the exception of interspersed, relatively flat coastal plains in the northern portion of the training area (USAG-HI 2004). Soils do not accumulate on the upper slopes; rather, the rock itself becomes weakened by weathering and sloughs off, often unexpectedly with no identifiable trigger aside from weathering. Earthquakes or vibrations from sonic booms may also trigger these slides (Jibson and Baum 1999). The rock rubble from these failures accumulates on the floors of the gulches and is ultimately carried downstream by runoff. The probability of earthquakes in KTA is similar to that of the other installations on Oahu because most earthquakes are centered in the active volcanic areas beneath the Island of Hawaii. The intensity of ground shaking, which is influenced by the underlying geologic materials, would be lowest in rocky upland areas and would probably increase somewhat on the lower slopes, where the alluvial deposits are thickest.

Kawailoa Training Area. The route of Drum Road is mainly along ridges within KTA and alternates between ridges and gulches along the western boundary of the KLOA. The potential for slope failure is probably high on slopes underlain by saprolite (deeply weathered basalt that retains the appearance of the original rock but that does not have the strength of the rock). The saprolite forms steep slopes in stream gulches, but the slopes may be weakened if undercut at the base or if overloaded on top.

3.1.1.4 Pohakuloa Training Area

Physiography

PTA is in the Humuula Saddle between the two major peaks on the Island of Hawaii; Mauna Kea lies to the northeast, and Mauna Loa lies to the south. Elevations within PTA range from 4,030 to 8,650 feet amsl. The slope of the Mauna Kea volcano rises steeply (about a 26 percent slope) from Saddle Road to an elevation of 13,796 feet amsl over a distance of about 6 miles. The slope of Mauna Loa, by contrast, rises to the southwest at about a 4 percent slope to an elevation of 13,678 feet amsl over a distance of about 20 miles. To the west of these two peaks is the Hualalai volcano (about 8,690 feet amsl).

The military vehicle trail from Kawaihae Harbor to PTA runs south inland of Highway 270 and rises to an elevation of about 250 feet amsl near the junction with Highway 19. The trail continues east, paralleling Highway 19 along the foot of the Kohala Mountains to the western edge of Waimea (Kamuela). This segment rises to an elevation of about 2,500 feet amsl over a distance of about 10 miles. Near Waiaka, on the outskirts of Waimea, the trail turns south and runs west of Highway 190, approximately following the 2,400-foot amsl elevation contour to the junction with Saddle Road (Route 200). The trail crosses Highway 190 west of a small volcanic cone called Nahonaoahe and continues upslope, roughly parallel to Saddle Road, until it reaches PTA at a point near the Puu Keekee cinder cone.

Geology

Most of PTA is on lava flow deposits erupted from Mauna Loa, the last eruption of which (1984) covered 16 square miles of land in 3 weeks. The lava erupted from the Northeast Rift Zone, which extends northeast from the Mauna Loa crater and skirts the southeast boundary of PTA (USAG-HI 2004). Below these lava flow deposits are overlapping historic basalt flows erupted from Mauna Loa and Mauna Kea. **Figure 3-1** shows the locations of PTA and PTA Trail.

The lower half of the Keamuku Parcel (formally the WPAA) is within the Waimea Plains, which were formed by lava flows from Mauna Kea that butted up against the older Kohala Mountains. These mountains are now covered with a blanket of volcanic ash soils. The lava is predominantly pahoehoe and aa basalt flows, scoria (cinder), and ash deposits of the Hamakua Volcano (USAG-HI 2004). Keamuku Parcel is dotted with Mauna Kea volcano cinder cones lying on the upper layer of the Hamakua basalts, which is covered by a layer of up to about 3 feet of Pahala ash deposited mainly on the southern flanks of the island by an explosive eruption period from Mauna Kea about 39,000 years ago (USAG-HI 2004).

Soils

Soils are thin and poorly developed on PTA. Recent lava flows cover about 80 percent of the land surface. The low precipitation, rapid runoff, and high altitude reduce the rate of weathering, and the steep slopes and wind tend to prevent soils from accumulating. About 88,000 acres of PTA are classified by the U.S. Natural Resource Conservation Service (NRCS) as lava flows, of which about half are aa flows and half are pahoehoe flows (USAG-HI 2004). An additional 1,400 acres are classified as cinder land. About 12,500 acres are classified as either rock land or very stony land. The remaining approximately 10,000

acres, almost all of which is along the northern boundary of PTA near Saddle Road within training areas 1 through 17 and 22, are classified as soils formed on volcanic deposits.

The predominant soil is Keekee loamy sand on 0 to 6 percent slopes, which is a mildly to strongly alkaline soil consisting of stratified sand developed in alluvium from volcanic ash and cinders. Permeability is rapid, and runoff is slow. The hazard of wind erosion is moderate to severe. Similar sandy soils developed on slightly steeper slopes are found in the same general vicinity, including Huikau extremely stony loamy sand on 12 to 20 percent slopes, and Kilohana loamy fine sand on 12 to 20 percent slopes.

The Keamuku Parcel is underlain primarily by very fine sandy loam soils belonging to the Puu Pa-Pakini-Waiaha soil association (U.S. Department of Agriculture [USDA] 1973), which developed on volcanic ash deposits. The predominant soils are Waikaloa very fine sandy loam and Puu Pa extremely stony very fine sandy loam on the lower two-thirds of the parcel; and Waikaloa very fine sandy loam, Kilohana loamy fine sand, and very stony land on the upper third of the parcel. Shallow gulches dissect the parcel; the largest of these are Waikii Gulch and Auwaiakeakua Gulch. The gulches contain soft, permeable soils, which form thicker deposits in some areas, while the Puu Pa soils in other areas contain a calcium carbonate cemented layer that impedes percolation of water. Wind and water easily erode Waikaloa and Puu Pa soils.

The Kawaihae Harbor area is built on imported fill and is paved. Between Kawaihae Harbor and about midway to Waimea, PTA-Kawaihae trail follows the route of an existing military vehicle trail. The foot of the slope just east of Kawaihae Harbor is composed of Kawaihae very rocky very fine sandy loam. The trail continues upslope over Kawaihae extremely stony very fine sandy loam on slopes of 6 to 12 percent, eventually crossing the former Lalamilo Firing Range, just below a rock wall, and follows the western boundary of the Puu Pa Military Maneuver Area (Earth Tech 2002). Kawaihae extremely stony very fine sandy loam also lines the gulches along the portion of the trail near Kamakoa Gulch that turns upslope along the southern boundary of the Puu Pa Maneuver Area toward the Saddle Road Junction. Kawaihae soils have a very weak structure and crumble easily. The soils are used primarily for grazing and occur at elevations of up to 1,500 feet amsl on the leeward side of Hawaii, where rainfall levels range from 5 to 20 inches.

The trail crosses about 1 mile of Puu Pa extremely stony very fine sandy loam on 6 to 20 percent slopes at about the 1,600-foot amsl elevation contour. Puu Pa soils are similar in characteristics to the Kawaihae soils, distinguished from Kawaihae soils primarily by their occurrence at higher elevations on steeper slopes in areas receiving higher annual rainfall. Permeability is moderately rapid and runoff is medium. At an elevation of about 1,900 feet amsl, the trail turns abruptly south again for about 4 miles, following an existing unpaved track for about 2 miles, and then continues above the 1,800-foot amsl contour, where there is no existing track, until it intercepts a paved road. The trail continues upslope along the paved road for a distance of about 4 miles alongside Auwaiakeakua Gulch, to the Auwaiakeakua Water Tank at Highway 190. The soil along about the last 7 miles of this segment is mainly Waikaloa very fine sandy loam on 6 to 12 percent slopes, interspersed with Puu Pa and Kamakoa very fine sandy loam on 6 to 12 percent slopes, and encountering a short segment underlain by Kaimu extremely stony peat on 7 to 25 percent slopes. A strongly cemented layer containing calcium carbonate occurs in most locations at a depth of about 4 feet. Waikaloa soils also exhibit characteristics similar to those of Kawaihae soils, but occur on slightly steeper slopes where rainfall levels are slightly lower. The Kaimu soil is formed in organic material mixed with minor amounts of basic volcanic ash in aa lava, occurring in areas where the mean annual rainfall is about 35 inches.

About 3 miles downslope from the 1010 Parcel, at an elevation of about 4,300 feet amsl, the trail crosses Kilohana loamy fine sand on 12 to 20 percent slopes formed in material weathered from volcanic ash, interspersed with very stony land. Kilohana soils are very highly permeable, runoff is slow, and outcrops of

aa lava flows are common. In the 1010 Parcel, the trail intercepts Keekee Road, an unpaved road that runs along the northwest side of Puu Keekee cinder cone, where the soils are classified as cinder land.

Erosion Management

As described previously for SBMR, USAG-HI conserves and manages soil resources on PTA by managing for natural rates of runoff, erosion, and sedimentation. The INRMP for PTA for 2002 to 2006 identifies installation-specific goals and management objectives of the ITAM Program for PTA (USARHAW 2001b). Erosion management strategies are similar to those implemented under the INRMP for Oahu, with the exception that site hardening involves putting down crushed lava to allow use of the area without degradation of the surrounding area. Restoration of artillery firing points has been the major area of emphasis for the LRAM program on PTA since 1996. Some of the firing points have become denuded, resulting in vegetation loss and subsequent major erosion and dust issues. PTA soil substrates are primarily fine, volcanic ash prone to wind erosion and dust generation.

Chemical Constituents in Soils

The USACE, Sacramento District, conducted a surface soil and surface water investigation at PTA between November 12 and November 14, 2002 (USACE 2002d). Samples were taken to collect data in order to establish baseline conditions for human health assessments for range exposure. Similar to the investigation conducted at SBMR, the investigation was not intended to be a comprehensive study of the distribution of contaminants on the ranges, but was only intended to support the description of current conditions and to provide evidence of the effects of past training activities on surface soils and surface water. The results of the study are summarized below.

*Semi-volatile Organics***.** Similar to the samples collected at SBMR, metals, explosives, and SVOCs (phthalate esters and polynuclear aromatic hydrocarbons [PAHs]) were detected. The phthalate esters are plasticizers and are ubiquitous in the environment, although they may have been present because of plastic parts in munitions. PAHs, produced by combustion of heavy organic compounds including wood, oils, and tars, are also common in the environment at low concentrations. None of the semi-volatile organics detected exceeded industrial soil PRGs.

Explosives. The sampling detected six explosives including TNT, 2,4-dinitrotoluene (DNT) (a degradation product of TNT), RDX, HMX, nitroglycerin, and perchlorate. With the exception of 2,4-DNT and perchlorate, these are the same compounds that were detected in samples from SBMR, suggesting that the effects of past training activities on surface soils and surface water are relatively consistent between military installations. Four of the 46 samples had detectable concentrations of TNT, but none of the samples exceeded the industrial soil PRG. The detections were found in three samples from the Range 9 Demo Area and in one sample from Range 5. Three samples contained 2,4-DNT at concentrations well below the industrial soil PRG. Perchlorate was detected in one sample, from firing point FP309 in the northwest corner of Training Area 8, at concentrations below the industrial soil PRG. Concentrations of RDX exceeded its industrial PRG in five samples.

Metals. Metals occur naturally in Hawaiian soils; however, human activities may also contribute to the background levels of metals in soils. Even in natural conditions, metals concentrations are expected to vary among different areas. This variation was observed in the metals concentrations of the soils on PTA. One reason for this phenomenon could be that the heterogeneous lavas on which the thin, poorly developed soils formed contained different compositions of metals due to varying ages of the flows, and the soils have not had much time to be mixed or redeposited (USAG-HI 2004).

When metals concentrations are significantly different from the typical background range of concentrations, then it is more likely that human sources contributed to the metals concentrations. Among the metals that were analyzed in the samples, the most abundant metals in basalt minerals are aluminum, barium, chromium, iron, nickel, and zinc. Other metals would generally be expected to be present at lower concentrations. Except for iron, none of these metals were detected at concentrations above the residential soil PRGs. Iron did not exceed the industrial PRG in any samples collected from PTA. Chromium, nickel, and zinc were detected in one sample from Range 11 at much higher concentrations than in the other samples, indicating possible contribution by human sources, but the concentrations were still less than the industrial soil PRGs. Zinc was also detected in a few samples from Range 5 at much higher concentrations than in other samples from that range, but the concentrations were below the industrial soil PRGs. Most other less abundant metals were detected at concentrations below their respective industrial soil PRGs. The highest concentrations were generally detected in a single sample from Range 11, or in samples from Ranges 9 or 10. Exceptions to this were apparently random distributions of higher concentrations of beryllium and selenium, including background samples from near the Range Control office. The highest lead concentrations, two of which exceeded the industrial soil PRG, were detected in samples from Ranges 9, 10, and 11.

Based on the results of the 2002 investigation, it appears that both elevated metals concentrations and detectable explosives concentrations were generally found in the impact areas of Ranges 5, 9, 10, and 11. Military training activities are the most likely source of the elevated concentrations, based on the training land use in these areas. Few of the concentrations exceeded industrial soil PRGs. The combined noncancer occupational health risk associated with exposure to the observed metals concentrations from the soil investigation is just below the threshold of no further action. Excluding the calculated values for iron, aluminum, and manganese (known naturally occurring metals), the combined risk is above the one in one million cancer risk threshold (which mainly results from lead), but is within the range of what is considered acceptable under some circumstances (USAG-HI 2004).

Geologic Hazards and Seismicity

Areas with slopes greater than 30 percent are primarily limited to the slopes of Mauna Kea, north of Saddle Road, and to the southern portion of PTA on the north-facing slope of Mauna Loa. The potential for slope failure and landslides would be greatest in these areas.

The USGS has divided the island of Hawaii into Lava Hazard Zones based on the probability of coverage by lava flows. Other hazards from volcanic eruptions are not classified in this system. Zone 1 has the highest risk and Zone 9 has the lowest. PTA overlies areas categorized as Zones 2, 3, and 8 (County of Hawaii 2002a). The eastern margin and northeastern corner of PTA are in Zone 2, which is classified as having 15 to 25 percent of the land covered by flows since 1800. Most of the PTA is in Zone 3, which has had 1 to 15 percent coverage by lava flows since 1800. Zone 8 has had no lava coverage over the past 750 years, and only a low percentage of the area was covered in the past 10,000 years. Zone 8 represents areas near or north of Saddle Road that are underlain by lava erupted from Mauna Kea. PTA Trail is entirely within Zone 8. Infrequently, Hawaiian volcanoes erupt explosively. Kilauea erupted explosively in 1790, creating a surge of hot gases and fine dust that killed a group of Hawaiian warriors and their families near the summit.

Most of the earthquake activity that occurs in the Hawaiian Islands is centered on the island of Hawaii. A magnitude 7.2 earthquake in 1975 that originated beneath Kilauea was the largest earthquake to originate in Hawaii during the past century. Hazards associated with earthquakes include ground shaking, liquefaction, landslides, and tsunamis. The 1975 earthquake generated a tsunami that killed two people and damaged property along the coast (USGS 1997).

PTA is in an area in which there is a 10 percent probability that an earthquake will cause a ground acceleration of more than 40 to 60 percent of gravity in the next 50 years, with the likely size of the earthquake increasing to the south, in the direction of Kilauea and the southern coast. Ground acceleration of more than 40 to 60 percent of gravity roughly corresponds to earthquakes of magnitude 6.9 on the Richter Scale and intensity IX to X on the Modified Mercalli Scale, which can cause considerable damage in specially designed structures, and subsequently greater damage in regular and poorly designed structures, respectively. Most of PTA is underlain by hard rock with thin or no soils, so seismic waves would not be amplified. In August 1951, an earthquake with a magnitude of 6.9 and a maximum intensity of IX on the Modified Mercalli Scale damaged structures on the Kona Coast and caused a 12-foot tsunami. The earthquake also initiated a number of destructive landslides and caused cracks in the coastal highway (USGS 2001a).

3.1.2 WATER RESOURCES

The proposed project components are located on two Hawaiian Islands — Oahu and Hawaii. The project area is located in a tropical climate. Rainfall in the Hawaiian Islands is very unevenly distributed and is highly dependent on elevation as well as location. The maximum rainfall occurs at elevations between 2,000 to 3,000 feet amsl. Above this elevation, rainfall decreases rapidly so that the high elevations are relatively dry (USAG-HI 2004).

Affected Environment for water resources includes description of surface water and groundwater resources. These include surface water occurrence, flooding, surface water quality, groundwater occurrence, and groundwater quality.

The ROI for surface water resources includes the watersheds containing the training and deployment areas on Oahu and Hawaii. The ROI for surface water is not necessarily the same as the ROI for groundwater. Because groundwater often crosses topographic watershed boundaries, the ROI for surface water is expanded to include the aquifers underlying these watersheds and any aquifers downgradient (in the direction of groundwater flow) from the training and deployment areas. The ROIs for both surface water and groundwater include the downstream and downgradient near-shore areas along the coast where surface water and groundwater, respectively, discharge to the sea.

3.1.2.1 Schofield Barracks Military Reservation

The uneven distribution of rainfall has implications for surface water runoff and groundwater recharge. The upper portion of each watershed can receive significantly more rainfall in a given storm than the lower portion. Many of the watersheds on the islands are small, and there is often little storage capacity, resulting in rapid runoff and common flooding. Streams on Oahu are generally perennial at higher elevations, where there is greater precipitation, and at lower elevations, where the topography intercepts the groundwater table (Nichols et al. 1996). At intermediate elevations, streams tend to be intermittent due to a combination of high infiltration, diversion of the flows, and high evaporation rates at low elevations (USAG-HI 2004).

Surface Water Occurrence

The average annual precipitation at SBMR is 43.75 inches. Monthly averages range from 1.63 to 3.78 inches during the dry season (April through October) and from 4.14 to 6.21 inches during the wet season. SBMR lies within an area in which the 100-year 24-hour rainfall is estimated to be about 16 inches.

SBMR lies near the drainage divide between the Kaukonahua watershed and the Waikele watershed. The principal surface water feature of the Kaukonahua watershed is the Wahiawa Reservoir (Lake Wilson),

which lies just outside the eastern boundary of SBMR, east of Highway 99. The reservoir stores drainage from tributaries of the Kaukonahua Stream that originate in the Koolau Range. The reservoir receives small amounts of surface drainage from the eastern side of SBMR and is used for agricultural irrigation.

The main drainages at SBMR are the Waikoloa Gulch and the Waikele Stream. The Waikoloa Gulch drains the area just north of the cantonment and joins the Kaukonahua Stream below Wahiawa Reservoir. Two other streams that drain the north part of SBMR (Mohiakea Gulch and Haleanau Gulch) are tributaries to the Kaukonahua Stream. Kaukonahua Stream drains northward through the area underlain by the Waialua aquifer system, joining the Poamoho Stream to form the Kiikii Stream, which discharges to Kaiaka Bay just east of Waialua. Streams in lower reaches of SBMR tend to be intermittent because runoff from small storms is absorbed in bedrock fractures and never reaches the plateau. Runoff from larger or more intense storms overwhelms the capacity of these fracture systems and continues to flow onto the plateau.

Waikele Stream, which originates in the Honouliuli Forest Preserve along the east slope of the Waianae Range south of SBMR, drains the south boundary of SBMR. It flows south along the west side of WAAF, across land overlying the Waipahu-Waiawa aquifer system, and eventually discharges to the West Loch of Pearl Harbor.

WAAF is a 2,085-acre installation bounded by Schofield Barracks, Wahiawa Reservoir, the Kamehameha Highway, and Waikele Stream. The mean annual precipitation measured at WAAF is 38 inches, most of which falls between November and April. Surface drainage from WAAF drains to Waikele Gulch. Runoff from the runway area is reportedly collected in a network of grated drains that drain to a 15-inch-diameter storm drain believed to discharge to Waikele Gulch (USGS 1996).

The mean annual rainfall within SBER varies from about 200 inches on the crest of the Koolau Range to about 40 inches near Wahiawa and WAAF (Oki 1998). In general, precipitation and evaporation are correlated with elevation. The majority of SBER lies within the Kaukonahua watershed. The southern boundary of SBER lies on or near the topographic divide separating the Kaukonahua watershed from the Waikele watershed. Therefore, some surface water from SBER may drain to the Waikakalaua Stream, which ultimately drains south to the West Loch of Pearl Harbor.

Most of SBER is drained by the South Fork of Kaukonahua Stream, which discharges to the Wahiawa Reservoir. The Kaukonahua Stream, downstream of Wahiawa Reservoir, ultimately discharges to Kaiaka Bay at Haleiwa. Kaukonahua Stream, at 33 miles, is the longest stream on Oahu and the longest perennial stream (30 miles).

SBER extends to the crest of the Koolau Range, which has the highest rainfall on Oahu. Thus, the east side of SBER is an important source region for surface water supplies. A number of reservoirs and surface water conveyances (ditches and tunnels) have been constructed along the Kaukonahua Stream drainage and its tributaries. The Ku Tree Reservoir is the largest of these water storage facilities (USAG-HI 2004).

Helemano watershed is drained by Helemano Stream. On the coastal plain, Helemano Stream joins Paukauila Stream, which discharges to Kaiaka Bay, south of Haleiwa. Helemano Stream is a perennial Class 1 stream in its upper reaches. The trail crosses four branches or tributaries of the Helemano Stream.

The Poamoho watershed is drained by the Poamoho Stream and several smaller streams. The Upper Helemano Reservoir is east of the Helemano Trail and stores water for irrigation. The water is conveyed to farmland in the Poamoho watershed through a network of canals and ditches, some of which follow existing drainages. Helemano Trail crosses the main stem of Poamoho Stream near Poamoho Camp. At

Kaukonahua Road (Route 80), the trail crosses into the Kaukonahua watershed downstream of Wahiawa Reservoir. The trail then crosses Kaukonahua Stream, which marks the boundary of SBMR.

The SRAA is a 1,402-acre area that borders the southern boundary of the SBMP west of WAAF. It is drained by Waikele Stream and its tributaries and lies entirely within the portion of the watershed of Waikele Stream that is upstream of WAAF. The tributaries to Waikele Stream are ephemeral and generally dry except during short periods following heavy rainfall.

Flooding

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), SBMR is located in Zone D, which refers to areas that have not been mapped. The area containing the reach of Waikele Stream adjacent to WAAF has not been mapped.

Surface Water Quality

SBMP, WAAF, and SRAA are located in the Kaukonahua and Waikele watersheds. The State of Hawaii classifies these watersheds as second tier Category I under the Hawaii Unified Watershed Assessment. Based on the Hawaii Unified Watershed Assessment there are four watershed categories. Category I watersheds are those in need of restoration because they do not meet, or are close to not meeting, clean water and other natural resource goals. Category 1 watersheds are further divided to tier 1 and 2 watersheds. Tier 2 watersheds include those containing or drained by 303(d) impaired water bodies (Hawaii Department of Health [HDOH] 1998b).

The classification of the Kaukonahua watershed was based largely on the fact that the coastal receiving water, Kaiaka Bay, is classified as an impaired water body based on pathogens, nutrients, ammonium, algal growth, and turbidity (HDOH 2004). Kaukonahua Stream is not identified as an impaired water body. HDOH has been developing total maximum daily loads (TMDLs) for Kaiaka Bay Watershed with completion expected in 2005, and Wahiawa Reservoir, phased TMDL (HDOH 2004).

Waikele Stream is listed as an impaired water body based on nutrients and turbidity. TMDL development is in progress (HDOH 2004). The Waikele watershed drains to Pearl Harbor, which is also listed as an impaired water body based on nutrients, turbidity, suspended solids, and PCBs. HDOH has also been developing TMDLs for listed water bodies in Pearl Harbor Watershed with completion expected in 2005 (HDOH 2004).

Water quality in the Wahiawa Reservoir has been affected by nutrients in the past. As mentioned above for SBMR, the State of Hawaii classifies the Kaukonahua and Waikele watersheds as second tier Category I, under the Hawaii Unified Watershed Assessment (HDOH 1998b).

Groundwater Occurrence

The groundwater resources on Oahu are well developed, yielding more than 635 million gallons per day (mgd) from numerous hydrogeologic units and aquifer basins. Approximately 50 percent of the fresh water used in Hawaii, and about 99 percent of the drinking water, is from groundwater (Nichols et al. 1996).

Groundwater on Oahu occurs in basal aquifers, perched aquifers, and dike-impounded zones. The basal aquifer is a freshwater lens occupying porous and permeable volcanic rocks beneath the island. The freshwater lens is thickest near the center of the island and tapers off toward the edges of the island. Fresh water also occurs at higher elevations in perched aquifers and in dike-impounded zones, both of which are classified as “high-level” groundwater. Dike-impounded water is groundwater trapped behind vertical

dikes. Perched aquifers are saturated permeable layers or fractured zones that occur above the basal lens and are separated from it by unsaturated deposits (USAG-HI 2004).

SBMR is in the Schofield groundwater area of the central Oahu groundwater flow system, the largest and most productive flow system on Oahu (Oki 1998). The central flow system is bounded on the north and south by coastal sedimentary deposits, known as caprock, because they overlie more permeable rocks and can confine the groundwater contained in those rocks within the coastal zone (USAG-HI 2004).

The Schofield hydrologic sub-area lies on the divide between the northern and southern parts of the central Oahu flow system. The northern portion includes the Mokuleia, Waialua, and Kawailoa hydrologic units, while the southern portion includes the Ewa, Pearl Harbor, Moanalua, Kalihi, Beretania, and Kaimuki hydrologic units.

The Schofield sub-area is bounded on the north and south by vertical low permeability features that reduce or prevent groundwater flow. These features might be dike intrusions or possibly depositional features (Oki 1998). Because the groundwater elevation inside the "dams" is higher than outside, the groundwater in the Schofield Plateau is called high-level groundwater. Rift zones associated with the Waianae and Koolau volcanoes contain clusters of vertical or nearly vertical dikes that bar groundwater flow. The eastern and western sides of the Schofield sub-area are bounded by dike zones of the Koolau and Waianae volcanoes, respectively.

Beneath the Schofield Plateau, groundwater occurs in the Schofield High-Level Groundwater Body, where depth to groundwater is approximately 600 feet or more, depending on the ground surface elevation. Additionally, groundwater occurs in the basal aquifer and dike-impounded groundwater system associated with the dike intrusions within the Waianae volcanics. Groundwater also occurs locally in perched aquifers above the High-Level Groundwater Body or the basal aquifer.

Recharge over most of the SBMR ranges between about 10 and 25 inches per year. Recharge is higher along the eastern slope of the Waianae Range and in the southeast margin of the reservation (Shade and Nichols 1996 as cited in USAG-HI 2004). Recharge near the southeast margin of the range is greater because of contributions from irrigation. Most of the recharge to the central sector (Wahiawa aquifer system) is from the Koolau Range (USAG-HI 2004).

Annual groundwater pumpage in the Schofield groundwater area (Wahiawa aquifer system) is estimated to be less than 10 mgd and has decreased since 1979, when total pumping was about 20.6 mgd (Oki 1998 as cited in USAG-HI 2004). While this is less than half the estimated sustainable yield of the aquifer, any consumptive use of groundwater in the Central Sector decreases the underflow to the adjacent Pearl Harbor Sector or North Sector.

WAAF lies over the southern boundary of the Schofield high-level water body, as described above. The water table declines from about 275 feet amsl on the north side of WAAF (high-level groundwater, or transitional) to about 30 feet amsl on the south side (basal aquifer; USGS 1996). Groundwater flows south, toward the Pearl Harbor aquifer.

SBER occupies a portion of the Waipahu/Waiawa groundwater hydrologic unit in the Pearl Harbor hydrologic sector, just south of the hydrologic divide that separates it from the central hydrologic sector. Groundwater in the eastern part of SBER includes high-level volcanic dike-impounded groundwater that overlies and is probably hydraulically connected to the basal aquifer. This area is part of a 135-square-mile area in the Northwest Rift Zone of the Koolau Range, which is the most important and productive of the dike-impounded groundwater reservoirs on the island. The USGS has estimated that approximately

560 billion gallons of water are stored above sea level in this natural groundwater reservoir (Takasaki and Mink 1985).

Additional groundwater is believed to be present below sea level but has not been estimated. Although the dikes impede the flow of groundwater, they do not prevent it, and groundwater leaks from the dike complex at an estimated rate of 280 mgd. This is more than half of the total estimated yield of water from all sources from the Koolau Range of 450 to 580 mgd (Takasaki and Mink 1985).

The SRAA lies in the upper portion of the Ewa-Kunia sub-unit of the Peal Harbor hydrologic unit. The Ewa-Kunia sub-unit lies along the southern edge of the subsurface basalt groundwater dam that underlies the Schofield Plateau. This sub-unit is recharged in part by groundwater that overflows this dam and flows southward from the Central or Wahiawa hydrologic unit. It is unlikely that groundwater contributes significantly to flows in Waikele Stream because perched groundwater is deeper than the stream channel (Golder Associates 1998).

Several wells have been drilled south of SBMR near Kunia Village. One, called the Navy Well, is about 1 mile north of Kunia Village and provides most of the drinking water for Kunia Village. The well is believed to be completed in the high-level aquifer rather than in the basal aquifer at this location (Golder Associates 1998). The direction of groundwater flow beneath the SRAA is thought to follow the regional trend and likely flows south.

Groundwater Quality

The Southern Oahu Basal Aquifer, which underlies SBMR and part of the East Range, was designated by the USEPA as a Sole Source Aquifer in 1987 under Section 1424(e) of the Safe Drinking Water Act (USEPA 2003). A sole source aquifer supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer and represents a water supply source for which there is no alternative that could "physically, legally, and economically supply all those who depend on it for drinking water." Under the program, all federally funded projects in the area overlying a sole source aquifer are subject to review by USEPA to ensure that they do not endanger the water source.

The quality of groundwater in the Schofield groundwater area is generally good. However, the regional groundwater system has been affected by pesticides and fertilizers related to agricultural practices, and groundwater quality in the SBMR has been affected by contaminants from industrial activities. The two major groundwater contaminants at SBMR are chlorinated solvents (TCE) and carbon tetrachloride.

For the purpose of cleaning up the contaminated groundwater, the groundwater beneath SBMR has been identified as an "operable unit" (OU2), requiring remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). The source of the carbon tetrachloride contamination was identified as a former landfill located on SBMR. The source of the TCE contamination was not determined. The distribution and extent of groundwater contamination is discussed further in detail in 25th ID Transformation EIS (USAG-HI 2004). The ROD for OU2 identified the groundwater remedy as continued pumping of contaminated groundwater by SBMR supply wells and treatment of the extracted water at the wellhead by air-stripping (Harding Lawson Associates, Inc. 1996). In August 2000, the USEPA delisted SBMR from the NPL because it determined that the site remediation, including continued wellhead treatment of groundwater and long-term monitoring, was adequate to protect human health and the environment (USAG-HI 2004).

Groundwater quality in the dike-impounded groundwater system of SBER is generally excellent, with chloride concentrations lower than 20 mg/L. Dike-impounded groundwater is not known to be contami-

nated with organic chemicals within the central Oahu flow system (Oki 1998 as cited in USAG-HI 2004). As described above, high-level groundwater in portions of SBER is contaminated by TCE. The contamination is being addressed by treating the water pumped by wells at the wellhead.

No groundwater quality data are available for the SRAA. Several wells have been installed and are being monitored in the Kunia area, south of the SRAA, as part of a remedial investigation of the Del Monte Corporation Superfund Site. The primary contaminants of concern at this site are pesticides resulting from accidental spills. Monitoring wells in this area are also periodically sampled as part of the SBMR groundwater-monitoring program. Carbon tetrachloride, as a know groundwater contaminant in the area, has not been detected in these wells. TCE, another known groundwater contaminant, has been detected in these wells, but at concentrations below the USEPA Region IX maximum contaminant level (MVCL).

3.1.2.2 Dillingham Military Reservation

Surface Water Occurrence

DMR is on the windward (north) coast of the Waianae Range. The average annual precipitation at DMR ranges from 20 to 30 inches but varies with elevation and time of year (USARHAW and 25th ID [L] 2001a). The majority of DMR is located in the Kawaihapai watershed. The most extreme eastern portion of DMR is located in the Pahole Watershed. Dillingham Trail is located in the Kawaihapai, Pahole, and Makaleha watersheds. Several unnamed intermittent streams occur on DMR.

DMR and most of the proposed Dillingham Trail are on the north slope or at the foot of Kaala Mountain and the northwest-trending ridge of the Waianae Range. Streams are incised in steep, narrow valleys containing thin soil cover. Most of the streams carry intermittent flows and are subject to short duration flash floods following rainfall events. However, the lower reaches of some of the streams, where they encounter the alluvial deposits overlying caprock on the coastal plain, flow year round.

Stearns and Vaksvik (1935) noted that springs occur in many places along the northeast coast, including at Waialua, near sea level. They concluded that the springs discharge water mainly from the basal water table within the Koolau basalts. DMR and Dillingham Trail are underlain by Waianae volcanics or, on the coastal plain, by sedimentary caprock.

One nonjurisdictional wetland is located adjacent to the proposed training area at DMR. This means that the wetland is not regulated under Section 404 of the Clean Water Act (USAG-HI 2004). Another jurisdictional wetland at DMR is not adjacent to proposed training activities.

Flooding

A review of FEMA FIRMS indicates that the northeastern corner of DMR is mapped as a 100-year flood zone (FEMA 2000). The FEMA study area did not extend over the entire reservation. However, by comparing elevations on the unmapped portion of the reservation to the areas that were mapped, it appears that the 100-year flood zone extends inland from the shoreline to about the 15- to 20-foot elevation contour. Thus, much of the flat-lying area of DMR may be effectively within an area subject to a 100-year return period for flooding.

At least part of the flood potential is likely the result of calculations of tsunami runup. Since 1946, six tsunamis were recorded in the Hawaiian Islands that had wave runups of 6.6 feet or more (National Oceanic and Atmospheric Administration [NOAA] 2003). Tsunami evacuation maps prepared by the US Pacific Disaster Center (PDC) indicate that the flightline at DMR is within the area to be evacuated, roughly 500 feet inland from Farrington Highway (PDC 2001).

Surface Water Quality

There are several unnamed intermittent streams on DMR. HDOH classifies these streams as Class 2. Class 2 waters are protected for recreational uses, aquatic life, agricultural and industrial water supplies, and shipping and navigation. No surface water quality sampling has been performed at DMR.

Groundwater Occurrence

DMR is located in the Mokuleia hydrologic unit of the north hydrologic sector. The State of Hawaii Water Commission estimates the sustainable yield of the Mokuleia hydrologic unit to be 12 mgd. The coastal plain is the area where the basal groundwater lens beneath the islands meets the sea and is found at shallow depths. It is also the area where surface water and shallow groundwater in intermittent drainages discharge to the sea. Due to its proximity to the coast, the basal groundwater is vulnerable to salt water intrusion. In the coastal area, tidal fluctuations and variations in groundwater discharge create a mixing zone in which the groundwater tends to be brackish.

Stearns and Vaksvik (1935) mapped the coastal area from Waialua to near Kaena Point as an area of artesian groundwater (basal groundwater under confining pressure). They attributed the artesian conditions to the presence of a cap of Koolau basalt over permeable beds in the Waianae volcanic series (Stearns and Vaksvik 1935). Further inland however, the basal groundwater is not artesian (not confined under pressure). DMR appears to overlie both of these regions (USAG-HI 2004).

Several wells have been installed on DMR, and many of them are present on the ranchlands to the east of DMR (Hawaii Department of Land and Natural Resources [HDLNR] 2002b). Existing water allocation permits in the Mokuleia aquifer system total 6.3 mgd, or about 52 percent of the sustainable yield of the aquifer system. The water supply for DMR and several nearby residences is a well located about 700 feet south of the control tower. The well reportedly yields about 55,000 gpd and is completed at a depth of 180 feet (USARHAW and 25th ID [L] 1997).

Groundwater Quality

No specific information about groundwater quality at DMR is available. The installation is located over an area underlain by caprock, with surficial deposits of dune and beach sands and soils derived from erosion of the nearby Waianae Range. It is expected that basal groundwater beneath the caprock is of good quality because there are no obvious sources of pollutants in the Waianae Range inland of the installation. Shallow groundwater may be affected by local sources of pollutants, including agricultural runoff and surface spill; however, no data are available to suggest that there has been any historical impact on groundwater quality.

3.1.2.3 Kahuku /Kawailoa Training Area

Surface Water Occurrence

Average annual rainfall within KTA and KLOA ranges from 40 to 50 inches near the coast to 150 inches at the summit of the Koolau Mountains. KTA contains portions of four watersheds: Paumalu, Kawela, Oio, and Malaekahana watersheds. The Paumalu watershed in the west includes drainages from Paumalu Stream on the west to Waialee Gulch on the east. The headwaters of the Paumalu Stream are in the Pupukea Paumalu Forest Reserve, most of which is within the boundaries of KTA. KTA does not include the downstream portion of the Paumalu Stream, but most of the watershed east of the Paumalu drainage, almost to the Kamehameha Highway, is on KTA.

To the east of Paumalu watershed is the Kawela watershed, which includes the streams that drain to Kawela Bay (Pahipahialua Stream and Kawela Stream). East of Paumalu and Kawela watersheds is the Oio watershed, which includes the upper portions of drainages from Oio Gulch east to Keaaulu Gulch, which discharges at the town of Kahuku. Adjacent to the Oio watershed is the Malaekahana watershed, which consists of the upper drainage of Malaekahana Stream. The lower reaches of many of these streams have been diverted or captured for irrigation and flood control, but the upper reaches, on KTA, are generally the natural drainages. All streams and gulches on KTA are intermittent except for Malaekahana Stream, which is perennial (USARHAW and 25th ID [L] 2001a).

Drum Road runs along the west slope of the Koolau Mountain Range and across the Schofield Plateau, from KTA, through KLOA to SBMR. Outside of KTA, the Drum Road crosses several watersheds. Waimea watershed is drained by several streams including Kauwalu Gulch, Elehaha Stream, Kamananui Stream, and Kaiwikoele Stream. Kauwalu Gulch and Elehaha Stream are both intermittent, while Kamananui and Kaiwikoele Streams are both perennial. Elehaha and Kamananui Streams are tributaries of the Waimea River.

Drum Road passes along the ridge that forms the boundary between the head of the Keamanea, Waimea, and Kawailoa watersheds, northwest of Puu Kapu. At about this point, the road follows the Pupukea Road and crosses inside KLOA. West of Puu Kapu, it crosses Kawailoa watershed and then follows the ridge separating the Kawainui and Kawaiiki watersheds (on the east) from the Anahulu watershed (to the west). The Kawailoa watershed is a narrow east-west trending strip of land, north of Puu Kapu, that does not have any surface outflow but probably drains below the surface to the adjacent watersheds. The Kawainui and Kawaiiki Streams (both perennial streams) are tributaries of the Anahulu River, which occupies the Kawailoa Gulch and discharges at Waialua Bay, north of Haleiwa. The junction of the two streams marks the head of the Anahulu watershed.

The road follows the boundary of the Kawaiiki watershed, then turns sharply west and continues along the ridge separating the Anahulu watershed and the Opaeula watershed. The Opaeula Reservoir is in the Anahulu watershed, but is recharged by diversions from the Kawaiiki and Opaeula streams via ditches or tunnels that cross the watershed boundaries. Southwest of the Opaeula Reservoir, Drum Road crosses the Opaeula watershed and the Opaeula Stream (a perennial stream) and then follows Twin Bridge Road west of Bryans Mountain House. This segment of the trail is on the boundary between the Opaeula watershed and the Helemano watershed.

Surface Water Quality

None of the watersheds on KTA have been identified as Category I watersheds in need of restoration. The watersheds crossed by Drum Road south of the Kawailoa watershed are identified by the State of Hawaii as tier 2 Category I watersheds (HDOH 1998b).

Soil erosion has been identified as a potential problem in many areas of the Koolau Mountains. Among the major causes of soil erosion are human activities, wildfire, and soil disturbance by feral pigs. Human activities with the potential to cause erosion include military training, hiking, motor biking, and illicit drug cultivation. These activities have not been identified as severe threats to watershed resources, but the watershed may be affected by these activities in the future as intensity of human use increases (USAG-HI 2004).

Groundwater Occurrence

KTA overlies the ridge of the Koolau Mountain Range, which is considered to be a hydrologic boundary between the north and windward hydrologic sectors. The western side of KTA is in the Kawailoa aquifer

system of the north hydrologic sector. The eastern side of KTA is in the northern end of the Koolauloa aquifer system of the windward hydrologic sector.

Groundwater in the Kawailoa aquifer system is thought to drain northwest toward the Waimea coast. Since 1927, annual groundwater pumping from the Kawailoa aquifer system reportedly remained below 9 mgd and ranged from 1.5 mgd in 1936 to 8.9 mgd in 1970. The State of Hawaii estimates the sustainable yield of the Kawailoa aquifer system at 39 mgd. Regional groundwater flow in the Koolauloa aquifer system is believed to be to the north or the northeast in this part of KTA. The State of Hawaii estimates the sustainable yield of the aquifer system at 35 mgd (USAG-HI 2004).

Most of KTA is within the Northwest Rift Zone of the Koolau Volcano. The Northwest Rift Zone is densely intruded by volcanic dikes, and the groundwater system at higher elevations is dominated by dike-impounded groundwater. The Northwest Rift Zone is primarily within the Koolauloa aquifer system but extends into the Kawailoa aquifer system. The extreme northwest side of KTA marks the western boundary of the Northwest Rift Zone, where dike density decreases.

The coastal plain north and east of KTA is underlain by sedimentary deposits, including alluvial deposits and limestone caprock. Drum Road crosses the upper portions of the Kawailoa and Waialua aquifer systems in the north hydrologic unit and the central part of the Wahiawa aquifer system in the central hydrologic unit.

Groundwater Quality

Groundwater in the high-level groundwater system of the Koolau Mountain Range is generally of very good quality and is used as a drinking water source. On the coastal plain, groundwater has been affected by agricultural contamination. Groundwater in the Koolau Loa aquifer system has been affected by pesticides used in sugar cultivation, including dibromochloropropane (DBCP) and 1,2,3-trichloropropane (HDOH 1999b). Groundwater beneath the coastal plain north of KTA has been affected by nitrates and sulfates associated with crop fertilizers and irrigation (Tenorio et al. 1970).

3.1.2.4 Pohakuloa Training Area

Surface Water Occurrence

On the Island of Hawaii, there are few defined watersheds because the young, highly permeable rock and soil deposits generally absorb the precipitation without forming stream channels. The exception is along the island's northern coast, where streams are better defined.

The climate at PTA is classified as cool and tropical. The average annual precipitation at PTA ranges from 10 to 16 inches. PTA lies within the Northwest Mauna Loa and the West Mauna Kea watersheds, which drain to the northern Hualalai and southern Kohala coasts, respectively (Mink and Lau 1993). The Keamuku Parcel and the PTA Trail are mainly within the West Mauna Kea watershed. The two watersheds are underlain by aquifer "sectors" of the same name.

There are no surface streams, lakes, or other bodies of water within PTA boundaries due to low rainfall, porous soils, and lava substrates. Rainfall, fog drip, and occasional frost are the main sources of water that sustain plants and animals in the dryland habitat of PTA and Keamuku Parcel. There are no perennial streams within 15 miles of PTA. However, there are at least seven intermittent streams that drain surface water off the southwestern flank of Mauna Kea and lie within the same drainage area as the PTA. Popo's Gulch is the closest stream to PTA boundaries. There are three intermittent streams located within 2 miles

of the cantonment area (Waikahalulu Gulch, Pohakuloa Gulch, and an unnamed gulch) which collect runoff from the southern flank of Mauna Kea (USACE 1997).

Lake Waiau, near the summit of Mauna Kea, located approximately 8 miles from PTA, is the nearest known surface water body. There are also three freshwater springs in Pohakuloa Gulch on the slope of Mauna Kea known as Hokupani Spring, Waihu Spring, and Liloe Spring (USARHAW and 25th ID [L] 2001b, 1996).

One perennial stream occurs downstream of the PTA. This is Waikoloa Stream, which heads in the Kohala Mountains, runs north parallel to State Highway 19, and discharges into Kawaihae Bay through the Waiulaula Gulch (State of Hawaii 2002b). The proposed PTA Trail route crosses Waikoloa Stream near the rock wall south of Highway 19, in the upper reach of Waiulaula Gulch.

Flooding

The cantonment and airfield areas of PTA, north of Saddle Road, are on land that slopes gently to the west. Under some circumstances, the runoff from the south slope of Mauna Kea could exceed the drainage capacity of the area and result in temporary flooding or localized ponding. However, the soils in the area are permeable, and the underlying lava flows contain sufficient secondary permeability that infiltration to the subsurface is rapid.

The civil defense tsunami evacuation map in the area of Kawaihae Harbor shows the evacuation area as extending inland beyond the Kawaihae-Mahukona Road (Highway 270) to an elevation of about 50 feet amsl (PDC 2001). The area west of the highway and north of the road to Spencer Beach Park, including the harbor, lies within the evacuation zone (USAG-HI 2004).

Surface Water Quality

According to Hawaii's 1998 305(b) report, most of the state's water bodies have variable water quality that declines when stormwater runoff carries pollutants into surface waters. The most significant surface water pollution problems in Hawaii are siltation, turbidity, nutrients, organic enrichment, toxins, pathogens, and pH from nonpoint sources, including agriculture and urban runoff (USEPA 1998).

Few data on surface water quality are available for the PTA watersheds. As stated above, there are no perennial streams within PTA. According to the 303(d) List of Impaired Waters in Hawaii prepared under the Clean Water Act none of the streams in the PTA are listed as impaired (HDOH 2004).

Marine waters north of Waiulaula Point are considered to be Class A waters rather than Class AA. The objective of Class A marine waters is to protect recreational and aesthetic uses. Pelekane Bay/Kawaihae Harbor are identified on the 303(d) list as impaired water bodies due to turbidity and were assigned low priority for development of TMDLs (HDOH 2004). Construction of the Kawaihae Harbor in 1995 had adverse effects on coral growth and water quality due to changes in sediment inputs in Pelekane Bay (Tissot 1998).

Groundwater Occurrence

Groundwater occurrence on the Island of Hawaii is not well studied due to the younger age of the island, continuing volcanic activity, and the greater thickness of the volcanic deposits. Rainfall is the primary source of groundwater recharge on the Island of Hawaii. The geology of the island is characterized by highly permeable lavas from which little or no runoff occurs. Most of the precipitation percolates relatively quickly to the underlying groundwater body and then moves seaward, discharging into the coastal

waters (Stearns and MacDonald 1946). The Island of Hawaii has the highest recharge rate among the Hawaiian Islands, with a rate of 188.4 cubic meters per second (Lau 1983). Sustainable yields for each of the island's aquifers are considerably less and are described below for each aquifer system underlying PTA (USAG-HI 2004).

According to the classification scheme proposed by Mink and Lau (1993), PTA lies above two aquifer systems: the Northwest Mauna Loa and the West Mauna Kea aquifer sectors.

The northern portion of PTA and PTA Trail lie within the Waimea aquifer system of the West Mauna Kea aquifer sector. A basal groundwater lens reaches to about 4 miles inland in the area. Beyond this point, the water becomes high-level groundwater, although the mode of occurrence is not understood. The Waimea aquifer system has an estimated sustainable yield of approximately 24 mgd (HDLNR 1995).

The majority of PTA lies within the Northwest Mauna Loa aquifer sector, which has an estimated sustainable yield of 30 mgd (HDLNR 1995). The Anaehoomalu aquifer system comprises the entire Northwest Mauna Loa aquifer sector. High-level groundwater likely occurs at elevations greater than 1,200 feet amsl, although this has not been shown yet (Mink and Lau 1993). The basal lens, extending about 4 to 5 miles inland, is brackish except possibly near the inland periphery. Basal springs and anchialine ponds are common along the coast (Mink and Lau 1993).

There is evidence of perched groundwater within the aquifer sectors underlying and adjacent to PTA (Stearns and McDonald 1946). The highest perched water in the Hawaiian Islands is Lake Waiau on Mauna Kea, at an elevation of 13,007 feet amsl. It is thought that the lake is perched on ground ice (Stearns and MacDonald 1946).

Based on regional hydrogeological information, it is believed that the groundwater beneath PTA occurs primarily as deep basal water within the older Pleistocene age basalts (USACE 1997).

Groundwater Quality

There are limited data for groundwater quality for PTA because of the absence of monitoring wells in the inland area of the island. In general, the quality of the natural fresh water in Hawaii's basaltic aquifers is considered to be good (Lau 1983).

Regional water quality is presented in the paragraphs below to provide a general snapshot of water quality on the island of Hawaii. Since the early 1980s, organic chemical contaminants associated with agricultural, industrial, and urban activities have been detected in water samples taken from wells on the Island of Hawaii (USGS 2000b).

Salt-water intrusion, particularly along the coast, also threatens groundwater quality. Groundwater withdrawals induce upward and landward movement of saltwater. Wells pumped in the freshwater lens near the coast are particularly likely to induce brackish water or saltwater to move into the well as pumping continues (USGS 1999b).

Since August 1989, the HDOD has issued "Groundwater Contamination Maps" for Hawaii. According to these maps, most of the well locations where contamination is detected on the Island of Hawaii are located along the eastern coast of the island, and groundwater quality generally diminishes towards the coasts due to increased saltwater intrusion. Detected contamination levels are below federal and state drinking water standards and do not pose a significant risk to humans (HDOH 1999b). Groundwater quality beneath PTA is likely of higher quality due to its distance inland from the coast.

3.1.3 WILDFIRE MANAGEMENT

Wildfire poses a significant threat to the sensitive ecosystems, cultural sites, and training lands of the Army. Army training activities require the use of munitions and weapons systems that often increase the chance of wildfire ignition and may damage important resources. The ROI covered in this analysis includes those Army-administered lands that would be affected by permanent stationing and training of the 2/25th SBCT (**Figure 3-1**). This information is provided in this section to serve as baseline data for the analyses and comparison of the alternatives discussed in Chapter 5.

3.1.3.1 Wildfire Management Direction

Wildland fire management on Army-controlled Oahu lands is conducted in accordance with the Sikes Act and by Army Regulation 200-3. The Integrated Wildland Fire Management Plan (IWFMP) for all Hawaiian Army-administered lands was developed to establish specific guidance, procedures, and protocols for managing wildfires on Army training lands (USARHAW and 25th ID [L] 2006). Impacts of implementing the IWFMP were analyzed in a Programmatic Environmental Assessment (PEA), and therefore its scope is more generic and broad. NEPA analyses such as this EIS are intended to be tiered under the IWFMP PEA to address site-specific conditions that require analyses that are more detailed. The IWFMP is the primary guidance document with respect to environmental conditions and fire effects in Hawaii, fire prevention, fire suppression, post-fire actions, and fire management areas. Impacts of project activities would all occur in locations covered by the IWFMP, and the existing conditions and management strategies are summarized below. Fire prevention includes planning, managing fuels, using prescribed fire, planning water resources, and conducting firefighter training. The actions below are components of the IWFMP and provide the overall framework to address wildfire management.

Planning. Planning activities would include procedures, purchases, and budgeting to improve the Army's prevention of and response to wildfires. Procedures include, but are not limited to, implementing the National Fire Danger Rating System (NFDRS), fire reporting procedures, and keeping records on the maintenance of vegetation modifications and wildfire occurrences. Budgeting and purchases include additional funding to hire more firefighters and purchase firefighting equipment.

Fuel Management. Fuel management activities include fire access road and fuel management corridor construction, expansion, and/or maintenance; and fuels management including prescribed burning, construction of dip ponds, and firefighting actions. Fire access road and fuel management corridor expansion, construction, and/or maintenance are slated in one form or another for all Army training areas except KTA and SBER. Existing roads are sufficient for fire management purposes at KTA and SBER, as they are found throughout the installations and are well maintained, and would be used to implement fuel modification project.

Fuels Modification. Fuels modification is defined as removing and/or modifying an area of flammable vegetation, thereby managing the fire hazard by changing the vegetation type. The goal is to maintain a fuel condition that makes fires easier to control. Mechanical treatments, chemical treatments, biological treatments, and prescribed burns would be implemented as part of the IWFMP.

Dip Ponds. One of the most important resources for firefighters is an ample water supply. Dip ponds are plastic-lined, earthen ponds that serve as a water storage resource that would be available for aerial fire bucket operations, thereby enhancing firefighting capabilities.

Firefighting Actions. Firefighting actions may take place at any time and at any installation. This includes helicopter bucket drops of freshwater, retardant, foam, and in emergencies, saltwater. Firefighting activities may also involve cutting fire lines by hand or by bulldozer, burnout operations, and increased

traffic in the form of firefighters on foot and in vehicles as well as in the air. Because firefighting is considered an emergency operation, it is exempted from NEPA under 32 CFR part 651.11. However, all reasonable efforts will be made to protect natural and cultural resources from unnecessary harm during firefighting operations.

3.1.3.2 Schofield Barracks Military Reservation

Fire Management Areas

Schofield Barracks Main Post. There is one existing fire access road at SBMP. The existing fire access road surrounding the impact area requires continued maintenance via vegetation cutting, grading, and biodegradable herbicide application. This has been the normal maintenance for this fire access road in the past. In some locations the access road may be widened, if feasible, to upgrade it to the standard of 20 feet. Prescribed burning has been conducted in the past and will continue in the future, primarily within the impact area.

Mowing is used to maintain vegetation at stubble height in the most commonly used fixed ranges such as the MF and Central Ranges. Biodegradable herbicide is also be used to control fuels along the edges of all the fire access roads. In situations where the fuels are thick, mechanical removal may be used to supplement the herbicide.

Schofield Barracks East Range. There are several existing roads at SBER that will serve as fire control lines during fire suppression. These roads would be maintained to the extent necessary for vehicle access. No major fuels management projects are scheduled for SBER, but normal grass cutting along the sides of roads would continue as it is currently practiced.

Fire History and Firefighting Resources

Schofield Barracks Main Post. There is a high level of fire danger at some SBMP ranges because the rugged terrain limits accessibility for fire suppression (USARHAW and 25th ID [L] 2001a). Highly flammable plants are particularly abundant throughout the moist habitat areas, especially below 3,000 feet. Tracer rounds, pyrotechnics, and indirect fire, such as illumination rounds, are the most common ignition sources, and most wildland fires originate in the ordnance impact area. Two remote automated weather stations (RAWS) on SBMP aid in determining weather conditions and the threat of wildfires. Schofield has a newly constructed and very up-to-date fire station. SBMP has two commercial pumpers and two military field firefighting vehicles.

Wheeler Army Airfield. WAAF is in a developed area between Kunia Road and Kamehameha Highway. Little vegetation in the project area could be involved in a wildland fire. WAAF has a two-company firehouse, crash-fire-rescue vehicles, conventional pumpers, and one field firefighting vehicle (Belt Collins 1994). Fire companies posted at SBMR can augment firefighting support at WAAF.

Schofield Barracks East Range. Although SBER is not a live-fire area, a number of wildfires have been documented. In the period 1994 to 1998 and 2000 to 2002, a total of 14 fires were reported at SBER. These ranged in size from hundredths of an acre to 10 acres and totaled 23 acres. The most common cause was pyrotechnics of various varieties. (USARHAW and 25th ID(L) 2003). There are no designated firebreak roads on SBER, but all roads are used as fire access roads. SBER is considered a non live-fire range and depends on the closest responding forces (i.e., the City and County of Honolulu Fire Department) for first response and immediate Federal Fire Dept/Range Control response. The development of SBER-specific SOPs for wildland fire management is critical to ensure fire prevention and mitigation of off-site

impacts. The fire management planning process includes researching the fire history of the areas, identifying likely ignition sources, and developing methods to reduce fuel loads.

The rugged topography on SBER constrains fire suppression efforts; however, thick wet vegetation decreases the likelihood of fire spreading to sensitive native habitats. Fire prevention at SBER centers on reducing the likelihood of destructive fires that may threaten endangered species and their habitat. Success depends on conducting suppression activities to reduce ignition and fuel sources, and maintaining the capability to respond immediately with trained personnel, adequate resources, and a plan to contain any fires that occur. The fire danger index can be calculated, and real-time weather can be tracked using weather data collected from on-site RAWS. Currently, there is one RAWS on SBER.

South Range Acquisition Area. USAG-HI recently acquired the SRAA. Agricultural burning has been practiced here in the past, but no complete fire records are available. Several fires that have started in the pineapple field below Honouliuli Preserve have spread into the preserve threatening rare species and their habitat. Army helicopter firefighting resources have been used to help fight previous fires in the preserve, and will continue to do so. The Army is not currently using the SRAA for training.

3.1.3.3 Dillingham Military Reservation

Fire Management Areas

There are no existing firebreaks at DMR, though there are a number of existing roads that will serve as firebreaks during fire suppression.

Fire History and Firefighting Resources

There is a high risk of fire during the summer in the relatively dry Mokuleia region (USARHAW and 25th ID [L] 2001). Cigarettes, vehicles, and bivouac activities are the major sources of fire risk from military training. There are records for only two fires at DMR since 1996 (USARHAW and 25th ID [L] 2003), both of which occurred in training area P-1 (east and southeast of the airstrip). They burned a total of 6 acres and were both caused by pyrotechnics. A lack of data precludes analysis. Fire suppression is not a high priority because of the few rare and endangered species on DMR relative to other Oahu sub-installations (USARHAW and 25th ID [L] 2001a). Also, no live-fire training takes place, and the terrain is not conducive to high erosion rates if vegetation is absent. There are no RAWS on DMR to aid in determining weather conditions and the threat of wildfires. Through mutual aid agreements, the City and County of Honolulu Fire Department would assist the Army with initial wildfire suppression.

3.1.3.4 Kahuku Training Area and Kawailoa Training Area

Fire Management Areas

There are several existing roads at KTA that will serve as fire control lines during fire suppression. These roads will be maintained to the extent necessary for vehicle traffic. No major fuels management projects are scheduled for KTA, but normal grass cutting along the sides of roads would continue as it is currently practiced.

Fire History and Firefighting Resources

The risk of wildfire danger at KTA varies from low to high, depending moisture regime and fuel types (USARHAW and 25th ID [L] 2003), Rugged terrain in some areas limits accessibility for suppression and increases the risk of fires spreading to sensitive native habitat (USARHAW and 25th ID [L] 2001a). Records indicate that there have been 16 fires at KTA since 1996. These fires burned less than 300 acres to-

tal. A single fire of 250 acres in the late 1990s in training area C-2 accounts for 85 percent of the recorded acreage burned. About half of the fires started in August, but there is no clear pattern in the time of ignition. A number of different pyrotechnic devices, including smoke grenades, simulators, and star clusters, as well as blanks were the ignition sources (USARHAW and 25th ID [L] 2003). KTA is not a live-fire training area, and smoke grenades and other pyrotechnics are permitted only in designated areas. Blank ammunition, SRTA, and pyrotechnics are the only types of ammunition used. KTA depends on the closest responding forces, such as the City and County of Honolulu Fire Department, for first response and immediate Federal Fire Department/Range Control response. There is one RAWS on KTA to aid in determining weather conditions and the threat of wildfires.

A wildfire risk analysis requires that a parcel of land be divided by significant barriers to fire, either man-made or natural, in order to create units that are then given a presuppression priority based on wildfire risk. Because there are no readily definable barriers within KLOA, discrete areas with assigned fire risks have not been developed. Generally, areas at low elevation are dominated by flammable alien species, while higher elevations are less fire prone (USARHAW and 25th ID [L]. 2003). Only one fire has been recorded at KLOA. It burned 125 hectares (310 acres) in September of 2000. The reported ignition source was hot brass/muzzle flash, and must have been caused by blank fire, since no other munitions are allowed at KLOA. Despite the size of this fire, blanks represent a very low fire ignition threat based on the number of fires they have caused throughout the USAG-HI fire history. No analysis for fire trends is possible at KLOA with such a limited data set (USARHAW and 25th ID [L]. 2003). It depends on the closest responding forces, such as the City and County of Honolulu Fire Department, for first response and immediate Federal Fire Department/Range Control response (USARHAW and 25th ID [L] 2001a). There are no RAWS on KLOA to aid in determining weather conditions and the threat of wildfires. Details of past fire occurrence on KTA and KLOA (frequency, location, number, and size), ignition sources, and weather monitoring capabilities have been compiled (USAG-HI 2004).

3.1.3.5 Pohakuloa Training Area

Fire Management Areas

Five wildfire management areas have been designated, based on existing and planned fuel management corridors (USARHAW and 25th ID [L] 2003). The ordnance impact area is not considered because prevention activities there are not possible and resources at risk are largely unknown. Each area was assigned an ignition potential, fuels hazard, and habitat value, based on the best currently available information. Representatives of the U.S. Fish and Wildlife Service (USFWS) and USAG-HI agreed on the ratings. The Kipuka Kalawamauna, Mauna Kea, and Kipuka Alala areas have a high wildfire prevention priority. The Keamuku Parcel and southwestern PTA area have a moderately high wildfire prevention priority.

According to the IWFMP, fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID [L] 2003). Given the weather, topography, and fuel conditions, which make fire suppression at PTA difficult, implementing adequate prevention measures is all the more important for minimizing fire loss. Serviceable access roads and firebreaks should be of highest priority, as they can be reasonably implemented and provide an effective fire management tool when properly planned and maintained. Existing roads will serve as firebreaks. Preconstructed firebreaks need to be negotiable by four-wheel drive vehicles to facilitate fire and management access. All firebreak/fuelbreak measurements are additive. Most firebreaks at PTA will be combined with a fuelbreak to increase their effectiveness.

Fire History and Firefighting Resources

Historically, fire in the area of PTA was most likely rare and of little significance, limited to volcanically started fires and occasional lightning ignitions. Military use for live-fire exercises and target practice has increased ignition frequency dramatically and resulted in numerous small fires, though it appears that much of the threat to endangered species populations is a result of off post ignitions. However, PTA is particularly susceptible to fire for numerous reasons (USARHAW and 25th ID [L] 2001b). First, there is a history of ordnance-induced fires because several ranges are used year-round for live firing of a wide variety of ordnance. Also, there is a high risk of wildfire ignition from the use of aerial flares and similar pyrotechnics. Since July 1990, over 8,000 acres have been recorded as burned. Of these, over 7,700 acres or 91 percent of all acres burned, were burned by fires caused by lightning, arson, or carelessly discarded cigarettes, and the largest of these started off of Army lands and later burned into PTA (USARHAW and 25th ID [L] 2003). Fire suppression is difficult in the impact area's rugged habitat, and UXO makes it difficult for helicopters to drop water in the impact area. Vehicles with catalytic converters, which pose a potential fire threat, are used on PTA. Highly flammable fuels and unique weather conditions also lead to high ignition rates. However, fires may also originate from other sources, such as arson, cigarettes, or campfires, within or adjacent to training areas.

Military live-fire activities start many of the fires in the ordnance impact area (USARHAW and 25th ID [L] 2001b). Most of these fires and other fires that start on PTA are prevented from leaving the boundaries of the installation; however, some fires have burned onto adjacent lands. Also, fires can come onto the installation from off-post. The PTA Fire Chief is responsible for ensuring that wildland fire responses are in accordance with the IWFMP (USARHAW and 25th ID [L] 2001b). Four remote weather stations on PTA are used for fire indexing. An auxiliary wildland firefighting force provides an initial attack on a fire before the fire department arrives. The Hawaii County Fire Department, HDLNR, and Hawaii Volcanoes National Park assist with wildland fire suppression.

3.1.4 CULTURAL RESOURCES

Cultural resources are defined as historic properties, cultural items, archaeological resources, sacred sites, or collections subject to protection under the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA), Executive Order (EO) 13007, and the guidelines on Curation of Federally Owned and Administered Collections (36 CFR Part 79). Cultural resources to be considered include prehistoric and historic archaeological sites, historic buildings and structures, and Native American or Native Hawaiian traditional resources. In the source documents for this analysis, Native Hawaiian traditional resources are discussed as areas of traditional interest (ATIs), and Native American traditional resources in Alaska and Colorado are discussed as properties of traditional, religious, or cultural significance (PTRCSs). These categories include traditional resources, use areas, and sacred sites that are potentially eligible for the National Register of Historic Places (NRHP) as traditional cultural properties (TCPs). Principal issues to be considered are the impacts of renovation, construction, training exercises, exploded ordnance, and changes in access on prehistoric and historic archaeological sites; historic buildings and structures; and properties of traditional, religious, and cultural significance. These include intrusion of new buildings or structures within or near historic sites or districts that are out of character with the historic setting or characteristics of the site or district, renovation or demolition of historic buildings, ground disturbance at archaeological sites, removal of objects or artifacts from eligible sites, increased access to archaeologically or traditionally sensitive areas, or restriction of access to sacred sites. This section briefly discusses known cultural resources for the three bases under consideration as alternatives.

The ROI for the Stryker Brigade transformation in Hawaii includes the geographic extent of the SBMR, the DMR, the KTA, the KLOA, and PTA (**Figure 3-1**). The SBMR includes WAAF and SBER. The ROI

for cultural resources includes the areas of construction of SBCT facilities, the ranges and training areas to be constructed or used under SBCT, those off-road areas to be used by Strykers, and areas adjacent to road alignments affected by SBCT activities (Dillingham Trail, Drum and Helemano Roads, and PTA Trail). The baseline information for this discussion is taken from the FEIS for Transformation of the 25th Infantry Division in Hawaii (USAG-HI 2004). More detailed discussions are presented in that document and in the annual report of cultural resource management of transformation projects (USAG-HI 2006).

USAG-HI (2004) briefly discusses Native Hawaiian concepts, culture, and landscapes that are important to consideration of Native Hawaiian resources. By the time Europeans arrived in Hawaii, native subsistence and trade had developed to maximize access to natural resources among diverse areas of the islands. Archaeological sites reflect the systems used to maximize natural resources and trade. The FEIS (USAG-HI 2004) defines five cultural landscape types that reflect the importance of culturally significant natural resources and man-made resources such as archaeological sites:

1. Areas of naturally occurring or cultivated resources used for food, shelter, or medicine.
2. Areas that contain resources used for expression and perpetuation of Hawaiian culture, religion, and language.
3. Places where known historical and contemporary religious beliefs or customs are practiced.
4. Areas where natural or cultivated endangered terrestrial or marine flora and fauna used in Native Hawaiian ceremonies are located, or where materials for ceremonial art and crafts are found.
5. Areas that provide natural and cultural community resources for the perpetuation of language and culture including place names and natural, cultural, and community resources for art, crafts, music, and dance.

The FEIS (USAG-HI 2004) presents overviews of the affected environment and environmental and socioeconomic consequences in chapters 3 and 4, and then chapters with more detailed discussions of each for SBMP (Chapter 5), DMR (Chapter 6), KTA and KLOA (Chapter 7), and PTA (Chapter 8).

Historic Overview

All areas of the ROI are within or near traditional areas that are likely to contain ATIs. The central plateau where SBMR is located is of religious and cultural significance to Native Hawaiians, and numerous traditional natural settings exist in the area (USAG-HI 2004). There are also traditionally important places in the area of DMR that are associated with spiritual beings, myths, legendary stories, and oral histories along the shoreline, on the upper slopes of the mountains above the installation, and in Kaena to the west. Best known among these important places is Kaena Point. KTA is on the northernmost point of the traditional Koolauloa District. Important legends hold that this land was once a separate island. Many traditional stories are associated with this land (USAG-HI 2004). PTA is part of a large cultural landscape that includes the sacred mountains Mauna Kea and Mauna Loa and the saddle between them. This area is spiritually and historically one of the most important places in Hawaiian tradition and history.

In 2004 the USAG-HI, the state historic preservation office (SHPO) and the Advisory Council for Historic Preservation (ACHP) entered into a programmatic agreement (PA) to address NHPA concerns related to the transformation of the second brigade into a Stryker brigade in Hawaii. In compliance with Stipulation VI (B) of the PA, a report of all SBCT projects, cultural resources program activities, mitigations, site evaluations, and Native Hawaiian consultation was compiled (USAG-HI 2006). Activities have included cultural and archaeological monitoring of projects, evaluation of known sites, and archaeological surveys for SBCT project areas and project areas for other planned transformation projects at all affected USAG-HI ranges. The report addresses 32 investigations in 28 project areas. Survey acreage is not listed

for many of the smaller surveys or for monitoring projects; however, at least 35,700 acres were surveyed by these recent investigations. Of the new sites in this report, 111 are recommended eligible for the NRHP, but many sites are still being evaluated for eligibility.

3.1.4.1 Schofield Barracks Military Reservation

Prehistoric Context

Hawaiians lived in the central plateau of Oahu hundreds of years before European contact. The boundaries of SBMR correspond roughly to the traditional Hawaiian land unit called Waianae Uka, a landlocked portion of the ahupuaa of Waianae. Waianae Uka was relatively isolated from the rest of its ahupuaa. As a result, the trail that connected Waianae Uka with Waianae Kai, the coastal portion of the ahupuaa, by way of Kolekole Pass, was of strategic importance. Archaeological evidence indicates the presence of traditional Hawaiian agricultural field systems, both dryland and irrigated taro wetland fields (loi) along the streams that flow through SBMR (USAG-HI 2004).

Historic Context

Early historic descriptions indicate that lush native forest covered most of the plateau lands between the stream valley farms. These forests may have been used to hunt birds for food and feathers and to gather other upland resources, especially valuable woods such as koa and sandalwood. Between about 1816 and 1830, under the direction of the Hawaiian chiefs, these forests were intensively cut to obtain sandalwood for trade to China. Following deforestation, the land was used for animal grazing. After 1850, the Crown leased much of the ahupuaa to rancher John Meek to raise cattle, sheep, and horses. In the late 1800s, James Dowsett owned the land that is now the Main Post and operated it as a ranch. After the annexation of Hawaii in 1898, the United States took possession of the property and, in 1909, established Schofield Barracks as a base for mobile defense troops. In the late 1930s, defense mobilization increased, and the installation's population swelled to 20,000. During World War II, SBMR became the Army's single largest garrison. After the war, the Hawaiian Infantry Training Center was established at SBMR, and upon the end of the Korean War, the 25th Infantry Division returned to its home post at SBMR, where it has remained the principal occupant (USAG-HI 2004).

Archaeology

Archaeological sites on Oahu are diverse and may include heiau (religious structures), koa (small shrines), fishponds, stone markers, fishing shrines, habitation sites, caves and rock shelters, mounds, burial platforms, earth ovens, stone walls and enclosures, agricultural terraces, canals or ditches, rock art sites, and trails. Historic period archaeological sites include gun emplacements, concrete structures and bunkers, concrete walls, wooden structural remains, masonry platforms, concrete revetments, bermed depressions, berms and rock piles, tunnels, miscellaneous feature complexes, road beds, railroad remnants, and trash deposits (USAG-HI 2004).

Archaeological surveys have been completed in the SBMR cantonment area and both ranges. Investigations have documented at least 217 archaeological sites in 4,151 acres of survey (USAG-HI 2006). Most of the archaeological sites remain unevaluated for eligibility to the NRHP. Archaeological sites that have been recommended as not eligible include five historical archaeological sites within the cantonment areas relating to military use of the property. No prehistoric sites have been identified within the cantonment area.

Historic Built Environment

Historic resources within the ROI also include military housing, offices, structures, landscapes, and districts, as well as National Historic Landmarks. These historic resources include the Schofield Barracks Historic District and the WAAF National Historic Landmark (USAG-HI 2004). These historic resources can include properties that are recently or less than 50 years old, such as later Cold War properties, if they are found to be of exceptional significance.

Several surveys of historic buildings have been completed for the SBMR, and the results have been integrated into the 2000 Cultural Resource Management Plans. The Schofield Barracks Historic District and the Schofield Barracks Confinement Facility (Stockade) are listed on the NRHP. The Schofield Barracks Historic District includes 176 contributing buildings and 10 other contributing sites, structures, and objects. Surveys at the Virtual Fighting Training Facility, Tactical Vehicle Wash, Information Systems Facility, and Mission Support Facility did not report any cultural resources.

Areas of Traditional Interest

Traditions and oral histories indicate that the central plateau where SBMR is located was an area of sacred activities and the residences of Oahu chiefs. An oral history study was completed to try to locate TCPs and ATIs. Informants indicated that there were several ATIs in the area, but they would not disclose specific information about their locations.

3.1.4.2 Dillingham Military Reservation

Prehistoric Context

Archaeological evidence of prehistoric land use and settlement on DMR is limited. Offshore rich deep-water fishing areas were no doubt exploited by residents of this region. Along the coast fronting DMR was a line of sand dunes in which Hawaiians buried their dead. Along the slope at the foot of the Waianae Mountains are several agricultural features, including terraces, indicating the cultivation of crops along the gulches that cut through the area. Part of the slope area was set aside as a sacred place on which Kawailoa Heiau was constructed. The well-watered slopes behind DMR were a source of water that was channeled down the mountainside into the irrigated taro fields below (USAG-HI 2004).

Historic Context

The fertile region of DMR was home to a thriving community of small landholders until the advent of large-scale ranching. Cattle and horses from large ranches, allowed to roam free, damaged or destroyed native gardens and homes; the Hawaiians protested to no avail. After the Great Mahele, a number of Hawaiians claimed land from the government. In an 1863 mission report, Emerson claimed that more “common natives” owned land in Waialua than anywhere else on Oahu. Both Native Hawaiians and western residents obtained grants of land covering all of DMR. On these lands, they cultivated sugar cane and newly introduced crops: wheat, corn, rice, and coffee. The land that now makes up DMR became a ranch in the 1800s and was used for sugar farming. DMR was established by EO of the President in 1927, but it did not come into its full use as a military airfield until World War II. In 1948, the Air Force took over administration of DMR. Subsequently, the reservation was transferred to the Army, under whose administration it remains (USAG-HI 2004).

Archaeology

Most of DMR has been covered by archaeological surveys. These surveys documented 24 archaeological sites (USAG-HI 2004). All but two of the archaeological sites are historic or traditional historic sites related to agriculture, transportation, or military use.

Historic Built Environment

Prior to the EIS, no formal historic building surveys had been completed at DMR. Nevertheless, 21 historic buildings have been documented at DMR. All of the buildings are related to military use. Archaeological surveys at DMR in the 1990s identified 21 buildings associated with a NIKE missile site. All but five of these have been demolished.

Areas of Traditional Interest

No TCP surveys or oral histories have been completed for the DMR.

3.1.4.3 Kahuku Training Area/Kawailoa Training Area

Prehistoric Context

The KTA area has been occupied at least seasonally since the 14th century. Evidence of early occupation includes rockshelters, burials, irrigation complexes, and habitation sites. The earliest occupation was concentrated on the coast. In the late 17th century, there was a more intensive settlement of the upper valleys (USAG-HI 2004).

Historic Context

Kahuku was apparently a prosperous region until European contact, but by the late 18th century or early 19th century, it was largely abandoned. At least one contributing factor after contact was extensive upland ranching, which destroyed native crops. The Kahuku Plantation Company was established in 1890 and replaced most of the pasture with sugarcane and scattered pineapple cultivation. Remains of small pineapple fields and plantation camps are scattered across KTA lands. In the 1930s, the military obtained the plantation to establish an airfield and radar installation. After the war, the training area was developed, and in 1959, a Nike Hercules missile battery was constructed. The more rugged terrain of the KLOA was not used as much as the KTA. Beginning in 1930, the KLOA was used as a training area (USAG-HI 2004).

Archaeology

Past surveys conducted by the Army have located 103 archaeological sites on KTA and 79 sites on KLOA. Thirty-eight of these sites are considered eligible or need to be evaluated for eligibility. Site numbers are low in the immediate areas to be affected by SBCT projects. Site probability models for KTA identify bluff slopes and edges and the mouths of narrow gullies as areas of high probability for surviving sites (USAG-HI 2004). Limited areas of KLOA that have not been surveyed due to very rugged and steep terrain have a low probability for sites. Some other areas that have not been surveyed are similar to areas with known sites.

Historic Built Environment

A variety of Cold War era buildings and structures exist on KTA. The buildings and structures are principally the eligible Nike missile sites and associated facilities that were in use between 1961 and 1970. One

of the stipulations resulting from Section 106 consultation over the demolition of the Nike missile site on DMR was that the KTA Nike site be preserved as an intact example of a Cold War Nike missile site.

Areas of Traditional Interest

Several ATIs have been identified on KTA including three heiau consisting primarily of rock platforms. One of these is believed to have been destroyed, but a recently identified cluster of features may be remnants of the site. Several burials have been identified on state lands adjacent to KTA. Formal TCP and ATI surveys have been undertaken for KTA and KLOA. The survey report is in a draft phase undergoing internal review, and is expected to be released the end of 2007.

3.1.4.4 Pohakuloa Training Area

Prehistoric Context

Evidence of occupation in the upland areas of PTA ranges from the 10th through the 18th centuries. The heiau on the slopes of Hualalai south of PTA is said to have been built by a legendary chief in the early 17th century. This chief and his father are credited with unifying the island and creating the traditional system of land division. The chilly heights of the Saddle and the peaks are not thought to have been the locations of permanent residences, but many passed through in search of natural resources and they used areas for religious/spiritual reasons. Natural resources included high-quality basalt, high-quality wood, forest plants, and birds. USAG-HI (2004) should be consulted for a complete summary of the prehistory of this area.

Historic Context

In the late 1800s in the PTA area, the owners of two large ranches competed over the rights to raise cattle and sheep and to hunt in the Saddle Region. John Parker II held a lease to the Kaohe lands of PTA from before 1876 through 1891. The Waimea Grazing and Agricultural Company leased Humuula east of PTA around 1860 to raise sheep and hunt wild cattle. The company built a wagon road through PTA from its sheep station along the current Saddle Road in Humuula to the harbor at Kawaihae. A portion of this road is still in PTA and to the east (USAG-HI 2004). By 1891, the Humuula lease was held by the Hackfield's Humuula Sheep Station Company, which also obtained the lease for the east side of Kaohe. The company built a number of stonewalls. Standing stone walls in the northeast part of PTA may be the ones referred to in the oral history documents. After 1900, Parker obtained control of the Humuula Sheep Company and controlled most of the saddle. Military use of PTA began in 1942 with the construction of the Kaumana Road (now the Saddle Road, SH200) for access between Hilo and Waimea. The Saddle Training Area, which included BAAF and the PTA cantonment area, was developed later. Most of the cantonment area consists of Quonset huts built between 1955 and 1958 (USAG-HI 2004).

Archaeology

The most common archaeological resources at PTA consist of modified natural features such as lava tubes, lava shelters, and lava blisters. Other archaeological resources include cairn sites, trails, volcanic glass quarries, excavated pits, and lithic workshops. Most of the known archaeological sites at PTA are Native Hawaiian sites reflecting traditional activities. A few sites may have ritual aspects. Seven known stone shrines attest to ritual activity in the area. Surveys at PTA and the Keamuku Parcel have located 383 known prehistoric and historic archaeological sites at PTA. Twenty-two of those sites are located in SBCT areas at PTA identified, and include habitation complexes, rockshelters, pahoehoe pits, pit complexes, and a lithic scatter. Most of these are common site types representing short-term occupation, resource exploitation, and lithic procurement.

The PTA Trail, also called the Tactical Vehicle Trail, begins at the Kawaihae Harbor where there are no known archaeological resources. The PTA Trail then runs inland from the harbor and across the Puukohola National Historic Park. This historic park is associated with the founding of the Hawaiian Kingdom. There are many known archaeological sites north and east of the harbor and along the proposed alignment for the PTA Trail as it approaches the installation.

Historic Built Environment

The DPW Buildings List includes 138 structures at PTA that are already or soon will be 50 years old. A survey and condition assessment has been completed, and an MOA for treatment of the structures is being developed. These 138 structures include Quonset huts dating from 1955 to 1958. All of the structures from the late 1950s should be treated as being 50 years old. Other associated structures in the cantonment area, BAAF, and other areas of the PTA date from World War II or the Cold War era. No historic buildings or structures have been identified along the PTA Trail. The report of investigations for SBCT-related projects between 2004 and 2006 (USAG-HI 2006) indicates that five historic buildings or structures have been identified in areas of new survey. These have not yet been evaluated for NRHP eligibility.

Areas of Traditional Interest

A draft report of an oral history survey of PTA was completed in 2002. The report summarizes previous work and information on place names, trail systems, and known Native Hawaiian structures (USAG-HI 2004). Informants indicated concern about possible burials in the general area of the Saddle, but no exact locations were given. Informants also indicated that traditional trails through the PTA are still used and the area is still used for bird hunting. Several studies of the Mauna Kea area suggest that this area remains significant to Native Hawaiians and should be considered an eligible TCP.

3.1.5 LAND USE AND RECREATION

The ROI for the land use and recreation analysis is each Army installation potentially affected by the proposed activities and adjacent or surrounding lands (**Figure 3-1**). The current land uses and recreational resources, as well as pertinent federal, state, and local land use regulations, policies, and plans for the ROI are described in the following subsections.

This section summarizes the affected environment for land uses and recreational resources within the ROI in Hawaii. The proposed project activities would primarily be located on land owned by the federal government. The following subsections describe the existing land uses and recreational resources within the ROI in Hawaii for the Army installation and surrounding lands potentially affected by the Project.

The proposed federal activities are subject to the federal authorities, but are not required to conform to state plans and policies or related land use documents. For informational purposes, the descriptions of existing land uses in this section include the State Land Use District designations. These designations list all lands in one of four districts: Conservation, Agriculture, Urban, or Rural (State of Hawaii 2002a). Conservation District Subzone designations, regulated by HDLNR, are Protective, Limited, Resource, General, and Special. The state designations for Agricultural Lands of Importance to the State of Hawaii (ALISH) categorize agricultural land as Prime, Unique, or Other (State of Hawaii 2002a).

In general, most of the proposed project activities would occur within Army installation boundaries as shown on **Figure 3-1**. Activities that have occurred outside of the Army installation boundaries include fixed tactical internet (FTI) sites within state-designated Conservation District land, acquisition and use of agricultural land (pineapple cultivation and cattle ranch land), and construction of military vehicle trails on agricultural roads or undeveloped areas.

A range of recreational activities is available on lands within the ROI including surfing, hunting, fishing, mountain biking, and visiting national monuments. Additional recreational opportunities are available on some of the lands adjacent to or near the Army installations. Existing land uses and recreational opportunities are summarized in the following subsections for each of the Army installations within the ROI and surrounding lands.

3.1.5.1 Schofield Barracks Military Reservation

The following subsections describe the existing land uses and recreational resources within the ROI in Hawaii for the Army installation and surrounding lands potentially affected by the Project, including the SBMP, WAAF, SBER, SRRA, the Helemano Trail, and surrounding lands.

Schofield Barracks Main Post. SBMP encompasses 9,880 acres. Current land uses at the SBMP include training (ranges and ordnance impact area), supply/storage, outdoor recreation, operations, and housing (Belt Collins 1993). These land uses are generally consistent with planned land uses identified within the installation master plan.

The SBMP includes some lands within the state-designated Urban, Agricultural, and Conservation Districts (State of Hawaii 2002a). The mountainous areas of SBMP are within the Conservation District: Resource and Protective Subzones. Some of the lands within the SBMP are within state-designated districts for Prime and Other agricultural lands of state importance; however, these lands are actually training ranges and the ordnance impact area.

Recreational opportunities at the SBMP include archery, skeet shooting, and hiking. Limited hunting is permitted at the Main Post. Hiking trails include the 2-mile Puu Hapapa Trail, and the 2.5-mile Puu Kalena Trail, all of which the Army manages.

Land uses surrounding the SBMP include agriculture, forest, urban, and military. The Kaala Natural Area Reserve is northwest of the SBMP, with agricultural land to the north. The town of Wahiawa and Wahiawa Reservoir are east of the SBMP, with WAAF to the southeast. Land to the south of the SBMP includes the recently acquired SRAA, the military's Field Station Kunia, the Honouliuli Preserve, and Naval Magazine Pearl Harbor Lualualei Branch. Land use to the west of the SBMP includes the Waianae Kai Forest Reserve, which includes a remnant native forest (HDLNR 2003b).

Wheeler Army Airfield (WAAF). WAAF, a sub-installation of SBMR, is located southeast of SBMR and Kunia Road. WAAF encompasses 1,369 acres and provides administration, housing, maintenance, training, and flight facilities for peacetime mission requirements, including security and law enforcement support. The installation master plan identified land uses in the project areas as operations/airfield, supply/storage, and training (Belt Collins 1994). Portions of WAAF are on lands within the state-designated Urban and Agricultural Districts (State of Hawaii 2002a). No state hunting or hiking areas were identified in the state literature.

Land uses surrounding WAAF include Urban, Military, and Agriculture. The town of Wahiawa is to the north, and Mililani Town is to the east-southeast of WAAF. The Main Post and Field Station Kunia are to the west of WAAF, and SBER is to the east. Land to the south of WAAF is used for agriculture.

Schofield Barracks East Range (SBER). The SBER is east of the Main Post and encompasses 5,154 acres. The installation master plan identified land uses at SBER as training, education facilities, the U.S. Army Non-Commissioned Officers Academy, warehouses, and a maintenance facility (Belt Collins 1993). Training areas at SBER are within the state-designated Conservation District Resource and Protective Subzones (State of Hawaii 2002a). SBER provides training grounds for the 25th ID and for tactical field

exercises of other Army and U.S. Marine Corps units (USARHAW and 25th ID [L] 2006). The western half of the training area is suitable for limited battalion and company-level Army Training and Evaluation Program (ARTEP) missions and fixed and rotary wing parachute drop operations (USARHAW and 25th ID [L] 2006). The area is valuable for rappelling, jungle survival training, and patrolling operations. The eastern portion of SBER has extremely rugged terrain and is densely forested, restricting operations to squad level training.

No live fire exercises are conducted at SBER. Use of blank ammunition, noise simulators, and limited use of pyrotechnics are permitted throughout the training area except near the training area boundary adjacent to the town of Wahiawa (USARHAW and 25th ID [L] 2006).

Recreational opportunities at SBER include the 18-hole Leilehua golf course and hiking on the Schofield-Waikane Trail, which is owned and managed by the state and the Army. This 3.5-mile long trail extends along most of the northern boundary of SBER and ends on the Koolau Mountain Ridge. Access to this trail requires permission from Range Control and Army Support Command. Hunting is allowed on SBER on a limited basis

Land uses surrounding SBER include urban, military, forest, and agriculture. The town of Wahiawa is located along the northwestern border of SBER. KLOA is along the northeastern border and includes the Ewa Forest Reserve. The Koolau Mountains and Ahupuaa O Kahana State Park are east of SBER. Land south of SBER includes forest, agricultural lands, and Mililani Town.

South Range Acquisition Area (SRAA). The SRAA was recently acquired to support SBCT transformation. SRAA encompasses approximately 1,402 acres. QTR2 and the SBCT motor pool are located on this parcel and are in various stages of construction. A fixed small arms live-fire qualification range is planned for SRAA. The SRAA is currently used for pineapple agriculture and contains state-designated Unique and Other agricultural lands (State of Hawaii 2002a).

The SRAA includes land within the Conservation District Resource Subzone. SRAA also contains approximately 100 acres of Forest Reserve lands that are managed by The Nature Conservancy (TNC) (USARHAW and 25th ID [L] 2006) and used for natural resource management and hiking. Portions of the Contour Trail lie within the SRAA and are used for monthly interpretive organized hikes and to access TNC work areas.

Land uses surrounding the SRAA include military, forest, and agriculture. The Main Post is to the north, and Field Station Kunia and WAAF are to the east. Land to the south is used for pineapple agriculture, and land to the south and west is part of the Honouliuli Preserve.

The Helemano Trail would connect the SBMP with an HMR access road (Paalaa Uka Pupukea Road). The trail alignment, consisting of 13 acres, uses agricultural roads within state-designated Prime and Unique agricultural land (USGS 1999b; State of Hawaii 2002a). Land surrounding the Helemano Trail alignment is military (SBMP) and agricultural.

3.1.5.2 Dillingham Military Reservation

Land uses at the 664-acre DMR include an airfield and associated roadways, bunkers, and earthen airplane hangars; approximately 354 acres suitable for maneuver and field training; 107 acres are developed within the cantonment area; and the remaining lands are located on steep slopes of the Waianae Mountains (USARHAW and 25th ID [L] 2006). Most of DMR is within the state-designated Agricultural District but is not used for agriculture. The airfield portion of DMR is within the Special Management Area (SMA). SMAs are lands within the shoreline setback, which is currently 40 feet from the shoreline, al-

though some setback boundaries extend farther inland. SMAs are designated for more intensive management and actions within the SMA may require an SMA use permit from the local planning commissions.

There are no live-fire activities, designated impact areas, or associated surface danger zones on DMR (USARHAW and 25th ID [L] 2006). Ammunition is restricted to the use of blanks, and non-aerial smoke is allowed in designated areas. Portions of the reservation, including the runway and parking area, have been leased to the Hawaiian Department of Transportation (HDOT) since 1983 for civilian light aircraft operations and support (USARHAW and 25th ID [L] 2006).

Public recreational uses at DMR include hunting, glider plane operation, parachuting, sky diving, hang gliding, and hiking. Glider plane operation, parachuting, sky diving, and hang gliding are allowed in designated areas associated with the airfield. The 2.3-mile Kealia Trail can be accessed through the western portion of DMR (USARHAW and 25th ID [L] 2006). This trail allows non-motorized biking and is open to the general public.

The land surrounding DMR is generally undeveloped and includes state-designated Prime agricultural land to the east, beaches to the north, and some residences to the northeast. The Kawaihapai reservoir and associated pumping station and aqueducts are east of DMR (USGS 1998). Land south of DMR is mountainous and includes a state hunting area to the southwest. Land uses to the west include an inactive quarry, the YMCA's Camp Erdman, and the military's Camp Kaena. The Pacific Ocean is to the north.

The Dillingham Trail would connect the SBMP and DMR using a southeast to northwest alignment. The trail alignment would require a 55-acre easement along agricultural roads and undeveloped lands (USGS 1999b, 1998). The land surrounding Dillingham Trail is generally agricultural or undeveloped. The trail crosses the SMA as it passes to the north and west of Thomson Corner, a residential subdivision (State of Hawaii 2002a).

3.1.5.3 Kahuku and Kawailoa Training Areas

Land uses on KTA include tactical maneuver training and KLOA is primarily used for maneuver, helicopter, and mountain/jungle warfare training. The following subsections provide additional land use information for KTA and KLOA, as well as for the proposed Drum Road realignment.

Kahuku Training Area. KTA is located in northern Oahu at the northern terminus of the Koolau Mountains and encompasses 9,480 acres. The northern portion of the installation supports all tactical maneuver training on KTA, including mountain and jungle warfare, limited pyrotechnics (e.g., smoke, incendiary devices), and air support training (USARHAW and 25th ID [L] 2006). KTA can accommodate a number of training scenarios involving infantry battalion ARTEP missions.

Aerial pyrotechnics are not allowed anywhere in KTA. Although live-fire is authorized on state land, live-fire operations have not been conducted. Ammunition used on KTA is limited to blanks, SRTA, and pyrotechnics (e.g., smoke and incendiary devices). There are no ordnance impact areas or surface danger zones (SDZs) on KTA. Implementation of the SBCT will include live-fire training at KTA that will be limited to short-range training ammunition.

About half of KTA lands are within the state-designated Conservation District Resource Subzone, and the remaining lands are within the Agricultural District (State of Hawaii 2002a). Public recreational use of KTA is primarily for hiking, biking (including motocross activities), and hunting in two Army-maintained areas. The 2.5-mile Kaunala Trail is located in the west-central portion of KTA. The trail is open for hiking and bicycling on weekends and holidays. The Pupukea Summit Trail passes along the border of KTA

and extends south along the eastern border of KLOA. Hiking along this trail is allowed with an Army permit.

KTA includes two Army-maintained hunting areas. The Kahuku Hunting Area is in Training Area A1, and the Pupukea State Public Hunting Area is in Training Area A3.

Land to the north and east of KTA is agricultural, and includes the town of Waialee and Waialee Beach Park. Forest and agricultural land is to the southeast, and KLOA is south and southwest of KTA. Agricultural land is west of KTA, with Pupukea Paumalu Forest Reserve, the Pupukea Paumalu Homesteads, and Camp Paumalu. Land uses to the northwest of KTA include agriculture, park, and rural communities.

Kawailoa Training Area. KLOA is located in the Koolau Mountains in north-central Oahu and encompasses 23,348 acres. KLOA is used primarily for small infantry unit maneuvers and helicopter training. The area is considered excellent for mountain and jungle warfare training because of its ravines and dense vegetation. Only 5,310 acres of the training area are actually suitable for maneuver training activities (USARHAW and 25th ID [L] 2006). The remaining are is considered unsuitable for maneuver training activities due to excessively steep slopes. In areas with a slope of 20 percent or more, troop deployment is typically limited to single-file, small unit movements on ridgelines. Nap of the Earth (NOE) and night vision goggle (NVG) helicopter training is common. Small unit infantry maneuver operations via helicopter insertion are also practiced. Blank fire of small arms up to 0.50 caliber is allowed. The lease agreement prohibits the use of live fire, tracer ammunition, incendiaries, explosives, and pyrotechnics in all parts of KLOA (USARHAW and 25th ID [L] 2006).

KLOA is included in the state-designated Conservation District Resource and Protective Subzones. Most of KLOA is included in the Kawailoa Forest Reserve, and the southern portion of KLOA includes the Ewa Forest Reserve. Recreational hiking trails at KLOA include the Poamoho Ridge Trail and the Schofield-Waikane Trail (USARHAW and 25th ID [L] 2006). The Poamoho Ridge Trail is in the southern portion of KLOA, and its use requires permission from Dole Food Co., Inc. (USARHAW and 25th ID [L] 2006). The Schofield-Waikane Trail is located along the southern boundary of KLOA. Access to this trail requires written permission and a permit from the Army.

KLOA is bordered on the north by KTA. To the east of KLOA are private lands, Kaipapau Forest Reserve, Hauula Forest Reserve, and Sacred Falls State Park. SBER is south of KLOA and Ahupuaa Kahana State Park is southeast. The Helemano Military Reservation is southwest of KLOA, and private agricultural lands are to the west.

Drum Road is a dirt and gravel road that runs north and northeast from HMR to KTA. The proposed Drum Road realignment crosses a state-designated Agricultural District and Conservation District Resource, General, and Limited Subzones (State of Hawaii 2002a). The alignment also crosses portions of state-designated Prime agricultural land, but most of this alignment is on existing roads (State of Hawaii 2002a). The northern portion of Drum Road is within the SMA (State of Hawaii 2002a).

Land uses surrounding Drum Road are Open and Forested Areas, Agriculture, and Military/Federal (City and County of Honolulu 2000a). Drum Road is adjacent to and west of KLOA.

In 2006, USAG-HI contributed $3.5 million to the purchase of 1,875 acres in the Waimea Valley west of KLOA. As part of the Army's Collaborative Use Buffer (ACUB) program, USAG-HI was one of several contributing entities. Partnered with the Trust for Public Land and The North Shore Community Land Trust, USAG-HI holds no ownership status to the acquired lands. Also under the ACUB program, USAG-HI was a contributor to the purchase of the 3,716-acre Moanalua Valley near Honolulu.

3.1.5.4 Pohakuloa Training Area

Located on the island of Hawaii, PTA is the largest Army training area in Hawaii, totaling 132,784 acres. PTA lands are within the state-designated Conservation District General, Limited, and Resource Subzones (State of Hawaii 2002a). Land uses at PTA include the cantonment area, BAAF, maneuver training areas, drop zones, live-fire training ranges, artillery firing points, an ordnance impact area, and areas unsuitable for maneuver. The cantonment area consists of 566 acres with 154 buildings, mostly Quonset huts (USARHAW and 25th ID [L] 2006). BAAF has a 3,969-foot runway and offers helicopter access and limited C-130 access (USARHAW and 25th ID [L] 2006). Land suitable for field maneuvers consists of approximately 56,661 acres, and the ordnance impact area is approximately 51,000 acres (USARHAW and 25th ID [L] 2006). Recreation at PTA includes archery, biking, motor sports, and hunting on designated training areas, which the Army coordinates with the state (R.M. Towill Corp. 1997a).

Lands surrounding PTA are generally within the state-designated Conservation District (USARHAW and 25th ID [L] 2006). Land uses in the areas include cattle grazing, game management, forest reserves, and undeveloped land. Land to the northwest of PTA is agricultural, primarily for cattle grazing, and also provides limited hunting opportunities for big game species and game birds. Land to the north of PTA includes the Kaohe Game Management Area, Mauna Kea State Park, and Mauna Kea Forest Reserve. Land to the east and south is included in the Mauna Loa Forest Reserve.

PTA Trail would include approximately 132 acres of land northwest and west and of PTA to Kawaihae Harbor. Land uses within the proposed military vehicle trail corridor include cattle grazing, agriculture, periodic military training, open space, utility easements, a portion of a former military vehicle trail, and Kawaihae Harbor. PTA Trail land is mostly agriculture, with urban areas at and near Kawaihae Harbor. The southern portion of the proposed military vehicle trail is designated as Other Agricultural Land (State of Hawaii 2002a). The trail alignment near Kawaihae Harbor is included in the SMA (County of Hawaii 2001b). There is also a shoreline setback along the harbor property. The southern portion of the PTA Trail crosses the Parker Ranch-managed hunting area, which is located within the Keamuku Parcel.

Land uses surrounding the proposed military vehicle trail include cattle grazing, residential (Waikoloa Village and Kawaihae Village), Puukohola Heiau National Historic Site, agriculture, agricultural subdivision, open space, and periodic military training.

According to USACE, the ordnance and explosives hazard level for the PTA Trail alignment ranges from low to high, and the policy regarding use of roads and trails primarily depends on landowners and current land use (Earth Tech 2002; Streck 2003). The institutional controls for these areas include community awareness outreach programs, educational media, and coordinated construction support.

West PTA Acquisition Area (Keamuku Parcel). The Keamuku Parcel was acquired in July 2006, lies at the western foot of Mauna Kea, consists of approximately 23,000 acres, and is currently used for cattle grazing, occasional military maneuver training, and a quarry. It is leased four to six times a year by the Army or other military entities for maneuver training (USARHAW and 25th ID [L] 2006).

The Mamalahoa Highway forms the northwestern boundary, and Saddle Road forms most of the eastern boundary. Saddle Road Junction, where these roads connect, forms the northern boundary.

Land uses surrounding the Keamuku Parcel include cattle grazing, military training, agriculture, residential lots, and open space. PTA is to the south-southeast of the area, and the Puu Paa Military Maneuver Area is adjacent to the northern tip, west of Mamalahoa Highway. The remaining surrounding lands are used for recreation and ranching or are undeveloped.

UXO hazards along the Saddle Road corridor (extending approximately 164 feet from the road) need to be cleared to a safe depth to support the heaviest track and wheeled vehicle that will use the area. According to the USACE, the overall ordnance and explosives hazard level for the Keamuku Parcel is low (Earth Tech 2002). The institutional controls for these low-risk areas include community awareness outreach programs, educational media, and pre-coordinated construction support.

3.1.6 TRAFFIC AND TRANSPORTATION

This section describes the transportation resources near the proposed project and focuses primarily on roadways. Traffic refers to the movement of vehicles along roadways. Roadways may include paved and unpaved roads or trails.

The ROI for transportation resources includes the roads and trails to be used by the project alternatives as described in the following paragraphs.

The ROI for transportation resources in Hawaii is defined as follows:

- SBMR – The ROI is the area within the SBMR/WAAF perimeter and Kunia Road adjacent to the project area;
- Dillingham Trail – The ROI is the corridor between SBMR and DMR. This corridor includes the area from central Oahu to DMR, which is in the northwest area of the island;
- Drum Road and Helemano Trail – The ROI is the corridor from SBMR to KTA, which consists of two trail segments: Drum Road and Helemano Trail. This corridor originates at SBMR, which is located in central Oahu, and ends at KTA, which is located on the windward side of Oahu; and
- PTA Trail – The ROI is the corridor between PTA and Kawaihae Harbor. This corridor is approximately 26 miles long and is bounded by State Road 190 on the east and the coastline on the west.

3.1.6.1 Oahu

On Oahu, the primary urban development is along the southern coastal areas. Urban development extends from Ewa on the west to Hawaii Kai on the east.

The Transportation for Oahu Plan 2025 provides an overview of traffic conditions, which are currently operating at acceptable levels on Oahu. However, traffic tends to back up on the roads to WAAF and SBMR during times of heightened security.

There are four freeways on Oahu that provide approximately 55 miles of state roadway. H-1 (Lunalilo Freeway) traverses the southern portion of Oahu and connects the Ewa areas with Hawaii Kai. The freeway also provides service to Honolulu International Airport, Pearl Harbor, Hickam Air Force Base (HAFB), and downtown Honolulu. H-2 connects the Ewa area with central Oahu, where the SBMR is located. H-2 ties into H-1 east of Honolulu. H-3 is the newest freeway on Oahu and connects the Pearl Harbor area with Kaneohe Bay Marine Corps Airfield, which is on the northeast side of Oahu. Finally, State Road 78, referred to as the Moanalua Road, provides a bypass for H-1 traffic between the Aiea/Pearl City area and downtown Honolulu.

The remaining state highways provide approximately 200 lane-miles of roadway. The City and County of Honolulu maintains approximately 1,200 lane-miles of roads (Carter-Burgess 2001). There are few roadways connecting the southern and northern portions of the island, which are separated by the Koolau Mountains. The connecting roadways are the Pali Highway, the Likelike Highway, and H-3. Kalanianaole

Highway goes around the east coastline between Hawaii Kai and Kailua. H-2 and Kamehameha Highway go around the western end of the Koolau Range, connecting Honolulu with Mililani, Wahiawa, Schofield Barracks, and Haleiwa.

The main access routes for the training areas around SBMR are via the Ewa/Honolulu area: Kamehameha Highway and Kunia Road from the Ewa District, and Kamananui Road and Wilikina Drive from the North Shore district. Trimble Road, Kolekole Avenue, and Lyman Road are the primary circulation routes through SBMR. Access to and egress from KTA is via Drum Road or Kamehameha Highway.

3.1.6.2 Island of Hawaii

The major urban areas on the island of Hawaii are Hilo and Kailua-Kona, which are on the east and west sides of the island, respectively. Air service for these centers is provided by Hilo International Airport and Kona International Airport. Generally, major roadways in Hilo are congested, and major highway improvements are underway to address these problems. There are several congested areas in Kailua-Kona, but the periods of congestion are short.

The most direct roadway link between these population centers is Saddle Road, but most motorists use Queen Kaahumanu Highway (Highway 19) because this road has better design features. Saddle Road is not up to current design standards, and sight distances are limited. The HDOT, with the Federal Highways Administration as the lead agency, have construction projects in progress to improve Saddle Road. The first of these projects is a 7-mile segment from Mauna Kea State Park towards Hilo, which will be dedicated in May 2007.

Major roadways on the island are under the jurisdiction of the HDOT. Roadways under the jurisdiction of HDOT are Queen Kaahumanu Highway, Mamalahoa Highway, Hawaii Belt Road, Volcano Highway, and Kawaihae Road. Except for limited sections, these roadways are two-lane highways. Major intersections are signalized. The remaining local roads and streets are under the jurisdiction of the County of Hawaii Department of Public Works.

Current traffic conditions in Hawaii vary depending on location, but are typically over capacity during peak hours, resulting in significant traffic delays. These traffic delays occur in urban areas with multi-lane roads as well as less developed areas with only two-lane roads.

3.1.7 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PROTECTION OF CHILDREN

The socioeconomic indicators used for the analysis of potential impacts to socioeconomic resources include population; economy, employment, and income; housing; and schools. The population data include the number of residents in the area and the recent changes in population growth. Data on employment, labor force, unemployment trends, income, and industrial earnings describe the economic health of a region. Income information is provided as an annual total by county and per capita. Housing availability and school enrollment and capacity are important considerations for assessing the effects of potential growth. The number and type of housing units, ownership, and vacancy rate can also be indicators of the regional quality of life. Additional demographic data, including race and ethnicity, age, and poverty status, are presented at the end of this section to facilitate the evaluation of potential environmental justice and protection of children issues.

The ROI for socioeconomic impacts includes the counties in which the proposed facilities would be located. The ROI includes nearby trade and service centers related both directly and indirectly to the eco-

nomic activities of each installation, and takes into account the residency distribution of military and civilian personnel, and the schools their children attend.

The ROI for the proposed activities in Hawaii is defined as the Counties of Honolulu (Island of Oahu), on which SBMR, SBER, SRAA, DMR, KTA, and KLOA are located, and Hawaii (the Island of Hawaii), on which PTA is located. For the purpose of discussing socioeconomic characteristics, the islands can be further defined by the Census County Divisions (CCDs).

One county covers each island. Honolulu County covers Oahu and parts of the smaller islands, and Hawaii County covers the Island of Hawaii. Honolulu County is divided into seven CCDs including Ewa, Honolulu, Koolauloa, Koolaupoko, Wahaiwa, Waialua, and Waianae. A CCD represents a relatively permanent statistical area established cooperatively by the U.S. Census Bureau and state and local government authorities. The twelve districts within Hawaii County are Hilo, Honokaa-Kukuihaele, Kau, Keaau-Mountain View, North Hilo, North Kohala, South Kohala, North Kona, South Kona, Paauhau-Paauilo, Pahoa-Kalapana, and Papaikou-Wailea. DMR is within the Waialua CCD, and KTA is within the Koolauloa CCD. SBMR is within the Wahiawa CCD. PTA occupies mainly Paauhau-Paauilo CCD and small portions of the North Kona, South Kohala, and North Hilo CCDs.

3.1.7.1 Population

The population of the State of Hawaii increased by 9.3 percent between 1990 and 2000. While the population increase in Hawaii County (23.6 percent) was more than twice the percentage increase at the state level, the population increase in Honolulu County (4.8 percent) was approximately half that of the percentage increase at the state level. In 2000, Hawaii County's population accounted for 12.3 percent of the state population (a slight increase from 1990) and ranked second in the state (which contains four counties). Honolulu County's population (ranked first in the state) comprised 72.3 percent of the state population (a 2.2 percent decline from the 1990 level) (U.S. Census Bureau 1990a, 2000d).

Hawaii has a large military population, albeit one that has decreased from a high of 67,100 military personnel in 1984 to 40,800 in 2000. Because most of the population resides in or near Honolulu, the presence of military personnel and their dependents is most prominent on Oahu. The following subsections summarize the population and demographic information for the CCDs in which the SBMR, SBER, SRAA, DMR, KTA, KLOA, and PTA are located.

Schofield Barracks Military Reservation

The SBMP, SBER, and SRAA are all within the Wahiawa CCD. The population of the Wahiawa CCD represented approximately 4.4 percent of the population of Honolulu County in 2000. Between 1990 and 2000, the population of this area decreased by 12.6 percent (U.S. Census Bureau 1990a 2000a). The Wahiawa CCD had a minority population of 26,235 (68.4 percent). The population identified as Asian/ Pacific Islander was the largest minority ethnic group and made up 34.2 percent of the population (U.S. Census Bureau 1990a, 2000d). Approximately 31 percent of the population of Wahiawa CCD was under the age of 18 in 2000, one of the highest percentages in Honolulu County (U.S. Census Bureau 2000c).

Dillingham Military Reservation

DMR is within the Waialua CCD. The population of the Waialua CCD represented approximately 1.6 percent of the population of Honolulu County in 2000. Between 1990 and 2000, the population of this area grew from 11,549 to 14,027, an increase of 21.5 percent (U.S. Census Bureau 1990a, 2000d). Approximately 69.6 percent of the Waialua CCD population was made up of minority ethnic groups, the largest percentage of which was Asian/Pacific Islander (37.3 percent of the population) (U.S. Census Bu-

reau 1990a, 2000d). Approximately 27.4 percent of the population was under the age of 18 in 2000 (U.S. Census Bureau 1990a, 2000b). No military or civilian personnel are permanently stationed or reside at DMR.

Kahuku Training Area

KTA is within the Koolauloa CCD. The population of Koolauloa CCD represented approximately 2.2 percent of the population of Honolulu County in 2000. Between 1990 and 2000, the population of the Koolauloa CCD area grew from 18,443 to 18,899, an increase of 2.5 percent (U.S. Census Bureau 1990a, 2000d). Approximately 68 percent of the Koolauloa CCD population was made up of minority ethnic groups, the largest percentage of which was Asian/Pacific Islander (38.9 percent of the population) in 2000 (U.S. Census Bureau 1990a, 2000d). The population of Koolauloa CCD under the age of 18 comprised approximately 32.3 percent of the population in 2000 (U.S. Census Bureau 1990a, 2000b). No military or civilian personnel are permanently stationed or reside within KTA.

Kawailoa Training Area

KLOA occupies portions of both the Waialua and Koolauloa CCDs. The population and demographic data for these CCDs was previously described above. No military or civilian personnel are permanently stationed or reside at KLOA.

Pohakuloa Training Area

PTA mainly occupies the Paauhau-Paauilo CCD and small portions of the North Kona, South Kohala, and North Hilo CCDs. Within Hawaii County, the South Kohala CCD experienced one of the greatest population growth percentages (43.7 percent). In 2000, the population of the North Kona CCD was one of the largest population centers on the Island of Hawaii, with 19.2 percent of the population (U.S. Census Bureau 1990a, 2000d). The North Hilo CCD had the highest percentage of minority populations (71.9 percent), and North Kohala had the lowest (52.9 percent) (U.S. Census Bureau 1990a, 2000d). The percentages of the populations of North Hilo, North Kona, Paauhau-Paauilo, and South Kohala CCDs under the age of 18 were 25.8, 25.5, 28.7, and 30.1 percent, respectively (U.S. Census Bureau 1990a, 2000b). No military or civilian personnel are permanently stationed at or reside at PTA.

3.1.7.2 Economy, Employment, and Income

Federal government expenditures in Hawaii totaled approximately $9 billion in 2000. Defense expenditures accounted for 39 percent of federal spending in 2000, down from approximately 54 percent in 1990. Nonetheless, defense spending in Hawaii increased 33 percent between 1990 and 2000 to $3.5 billion (Hawaii Department of Business, Economic Development and Tourism [HDBEDT] 2001c). In 2002, per capita defense spending in Hawaii reached $3,045, second only to that of Virginia in the 50 United States. The economic impacts of defense spending have a ripple effect throughout the Hawaiian economy due to additional spending by military residents for goods and services procured off-post and the increased demand for goods and services generated by vendors and contractors associated with the military installations.

In 2000 the services, government, and retail trade sectors employed the greatest number of workers in the state and in both Hawaii and Honolulu Counties in 2000. Between 1990 and 2000, employment in the State of Hawaii in the mining, farm services, forestry, fishing, and services sectors increased by the largest percentages. Within the government sector, state and local government employed the majority of workers. The military experienced a 21.5 percent decline in employment between 1990 and 2000. Of the

major employment sectors, construction, manufacturing, and farm employment experienced the greatest percentage decreases over the decade in the state (Bureau of Economic Analysis [BEA] 2002a).

As of September 2001, SBMR employed approximately 12,000 personnel (HDBEDT 2003). About 10,100 were military personnel, 300 were civilian personnel, and the remaining 1,600 were other personnel. SBMR accounts for approximately 9 percent of all government jobs in Honolulu County. PTA employs approximately 170 military and civilian personnel.

Hawaii County had a higher unemployment rate than the state rate in 2000. Hawaii County had the highest unemployment rate in 2000 (6.7 percent), which exceeded the state average of 4.3 percent, while Honolulu County's unemployment rate (3.8 percent) was below that of the state (Bureau of Labor Statistics [BLS] no date).

In 2000, the Honolulu County average per capita personal income was $29,960, exceeding both the state average ($27,851) and the Hawaii County level ($20,399). Honolulu County also experienced the greatest growth in per capita personal income between 1990 and 2000. For the State of Hawaii, Hawaii County, and Honolulu County, per capita personal income increased by 24.5, 22.9, and 26.1 percent, respectively (BEA 2002b).

3.1.7.3 Housing

In 2005, the state vacancy rate for housing was 12.4 percent (61,064 units), while Hawaii County had the highest vacancy rate of 17.4 percent (12,514), and Honolulu County had the lowest vacancy rate of 8.7 percent (28,743) (U.S. Census Bureau 2005). In 2005, the median owner-occupied home value in Hawaii County was $329,900 and in Honolulu County was $457,700 (U.S. Census Bureau 2005).

Near the SBMR and SBER, 31 percent of the housing in the Wahiawa CCD was owner-occupied and 12.6 percent were vacant in 2000 (U.S. Census Bureau 1990a, 2000a). For the Waialua CCD (the CCD occupied by DMR) 41 percent of the housing was owner-occupied, and 5.7 percent was vacant in 2000 (U.S. Census Bureau 1990a, 2000b). KTA occupies the Koolauloa CCD, in which approximately 49.7 percent of the housing was owner-occupied, and 16.6 percent was vacant in 2000 (U.S. Census Bureau 1990a, 2000a). Of the CCDs occupied by PTA, North Hilo CCD had the highest level of home ownership (78.7 percent) and North Kona CCD had the lowest (58.5 percent). In Paauhau-Paauilo CCD and South Kohala CCD, 77.1 percent and 58.9 percent of occupied units were owned. North Kona CCD had the highest level of vacancy (24.6 percent), most of which were seasonal/recreational units; and Paauhau-Paauilo CCD had the lowest vacancy rate (7.7 percent; U.S. Census Bureau 1990a, 2000a). There are no housing facilities at DMR, KTA, KLOA, or PTA.

3.1.7.4 Schools

Within Hawaii County in 2000, a total of 32,974 students were enrolled in school up to high school (grade 12 level); of whom 6.7 percent were in preschool, 6.2 percent were in kindergarten, 56.5 percent were in elementary school (grades 1 through 8), and 30.6 percent were in high school (grades 9 through 12). Within Honolulu County, a total of 168,531 students were enrolled in school up to high school (grade 12 level); of whom 7.7 percent were in preschool, 7.2 percent were in kindergarten, 56.6 percent were in elementary school (grades 1 through 8), and 28.5 percent were in high school (grades 9 through 12) (HDBEDT no date [a] and [b]). In general, schools near the Proposed Action are operating at or below capacity, with the exception of Mililani High School on Oahu.

3.1.7.5 Environmental Justice

On February 11, 1994, President Clinton issued EO 12898, entitled Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. This order requires that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities, on minority populations and low-income populations" (EO 12898, 59 FR 7629 [Section 1-101]).

Gathered economic, racial, and demographic information were generated to identify areas of low-income and high minority populations (those who are in the minority of the population of the U.S. as a whole consisting of Blacks or African Americans, Native Americans, Eskimos, Aleuts, Asians, Pacific Islanders, other, and two or more races) in and around the project area.

Low-income populations are identified using the U.S. Census Bureau's statistical poverty threshold, which varies by household size and number of children. Based on data from the 2000 Census, the 1999 average estimated poverty threshold for an individual was an annual income of $8,787, and $17,601 for a four-person household (Dalaker and Proctor 2000). The nationwide poverty rate was 12.4 percent at the 2000 Census and 12.5 percent in 2003 (U.S. Census Bureau 2006b). The U.S. Census Bureau defines a poverty area as a census tract where 20 percent or more of the residents have incomes below the poverty threshold; an extreme poverty area has 40 percent or more of the residents below the poverty level (U.S. Census Bureau 1995).

Minority populations are defined as the populations in all race categories except White and Hispanic. Hispanic is considered an ethnic group rather than a racial category because persons of Hispanic origin may be of any race. The dominant ethnic group in 2000 in the state and both Hawaii and Honolulu Counties was the Asian and Pacific Islander group, with 51.0, 38.0, and 54.9 percent of the population, respectively.

Within Hawaii County, the Hilo and Papaikou-Wailea CCDs had the highest minority populations; however, all CCDs were composed of greater than 50 percent minority populations. Within Honolulu County, all CCDs were composed of 67 percent or greater minority populations.

Census estimates for 1998 indicate that approximately 10.5 percent of the population of the State of Hawaii, 15.1 percent of Hawaii County, and 9.7 percent of Honolulu County were below the poverty level in 1998 (U.S. Census Bureau 2001). Within Hawaii County, Hilo had the highest total number of families below the poverty level in 1999. In Honolulu County in 1999, Honolulu had the largest total number of families below the poverty level (HDBEDT no date [a] and [b]).

3.1.7.6 Protection of Children

EO 13045, entitled Protection of Children from Environmental Health Risks and Safety Risks (EO 13045, 62 FR 19885), states that each federal agency shall make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks. Environmental health and safety risks primarily mean risks that are attributable to products or substances that the child is likely to come into contact with or to ingest.

In 2000, the percent of the population of Hawaii County under 18 years was 27.4 percent. In Honolulu County, 25.1 percent of the population was under the age of 18 in 2000.

3.1.8 HAZARDOUS MATERIALS AND HAZARDOUS WASTES

The ROI for hazardous materials and wastes is the area on and surrounding the potentially affected Army installations. Because fences or mountain ranges cannot always confine or reduce impacts from spills or releases of hazardous materials or wastes, areas immediately adjacent to these project locations are considered part of the ROI.

Specific regulations generally govern the use, storage, and disposal of hazardous materials and wastes. The U.S. Army Pamphlet 200-1 governs all aspects of managing hazardous materials and regulated waste by military or civilian personnel and on-post tenants and contractors at all Army facilities. The Army maintains site-specific spill prevention, control, and countermeasure (SPCC) plans and pollution prevention plans that regulate the storage and use of petroleum products and hazardous materials, respectively. Hazardous material and waste management continues to follow Army, federal, and state regulations in order to minimize potential impacts to human health or the environment.

According to CERCLA, a hazardous substance can be defined as any substance that, due to its quantity, concentration, or physical and chemical characteristics, poses a potential hazard to human health and safety or to the environment. CERCLA has created national policies and procedures to identify and remediate sites contaminated by hazardous substances.

The following specific hazardous materials and wastes are addressed:

- Ammunition, Live-Fire, and Unexploded Ordnance (UXO);
- Petroleum, Oils, and Lubricants (POLs) and Storage Tanks;
- Contaminated and Installation Restoration Program (IRP) Sites;
- Lead;
- Asbestos;
- Polychlorinated Biphenols (PCBs);
- Pesticides/Herbicides;
- Radon; and
- Hazardous Wastes.

The following subsections summarize the hazardous materials and wastes used or generated by the Army installations.

Hazardous materials and wastes at the Army installations in Hawaii include ammunition, live-fire, and UXO; POLs; contaminated and IRP sites; lead; asbestos; PCBs; pesticides/herbicides; radon; and hazardous wastes, including waste oils, depleted uranium, and biomedical waste. The Transfer Accumulation Point at SBER, Building 6040, stores hazardous materials and wastes used and generated at SBMR, SBER, and WAAF. The Army maintains updated material safety data sheets for all hazardous materials used. The hazardous materials and wastes used and generated within the ROI in Hawaii are summarized in the following subsections.

3.1.8.1 Ammunition, Live-Fire, and UXO

Live-fire training exercises occur within the range areas and various types of ordnance are used. The general public is not allowed into areas where ammunition is stored or used. Any unused ammunition must be returned to the original storage facility at the end of the exercise.

Live-Fire Training

Live-fire training takes place at SBMR and PTA. Live-fire activities include artillery and mortar (A&M) training, which requires the use of bags filled with explosive propellant for artillery and similar explosive propellant charges for mortars. Charges that are not used during training are burned, creating a residue. Residues from burned propellant are the only hazardous wastes temporarily stored at the range burn site in a designated hazardous waste satellite storage point.

SDZs are associated with live ammunition firing at range training facilities (SBMR and PTA). SBMR's SDZs exist roughly within an arc formed by Area X (the eastern boundary), Trimble Road (the southern boundary), and the Waianae Mountain Range (the western boundary). The direction of fire is generally west to north. The area supports small arms, mortar, and artillery training. No live tube-launched, optically tracked, wire-guided missile, air-to-ground, or ground-to-air firing is conducted at the SBMR ranges (Belt Collins 1993). In recent years, there have been no problems involving the public and the storage, transportation, and use of ammunition for training at SBMR (Borja 2002b).

SDZs are also designated for the ranges at PTA (Sato 1996). Their construction is based on information in AR 385-63 and the draft update of this regulation. Increased emphasis is placed on the effects of ricochets at closer ranges in the draft version. SDZs are configured toward a cumulative ordnance impact area (approximately 51,000 acres) in the central portion of PTA. In addition, although improved conventional munitions (ICMs) are no longer used on any Army training land due to the extreme safety risk (HQDA 2001), there is a 16,800-acre ICM impact area within the larger impact area. ICMs, also referred to as cluster bombs, are artillery munitions that contain multiple submunitions. The ordnance impact area and ICM area are not accessible to the public.

Permanent ammunition storage is not authorized on SBMR or PTA. During training, ordnance is temporarily stored in ammunition holding areas. At completion of training, unused ammunition is returned to the ammunition storage point (ASP) located on WAAF in buildings 1538 and 1551. Weapons are stored in the unit areas between training sessions. The Naval Magazines at Lualualei provide ammunition to WAAF (Belt Collins 1993). These buildings act as permanent ordnance storage for all of USAG-HI (Borja 2002b).

There are no live-fire areas at WAAF; however, the airfield has an ammunition storage point with an established explosive safety quantity-distance arc (Belt Collins 1994). The safety arc around the ammunition storage point is in the south-central portion of the installation. Explosives quantity distance regulations (TM 9-1300-206) are imposed on ammunition storage facilities for the safety of personnel and supplies. All explosives and ammunition are stored within the ASP on WAAF under the supervision of the US Army Support Command, Hawaii Directorate of Logistics (DOL).

During 8 or 9 months of the year, ammunition is brought from WAAF or Lualualei to PTA via boat or helicopter (Saldivar 2002). If boats are used, the ammunition is driven from Kawaihae Harbor to PTA. There have been no accidents involving the transport of ammunition in the last 5 years.

Non-live-fire training occurs on SBER, SRAA, DMR, KTA, and KLOA. The Army also conducts non-live-fire maneuver training on training areas around PTA. Exercises at SBER use pyrotechnics and blank

ammunition, and no live-fire exercises occur at SBER; therefore, no surface danger zones exist because the range is used for bivouac, maneuver, and dummy fire training activities (Army 1993).

Results from recent soil sampling of SBMR and PTA ranges produced some samples with levels above USEPA Region IX residential and industrial PRGs. At SBMR, two samples for RDX and one sample for nitroglycerin slightly exceeded the industrial PRG, but the level of exposure on a range (days or weeks) compared with the level of exposure used to calculate an industrial PRG (25 years) minimizes the concern. Five samples from PTA exceeded the PRG for RDX. Lead concentrations of two samples from Ranges 9, 10, and 11 exceeded the industrial soil PRG. The exceedances of heavy metal PRGs are attributable to naturally occurring high background levels.

Although metals such as aluminum and iron occur naturally in Hawaiian soils, byproducts of munitions, such as lead and RDX, contribute contaminants that could create health and safety concerns in the natural environment. Hazardous waste is transferred to the SBMR or PTA transfer and accumulation point facilities, as appropriate, for proper storage until disposal contractors and the defense reutilization and marketing office (DRMO) coordinate to ensure proper disposal.

Unexploded Ordnance (UXO)

DOD 6055.9 Standard defines UXO as "explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constituted a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause." Grenades, mortars, and artillery weapons used in live-fire training can produce UXO; all other ammunition is inert. When a live-fire training range is closed, all UXO is normally is destroyed where it is found. No known dud rounds are left in place at the conclusion of a training exercise.

UXO is suspected in various training areas and presents a potential threat to Army personnel. UXO is not cleared before maneuvers commence because there is a low level of suspected UXO. Soldiers are taught how to identify UXO and how to handle it properly.

3.1.8.2 Petroleum, Oils, Lubricants (POLs) and Storage Tanks

POLs include engine fuels (gasoline, diesel, and jet fuel), motor oils and lubricants, and diesel and kerosene heating fuels. Vehicle and heating fuels include a mixture of aliphatic hydrocarbons and such aromatic organic compounds as benzene, toluene, ethylbenzene, and xylene (BTEX). CERCLA definitions of hazardous substances (42 USC 9601[14]) and pollutants exclude petroleum unless specifically listed. The USEPA interprets petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

Most industrial operations for the Army installations in Hawaii use the "Super Station" centralized motor pool southwest of Lyman Road at Building 2805 on SBMR. All fuel for industrial use is transported from the Hickham Air Force Base (HAFB) Fuel Farm via Tesoro and stored in aboveground storage tanks (ASTs) at the Super Station (Akasaki 2002a). Two Army and Air Force Exchange Service (AAFES) retail filling stations are located on SBMR at buildings 80 and 1167. Each distributes different grades of unleaded gasoline, with diesel fuel also sold at the first station.

Both underground storage tanks (USTs) and ASTs are used to store petroleum products and fuels at locations throughout the project area. POL storage is summarized in the following paragraphs by location including USTs, ASTs, and oil-water separators.

Underground Storage Tanks

There are a number of in-use and permanently out-of-use USTs and leaking underground storage tanks (LUSTs) at SBMR and WAAF. For both DMR and KTA, only one UST remains in use at each area.

Aboveground Storage Tanks

There are 18 motor pools at SBMR. Some motor pools use ASTs to store diesel fuel or used oil in conjunction with vehicle maintenance. All fuel for industrial use is transported from the Hickam AFB Fuel Farm via Tesoro and stored in four ASTs at the Super Station (Akasaki 2002). Additionally, ASTs are used by many buildings on base to store liquid petroleum gas (LPG), also known as propane, to fuel hot water heaters.

Several ASTs on WAAF in the area of the aircraft runway contain diesel or aviation gas. Emergency generators can be found throughout SBMR, SBER, and WAAF. Many of these units contain integrated tanks to store fuel as opposed to being connected to separate ASTs. A list of these units is maintained by the DPW (McGinnis 2002). There are no known ASTs on DMR. There is one AST on KTA used to store propane.

Oil-Water Separators, Wash Racks, and Grease Traps

Oil/water separators (OWSs) separate oil, fuel, and grease from water by gravity because these substances have a specific gravity that is lower than that of water (i.e., gasoline floats on water). OWSs can create environmental issues similar to those associated with USTs. Oils are skimmed from the surface of these OWSs or USTs and recycled or disposed of; sediments are removed every 6 months or more frequently, if needed, by a service contractor. The DPW maintains a list of all OWSs, grease traps, and wash racks on SBMR and these facilities are inspected regularly by the USAG-HI Environmental Compliance Office (ECO), and DPW is responsible for maintaining these devices (McGinnis 2002). There are no known OWSs on DMR, KTA, or PTA.

3.1.8.3 Contaminated and Installation Restoration Program (IRP) Sites

The IRP is an ongoing DoD-administered program for identifying, evaluating, and remediating contaminated sites on federal lands under DoD control. A comprehensive identification and evaluation of all IRP sites on all existing Army training areas on Oahu and Hawaii was completed for the SBCT FEIS (USAG-HI 2004). There are several IRP sites within the Hawaii installations on SBMR, WAAF, and PTA. No IRP sites are under investigation on DMR or KTA.

An investigation was performed to evaluate contamination in surface soil and water samples from the SBMR and PTA firing ranges. Secondary explosives compounds, primarily TNT and RDX, which are the major ingredients in nearly all munitions formulations, were found on SBMR and PTA firing ranges. In addition, several metals (aluminum, iron, lead, and antimony), explosives (RDX, TNT, and nitroglycerin), and semivolatile organic compounds (PAHs) were found at levels exceeding USEPA Region IX PRGs on both SBMR and PTA.

Trichloroethylene (TCE) is mainly used as a solvent to remove grease from metal parts. In 1985, TCE was found in four wells supplying potable water to SBMR at levels exceeding regulatory limits. The

SBMR was put on USEPA's National Priorities List (NPL), and an IRP was established for the site in 1990. The SBMR NPL site has been remediated and was removed from the NPL in August 2000.

3.1.8.4 Lead

Lead sources within the ROI include lead-based paints and lead from ordnance and ammunition. Lead was a major ingredient in house paint used throughout the country for many years. Lead-based paint (LBP) is defined as any paint or surface coating that contains more than 0.5 percent lead by weight. Buildings constructed before 1978 are considered to be a risk for LBP. LBP is a hazard because it can slough off as dust or chips that children can easily inhale or ingest.

The Army environmental department maintains a database of lead surveys. The most recent version of the lead survey database for SBMR, WAAF, KTA, and DMR is available through the Army DPW. As of 2005, structures on PTA have not been surveyed for lead.

Lead is also used in manufacturing ordnance/ammunition, such as that used for small arms training. The Army recognizes the potential health threats associated with lead. The Army document, "Prevention of Lead Migration and Erosion from Small Arms Ranges" (USAEC 1998) provides management practices to minimize adverse impacts on human health and the environment from small arms ranges. The Army implements general cleanup procedures following training events to remove shell casings and other munitions residue from the ranges, and explosive ordnance disposal (EOD) specialists destroy all UXO.

3.1.8.5 Asbestos

Buildings constructed prior to 1980 are considered to be at risk for asbestos-containing materials. Building surveys to identify asbestos materials are conducted prior to the start of renovation and demolition work. Asbestos-containing materials were used in some of the older buildings within the ROI. Current asbestos survey information for the USAG-HI facilities is maintained on the DPW database.

An installation asbestos management program has been established by the DPW to ensure the health and safety of Soldiers and civilians within USAG-HI.

3.1.8.6 Polychlorinated Biphenyls

PCBs may be found in the cooling fluid of electrical equipment, including transformers and capacitors, particularly if such equipment was manufactured before the early 1970s. PCBs are also found in fire retardants and other solid materials. The Army is committed to removing or retrofilling all electrical equipment containing regulated amounts of dielectric fluid containing PCBs.

A survey was conducted in 1991 to determine the concentration of PCBs in the electrical distribution equipment on military installations in Hawaii. The survey results indicated that there were PCB-containing transformers and electrical equipment throughout SBMR and in a few transformers at DMR and KTA. PCB concentrations in soil samples from PTA were below the listed PRG. Devices that are found to contain regulated levels of PCB are either removed and upgraded with non-PCB devices, or are being retrofilled or removed, drained, packaged, and disposed of in accordance with 40 CFR Part 761 (PRC Environmental Management, Inc. 1995).

3.1.8.7 Pesticides/Herbicides

Various types of pesticides, including insecticides, herbicides, fungicides, avicides (bird poison), and rodenticides, have been used at USAG-HI installations to maintain the grounds and structures and prevent pest-related health problems. Pesticides and herbicides are primarily stored in four locations on SBMR

and one location on KTA (Yamamoto 2002). Pesticides and herbicides are stored at PTA in approved containers at the ENV Office facilities.

3.1.8.8 Radon

Radon is a naturally occurring, slightly radioactive gas that is produced by the decay of rock containing uranium. Inhalation of radon gas may be associated with an increased risk of lung cancer, and the USEPA has made recommendations for safe radon levels in both residential housing and schools. Radon occurs in low concentrations in the Hawaiian Islands. As part of the National Radon Database, the USEPA and the USGS have evaluated the radon potential in both Honolulu and Hawaii Counties. Data from several radon surveys in Hawaii show that concentrations are much lower than the USEPA's recommended action level of 4 picocuries per liter (pCi/L). Therefore, radon is not addressed in the individual installation analyses.

3.1.8.9 Hazardous Wastes

The primary function of the motor pool facilities on SBMR is vehicle maintenance. Although motor fuels were previously stored and distributed at these motor pools for military vehicles, all fueling for industrial purposes now takes place at the Super Station. Most of the motor pool facilities have a designated waste storage/holding areas with both primary and secondary containment for wastes generated by shop and vehicle servicing. Normally, the waste products are temporarily collected and stored in containers at a far corner of each motor pool, which is surrounded with sandbags for secondary containment of potential leaks, and cordoned with barbed wire (Belt Collins 1993). The waste is separated into hazardous waste such as lithium batteries or Resource Conservation and Recovery Act (RCRA) chemicals, and non-regulated waste such as recyclable oil. The hazardous waste is brought to the hazardous waste shope storage point (HWSSP), while the recyclable materials are brought to the Recyclable Material Shop Storage Point (RMSSP) (Akasaki 2002).

Biomedical Waste

The Army follows strict guidelines according to AR 200-1 in the handling, use, and disposal of medical, dental, and veterinary supplies. Most medical waste within the project vicinity is produced and temporarily stored outside of the project area at Tripler Army Medical Center. The medical clinics on SBMR and PTA produce small amounts of regulated chemical and medical waste. The medical waste is combined and temporarily stored before being disposed of at a regulated off-base disposal site. Emergency medical training medics accompany units on deployment at KTA and DMR, and biomedical waste is shipped back to SBMR with the units.

3.1.9 BIOLOGICAL RESOURCES

This section describes biological resources in the SBCT project areas and surrounding areas. Biological resources include plant and animal species and the habitats or communities in which they occur. Discussion of resources occurring in the SBCT ROI includes vegetation, habitat types, general wildlife; and sensitive wildlife, vegetation, and habitats. The SBCT ROI for biological resources is composed of the direct area where SBCT actions are proposed and surrounding areas that would likely be affected by these actions. The ROIs are based on the extent of fire, erosion, and boat and helicopter activity, as well as the area where all other impacts, including construction and training-related impacts, would occur.

Sensitive Species. Sensitive species include special status, or regulated, species such as USFWS or state listed endangered, threatened, candidate species, or proposed candidate species; Marine Mammal Protection Act (MMPA) species; federal and state species of special concern; and locally regulated species. Also considered sensitive are rare species whose populations have rapidly declined or whose habitat has mark-

edly decreased in recent years. All Army operations take into consideration any published biological opinions, listing, or recommendations regarding any special status species and take appropriate action to protect these species from impact.

On May 9, 2006, the USFWS listed 11 species of Hawaiian picture-wing flies as endangered pursuant to the Endangered Species Act of 1973, as amended; *Drosophila aglaia*, *D. differens*, *D. hemipeza*, *D. heteroneura*, *D. montgomeryi*, *D. musaphilia*, *D. neoclavisetae*, *D. obatai*, *D. ochrobasis*, *D. substenoptera*, and *D. tarphytrichia* (USFWS 2006a). The USFWS also listed one species as threatened, *D. mulli* (USFWS 2006a). Pursuant to a settlement agreement approved by the United States District Court for the District of Hawaii, the USFWS anticipated finalizing critical habitat by April 2007 (USFWS b); however, as of June 2007, no critical habitat ruling had been made. Activities that will trigger consultation under Section 7 of the Endangered Species Act (ESA) if they may affect the picture-wing flies specifically include DoD activities such as troop movements, bombardment, and live-fire exercises (USFWS 2006a). The Army has funded surveys to determine the presence or absence of these species on Oahu installations.

Critical Habitat. Areas of habitat considered essential to the conservation of a listed endangered or threatened species may be designated as critical and are protected under the ESA. These areas may require special management considerations or protection. Although critical habitat may be designated on private or government land, activities on these lands are not restricted unless there is federal involvement in the activities or direct harm to listed wildlife. Federal agencies are required to conduct Section 7 consultation if a proposed action could affect designated critical habitat, even if the effects are expected to be beneficial. The Army, as a federal agency, is prohibited from adversely modifying critical habitat. The Army has completed Section 7 consultations for proposed SBCT actions on Oahu and the Island of Hawaii. Reasonable and prudent measures, as determined by the USFWS, will be incorporated into the Proposed Action. The USFWS has established critical habitat for 101 species of plants on Oahu (USFWS 2003b) and 46 plants on the Island of Hawaii (USFWS 2003). Critical habitat is mostly located in remote rugged locations of no real development value (USFWS 2003a). Army training areas were excluded from being designated plant critical habitat because of the essential contribution that Army-led natural resource conservation plays in the recovery of threatened and endangered species. These contributions include ongoing and proposed management actions specified in the INRMPs and other natural resource conservation programs. More than 90 percent of the land is already restricted for development because it is part of the State Conservation District. There are 864 acres of plant critical habitat within the Oahu ROI. There are two bird species, the Oahu elepaio (*Chasiempis sandwichensis ibidis*) and the palila (*Loxioides bailleui)*, that have federally designated critical habitat within the SBCT ROI. There are 8,629 acres of elepaio critical habitat, all of which occurs on Oahu, within the project ROI and 2,569 acres of palila critical habitat in the ROI. The Palila critical habitat is in the PTA ROI. The elepaio critical habitat is only within the Schofield Barracks ROI. There is no critical habitat in KTA, only in SBMR, KLOA, and SBER. There are 4,812 acres of critical habitat for the elepaio in the KTA/KLOA ROI (USARHAW and 25th ID [L] 2004).

In 2003, the Army began consultation with the USFWS regarding federally listed endangered species on the Hawaii Training Areas. A draft Oahu Implementation Plan (OIP) was completed to guide the conservation efforts for the plant, snail, and avian species potentially affected by military training on these installations. The Draft OIP also includes a full description and list of the invasive plants to be managed by the Natural Resource Staff. Selected invasive species are listed for the installations below. In addition, several Biological Opinions have been published in recent years, which include areas in the ROI for many of the alternatives. The initial Biological Opinion (BO) that triggered the development of the OIP was issued on 23 October 2003. The Army is currently drafting the PTA Implementation Plan pursuant to the USFWS BO.

In 2000, the USFWS granted the Oahu Elepaio endangered species status under the federal Endangered Species Act and designated critical habitat on Oahu for the Elepaio in 2001. The 2003 BO requires the Army to manage 75 Elepaio pairs through the control of alien rats during the breeding season at SBMR. The BO allows the management of a combination of on and offsite elepaio pairs to reach our goal of management of 75 pairs.at SBMR. These documents govern much of how the Army conducts operations in regards to special status species (Beachy 2004).

Biologically Significant Areas. Biologically Significant Areas (BSAs) contain varying levels of sensitive plants established as a formal rating system by TNC. The abundance and diversity of sensitive plants within an area are used to classify sensitivity. BSA 1 areas contain a high density of federally listed endangered, proposed endangered, or candidate species. BSA 2 areas contain lower densities of known federally listed endangered, proposed endangered, or candidate taxa, or contain candidate taxa or other species of concern that are expected to be upgraded to federally protected status within the next few years. BSA 3 areas contain stands of intact, relatively common native vegetation types with few or no known occurrences of rare elements.

Important habitat for sensitive snail species also exists in the SBCT ROI. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on Oahu.

3.1.9.1 Schofield Barracks Main Post

Vegetation Community Descriptions

The vegetation communities described below occur in multiple locations on the SBMR (which includes SBER and SBMP), WAAF on Oahu, and SRAA (at SBMR). The mixed fern/shrub community is a fairly restricted community in the topmost reaches of the Koolau Mountains, where rainfall generally exceeds 150 inches (USARHAW and 25th ID [L] 2001a).

Montane wet ohia forest is generally restricted to gulches and ridgetops between 3,200 and 4,000 feet. The dominant tree is ohia. Ohia shrubland falls between 2,500 and 3,000 feet in SBMR. The steep, windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches per year. Dwarfed native tree and shrub species thrive here.

There are three community types within the lowland wet communities, where conditions are generally warm and sheltered from wind, with annual rainfall exceeding 100 inches. Ohia forest is below the Koolau summit between 1,900 and 2,700 feet and below 5,000 feet in the Waianae Mountains (USARHAW and 25th ID [L] 2001a). Uluhe shrubland is widespread on many of the Hawaiian Islands, usually in wet lowland areas below 2,200 feet. Loulu hiwa forest gets between 75 and 150 inches of rainfall annually. It occurs exclusively in the Koolau Mountains on steep, rocky windward slopes. This is considered a globally imperiled vegetation community (USARHAW and 25th ID [L] 2001a).

There are four types of lowland moist communities on the training areas: Kawelu grassland, Ohia lowland moist shrubland, Oahu diverse forest, and Koa/Ohia forest (Army 2004). Lowland dry shrubland is generally dominated by aalii and is found on the main Island of Hawaii. Adjacent communities are often dominated by nonnative grasses and shrublands in fire-disturbed areas like SBMR.

Wetlands

There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID [L] 2001a). Possible wetlands on SBER, identified by the USFWS in 1977, include palustrine wetlands characterized by native

trees, shrubs, or persistent emergents; riverine wetlands located within channels and lacking woody vegetation; and a lacustrine wetland centrally located in a depression and lacking native trees (USARHAW and 25th ID [L] 2001a).

Noxious Weeds

Hawaiian ecosystems are threatened by the introduction of invasive species, i.e., nonnative species that compete with and often replace native species and native communities. Noxious weeds are those species that have been declared as such by the State. Noxious weeds and other highly invasive plants targeted for control or eradication around rare plants and communities on SBMR include oriental vessel fern *(Angiopteris evecta),* satinleaf *(Chrysophyllum oliviformes),* ginger *(Hedychium* spp.*),* and *Juniperus* spp. Current control efforts have focused on strawberry guava *(Psidium cattleianum),* ginger, and Koster's curse *(Clidemia hirta)* (USARHAW and 25th ID [L] 2001a). Invasive plants that occur on SBER and that are targeted for control where they threaten rare or endangered species include moho *(Heliocarpus popayensis),* cat's claw *(Caesalpinia decapetala),* treedaisy *(Montana hibiscifolia),* false meadowbeauty (*Pterolepis glomerata),* Christmas berry (*Schinus terebenthifolius*), and Sacramento bur *(Triumfetta semitriloba)* (USARHAW and 25th ID [L] 2001a; PCSU 2001). These

The Army seeks to preserve and expand the populations of federally listed plants on lands under its management. The pest management and natural resource management programs overlap to reduce the negative impacts of introduced species on the landscape (USARHAW and 25th ID [L] 2001a). Control of noxious weeds is required by the State of Hawaii Noxious Weed Rules, and is supported by AR 200-5, the Army's pest management regulations (HQDA 1999).

Wildlife

Regular zoological field surveys have covered much of the SBCT ROI. These surveys have focused on special status invertebrates, mammals, and birds. There have been no specific reptile or amphibian surveys at SBMR due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Wildlife surveys were conducted by Shallenberger at SBMR in 1976 and 1977 (USARHAW and 25th ID [L] 2001a; Shallenberger 1977 and Vaughn 1978. These natural resource surveys were used for the resource assessments in the *Endangered Species Management Plan Report, Oahu Training Areas* (R. M. Towill Corp. 1997a), as well as the more recent *Oahu Training Areas Natural Resource Management Report* (Pacific Cooperative Studies Unit [PCSU] 2001) and the *Oahu Training Areas INRMP* (USARHAW and 25th ID [L] 2001a). The ROIs for each installation that would be affected are presented as figures in USAG-HI 2004.

Wildlife information for the SRAA has been gathered from the Hawaii Natural Heritage Program (HINHP) database (HINHP 2002) and the Honouliuli Preserve Master Plan (TNC 2000). Less information is available regarding WAAF and the proposed Helemano Trail. WAAF is an established airfield, which offers little refuge to wildlife; however, a large population of Pacific golden-plover (*Pluvialis fulva*) winters on WAAF. The area proposed for the Helemano Trail is presently used as agricultural fields and dirt roads. Common Oahu wildlife would be expected to inhabit these areas. Wildlife information for these two locations was based on the *Draft Environmental Assessment for Realignment of Kunia Gate, Wheeler Army Airfield with the Existing Lyman Gate, Schofield Barracks* (Edward K. Noda and Associates, Inc. 2001), *Preliminary Draft EA Aviation Complex 6A & 6B, FY01-03, Whole Barracks Renewal Wheeler Army Airfield, Oahu, Hawaii.* (USACE 2001), and *Preliminary Draft Schofield Barracks to Helemano Military Vehicle Trail Land Acquisition Environmental Baseline Study* (USACE 2002e).

Invertebrates. The native invertebrates at the Main Post include the Oahu tree snail *(Achatinella mustelina),* six achatinellid land snail species *(Acuriculella ambusta, A.* spp. aff. *castanea, A.* spp. aff. *per-*

pusilla, Elasmuius spp., *Partulina dubia,* and *Tornatellides* spp.*),* and two amastrid land snail species *(Amastra rubens* and *Letachatina* spp.*)*. Three other native snail species, *Cookeconcha* spp., *Philonesia* spp., and *Succinea* spp., were also observed at the Main Post (R. M. Towill Corp. 1997b; USARHAW and 25th ID [L] 2001a). Endemic invertebrates at SBER include other Oahu tree snails *(Achatinella apex-fulva, A. byronii, A. decipiens, A. leucorraphe, A. sowerbyana,* and *A. swiftii).* Also found at SBER are other achatinellid land snails *(A. perpusilla, A. pulchra,* and *A.* spp.*)*, the Oahu megalagrion damselfly *(Megalagrion oahuensis),* the unique yellow-faced bee *(Hylaeus unica),* and opae oehaa, the Hawaiian prawn *(Macrobrachium grandimanus)* (USARHAW and 25th ID [L] 2001a). Although the mountainous areas of the Honouliuli Preserve are valuable habitat to many Oahu land snails, the portion proposed for the SRAA is highly disturbed agricultural area. These areas support mostly nonnative agricultural associated invertebrates (TNC 2000; HINHP 2002). HINHP surveys of SBMR in 1993 detected the following nonnative snails: giant African snail *(Achatina fulica),* bradybaenid land snail *(Bradybaena similaris),* cannibal snail *(Euglandina rosea),* and the zonitid land snail *(Hawaiia minuscula)*. Humans have purposely or accidentally introduced these species to Oahu, and they now threaten the native snail species through competition for resources, predation, and the spread of disease.

Amphibians. There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians found on Oahu include the green and black poison dart frog *(Dendrobates auratus),* the bullfrog *(Rana catesbeiana),* wrinkled frog *(R. rugosa),* giant toad *(Bufo marinus),* and Cuban tree frog *(Osteopilus septentrionalis)*. The coqui frog (*Eleutherodactylus coqui)* is presently only found on SBER, and control programs are in place to limit its spread. These species were introduced from other countries and have the potential to inhabit SBMR, WAAF, and the SRAA on Oahu, and PTA on the Island of Hawaii.

Reptiles. There are no native terrestrial reptiles on the Hawaiian Islands. Nonnative reptiles that have the potential to inhabit the SBMR, WAAF, and SRAA ROI include the green anole *(Anolis carolinenesis),* mourning gecko *(Lepidodactylus lugubris),* stump-toed gecko (*Gehyra mutilata),* tree gecko *(Hemiphyllodactylus typus),* Indo-Pacific gecko *(Hemidactylus garnotii),* house gecko *(H. frenatus),* metallic skink *Lampropholis delicata),* and gold dust day gecko *(Phelsuma laticauda laticauda)*. The only known terrestrial snake occurring on the Hawaiian islands is the island blind snake *(Ramphotyphlops braminus),* although the brown tree snake *(Boiga irregularis)* has been found in Hawaii at airports and other ports of entry; attempts are being made to prevent this species from establishing itself on the Hawaiian Islands. The red-eared turtle *(Trachemys scripta elegans)* was recorded at Waikele Stream and may be found at SBMR. This species was also identified in Kaukonahua Stream (Kiikii Stream), the primary drainage of Poahmoho tributary on KTA, and may be found at SBER (USARHAW and 25th ID [L] 2001a).

Terrestrial Mammals. The Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only native terrestrial mammal on the Hawaiian Islands (USFWS 1998a), but is not considered present on Oahu. The following nonnative species may occur at SBMR and SRAA: feral pigs *(Sus scrofa scrofa),* feral goats *(Capra hircus hircus),* feral cats *(Felis catus),* feral dogs *(Canis familiaris familiaris),* Norway rats *(Rattus norvegicus),* black rats *(R. rattus),* Polynesian rats *(R. exulans hawaiiensis),* and house mice *(Mus musculus)*.

Birds. The following indigenous species have been recorded at the Main Post: Oahu elepaio *(Chasiempis sandwichensis ibidis)*, Oahu creeper *(Paroreomyza maculatus),* iiwi (*Vestiaria coccinea),* apapane *(Hiatione sanguinea sanguinea),* Oahu amakihi *(Hemignathus virens chloris),* white-tailed tropic bird *(Phaethon lepturus dorotheae),* black-crowned night heron *(Nycticorax nycticorax hoactli),* Pacific golden-plover *(Pluvialis fulva),* and the Hawaiian short-eared owl *(Asio flammeus sandwichensis)*, also known as pueo. The Oahu elepaio, Oahu creeper, iiwi, Oahu amakihi, and apapane are all species limited to the Hawaiian Islands. Native birds recorded at SBER include the Oahu elepaio, Oahu creeper, iiwi, Oahu amakihi, apapane, and Oahu akepa *(Loxops coccineus wolstenholmii),* the white-tailed tropic bird, black-crowned night heron, and the Pacific golden-plover. Hawaiian short-eared owls are known to in-

habit areas adjacent to the SRAA and may occur on the property (TNC 2000). Mostly nonnative and common birds, such as the myna (*Acridotheres tristis*), are expected to use the SRAA because of its highly disturbed nature and the agricultural habitat that it provides. Numerous nonnative bird species are known to occur in SBMR and the SRAA (USAG-HI 2004).

Fish. The following endemic fish are known to inhabit the Waikele Stream, which runs through the Main Post: oopu nakea *(Awaous guamensis),* oopu naniha *(Stenogobius hawaiiensis),* oopu hiukole, oopu okuhe *(Eleotris sandwichensis),* aholehole *(Kuhlia sandvicensis),* and amaama *(Mugil cephalus)* (USARHAW and 25th ID [L] 2001a). Although these species have not been confirmed on the Main Post, they may occur within that portion of the waterway. No fish data are available specific to Kaukonahua South Fork Stream on SBER (USARHAW and 25th ID [L] 2001a), but information was gathered for Kaukonahua (Kiikii) Stream, which includes the Poamoho tributary on KTA and may represent some species at SBER. Native fish identified from the Kaukonahua Stream assessment include oopu nakea, oopu naniha, oopu okuhe, and oopu hiukole (USARHAW and 25th ID [L] 2001a). Several nonnative species are known to occur in SBMR, and several additional nonnative species may be present (USAG-HI 2004). The Lake Wilson overflow channel, which Helemano Trail would cross, is perennial but it is not known if fish inhabit this human-made stream. There is no documented aquatic species information available for the SRAA.

Threatened and Endangered Species/Sensitive Habitats

Sensitive Plant Species. The training areas that make up SBMR are home to 59 rare plant species. The USFWS has also designated critical habitat for areas within the SBMR ROI, but there is no designated critical habitat on the Army installations (USARHAW and 25th ID [L] 2004). The location of sensitive species in the potential Hawaii ROI is based on the HINHP database (HINHP 2002), the Draft OIP, (USAG-HI 2005a) the Oahu BO (USFWS 2003e), and the PTA BO (USFWS 2003c).

Sensitive Wildlife Species. The following discussion includes only those special status wildlife species that are considered likely to be found in the ROI. Twenty-eight special status wildlife species are known to occur or have the potential to occur at SBMR or its vicinity (R. M. Towill Corp. 1997a). These include 22 rare invertebrates (20 of which are endangered mollusks), one damselfly and one wasp species, as well as five rare birds and an endangered bat (USARHAW and 25th ID [L] 2001a). Sensitive species occurring within the ROI are most likely to occur in the higher elevations of the Waianae and Koolau Mountains and are unlikely to occur in the disturbed lowland areas, which make up a large portion of the ROI. The location of sensitive species in the potential Hawaii ROI is based on the HINHP database (HINHP 2002), the Draft OIP, (USAG-HI 2005a) the Oahu BO (USFWS 2003c), and the PTA BO (USFWS 2003d).

Ecologically Sensitive Areas. Surveys conducted under the HINHP show 11 native natural vegetation communities on SBMR. These zones are determined by climate, topography, elevation, and prevailing ecological conditions. The HINHP considers two of these vegetation communities to be rare with an HINHP rank of G1: the Oahu diverse lowland moist forest and Loulu Hiwa lowland wet forest (HINHP 1994b). Three ecological zones have been identified in the SBMR survey area. The wet summit crest zone exists in areas above 3,000 feet, along the tops of the Waianae and Koolau Mountains. This zone contains the globally imperiled Loulu Hiwa lowland wet forest. Cliffs and moderate slopes are the topographically dominant features in this cool, wet, cloud-swept region. Below this is the moist ridges and cliffs zone, which is warmer and drier than the wet summit zone, though it does not escape the winds. The vegetation community on this part of SBMR supports ohia lowland moist shrubland and Kawelu lowland moist grassland; these communities are not considered rare and have a Global Heritage Ranking of G3. The third ecological zone exists below the steepest cliffs and slopes described above and along the ridge tops to the gulch bottoms; this is the lowland forest zone. Typically warm and moist to wet, there are three forest types in this zone. The koa/ohia lowland moist forest is predominant on ridge tops and in

lower elevations; ohia lowland wet forests and uluhe lowland wet shrubland are the dominant native natural communities. Oahu diverse lowland moist forests occur on north-facing, moderately steep slopes, are considered rare, and have a Global Heritage ranking of G1.

Biologically Significant Areas. SBMR contains large expanses of native-dominated plant communities. These areas are defined to prioritize areas for management based on their relative richness of rare natural resources. The HINHP has defined three types of biologically significant areas for managing the important natural communities. There are three noncontiguous areas in the Waianae area of SBMR that are designated BSA 1, and all three areas are habitat for the endangered land snail *Achatinella mustelina* and several endangered plants. The southernmost BSA 1 is near Puu Hapapa and the Honouliuli Preserve. It is the habitat for more than 20 native and protected plant species in addition to the endangered snail. This area is located near QTR2 in the SRAA. The Koolau Mountain area of SBMR has two areas defined as BSA 1. These areas are both in the eastern portion of the range, near the summit crest, and contain several species of endangered plants. BSA 2 contains all or some of the following: lower densities of federally listed endangered or proposed endangered species; candidate species or other species of concern that are expected to be upgraded to federal protected status within the next few years; and areas judged likely to contain high densities of federally listed species, based on habitat assessment, despite the lack of any record of such occurrence to date. SBMR has two noncontiguous areas and one somewhat isolated area of habitat classified as BSA 2. These regions contain typical vegetation for natural communities of moist ridges and cliffs and lowland forest zones. There is one BSA 2 in the Koolau region of SBMR at East Range. It covers most of the eastern end of the range and is primarily a lowland forest. Most of the rare plants found in the Koolau range survey are in this area. There is one BSA 3 in the Waianae region of SBMR. There are no findings that support knowledge of natural communities in the area. Although there are no rare communities in the BSA 3 area, the forest supports six native endangered plant species haha *(Cyanea grimseana),* nanu *(Gardenia mannii),* kamakahala (*Labordia cyrtandrae),* wawaeiole *(Huperzia nutans), Pteris lydgatei* (no common name), and oheohe (*Tetraplasandra gymnocarpa).* The BSA 3 designated range in the East Range/Koolau region contains nanu and haha (*Cyanea longiflora)* but no rare natural communities. It is likely that, with further surveys of the areas, additional rare plant occurrences would be documented. Sensitive snail habitat is also found within the ROI. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on Oahu.

3.1.9.2 Dillingham Military Reservation

Vegetation Community Descriptions

The area surrounding DMR is sparsely populated, and neighboring land is owned either privately or by the State of Hawaii. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP surveyed the area in 1995, but the visit was brief due to the small size and rugged terrain of the training area. During this site visit, HINHP staff documented the only known example in Hawaii of extremely dry closed-canopy forest. These natural resource surveys have been used for the resource assessments in the *Endangered Species Management Plan Report, Oahu Training Areas* (R. M. Towill Corp. 1997a) as well as the more recent *Oahu Training Areas Natural Resource Management Report* (PCSU 2001) and *Oahu Training Areas INRMP* (USARHAW and 25th ID [L] 2001a).

There are only two types of native lowland dry communities on DMR. Lonomea *(Sapindus oahuensis)* forest is the only known occurrence in Hawaii of a closed canopy, extremely dry forest type. Little information is available about this type of forest due to its rarity. On DMR, it is found on the cliff slopes at the southern end of the training area. It is considered to be globally imperiled. The other forest type is wili-

wili *(Erythrina sandwicensis).* This is also found in the sloping cliff areas of DMR but grows in patches with the Lonomea Forest. These areas are surrounded by heavily degraded weedy shrubland.

Wetlands

A wetland delineation of DMR was conducted in the spring and summer of 2002 following procedures outlined in the USACE 1987 wetland delineation manual; results were published in a report dated August 2002 (USACE 2002c). Those conducting the survey identified one jurisdictional wetland on DMR (USACE 2002c). The wetland is spring-fed, is dominated by primrose willow, and is approximately 287 square yards (USACE 2002c). This perched wetland is within the ROI but outside of the area that will be used for maneuver training.

An additional wetland area was investigated at DMR. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, the wetland area was determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act. No training or construction is proposed to occur in this area.

Noxious Weeds

The low-lying areas of DMR are populated mostly by nonnative vegetation, some of these species are invasive or noxious and pose a serious threat to the native natural communities that exist in more remote locations of this small training area. Guinea grass *(Panicum maximum)* is becoming more widespread in DMR. It regenerates quickly after fire and can inhibit the growth of other plants by its dense matting and by producing chemicals that discourage other plants from taking root.

Invasive and noxious weeds targeted for eradication in DMR include padang cassia *(Cinnamomum burmannii)*, Chinese banyan *(Ficus macrocarpa)*, and fountain grass *(Pennisetum setaceum)* (USARHAW and 25th ID [L] 2001a). Widespread weed species are being controlled where they threaten native plants and communities.

Wildlife

Zoological field surveys on DMR have been limited due to the rugged terrain and small size. Surveys have focused on special status invertebrates, mammals, and birds. No specific reptile surveys have been conducted on DMR due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys of DMR were conducted by the Environmental Impact Study Corp. in 1977, the HINHP in 1995, and PCSU natural resource staff in 2000 and 2001. The following sections describe the general presence of invertebrate, mammal, bird, and fish species. There are two wildlife species with associated recovery plans in the ROI (Hawaiian hoary bat and Hawaiian seabirds).

Invertebrates. The native invertebrates on DMR could include the Hawaiian skimmer (*Nesogonia blackburni*) and Hawaiian Upland Damselfly (*Megalagrion hawaiiense)* (USARHAW and 25th ID [L] 2001a). In surveys of DMR conducted in 1995, staff from the HINHP detected three nonnative invertebrates: cannibal snail, two-spotted leafhopper (*Sophonia rufofascia*), and Louisiana crayfish (*Procambarus clarki*). The black twig borer (*Xylosandrus compactus*) is suspected to occur on DMR, based on the presence of host species, but has not yet been observed.

Humans have purposely or accidentally introduced these nonnative species to Oahu. The cannibal snail now threatens the native snail species through competition for resources and predation, as well as by the spread of disease.

Amphibians. There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians with the potential to occur at DMR include the green and black poison-dart frog, bullfrog, wrinkled frog, giant toad, and Cuban tree frog (USARHAW and 25th ID [L] 2001a). These species were introduced into Oahu from other countries and have inhabited areas of adequate aquatic habitat and surrounding vegetation.

Reptiles. The Hawaiian Islands have no native terrestrial reptiles. Nonnative reptiles with the potential to occur at DMR include the green anole, mourning gecko, stump-toed gecko, tree gecko, Indo-Pacific gecko, house gecko, metallic skink, and gold dust day gecko (USARHAW and 25th ID [L] 2001a).

Terrestrial Mammals. The following nonnative species may occur on DMR: feral pig, feral cat, feral dog, Norway rat, black rat, Polynesian rat, and house mouse.

Birds. The following indigenous forest bird species have been recorded on DMR: Hawaiian duck (*Anas wyvilliana*), Hawaiian coot (*Fulica alai*), Hawaiian goose (*Branta sandwicensis*), and Hawaiian moorhen (*Gallinula chloropus sandvicensis*). The pueo (*Asio flammeus sandwichensis*) is believed to occur on DMR, based on the presence of adequate habitat and prey. Several nonnative bird species are believed to occur in DMR (USAG-HI 2004).

Fish. There are no documented studies of fish in DMR streams (USARHAW and 25th ID [L] 2001a).

Marine Biological Resources. Because DMR is adjacent to a small segment of beachfront, a portion of the DMR ROI is extended to include this portion of the coast and the near-shore waters adjacent to the coast in order to address potential impacts on marine biological resources. This area is outside the Hawaiian Islands Humpback Whale National Marine Sanctuary waters. The sanctuary does encompass marine waters in north Oahu near, but not adjacent to, the Dillingham ROI.

There are no coral reef "hot spots" in the DMR ROI; that is, no specific coral reef areas of management concern (CRAMP 2003). There are, however, coral reefs in the coastal waters of the DMR ROI within 0.5 mile of the shoreline. Marine wildlife does occur in the coastal and marine portion of the DMR ROI. The adjacent beachfront/coastline area of DMR may provide shore habitat for some marine wildlife, such as sea turtles or monk seals.

Distribution and abundance of marine mammals and sea turtles in Pacific waters vary seasonally and spatially; that is, the numbers and types of animals may vary in the near-shore versus the offshore regions, as well as by the time of year (Calambokidis et al. 1997; Leatherwood et al. 1982; Mobley et al. 1999, 2000; NOAA 2000a to 2000bb). All marine mammal species are protected under the MMPA regardless of their status under the ESA. Informal consultation with NOAA Fisheries has been initiated for marine mammals in the DMR ROI. Both MMPA and ESA protected marine wildlife species may occur in the DMR ROI seasonally, permanently, or as transients.

The natural history of marine mammals, as well as specific documented locations either in or near the DMR ROI (if known), are described in Appendix I-1 of USAG-HI 2004. As marine mammals are mobile and rapid movers, if they have been documented near the DMR ROI (within 2 to 5 nautical miles), they are assumed to occur in the ROI. Most marine mammals are not expected to occur in the DMR ROI, with the exception of the humpback whale and several dolphin species.

Threatened and Endangered Species/Sensitive Habitats

Sensitive Plant Species. The rare plants found on DMR outside of the ROI include federal species of concern, candidates for federal listing, and state-ranked rare plants. Ahakea *(Bobea sandwicensis),* mao hau

hele *(Hibiscus brackenridgei* ssp. *Mokuleianu),* Kokio ula *(H. kokio* spp. *Kokio),* and Maolioli (*Schiedea kealiae)* are all sensitive species with the potential to occur within the ROI. The remaining native ecosystems near or adjacent to the ROI have low densities of native species and are fragmented and disturbed. A 1977 survey found unique populations of Lonomea and 'ohe makai *(Reynoldsia sandwicensis)* near the base of the cliffs. Though not endangered, these species are rare and represent the only example of closed-canopy *Sapindus oahuensis* forest known in the world (USARHAW and 25th ID [L] 2004).

Sensitive Wildlife Species. The following discussion includes a profile of sensitive wildlife species considered likely to be found in the project area. The first extensive zoological surveys of DMR were conducted in 1976 and 1977 (Shallenberger and Vaughn 1978). More recent studies were conducted in 1995 by HINHP, in search of rare and sensitive species on DMR, and by Army Natural Resource Staff in 2000 and 2001. The latest USFWS and HINHP survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources.

3.1.9.3 Kahuku Training Area / Kawailoa Training Area

Vegetation Community Descriptions

KTA, which encompasses 8,528 acres, is at the end of the Koolau Mountains, on the northern tip of Oahu. Private, agricultural, and additional Army training lands border it. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP surveys in 1989, 1993, and 1994 provided the foundation for much of the botanical information used in this EIS.

KLOA is north of SBER and south of KTA in the Koolau Mountains. It consists of 23,348 acres. KLOA was surveyed in 1976 and 1977 by the Environmental Impact Study Corporation and later by HINHP (1989 to 1993). Additional botanical and zoological information was collected on KLOA and adjacent land. Kawailoa is an area of incredible biological richness, with areas of significance for protecting and managing these resources.

Native natural community types within the KTA/KLOA ROI fall into six general categories: montane wet, lowland wet, lowland forest, lowland moist, lowland dry, and intermittent aquatic natural communities (USARHAW and 25th ID [L] 2001a).

There are three community types within the montane wet communities. The mixed fern/shrub community is a fairly restricted community in the topmost reaches of the Koolau Mountains (USARHAW and 25th ID [L] 2001a). Common shrub species include *Hedyotis* spp., ohia (*Metrosideros polymorpha),* ohelo *(Vaccinium* spp.*),* and kopiko *(Psychotria* spp.*).* The ohia mixed bog community is also restricted to the upper elevations (above 2,800 feet) of the Koolau Mountains. Ohia is the dominant species, whether in its dwarf form in open shrubland or as dense shrub thicket. This community is critically imperiled. Ohia shrubland falls between 2,400 and 2,800 feet. Dwarfed native trees and shrubs thrive here.

The lowland wet community type in KTA is ohia shrubland. It is found between 1,640 and 2,000 feet. Dwarf native tree and shrub species thrive here. The native ohia forest is within the lowland forest zone. The general conditions are warm, moist to wet, and wind-sheltered in this area below the Koolau summit (1,900 to 2,000 feet). In addition to the dominant ohia, other common tree species include manono *(Hedyotis terminalis),* mehame *(Antidesma platyphyllum),* and kolea *(Myrsine* spp).

Also within the lowland forest zone is the uluhe shrubland, which is widespread on many of the Hawaiian Islands, usually in wet lowland areas below 2,200 feet. The dominant plants in this community include two ferns: uluhe *(Dicranopteris linearis)* and uluhe lau nui *(Diplopterygium pinnatum)*.

The KTA/KLOA ROI contains two lowland moist communities. Koa/Ohia forest is below 2,100 feet and in leeward areas of good drainage; the koa *(Acacia koa)* and ohia are dominant. Ohia lowland mesic forest is an additional community dominated by ohia. Ohia makes up about 70 percent of the canopy layer, but many other native plants are included in the community.

Lama forest is the only lowland dry community type in the KTA/KLOA ROI. It is confined to cliffs and harsh aa lava flows in the Hawaiian Islands. KTA has small stands of this community type between 600 and 900 feet. The canopy is dominated by *Diaspyros sandwicensis,* though other native trees are common.

Wetlands

No wetlands have been identified at KTA. The Lehua Makanoe Bog along the summit of the Koolau Mountains is the only possible wetland known on KLOA. It contains both bog-specific plant species and other rainforest Hawaiian species, and contains a number of rare and endangered plant species. The Army has fenced the area to protect it. Riverine and palustrine wetlands may be associated with stream drainages.

Noxious Weeds

Much of the lower-lying vegetation of the KTA/KLOA ROI is composed of invasive plants. Several of these widespread species create dense single-species stands (Christmas berry, ironwood, strawberry guava) that shade out understory species. Two of the plants recently discovered in the ROI that are potentially devastating to the native communities of KTA are manuka *(Leptospermum scoparium)* and moho. Disturbed moist forests are most at risk from these invasions, and efforts are needed to protect the native communities within these boundaries.

Invasive and noxious weeds that are proposed for control in the KTA/KLOA ROI include *Acacia confusa,* hamakua pamakani *(Ageratina riparia), Aleurites moluccana,* broomsedge *(Andropogon virginicus),* Oriental vessel fern, shoebutton *(Ardisia elliptica),* pink fringe *(Arthrostema ciliatum),* daisy fleabane *(Erigeron karvinskianus),* Kahili ginger *(Hedychium gardnerianum),* heirba del solado *(Melochia umbellata),* fountain grass, and Chinese violet (*Asystasia gangetica).* Widespread weed species would be controlled where they threaten native plants and communities. Current control methods have focused on palm grass *(Setaria palmifolia),* strawberry guava, princess flower *(Tibouchina urvilleana),* manuka, teatree *(Leptospermum flavescens),* and holly *(Ilex cassine).*

Wildlife

Most of the wildlife species inhabiting the landscape that makes up the KTA/KLOA ROI are nonnative. The Army has been conducting regular zoological field surveys on KTA and KLOA that have focused on special status invertebrates, mammals, and birds. There have been no specific reptile or amphibian surveys on KTA due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys conducted by the University of Hawaii, Bishop Museum Hawaiian Heritage Program, and the HINHP (1994a,b) are cited in the following section. These natural resource surveys have been used for the resource assessments in the *Biological Inventory and Management Assessment at KTA for USARHAW*

(HINHP 1994a,b), *Biological Inventory and Management Assessment at KLOA for USARHAW* (HINHP 1994a,b), *Endangered Species Management Plan Report, Oahu Training Areas* (R. M. Towill Corp. 1997a), as well as the more recent *Oahu Training Areas INRMP* (USARHAW and 25th ID [L] 2001a). Zoological information on Drum Road is less extensive because there are few known surveys focused on wildlife in these areas. Information on this section was gathered in association with the environmental as-

sessment for improvements to Drum Road (USARHAW 2005). The following sections describe the general presence of invertebrate, mammal, bird, and fish species.

Invertebrates. The following are native snails observed in the ROI: Oahu tree snails (*Achatinella curta, A. dimorpha, A. sowerbyana,* and *A. livida),* achatinellid land snails (*Auriculella perpusilla, A. pulchra,* and *Tornatellides* spp.*),* and the subulinid land snail *(Lamellidea* spp.*)* (R. M. Towill Corp. 1997b). Other native invertebrates known to KTA include springtails *(Entomobyra* spp. and *Seira* spp.*),* flies *(Camsicnemus ornatus, Drosophilia suzukii* group spp., *Forcipomyia hardyi, F. kaneohe, Limonia hawaiiensis, L. jacoba, L. perkinsi, L. stygipennis, Orthocladius* spp., and *Scaptomyza* spp.*),* and three species of true bugs *(Hyalopeplus pellucidus, Microvelia vagans*, and *Nabis kerasphoros)* (USARHAW and 25th ID [L] 2001a). Also observed on KTA were four native species of butterflies and moths *(Hyposmocoma* spp. undetermined, *Mestolobes minuscula, Schrankia* spp., and *Scotorythra rara);* native planthoppers *(Trioza* spp.*);* bees, wasps, and ants *(Enicospilus* spp.*);* and an undetermined member of the *Eucoilidae* family. There are three native species of dragonflies and damselflies found on KTA *(Anax strenuus, Megalagrion koelense,* and *Neogonia blackburni).* The common stream shrimp *(Atyoida bisulcata)* and freshwater sponge *(Heteromyenia bailleyi)* are native aquatic invertebrates that occur on KTA (R. M. Towill Corp. 1997a; USARHAW and 25th ID [L] 2001a). Additional native invertebrate species known to KLOA include the Oahu tree snails *A. livida* and *A. pulcherima.* Zoological surveys of KTA have detected several nonnative invertebrates (USAG-HI 2004). Humans have purposely or accidentally introduced these species to Oahu. They now threaten the native invertebrate species through competition for resources, predation, and the spread of disease. The cannibal snail is especially destructive to the native snail population on which it preys.

Amphibians. There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians found on Oahu, and potentially on KTA/KLOA, are the bullfrog, wrinkled frog, giant toad, Cuban tree frog, and green and black poison-dart frogs. These species were introduced into Oahu from other countries and have inhabited areas of adequate aquatic habitat and surrounding vegetation.

Reptiles. There are no native terrestrial reptiles on the Hawaiian Islands. Nonnative reptiles found on Oahu include the green anole, mourning gecko, stump-toed gecko, tree gecko, Indo-Pacific gecko, house gecko, metallic skink, and gold dust day gecko. There is only one known terrestrial snake occurring on the Hawaiian Islands, the island blind snake.

Terrestrial Mammals. The following nonnative mammals may occur on KTA: feral pig, Indian mongoose *(Herpestes auropunctatus),* feral dog, Norway rat, black rat, Polynesian rat, and house mouse.

Birds. The following indigenous forest bird species have been recorded on KTA: Oahu elepaio, Oahu amakihi *(Loxops virens chloris),* great frigatebird *(Fregata minor palmerstoni),* Pacific golden-plover, and the Hawaiian short-eared owl. Several nonnative bird species have been recorded on KTA and KLOA (USAG-HI 2004).

Fish. The aquatic natural communities in the KTA/KLOA ROI are mostly intermittent streams. Malaekahana Stream is not intermittent, but it goes underground before reaching the ocean. HINHP conducted biological assessments of selected streams in 1997, and the USGS collects data from stream gages at Opaeula and Kamananui streams. Fish identified as part of the Anahulu River, Waimea River, and Paukauila Stream survey include endemic gobies (*Awaous guamensis, Lentipes concolor,* and *Stenogobius hawaiiensis),* Sandwich Island sleeper *(Eleotris sandwichensis),* Hawaiian flagtail *(Kuhlia sandvicensi),* and oopu nopili *(Sicyopterus stimpsoni)* (AECOS 2002; USARHAW and 25th ID [L] 2001a). One introduced fish, *Geotomus,* was observed at Paumalū Stream (USARHAW and 25th ID [L] 2001a).

Threatened and Endangered Species/Sensitive Habitats

Sensitive Plant Species. KTA and KLOA support 20 species of endangered plants, six species of concern, and ten candidate species for federal listing. Sensitive plants listed as occurring within the training area include Akoko (*Chamaesyce rockii),* numerous species of haha *(Cyanea acuminate, C. humboldtiana, C .lanceolata, C .st.johnii,C. koolauensis),Cyanea Crispa* (no common name), Haiwale *(Cyrtandra dentate and C. viridiflora), Doodia lyonii* (no common name), nioi *(Eugenia koolauensis),* heau (*Exocarpus gaudichaudii),* kamapua'a *(Hedyotis fluviatilis), Hesperomannia arborescens* (no common name),, *Kokio ula,* 'ohe *(Joinvillea ascendens* ssp. *Ascendens), Lobelia gaudichaudii* ssp. *Koolauensis* (no common name), panaunau *(L. hypoleuca),* alani *(Melicope hiiakae and M. lydgatei), ,* kolea *(Myrsine fosbergii and M. judii),* keahi *(Nesoluma polynesicum),* wawaeiole *(Huperzia nutans), Phyllostegia hirsute* (no common name), pilo kea *(Platydesma cornuta* var. *cornuta),* Oahu wild coffee (kopiko) *(Psychotria hexandra* ssp. *Oahuensis), Pteris lydgatei* (no common name), *Sanicula purpurea* (no common name), *Stenogyne kaakae* ssp. *Sherfii* (no common name), 'ohe 'ohe *(Tetraplasandra gymnocarpa),* Boyd's maiden fern *(Thelypteris boydiae),* kaulu *(Pteralyxia macrocarpa), Viola oahuensis (no common name),* nanu,, oha *(Delissea subcordata),* and ae *(Zanthoxylum oahuense).* Although the native vegetation on Oahu's central plateau has been almost completely replaced by agriculture, the KTA/KLOA ROI hosts a very important cache of endangered species and natural communities. The terrain is characterized by deep gulches and high cliffs covered with dense vegetation. (USAG-HI 2004).

Sensitive Wildlife Species. The following discussion includes a profile of only those sensitive wildlife species that are considered likely to be found in the project area. This information is based heavily on information from the Oahu INRMP (USARHAW and 25th ID [L] 2001a), Endangered Speceis Management Plant Report (ESMPR) (R.M. Towill Corp. 1997a), and the biological inventories of KTA and KLOA (HINHP 1994b) and relevant biological opinions. HINHP biologists and qualified individuals conducted surveys of KTA in 1993 and 1994. Shallenberger conducted special status species surveys of Oahu training areas, including KTA, in 1977. The latest USFWS and survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources. Sensitive species are most likely to occur in the higher elevations in the Koolau Mountains and are unlikely to occur in the disturbed lowland areas that make up a large portion of the ROI. Nine federally listed endangered species and five species globally or locally threatened have been recorded in KTA or its vicinity (R.M. Towill Corp. 1997b). This includes eight invertebrates, and five birds (USARHAW and 25th ID [L] 2001a).

Ecologically Sensitive Areas. There are two areas on KTA that have been determined by elevation, topography, and prevailing ecological conditions to be ecologically sensitive. They contain vegetation communities that are considered rare or threatened. The wet summit crest zone is considered sensitive and exists in areas above 1,640 feet along the northern Koolau summit. The relatively gentle ridges are cut by steep-sided gulches in this cool, wet, cloud-swept region. The vegetation community in this part of the ROI is almost exclusively ohia lowland wet shrubland; this community is not considered rare and has a Global Heritage ranking of G3. Loulu hiwa lowland wet forest had been labeled a rare natural community (Global Heritage ranking of G1) and occurs in one steep-sided drainage area within the ROI. An additional rare natural community known in this area is ohia mixed montane bog, which has a Global Heritage ranking of G1. The second sensitive area is the lowland forest zone. It exists from ridge tops to gulch bottoms at elevations of 590 to 2,200 feet. This area is generally less windy, with conditions being warmer, and moisture ranges from moist to wet as rainfall diminishes increasingly with distance from the summit. Ohia lowland wet forests are present in higher elevations, with gradation to koa/ohia lowland moist forest. Adjacent areas are generally mosaics of moist forest types, with somewhat diverse canopy constituents, though they are generally dominated by ohia. The drier zones are moist to dry shrublands dominated by *Dodonea viscosa* (aalii). The steeper slopes at this elevation are dominated by uluhe *(Dicranopteris)* lowland wet shrubland. These natural communities represent relatively widespread vegetation types that occur on most of the main islands; none is considered rare (Global Heritage rankings of G3 and G4). There

is one aquatic natural community (Malaekahana Stream) on KTA with a vegetation community rank of G4.

Biologically Significant Areas. The Hawaii Natural Heritage Program has defined three types of BSAs for managing important natural communities. Approximately 1,000 acres of the KTA/KLOA ROI in KLOA are designated as BSA 1. This includes much of the wet summit crest ecological zone and the two rare natural communities. Twenty-six of the 28 endangered plant species at KLOA are in this area. There are five BSA 2 areas in KTA, three of which are in the northern portion of the training area and contain populations of nioi. At the southern tip of KTA is a BSA 2 that includes in its vegetative community populations of the federally listed as endangered nanu, haha, and *Hesperomannia arborescens* (no common name). In the northwest portion of KTA is an additional BSA 2 that harbors the endangered tree Koolau Range ohe as well as nanu. An additional BSA 2 zone within the ROI is composed mostly of potential habitat for the endangered land snail, *Achatinella.* This area covers the entire remaining wet summit crest zone that was not included in BSA 1. The following endangered plant species are known to occur in this region: nioi, Cyanea crispa oha, nanu, wawaeiole, alani (*Melicope lydgatei*), *kolea (Myrsine judii), Phyllostegia hirsute,* and *Viola oahuensis.* KTA's BSA 3 area is large and continuous and adjoins all but one of the BSA 2 areas. The dominant vegetation types are ohia lowland wet forest and uluhe lowland wet shrubland, which are potential habitats for endangered tree snails and native forest birds. As of 1997, seven plants in the BSA 3 region were upgraded to federal status, and it is possible that boundaries have been revised. Although there are no rare communities in the BSA 3, the forests in these locations are native dominated and provide potential habitat for species reintroduction. Sensitive snail habitat is also found within the ROI. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on Oahu.

3.1.9.4 Pohakuloa Training Area

Vegetation Community Descriptions

PTA is on the Island of Hawaii on the west side of Humuula Saddle, a plateau formed by Mauna Kea and Mauna Loa. The surrounding lands are mostly designated as conservation district and are managed or leased by a variety of private landowners and the State of Hawaii. Approximately 38 percent of the plants found on PTA are indigenous or endemic, and thousands of hours have been spent collecting information on their location and distribution.

There are 24 vegetation communities on PTA (Shaw and Castillo 1997). Numerous introduced plant species make up a significant portion of many of these habitats, and introduced plants are components in all habitats on PTA. About 62 percent of the plants found at PTA are introduced species. Barren lava covers 25 percent of the installation. Lichens, such as *Stereocoulon vulcani,* and ferns, such as *Pella ternifolia,* are the first colonizers of these flows, though fountain grass is invading barren areas.

There are four types of *Metrosideros* treeland, ranging from sparse to mixed intermediate. The dominant canopy vegetation in these areas is generally ohia. There are three types of *Dodonaea* shrubland: open, dense, and mixed. Aalii *(Dodonaea viscosa)* is the dominant plant in each community, along with other native species, including ilima *(Sida fallax),* aheahea *(Chenopodium oahuense),* and naio. *Leptecophylla* occurs either as a mixed shrubland community or as a component of *Leptecophylla-Dodonaea* shrubland. *Chamaesyce* treeland is generally found hosting native species of *Chamaesyce olowaluana* (a species of concern), ilima, aheahea, and aalii. *Chenopodium* shrubland and *Eragrostis aptopioides* grassland are similar communities with different dominant species. The remainder of the native natural communities is a combination of *Chamaesyce, Myoporum,* and *Sophora* species, with divisions based on the densities of species.

Adjacent to the northwest corner of PTA is the 22,675-acre WPAA (Keamuku Parcel). The plant communities are similar to those within PTA and include native and nonnative dominated shrublands and drainages of varying density and composition. Fountain grass is the dominant member of several grassland communities that can include a proportion of native shrubs, herbs, and trees. The highly disturbed communities are identified as *Eucalyptus* woodlots, nonnative forb lands, and pastureland, all of which contain native plants scattered throughout the area.

Wetlands

No wetlands have been identified at PTA.

Noxious Weeds

PTA has federal and state listed noxious weeds. Though kikuyu grass *(Pennisetum clandestinum)* is included in this category, it is exceptional at PTA and is not invasive at high-elevation dry ecosystems (Gleason 2003; Shaw and Castillo 1997). Invasive and noxious weeds that are targeted for control on PTA include banana poka *(Passiflora mollissima),* fountain grass, fireweed *(Senecio madagascarensis),* and Russian thistle *(Salsola kali).* Other widespread weed species are controlled where they threaten native plants and communities.

Wildlife

Zoological field surveys that have been conducted on PTA include those by Shallenberger (1977), David (1995), and Freed (1991). More recent surveys targeting native rare invertebrates, mammals, and birds were also conducted (Gon et al. 1993; HINHP 1998; USARHAW and 25th ID [L] 2001b), as were entomology surveys of the PTA lava tubes (Garcia and Associates 2003). There have been no specific reptile surveys on PTA because there are no native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys of PTA were conducted by the University of Hawaii, the Bishop Museum Hawaiian Heritage Program, and the HINHP, which are cited in the following section. These natural resource surveys have been used for the resource assessments in the *Biological Inventory and Management Assessment on the PTA for USARHAW* (HINHP 1994a), as well as the PTA INRMP (USARHAW and 25th ID [L] 2001b). The following section describes the general presence of invertebrate, mammal, bird, and fish species.

Invertebrates. Native and endemic invertebrates on PTA include the Hawaiian helicoverpa moth (*Helicoverpa confusa)* and the Giffards rhyncogonus weevil (*Rhyncogonus giffardi*). Snails documented at PTA are *Letachatina* spp., *Euconulus gaetanoi*, *Nesopupa subcentralis*, *Nesovitrea hawaiiensis*, *Striatura* spp., and *Vitrina tenella.* The helicarionid land snail *(Philonesia* spp.*)* and succineid land snail *(Succinea konaensis)* were also observed on PTA (HINHP 1994b; R. M. Towill Corp. 1997a; USARHAW and 25th ID [L] 2001b). Three endemic caterpillar species, *Schrankia* sp., were noted during recent surveys for native invertebrates at PTA lava tubes (Garcia and Associates 2003). Surveys of PTA by HINHP in 1993 detected the following nonnative snails: giant African snail, bradybaenid land snail, cannibal snail, and the zonitid land snail. Humans have purposely or accidentally introduced these species to the Island of Hawaii. They now threaten the native snail species through competition for resources, predation, and the spread of disease (PCSU 1999).

Amphibians. There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians found on the Island of Hawaii include bullfrog, wrinkled frog, coqui frog, giant toad, and Cuban tree frog. These species were introduced into Hawaii from other countries and have inhabited areas of adequate aquatic habitat and surrounding vegetation. While these species have not been documented in PTA, they could occur in the general PTA ROI, which includes the proposed PTA Trail.

Reptiles. There are no native terrestrial reptiles on the Hawaiian Islands. Nonnative reptiles found on the Island of Hawaii include the green anole, mourning gecko, stump-toed gecko, tree gecko, Indo-Pacific gecko, house gecko, metallic skink, and gold dust day gecko. The only known terrestrial snake occurring on the Hawaiian Islands is the island blind snake. While these species have not been documented in PTA, they could occur in the general PTA ROI, which includes the proposed PTA Trail.

Terrestrial Mammals. The following nonnative species have been documented as occurring on PTA: feral pig, feral goat, feral cat, feral dog, Norway rat, black rat, feral sheep *(Ovis aries)*, mouflon sheep *(O. musimon)*, mongoose *(Herpestes auropunctatus)*, and house mouse. The Polynesian rat may occur in the ROI. Cows *(Bos taurus)* presently graze in the Keamuku Parcel.

Birds. Endemic species fairly common to PTA are apapane and Hawaiian amakihi. Endemic species with declining populations less common to but identified on PTA are iiwi, and omao *(Myadestes obscurus)* (USARHAW and 25th ID [L] 2001b). The dark-rumped petrel *(Pterodroma phaeopygia sandwichensis)* is a federally listed endangered species known to occur on PTA. A survey is planned to determine presence of the dark-rumped petrel. The elepaio, is native, but only two individuals are known at PTA. The Io (*Buteo solitarius*) and Nene (*Branta sandvicensis)* are also both occassionally observed on PTA. Nonnative bird species known to occur on PTA include lavender waxbill (*Estrilda caerulescens*), Erchel's francolin *(Francolinus erckelii)*, black francolin *(F. francolinus)*, California quail *(Callipepla californica)*, and Japanese quail *(Coturnix japonica)*. The house finch *(Carpodacus mexianus)* and Eurasian sparrow *(Paser domesticus)* are also species that have been introduced by humans on the Island of Hawaii.

Fish. No natural aquatic systems occur on PTA (USARHAW and 25th ID [L] 2001b). Although Waiulaula Gulch and Makeahua Stream cross the proposed PTA Trail alignment, no fish data are available for the PTA ROI.

Marine Biological Resources. The near-shore and offshore Pacific waters between Oahu and the Island of Hawaii, the Pearl Harbor area of Oahu, the Kawaihae Harbor area of the Island of Hawaii, and coastlines adjacent to the harbors are included in the PTA ROI. Some of the transit areas for the vessels between the two islands are within or in close proximity to the Hawaiian Islands Humpback Whale National Marine Sanctuary waters. Designated sanctuary waters surround the entire western portion of the Island of Hawaii and include waters just outside and surrounding Kawaihae Harbor. Designated sanctuary waters also occur outside of Oahu at Penguin Banks, which would be part of the transit route for crew-transporting vessels. Any adjacent coastline areas in the ROI may provide shore habitat for some marine wildlife, such as sea turtles and monk seals. There is a coral reef area of management concern (known as a "hot spot") in the PTA ROI. Located at Kawaihae Harbor, this reef is identified as at risk both from extensive development at the commercial harbor and from recent and continued development at the small boat harbor. While the main issue affecting this reef is harbor construction, other causes of decline for this reef system include interruption of long-shore transport due to harbor development, consequent siltation of Pelekane Bay, and close proximity to important cultural sites (i.e. Puu Kohola Heiau) that causes increased recreational use and human presence (Hawaii Coral Reef Assessment and Monitoring Program 2003). Any harbor construction impacts would be addressed in a separate NEPA document. In addition to this reef identified as a management concern, there are other coral reefs in the coastal waters of the PTA ROI. One that is well known is Puako reef, approximately 8 to 10 miles from Kawaihae Harbor. There are no coral reef areas of management concern outside Pearl Harbor on Oahu (Hawaii Coral Reef Assessment and Monitoring Program 2003). Marine wildlife occurs in the PTA ROI in both the near-shore and offshore regions of Pacific waters. The harbor areas and adjacent coastline areas also provide habitat for marine wildlife. Kawaihae Harbor is on the leeward side of the island, where waters are calmer and more protected. These waters provide good habitat for humpback mother and calf pods and for resting dolphin pods as well as sea turtles, potentially monk seals, and other marine wildlife.

Distributions and abundance of marine mammals and sea turtles in Pacific waters vary seasonally and spatially; that is, numbers and types of animals may vary in the near-shore versus offshore regions, as well as by the time of year (Calambokidis et al. 1997; Leatherwood et al. 1982; Mobley et al. 1999, 2000; NOAA 2000a through 2000bb). Many marine mammal species occur year-round in Pacific waters. All marine mammal species are protected under the MMPA, regardless of whether they have additional protection under the ESA. Informal consultation with NOAA Fisheries has been initiated for marine mammals in the SBCT ROI. Both MMPA and ESA protected marine wildlife species that may occur in the PTA ROI seasonally, permanently, or as transients, are detailed in USAG-HI 2004.

Threatened and Endangered Species/Sensitive Habitats

Sensitive Plant Species. The Army has funded botanical surveys on PTA since 1988, though other surveys date as far back as 1888 (USARHAW and 25th ID [L] 2001b). Approximately 38 percent of the plants found on PTA are indigenous or endemic. Endangered species, threatened species, and species of concern (all according to federal guidelines) are found on PTA.

Sensitive Wildlife Species. The following discussion includes an overview of the surveys conducted at PTA. This information is based primarily on information from the PTA INRMP (USARHAW and 25th ID [L] 2001b, R. M. Towill Corp. 1997a) and the 2003 BO for PTA (USFWS 2003b). Special species wildlife information was based on surveys conducted on PTA. In 1990, Dr. Freed conducted bird and mammal surveys at PTA (Freed 1991). Later surveys include David's two endangered and threatened species surveys conducted along designated palila critical habitat (David 1995), Cooper's studies of endangered seabirds and Hawaiian hoary bat (Cooper et al. 1996), and the HINHP's arthropod inventory (USGS 2001b). Annual avian surveys, with a focus on sensitive species, have been conducted on PTA since 1997 (HINHP 1998; Schnell et al. 1998; Schnell et al. 1999). The latest USFWS and survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources. Seventeen sensitive species (15 plant, 2 wildlife) have been determined to occur within the PTA ROI (USFWS 2003b). Critical habitat for the palila occurs in the northeast portion of PTA. Information regarding the locations of sensitive species on PTA is based on previous analyses of PTA natural resources (USARHAW and 25th ID [L] 2001b; R. M. Towill Corp. 1997a; HINHP 2002; USFWS 2003b). The majority of these species observations have been on the west and northwest of PTA where the BSAs are located (USAG-HI 2004).

3.1.10 AIR QUALITY

The Clean Air Act (CAA), adopted in 1970, and its amendments in 1977 and 1990, established programs and a permitting process designed to protect and improve air quality. Air quality regulations are published in 40 CFR, Sections 50 through 97 and Sections 1048 through 1068. As mandated by the CAA, USEPA has established maximum standards for carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead.

Although the federal standards apply to all states, individual states have also established their own air quality standards. Specific applicable standards are presented in the sections below that discuss specific state and local air quality issues.

Areas that meet the air quality standards for these pollutants are considered in "attainment," while areas with air concentrations that have exceeded these standards are considered in "non-attainment." Areas that have been reclassified from non-attainment to attainment may also be classified as "maintenance" to allow additional measures that are designed to prevent regressing back to a non-attainment status.

Federal clean air laws require areas with elevated levels of ozone, CO, NO_2, SO_2, and inhalable particulate matter (PM) to develop State Implementation Plans (SIPs) that describe how states would achieve the National Ambient Air Quality Standards (NAAQS). The NAAQS were established to protect human health and can be used to compare modeled net increases plus the ambient background concentrations.

Under the General Conformity provisions of CAA Section 176(c)(1), no federal agency can approve or undertake an action unless the action has been demonstrated to conform to the SIP prior to the action occurring. The conformity determination is a process that demonstrates how an action would conform to the SIP; it applies only in areas designated as non-attainment or maintenance for NAAQS. An action that produces emissions exceeding the General Conformity threshold or that are considered regionally significant is required to demonstrate conformity with the SIP through mitigation or other accepted practices.

Hawaii has established its own air quality agency for regulating emission sources of air pollutants. This agency has adopted federal rules and has established its own rules that are specific to attaining local air quality goals.

The ROI for air quality issues depends on the pollutant and emission sources under consideration. The ROI for a regional secondary pollutant, such as ozone, generally is island-wide. Secondary pollutants are not emitted directly but form through chemical reactions in the atmosphere. The directly emitted compounds that react to form secondary pollutants are called precursors. The time required for chemical reactions allows precursor emissions to be mixed over relatively large geographic areas before significant quantities of secondary pollutants are produced. Peak concentrations of secondary pollutants may occur some distance from the major sources of precursor emissions. The ROI for primary pollutants is the area potentially subject to measurable air quality impacts under unfavorable dispersion conditions.

Transport of primary pollutants away from the emission source is accompanied by dispersion and dilution, resulting in lower pollutant concentrations at greater distances from the emission source. In most cases, the ROI for primary pollutants will be an area extending no more than a few miles from the emission source. The ROI for low-magnitude emission sources may extend less than 1 mile from the source.

Air pollution levels in Hawaii are generally low due to the small size and isolated location of the state. This means that upwind areas do not contribute significant background pollution levels. The state's small size limits opportunities for locally generated air pollutants to accumulate or recirculate before being transported offshore and away from land areas. High concentrations of suspended particulate matter can occur in some areas, mostly due to agricultural burning or fireworks use during holiday celebrations. The entire state is classified as being in compliance with federal ambient air quality standards, and thus is generally designated as attainment.

3.1.10.1 Air Quality Standards

Hawaii has adopted ambient air quality standards that are in some areas more stringent than the comparable federal standards and addresses pollutants that are not covered by federal ambient air quality standards. The state ambient air quality standards are based primarily on health effects data but can reflect other considerations such as protection of crops, protection of materials, or avoidance of nuisance conditions (such as objectionable odors). Table 3-1 summarizes federal and state ambient air quality standards applicable in Hawaii.

Federal air quality management programs for hazardous air pollutants focus on setting emission limits for particular industrial processes rather than setting ambient exposure standards. Some states have established ambient exposure guidelines for various hazardous air pollutants and use those guidelines as part of the permit review process for industrial emission sources.

Hawaii has established significant ambient air concentration thresholds and criteria for hazardous air pollutants (Hawaii Administrative Rules Title 11 Chapter 60.1, Section 179). These are applied under the permit review process for emission sources that require state or federal air quality permits. These thresholds and criteria include the following:

Table 3-1 State and National Ambient Air Quality Standards Applicable in Hawaii

Pollutant	Averaging Times	State Standards	Federal Standards	Units
CO	1-hour	9	35	ppm
		10,000	40,000	µg/m³
	8-hour	4.4	9	ppm
		5,000	10,000	µg/m³
NO_2	Annual (Arith. Mean)	0.04	0.053	ppm
		70	100	µg/m³
SO_2	3-hour	0.5	0.5	ppm
		1,300	1,300	µg/m³
	24-hour	0.14	0.14	ppm
		365	365	µg/m³
	Annual (Arith. Mean)	0.03	0.03	ppm
		80	80	µg/m³
Ozone	1-hour	-	0.12	ppm
	8-hour	0.08	0.08	ppm
		157	157	µg/m³
PM_{10}	24-hour	150	150	µg/m³
	Annual (Arith. Mean)	50	Revoked	µg/m³
Lead	Quarterly Average	1.5	1.5	µg/m³
Hydrogen Sulfide	1-hour	0.025	-	ppm
		35	-	µg/m³
$PM_{2.5}$	24-hour	-	35	µg/m³
	Annual (Arith. Mean)	-	15	µg/m³

Source: Hawaii State Department of Health (HSDH) 2007
Notes:
All standards except the national PM10 and PM2.5 standards are based on measurements corrected to 25 degrees C and 1 atmosphere pressure.
The national PM10 and PM2.5 standards are based on direct flow volume data without correction to standard temperature and pressure.
The "10" in PM10 and the "2.5" in PM2.5 are not particle size limits; these numbers identify the particle size class (aerodynamic diameter in microns) collected with 50% mass efficiency by certified sampling equipment. The maximum particle size collected by PM10 samplers is about 50 microns. The maximum particle size collected by PM2.5 samplers is about 6 microns.
Ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

- For noncarcinogenic compounds, an 8-hour average concentration equal to 1 percent of the corresponding 8-hour threshold level value (TLV) value adopted by the Occupational Safety and Health Administration (OSHA);
- For noncarcinogenic compounds, an annual average concentration equal to 1/420 (0.238 percent) of the 8-hour TLV value adopted by OSHA;
- For noncarcinogenic compounds for which there is no OSHA-adopted TLV, the Director of Health is authorized to set ambient air concentration standards on a case-by-case basis so as to avoid unreasonable endangerment of public health with an adequate margin of safety; and

- For carcinogenic compounds, any ambient air concentration that produces an individual lifetime excess cancer risk of more than 10 in 1 million assuming continuous exposure for 70 years.

3.1.10.2 Clean Air Act Conformity

Because no areas of Hawaii are classified as nonattainment or maintenance areas, conformity analysis procedures do not apply to Army actions in Hawaii.

3.1.10.3 Existing Air Quality Conditions

Hawaii currently operates nine ambient air quality monitoring stations on Oahu, one station on Kauai, two stations on Maui, and five stations on the Island of Hawaii. All of the monitoring stations are in coastal regions, and many are in or near urban areas. None of the monitoring stations is sited at or near Army training areas. The monitoring stations on Maui are located to monitor the air quality impacts of sugarcane burning. The SO_2 monitoring stations on the Island of Hawaii have been located primarily to monitor the impacts of emissions from volcanic eruptions and geothermal development.

The monitoring data collected in recent years show that ambient air quality levels meet the associated state and federal ambient air quality standards.

For the years 2004 through 2006, PM_{10} and $PM_{2.5}$ concentrations at Pearl City have exceeded the state or federal 24-hour standards for 1 or 2 days per year. These episodes represent a violation of the state 24-hour PM_{10} standard but did not constitute a violation of the federal 24-hour PM_{10} standard.

3.1.10.4 Climate and Meteorology Conditions

The most prominent feature of the circulation of air across the tropical Pacific is the persistent trade wind flow in a general east-to-west direction. The trade winds blow across Hawaii primarily from the northeast quadrant throughout the year, with the windiest months being from May through September. In addition to the trade winds, wind patterns are influenced by major storm systems and by topographic features that alter or channel prevailing wind directions. Topographic features have additional influences on local wind patterns in coastal areas, with upslope/downslope flow patterns often reinforcing sea breeze/land breeze patterns and exert a strong influence on rainfall amounts and also influence temperature patterns at higher elevations Local winds tend to move inland from the coast during midmorning to early evening periods, then reverse direction and flow offshore during night and early morning hours. The onshore sea breeze component tends to be stronger than the offshore land breeze component. Sea/land breeze patterns are most common on the south and west coasts of the Hawaiian Islands.

The combination of a dominant trade wind pattern and limited seasonal changes in the length of day and night combine to limit seasonal variations in weather conditions in Hawaii. Weather conditions in Hawaii show a two-season pattern, with a winter season of 7 months (October through April) and a summer season of 5 months (May through September). The summer months generally are warmer and drier than the winter months. Most major storms occur during the winter season. Seasonal variations in temperature conditions are mild at lower elevations, with daytime temperatures commonly between 75 and 85 degrees Fahrenheit (°F) and nighttime temperatures between 65 and 75°F.

3.1.10.5 Schofield Barracks Military Reservation/Wheeler Army Airfield

No air quality monitoring stations are close to the SBMP or SBER. The closest ambient air quality monitoring station is about 6 miles from SBMR at Pearl City. In recent years, the Pearl City monitoring station has reported a few instances in which PM_{10} levels exceeded the state 24-hour standard, but not the federal 24-hour standard. These instances of high PM_{10} levels have been attributed to fireworks use during New

Year celebrations. The instances of high PM_{10} levels at Pearl City are not representative of conditions at SBMR.

Existing emission sources at SBMR include:

- A small quarry with gravel processing equipment;
- Boiler systems in various buildings;
- Generator systems in various buildings for backup power;
- Two incinerators for document destruction;
- Personal and government vehicle traffic;
- Aircraft and helicopter flight operations;
- Warehousing and related equipment operations;
- Equipment maintenance activities;
- Ordnance firing and detonations during training exercises;
- Controlled burning of ranges to restrict vegetative fuel growth; and
- Unplanned wildfires.

The Army operates three automated weather stations at SBMR that are used for monitoring and predicting fire hazard conditions at the SBMR range areas. Weather data from these stations have not been fully summarized. Historical data from WAAF show that average daily minimum temperatures range from 60°F in January to 69°F in August. Average daily maximum temperatures range from 75°F in March to 83°F in September. Precipitation averages 37.9 inches per year, with monthly average precipitation ranging from 1.38 inches in July to 5.22 inches in December (WeatherDisc Associates 1990). Wind speeds recorded at SBMR generally are light. Wind speeds at the Main Post generally average between 1 and 7 miles per hour (mph); wind speeds at SBER generally average between 1 and 8 mph. Maximum wind speeds seldom exceed the 15 mph threshold commonly associated with wind erosion processes.

3.1.10.6 Dillingham Military Reservation

There are no air quality monitoring stations close to DMR. The closest air quality monitoring stations are on the south side of Oahu. Vehicle traffic and aircraft flight operations represent the major Army emission sources that are present intermittently at DMR. Live-fire training exercises are not conducted at DMR, but blank ammunition and ground-based smoke devices are used in other types of training exercises. Army use of the airfield at DMR is rather limited, accounting for about 3 percent of total annual flight operations. DMR sometimes is used as a refueling and rearming location for Army OH-58D helicopters during training operations at other installations (Fanscher 2003). Private aircraft are the dominant users of Dillingham Airfield.

There are no meteorological stations at DMR, but the Army has a remote weather station on the ridge between DMR and MMR. The Makua Ridge monitoring station is probably more representative of conditions at DMR than is the Army's monitoring station at KTA. Wind speeds recorded on the northeast shore of Oahu tend to be stronger than those that would occur at DMR. Maximum wind speeds exceed the 15 mph threshold commonly associated with wind erosion processes about 9 percent of the time.

3.1.10.7 Kahuku Training Area/Kawailoa Training Area

There are no air quality monitoring stations close to KTA or KLOA. The closest air quality monitoring stations are on the south side of Oahu. Vehicle traffic, aircraft flight operations (mostly helicopters), and training munitions represent the majority of Army emission sources that are present intermittently at KTA and KLOA. Vehicle operations at KLOA are very limited and consist primarily of vehicle traffic between Schofield Barracks and KTA or KLOA. Most training at KLOA involves dismounted troop maneuvers and helicopter activity.

The Army has a remote weather station at KTA. Data from that station are used primarily in a real-time context for fire management. Consequently, comprehensive data summaries are not available. Two years of data from the KTA station show an average hourly wind speed of 13.7 mph and a maximum hourly average wind speed of 34 mph. Hourly average wind speeds exceeded 9.9 mph 75 percent of the time. Hourly average wind speeds at KTA exceeded the 15 mph threshold commonly associated with wind erosion processes about 40 percent of the time.

3.1.10.8 Pohakuloa Training Area

There are no air quality monitoring stations close to PTA. The closest air quality monitoring stations are in Hilo and Kona. The monitoring station in Hilo collects data on sulfur dioxide and PM_{10} levels. The Kona monitoring station in Kealakekua currently collects data on sulfur dioxide levels; PM_{10} monitoring at this station was discontinued in June 2000. Military vehicles, aircraft flight operations (mostly helicopters), and ordnance use represent the major Army emission sources at PTA. A package rock crushing facility from SBMR is moved to PTA when needed. There is a full time rock crushing operation at PTA at the quarry in TA 13 that is producing large quantities of aggregate for Saddle Road Realignment Construction.

A rain gage at BAAF records precipitation data. Annual precipitation averages 16.9 inches per year, ranging from 1.6 inches in June to 4.4 inches in March (WeatherDisc Associates 1990). The Army operates four automated weather stations at PTA, one each in the eastern, southern, north-central, and western portions of PTA. Data from these stations are used in a real-time context for fire management purposes. Consequently, comprehensive data summaries from these stations are not available. Wind speed data from these stations have been evaluated to assist in evaluation of potential wind erosion conditions. Data from the eastern and western stations are most representative of conditions in areas where troop and vehicle maneuver activity occurs. Three years of data from the eastern station show an average hourly wind speed of 13 mph and a maximum hourly average wind speed of 33 mph. Hourly average wind speeds at the eastern station exceeded 8.2 mph 75 percent of the time and exceeded the 15 mph threshold commonly associated with wind erosion processes about 35 percent of the time. Three years of data from the western station show an average hourly wind speed of 8.4 mph and a maximum hourly average wind speed of 44 mph. Hourly average wind speeds at the western station exceeded 4.7 mph 75 percent of the time. The low-density silty soils common in the Keamuku Parcel are subject to wind erosion at lower wind speeds than most soils. Wind speeds on the western side of PTA exceed the likely wind erosion threshold of 12 mph about 15 percent of the time.

Although Hawaii is in a PM_{10} attainment area under the CAA, the Island of Hawaii and the surrounding land at PTA have experienced discrete events in which dust impacts have had adverse effects. PM_{10} emissions are important because they are easily airborne and are small enough to be inhaled deep into the lungs, creating potential adverse health effects. Because of the extremely small particle size of the soils found on Keamuku Parcel, the particles easily become airborne during high-wind events and other disturbances once vegetation has been removed. In July 1999, a severe dust storm resulted from wind blowing

over areas denuded of vegetation by a recent fire. The result was fugitive dust emissions at high enough levels to require temporary evacuation of residences at Waikii Ranch.

3.1.11 NOISE

Noise levels are commonly referenced as average A-weighted decibels (dBA) levels for stationary noise sources, or peak dBA levels for brief noise events and noise sources moving past a fixed point. Decibel (dB) scales are not linear. Apparent loudness doubles for every 10-dBA increase in noise level, regardless of the dBA values. Data have been compiled from various published sources, noise monitoring studies, and noise modeling analyses.

Although the A-weighting scale is the most widely used decibel weighting procedure, other weighting scales have been developed. The C-weighted scale and unweighted decibel values are commonly used for blast noise, sonic booms, or other low-frequency sounds capable of inducing vibrations in buildings or other structures. In addition, evaluations of blast noise or sonic boom events sometimes use a peak overpressure measurement. The peak overpressure normally is an unweighted decibel measurement for the dominant octave band or ⅓ octave band component of a sound. In most cases, the specific octave or ⅓ octave band for the peak overpressure measurement is not reported. The peak overpressure level will be slightly lower than the corresponding composite unweighted decibel measurement.

Varying noise levels often are described in terms of the equivalent constant decibel level. Equivalent noise levels (L_{eq}) are not a simple averaging of decibel values, but are based on the cumulative acoustical energy associated with the component decibel values. L_{eq} values sometimes are referred to as energy-averaged noise levels. Because of the calculation procedure, high dB events contribute more to the L_{eq} value than do low dB events. L_{eq} values are used to develop single-value descriptions of average noise exposure over various periods of time. Such average noise exposure ratings often include additional weighting factors for potential annoyance due to time of day or other considerations. The L_{eq} data used for these average noise exposure descriptors generally are based on A-weighted sound level measurements.

Average noise exposure over a 24-hour period often is presented as a day-night average sound level (L_{dn}). L_{dn} values are calculated from hourly L_{eq} values, with the L_{eq} values for the nighttime period (10 PM to 7 AM) increased by 10 dB to reflect the greater disturbance potential from nighttime noises. Because of the time period weighting, an L_{dn} value will be 6.4 dB greater than the corresponding 24-hour L_{eq} value for a constant noise level. For most real noise conditions, the corresponding L_{dn} and 24-hour L_{eq} values will differ by less than this.

Discrete noise events sometimes are characterized using the sound exposure level (SEL) descriptor. The SEL measure represents the cumulative (not average) sound exposure during a particular noise event, integrated with respect to a 1-second timeframe. SEL measurements are equivalent to the L_{eq} value of a 1-second noise event producing the same cumulative acoustic energy as the actual noise event being analyzed. In effect, an SEL measure "spreads" or "compresses" the noise event to fit a fixed 1-second time interval. If the actual duration of the noise event is less than 1 second, the SEL value will be less than the L_{eq} value for the event. If the duration of the noise event exceeds 1 second, the SEL value will exceed the L_{eq} of the event. SEL values can be computed using any decibel-weighting scheme (Table 3-2).

The ROI for noise sources depends on the intensity of noise generation. For most common noise sources, the ROI will be limited to areas within ½ mile of the noise source. High-intensity noise sources, such as ordnance detonations, may have an ROI extending several miles from the noise source.

Sound is caused by vibrations that generate waves of minute air pressure fluctuations in the surrounding air. Sound levels are typically measured using a logarithmic dB scale. Measurements and descriptions of sounds are usually based on various combinations of the following factors:

- The vibration frequency characteristics of the sound, measured as sound wave cycles per second (Hertz [Hz]; this determines the "pitch" of a sound);
- The total sound energy being radiated by a source, usually reported as a sound power level;

Table 3-2 A-Weighted Decibel Values for Example Noise Sources

Characterization	dBA	Example Noise Source or Condition	Other Noise Examples
Threshold of pain	130	Surface detonation, 30 pounds of TNT at 1,000 feet	
Possible building damage	120	Mach 1.1 sonic boom under aircraft at 12,000 feet	Air raid siren at 50 feet; B-1 flyover at 200 feet
	115	F/A-18 aircraft takeoff with afterburner at 1,600 feet	Commercial fireworks (5 pound charge) at 1,500 feet
	110	Peak crowd noise, pro football game, open stadium	Peak noise at firing position of rifle range
	100	F/A-18 aircraft departure climb out at 2,400 feet	Jackhammer at 10 feet; B-52 flyover at 1,000 feet
Extremely noisy	95	Locomotive horn at 100 feet; 2-mile range, foghorn at 100 feet	Wood chipper processing tree branches at 30 feet
8-hour OSHA limit	90	Heavy truck, 35 mph at 20 feet; leaf blower at 5 feet	Person yelling at 5 feet; dog barking at 5 feet
Very noisy	85	Power lawn mower at 5 feet; city bus at 30 feet	Pneumatic wrench at 50 feet; jet ski at 20 feet
Noisy	75	Street sweeper at 30 feet; idling locomotive at 50 feet	Beach with medium wind and surf
	70	Auto, 35 mph at 20 feet; 300 feet from busy 6-lane freeway	Stream bank 10 feet from small/medium waterfall
Moderately noisy	65	Typical daytime busy downtown area conditions	Beach with light wind and surf; tree branches, light wind
	55	Typical daytime urban residential area away from major streets	Leaves, tall grass rustling in light/moderate wind
	50	Typical daytime suburban conditions	Open field, summer night, insects
Quiet	45	Typical rural area daytime conditions	
	40	Quiet suburban area at night	
Very quiet	30	Quiet rural area, winter night, no wind	Quiet bedroom at night, no air conditioner
	20	Empty recording studio	Barren area, no wind, water, insects, or animals
Barely audible	10	Audiometric testing booth	
Threshold of hearing	0		

- The actual air pressure changes experienced at a particular location, usually measured as a sound pressure level; the frequency characteristics and sound pressure level combine to determine the "loudness" of a sound at a particular location;
- The duration of a sound; and
- The changes in frequency characteristics or pressure levels through time.

Human hearing varies in sensitivity for different sound frequencies. The ear is most sensitive to sound frequencies between 800 and 8,000 Hz and is least sensitive to sound frequencies below 400 Hz or above 12,500 Hz. Consequently, several different frequency weighting schemes have been used to approximate the way the human ear responds to noise levels. The "A-weighted" decibel scale is the most widely used for this purpose, with different dB adjustment values specified for each octave or ⅓ octave interval. Table 3-2 summarizes typical dBA levels for various noise sources and noise conditions.

3.1.11.1 Department of Defense Noise Guidelines

The DoD began developing noise evaluation programs in the early 1970s. Initial program development involved the Air Installation Compatible Use Zone (AICUZ) program for military airfields. Early application of the AICUZ program emphasized Air Force and Navy airfields. The Army implemented the program as the Installation Compatible Use Zone (ICUZ) program by addressing both airfield noise issues and other major noise sources, such as weapons testing programs and firing ranges. Joint Air Force, Army, and Navy planning guidelines were issued in 1978 (DoD 1978). The 1978 guidelines use annual average L_{dn} values to categorize noise exposure conditions on military installations. The following three broad noise exposure zones are used as the basis for characterizing various land use compatibility conditions:

- Zone I—areas with Ldn levels below 65 dBA or 62 "C-weighted" decibel (dBC);
- Zone II—areas with Ldn levels of 65 to 75 dB or 62 to 70 dBC; and
- Zone III—areas with Ldn levels above 75 dB or 70 dBC.

The guidelines indicate that all land uses are compatible with Zone I noise levels. Educational, medical, and residential land uses generally are not compatible with Zone II noise levels unless special acoustic treatments and designs are used to ensure acceptable interior noise levels. Acoustical insulation also may be needed for administrative and office facilities located in Zone II areas. Residential, medical, and educational land uses are not compatible with Zone III noise levels. Industrial, manufacturing, and office land uses may be acceptable in Zone III areas if special building designs and other measures are implemented.

The Army has recently supplemented the original 1978 guidelines to develop a more comprehensive Environmental Noise Management Program (ENMP). The ENMP program incorporates ICUZ evaluations as one component of the program. Other components of the ENMP include programs for handling noise complaints and undertaking supplemental noise evaluations when warranted by the nature of discrete noise events. Criteria for evaluation of noise levels have been expanded beyond the normal A-weighted L_{dn} descriptor to include the use of C-weighted L_{dn} values to characterize major blast noise sources and the use of peak unweighted decibel values to characterize small arms firing (Table 3-3). While AR 200-1 identifies the peak unweighted dB value as the method for characterizing noise from small arms firing, A-weighted L_{dn} values often are used instead as the preferred method for assessing land use compatibility issues (Army 2002). USAG-HI will use the ENMP to explore the following:

- Improvements in land use compatibility adjacent and proximal to USAG-HI facilities;
- The feasibility of increasing acoustical insulation in structures or areas where noise sensitive receptors reside, specifically in areas that are or may become exposed to Zone III and Zone II noise conditions, giving priority to family and troop housing areas affected by Zone III conditions; and
- Ways to improve notification to surrounding communities about the scheduling and nature of nighttime training exercises, which are possible sources of complaints about noise and vehicle activity. While enhanced public information programs will not reduce actual noise levels, they can help reduce the frequency of noise complaints.

The Army Center for Health Promotion and Preventive Medicine (CHPPM) assists Army installations in developing environmental noise management plans. CHPPM also undertakes special noise studies to evaluate noise problems associated with various types of noise sources. When investigating noise conditions related to weapons firing or ordnance detonations, CHPPM typically measures peak unweighted decibel levels and/or C-weighted SEL levels. **Table 3-3** summarizes the noise criteria most often used by CHPPM when evaluating blast noise issues.

Table 3-3 CHPPM Blast Noise Assessment Criteria

Predicted Impulse Sound Level	Peak Unweighted dB Level C-Weighted SEL Value	Risk of Complaint	Recommended Action
Less than 115 dB	Lower than 90 dBC	low risk of complaint	No restrictions
115 to 130 dB	90 to 105 dBC	moderate risk of complaint	Postpone non-critical tests if possible
130 to 140 dB	105 to 115 dBC	high risk of complaints; possibility of damage	Postpone all but extremely important tests
Over 140 dB	Higher than 115 dBC	threshold for permanent hearing damage; high risk of physiological and structural damage claims	Postpone all explosive operations

Notes:
CHPPM normally uses peak unweighted dB measurements to investigate blast noise complaint issues. For rapid-fire test events with major weapons, noise level criteria should be reduced by 15 dB. C-weighted SEL values often are used to predict the potential for sleep disturbance.
Source: U.S. Army CHPPM 2001

3.1.11.2 State Regulations

Hawaii has adopted statewide noise standards that apply to fixed noise sources, construction equipment, and similar sources. The noise standards are phrased as property line noise limits and vary according to the zoning district of the impacted property. Separate noise standards have been established for non-impulse noise and impulse noise. All of the noise limits are specified as noise levels that can be exceeded no more than 10 percent of the time in any 20-minute period.

Available information on existing noise conditions at different Army installations is summarized in the appropriate section for each installation.

3.1.11.3 Schofield Barracks Military Reservation/Wheeler Army Airfield

The dominant noise sources at SBMR include military and personal vehicle traffic, small arms and heavy weapons firing, and helicopter flight activity. Noise from heavy weapons firing affects most of the SBMP. No live-fire training occurs in SBER, and there are no firing ranges or ordnance impact areas there. The 65-dBA L_{dn} contour around WAAF extends onto Leilehua Golf Course, but not into any residential area (U.S. Army Environmental Hygiene Agency [USAEHA] 1993b; US Army CHPPM 1999). Individual detonations from heavy weapons firing are readily audible in residential areas near the boundaries of the base. Noise from aircraft and helicopter flight activity at WAAF also affects on-post housing areas and residential areas beyond the base boundaries.

Noise zones are based on Army land use compatibility and CHPPM guidelines. These guidelines are used to determine the best locations for varying activities when planning expansion into areas currently not exposed to any noise levels. Zone I conditions (L_{dn} levels below 62 dBC) are considered compatible with all residential land use. Approximately 15 percent of the population would be annoyed with these levels. Zone II conditions (L_{dn} levels of 62 to 70 dBC) are considered normally unacceptable for noise-sensitive

land uses such as housing areas, educational facilities, and medical facilities. Approximately 15 to 39 percent of the population would be annoyed with these levels. Zone III conditions (L_{dn} levels over 70 dBC) are considered incompatible with residential and educational land uses. Forty percent or more of the population would be annoyed by these levels. Studies conducted by USEPA found that people living in noisy areas have acclimated to those noise levels and are less affected by the increased noise levels than people living in relatively quite locations.

Existing Noise Levels at Schofield Barracks Military Reservation

The existing noise contours in the 2004 Transformation EIS represent a weighted average of annual noise conditions, not a constant average noise level. Noise levels at any time can be significantly lower or somewhat higher than the values indicated by the noise contours because weighted average noise levels are disproportionately influenced by the loudest events. The L_{dn} noise contours incorporate a 10 dB penalty factor for nighttime noise. Approximately 10 percent of large ordnance item use occurs during nighttime hours (from 10:00 PM to 7:00 AM).

Noise contours representing existing noise levels indicate that Zone II conditions affect all but the easternmost portion of the cantonment area and Zone III conditions (with an L_{dn} above 70 dBC) affect the western edge of the cantonment area. Off-post residential areas in the Wahiawa, Mililani Mauka, and Mililani Town areas are considered Zone I areas and therefore not impacted by present ordnance firing noise conditions. Zone II noise conditions (L_{dn} levels of 62 to 70 dBC) encompass most of the cantonment area on the Main Post, reaching to the vicinity of Heard Avenue in the eastern portion of the cantonment area and extend off-post into undeveloped areas north and south of the cantonment area. Solomon Elementary School and Hale Kula Elementary School are presently within the Zone II noise exposure area. However, because the elementary schools are not in use during nighttime hours, noise levels without the nighttime noise penalty factor are more representative of conditions during daytime use periods. In the absence of the nighttime noise penalty factor, Solomon Elementary School is currently exposed to Zone II conditions and Hale Kula Elementary School is currently exposed to Zone I conditions.

Zone III conditions affect some of the western-most housing areas at SBMR. The Zone III contour extends east of Kahoolawe Avenue in the northwestern portion of the cantonment area and east of Beaver Road in the southwestern portion of the cantonment area.

Short-term noise monitoring in the western part of the cantonment area was conducted as part of the Environmental Assessment (EA) for the Mission Support Training Facility and the Information Services Facility (Y. Ebisu & Associates 2002). The average noise level at a distance of 69 feet from Beaver Road was 59 dBA. Noise sources identifiable during these monitoring periods included vehicle traffic, helicopter flight activity, and artillery firing. Noise levels generally varied from slightly lower than 50 dBA to about 70 dBA, with occasional noise events exceeding 70 dBA. Maximum noise levels for the loudest vehicles and helicopters were typically between 70 and 80 dBA. Maximum noise levels from artillery firing were generally less than 70 dBA at these locations.

The noise study for the Mission Support Training Facility and the Information Services Facility also summarizes data from an April 1993 noise-monitoring program at the nearby DPW 4 site. During periods of 155 mm howitzer firing, peak noise levels at the DPW 4 site were typically between 89 and 96 dBC, with a maximum of about 108 dBC. Fifteen of 154 events were measured at or above 100 dBC, and 30 events were measured at less than 85 dBC. The peak noise levels measured during the 1993 study do not indicate any blast noise exposure problems because the measured C-weighted peak levels indicate that unweighted peak dB levels were below the 115 dB threshold normally associated with a moderate rate of complaints about blast noise (US Army CHPPM 2001).

3.1.11.4 Dillingham Military Reservation

No noise monitoring data are available for DMR. The dominant noise sources include general aviation aircraft, vehicle traffic, limited military aircraft traffic, military vehicle traffic, and limited use of blank ammunition during Army exercises. No live-fire training occurs at DMR.

3.1.11.5 Kahuku Training Area/Kawailoa Training Area

No noise monitoring data are available for KTA or KLOA, where the dominant noise sources are military aircraft (mostly helicopters), military vehicle traffic, and training ammunition used during Army exercises. Ordnance use at KTA is primarily blank ammunition, other training ammunition, and some pyrotechnic devices. KTA and KLOA are heavily used for helicopter training.

3.1.11.6 Pohakuloa Training Area

Limited noise data are available for PTA. The dominant noise sources at PTA include military aircraft (mostly helicopters), military vehicle traffic, and ordnance use during live fire and other training exercises. Zone III noise conditions are contained within the present boundaries of PTA. Zone II noise conditions affect BAAF and the western portion of the cantonment area. Zone II noise conditions extend beyond the boundaries of PTA from BAAF westward to the northwest corner of the post. Except for the cantonment area, no noise-sensitive land uses are affected by existing Zone II noise conditions. No troops are permanently based at PTA. All troop housing is used for troops who are visiting PTA to participate in training exercises.

3.1.12 AIRSPACE RESOURCES

The Federal Aviation Administration (FAA) is responsible for the control and use of navigable airspace in the U.S. The definition of airspace includes vertical and horizontal boundaries and time of use. In addition to airspace, the FAA manages the air navigation system, equipment, airports, and the rules and regulations relating to powered flight. The FAA is responsible for managing the airspace for commercial airliners and air carriers, general aviation, and government agencies, including the U.S. military.

Aircraft operate under two distinct categories of operational flight rules: visual flight rules (VFR) and instrument flight rules (IFR). These flight rules are linked to the two categories of weather conditions: visual meteorological conditions (VMC) and instrument meteorological conditions (IMC). VMC exist during generally fair to good weather, and IMC exist during time of rain, low clouds, or reduced visibility. During VMC, aircraft may operate under VFR, and the pilot is primarily responsible for seeing other aircraft and maintaining safe separation. During IMC, aircraft operate under IFR and air traffic control (ATC) exercises positive control over all aircraft in controlled space and is primarily responsible for aircraft separation.

The FAA has designated six classes of airspace. Airspace designated as Class A, B, C, D, or E is controlled airspace. Class G airspace is uncontrolled airspace. Within controlled airspace, ATC service is provided to aircraft in accordance with the airspace classification (Class A, B, C, D, or E). Aircraft operators are also subject to certain pilot qualification, operating rules, and equipment requirements. Within uncontrolled airspace (Class G), no ATC service to aircraft is provided, other than possible traffic advisories when the air traffic control workload permits and radio communications can be established. Essentially, the controlled airspace system protects IFR aircraft from VFR aircraft during instrument meteorological conditions and in close proximity to busy airports.

Use of airspace is required for the successful operation of the U.S. military. Some military flight activities are not compatible with civilian uses of airspace, and some military activities potentially conflict with

other uses of military airspace. Airspace restrictions are needed within military installations to ensure safety and to avoid possible conflicts of airspace use.

Large segments of controlled and uncontrolled airspace have been designated as special use airspace. Operations within special use airspace are considered hazardous to civil aircraft operating in the area. Consequently, civil aircraft operations may be limited or even prohibited, depending on the area. Special use airspace is divided into prohibited, restricted, warning, alert, and military operations area (MOA).

MOAs are airspaces designated for non-hazardous military flight training, and they were established to minimize interaction between high-speed military aircraft and civilian air traffic. These areas include horizontal coordinates (i.e., latitude and longitude), vertical zones (i.e., base and ceiling), use restrictions, and exclusions. Restricted areas denote the existence of unusual, often invisible hazards to aircraft, such as artillery firing, aerial gunnery, or guided missiles. Consequently, flights from non-participating civilian or military aircraft are prohibited during certain training exercises.

Most of the airspace above Oahu is controlled airspace (USAG-HI 2004). The airspace over southern Oahu is dominated by the Class B airspace that lies above and around Honolulu International Airport. Other airports on the island are covered by Class D airspace. Elsewhere, the airspace not designated as Class A, B, C, D, or E airspace is uncontrolled or Class G airspace from the surface to a ceiling of either 700 or 1,200 feet. Above this, the rest of the island is covered with either Class E controlled airspace or special use airspace.

Oahu has several special use airspace areas, including the R-3109 and R-3110 restricted area complex over northwestern Oahu and the A-311 Alert Area in northern Oahu. The W-189 warning area lies three nautical miles off the north shore of Oahu. These areas have different effective altitudes and vary on times of use (USAG-HI 2004). There are no formal, published military training routes on Oahu (USAG-HI 2004).

Most of the airspace above the northern half of the island of Hawaii is controlled airspace of various classes. Class G airspace extends from the surface to 700 feet, except around Kona and Hilo International Airports and BAAF, which are surrounded by Class D airspace (USAG-HI 2004).

The northern part of the island of Hawaii has just one special use airspace area. That is the R-3103 restricted area over PTA. Its effective altitude is up to 30,000 feet and its time of use is intermittent. There are no formal, published military training routes on the island of Hawaii.

3.1.13 ENERGY

This section describes the current energy suppliers and demand within the ROI for each project alternative. The ROI for energy is defined as the Army installations in which the proposed activities would occur (**Figure 3-1**).

Energy consumption is perhaps the major infrastructure and budgetary challenge to the Army. Recent increases in energy costs have created an Army utility budget shortfall of $93 million for Fiscal Year (FY) 01 and increases in energy costs for FY02–07 estimated to require an additional $218 million. Increased energy costs are non-discretionary, which forces installation commanders to take funds from other accounts to pay for utilities, placing other mission areas at risk (Conrad 2001).

The Army developed an Energy Strategy for Installations to address the rising costs of energy and increased risk to other mission areas. This Strategy is based on five major initiatives:

- Eliminate energy waste in existing facilities,
- Increase energy efficiency in renovation and new construction,
- Reduce dependence on fossil fuels,
- Conserve water resources, and
- Improve energy security.

Implementation of these initiatives will improve the working, training, and living environment at Army installations and save critical resources that can be used to support other Army missions, such as training and force deployment.

Army installations on both Oahu and Hawaii use electrical power. The Hawaiian Electric and Light Company (HELCO) provides electrical power to both the island of Oahu and the island of Hawaii.

Each island must be completely self-sufficient in terms of electrical generation and transmission. Unlike states on the mainland, electricity cannot be imported from the grid, not even from the neighboring islands. Thus, HELCO and independent producers who sell HELCO electricity must generate enough to meet each day's demand. In addition, HELCO needs back-up or reserve generating capacity to allow for planned maintenance and unexpected loss of generation.

The demand for electricity is increasing throughout Hawaii. However, it is increasing rapidly on the island of Oahu. This increasing demand is the result of population growth and increases in the amount of electricity used by the average customer.

To meet this increasing demand, HELCO plans to construct the Campbell Industrial Park Generating Station. This station will produce 100 megawatts and will be used as a peaking unit (HELCO 2006). HELCO expects to have the station constructed and operating by 2009.

The Army is trying to reduce its demand for electricity in Hawaii. New buildings and facilities are designed with energy-saving features and construction. The Army also is looking at renewable sources and projects as a means to reducing demand for electricity. For example, the Army is working with HELCO on a bus stop photovoltaic lighting demonstration to promote and demonstrate off-grid photovoltaic technology (HELCO 2005). The demonstration involves installing photovoltaic area lighting systems at existing bus stops and other facilities on SBMR. It also has established a 50-kW photovoltaic power system project at PTA for range targets, control towers, and airstrip lighting.

3.1.14 FACILITIES

Facilities encompass all aspects of Army real property management. Army real property includes lands, facilities, and infrastructure. The ROI for facilities includes the Army installations in which the proposed activities would be located. In addition, the ROI includes the public services (police, fire and medical/dental services), and regional infrastructure and utilities serving the installations.

Lands include Army-owned land (real estate), leaseholds, and other interests in land. Military real property master plans provide the framework for facilities management, including design and construction activities for land development on military installations.

Facilities are buildings, structures, and other improvements to support the Army's mission, such as Cantonment areas, training ranges, housing, schools, and recreational facilities. Housing and schools are described in Section 0. Existing recreational facilities are described in Section 3.1.5.

Infrastructure is the combination of supporting systems that enable the use of Army land and resident facilities. Infrastructure includes roadways and infrastructure for utilities. Roadways and other transportation infrastructure and facilities serving the Army installations are described in Section 3.1.6, Traffic and Transport. Utilities include electrical, gas, water, wastewater, communications/telephone, and solid waste. Electrical and gas utilities, energy use, and conservation measures are described in Section 3.1.13.

The following subsections describe the affected environment for real estate, facilities, public services, and utilities for water, wastewater, communications/telephone, and solid waste serving the Army installations

This section identifies the existing Army real property within the installations potentially affected by the proposed project activities Hawaii (SBMR, WAAF, DMR, KTA, KLOA, and PTA), including real estate, facilities, and infrastructure and utilities. In addition, potential land acquisition areas, public services are also briefly described.

3.1.14.1 Real Estate

To manage land, facilities, and infrastructure, USAG-HI has prepared a real property management plan. Army Regulation 210-10, Real Property Master Planning, guides USAG-HI's real property planning process. Family housing, barracks, offices, roads, recreational areas, live-fire ranges, an maneuver areas are all real property assets occupying Army lands. The proposed project activities would primarily be located on land currently owned by the federal government. Land acquisition areas include the SRAA, Keamuku Parcel, and lands within the proposed Dillingham Trail, Helemano Road, and Kawaihae to PTA Trail. In general, most of the proposed project activities would occur within existing Army installation boundaries (SBMR, DMR, KTA/ KLOA, and PTA) as shown on **Figure 3-1**.

3.1.14.2 Facilities

The existing facilities within each of the potentially affected Army installations are summarized in the following subsections. Existing housing and other support facilities are located on SMBR, WAAF, SBER, and DMR. There are no housing facilities at DMR, KTA/KLOA, or PTA because no military or civilian personnel are permanently stationed or reside at these installations. Construction and renovation of buildings at SBMR, KTA, and PTA, as well as roadway and runway upgrades at WAAF, DMR, KTA, and PTA are planned. The ROI for the facilities analysis is shown on **Figure 3-1.**

Schofield Barracks Military Reservation/Wheeler Army Airfield

The SBMP, which includes 9,880 acres (3,998 hectares) includes a mixture of fee simple, leased and ceded lands. The installation master plan identified facilities within the SBMP, which include training ranges, an ordnance impact area, conservation land, and the Cantonment area (Belt Collins 1993).

The SBER land is also a mixture of fee simple, leased and ceded lands and totals 5,154 acres (2,086 hectares). The installation master plan identified the facilities at SBER as training, education facilities, the US Army Non-Commissioned Officers Academy, warehouses, and a maintenance facility (Belt Collins 1993).

The WAAF, which consists of 1,369 acres (554 hectares) and includes administration, housing, maintenance, training, and flight facilities for peacetime mission requirement, including security and law enforcement support. This also includes a mixture of fee simple, leased and ceded lands. The installation master plan identified facilities in vicinity of the proposed project activities as operations/airfield, supply/storage, and training (Belt Collins 1994). Housing for Soldiers who work at WAAF is provided both at WAAF and at SBMR.

The SRAA was recently acquired by the Army to support SBCT transformation. SRAA consists of approximately 1,402 acres (567 hectares). A fixed small-arms live-fire qualification range is planned for SRAA.

The Helemano Trail would connect the Main Post with an HMR access road (Paalaa Uka Pupukea Road). The trail alignment would consist of 13 acres (5.3 hectares), some of which is owned by the federal government.

Dillingham Military Reservation

DMR is owned by the federal government; however, the FTI site outside of DMR is owned by the State of Hawaii. DMR is comprised of 664 acres (269 hectares, which includes an airfield and associated roadways, and earthen airplane hangars, approximately 354 acres suitable for maneuver and field training, 107 acres are developed within the Cantonment area, and the remaining lands are located on steep slopes of the Waianae Mountains (USAG-HI 2006). There are no live-fire activities, designated impact areas, or associated surface danger zones on DMR (USAG-HI 2006).

The Dillingham Trail would connect the SBMP and DMR. The proposed alignment trail is owned by various entities and consists of approximately 36 acres (14.6 hectares). The alignment is generally undeveloped land along agricultural roads and undeveloped lands (USGS 1999b, 1998c).

Kahuku and Kawailoa Training Areas

The federal government owns the majority of KTA, which consists of (9,480 acres (3,837 hectares). KTA includes training areas, helicopter landing zones, and parachute drop zones. The northern portion of the installation supports all tactical maneuver training on KTA, including mountain and jungle warfare, limited pyrotechnics (e.g., smoke, incendiary devices), and air support training (USAG-HI 2006). KTA can accommodate a number of training scenarios involving infantry battalion ARTEP missions.

KLOA landowners include the State of Hawaii, Dole Food Company, Kamehameha Schools Bishop Estate, and other landowners. KLOA consists of 23,348 acres (9,449 hectares) and is used for maneuver, helicopter, and mountain/jungle warfare training, and primarily for small infantry unit maneuvers and helicopter training. Only 5,310 acres of the training area are actually suitable for maneuver training activities (USAG-HI 2006). The lease agreement prohibits the use of live-fire, tracer ammunition, incendiaries, explosives, and pyrotechnics in all parts of KLOA (USAG-HI 2006).

The Drum Road landowners include the federal government, the City and County of Honolulu, and other landowners. Drum Road is an existing dirt and gravel road from HMR to KTA. The proposed Drum Road realignment includes some agricultural land, but most of this alignment is on existing roads (State of Hawaii 2002a).

Pohakuloa Training Area

PTA land is a mixture of fee simple, leased and ceded lands. PTA is the largest Army training area in Hawaii, totaling 107,873 acres (43,656 hectares). Land uses at PTA include the Cantonment area, BAAF, maneuver training areas, drop zones, live-fire training ranges, artillery firing points an ordnance impact area, and areas unsuitable for maneuver. The Cantonment area consists of 566 acres with 154 buildings, mostly Quonset huts (USAG-HI 2006).

BAAF has a 3,969-foot runway and offers helicopter access and limited C-130 access (USAG-HI 2006). Land suitable for field maneuvers consists of approximately 56,661 acres and the ordnance impact area is approximately 51,000 acres (USAG-HI 2006).

The Keamuku Parcel, consisting of approximately 24,013 acres (9,718 hectares), s owned by USAG-HI. Keamuku Parcel is currently used for cattle grazing, limited hunting, occasional military maneuver training, and a quarry.

UXO hazards along the Saddle Road corridor (extending approximately 164 feet [50 meters] from the road) need to be cleared to a safe depth to support the heaviest track and wheeled vehicle that will use the area. However, the USACE indicated that the overall ordnance and explosives hazard level for the Keamuku Parcel is low (Earth Tech 2002).

Some of the land within the proposed PTA trail is currently owned by nonmilitary entities. PTA Trail would include approximately 132 acres (53.4 hectares) of land between PTA and Kawaihae Harbor. Existing facilities within the proposed military vehicle trail corridor include cattle grazing, agriculture, periodic military training, open space, utility easements, a portion of a former military vehicle trail, and Kawaihae Harbor.

3.1.14.3 Public Services

SBMR and PTA are the only facilities that have their own fire and medical facilities, and PTA has a police facility as well. In general, regional providers of police, fire, and emergency medical services are available to personnel using Army facilities, and units involved in training at the various facilities may bring military police of their own.

Fire services to the installations on Oahu are provided by the Federal Fire Department under the supervision of Commander, U.S. Naval Station Pearl Harbor. A one-company fire station is at SBMR, and a two-company fire station is at WAAF. Two commercial pumpers and two military field fire-fighting vehicles are based at the SBMR station, and crash fire rescue and commercial pumper equipment is based at WAAF (Belt Collins 1993). For both fire and police services, there is extensive coordination with Honolulu City and County fire and police departments. Medical services are provided to SBMR, WAAF, DMR, KTA, and KLOA at Tripler Army Medical Center (TAMC) in Honolulu, which provides a full complement of medical facilities, including medical evacuation by helicopter from outlying training areas and ranges.

3.1.14.4 Infrastructure and Utilities

This section summarizes the existing infrastructure and utilities for water, wastewater, communications, and solid waste management at SBMR, DMR, KTA, and PTA. Trends regarding demand for utilities normally reflect population growth, which is minimal for the ROI. Infrastructure at SBMR, DMR, KTA/KLOA, and PTA is currently sufficient to meet the needs of the Army.

Demand for water has been growing in the Ewa area of Oahu, but the windward side of the island currently has sufficient supplies. Water is supplied to SBMR and DMR through pipelines; whereas water must be trucked in to KTA, KLOA, and PTA. Utility systems at SBMR, DMR, KTA, and PTA have been evaluated for adequacy. Many elements in these systems have been identified as requiring upgrades in order to provide the needed service and accommodate existing staff. Wastewater treatment in Hawaii is done by wastewater treatment plants and by underground injection control.

Telecommunication services used at all Army installations include commercial and official lines. Verizon Hawaii provides commercial telephone service to the housing areas, mainly from direct buried lines that are deteriorated. Phone service is provided to the Army from ATT-HITS in duct lines, which were recently installed by the Army. The Army is responsible for repairing and maintaining the official lines and for providing underground ducts for the commercial phone lines.

Fuel Oil Polishing Company (FOPCO) and Horizon Waste Services collect the solid waste generated at Army installations on Oahu and transport it directly to a City and County of Honolulu-owned incinerator at Campbell Industrial Park. This facility, known as HPower, generates electric power that supplies electricity to approximately 80,000 local residents. The plant diverts 90 percent of the waste stream and produces 10 percent ash that is deposited at the Waimanalo Gulch Landfill. Solid refuse is separated into family housing refuse and industrial (all other buildings) refuse. Waste generated on PTA goes to a landfill (Ching 2002).

One recycling center processes recyclable items from industrial work areas, barracks, and family housing areas on SBMR, WAAF, and SBER. No recycling pickup services are provided for KTA, DMR, and PTA. The recycling operation at SBMR is at Building 1087B, MacMahon Road, and is operated by Goodwill Industries, with a staff of five workers (Ching 2002).

The US Army is investigating opportunities for updating the utilities infrastructure and systems on its installations in Hawaii. Some of these systems have been in place for approximately 60 years and are deteriorating with age or are outdated. This process is likely to involve partnerships with private companies and other nonmilitary agencies in developing replacements/alternatives to the portions of the infrastructure that are determined to be at risk.

3.2 ALTERNATIVE B — ALASKA

3.2.1 GEOLOGY, SOILS, AND SEISMICITY

The geologic, soil, and seismic conditions of the Fort Richardson area (FRA) and DTA are detailed in the Transformation of U.S. Army Alaska (USARAK) FEIS (USARAK 2004), the 2006 INRMP EA (USARAK 2002d and 2002e), and the Construction and Operation of BAX and a CACTF within U.S. Army Training Lands in Alaska Final EIS (USARAK 2006), and are summarized below as they relate to existing conditions used to assess potential effects of activities associated with implementation of Alternative B. **Figure 3-2** shows the extents of the ROI for geology, soils, and seismicity in Alaska.

In Alaska, climate is the most important soil-forming factor. Permafrost is a condition in which soil, silt, and rock remain frozen year-round, and it is common throughout Alaska. Only a thin layer of topsoil may thaw in the summer months, while the rest of the soil down to bedrock remains frozen until climatic conditions change or overlying insulating vegetative or organic material (peat) is disturbed. Permafrost typically exists in multiple layers, varying in thickness from less than 1 foot to more than 150 feet (USARAK 2004). The distribution of vegetation and limitations of human activity in Alaska are significantly influenced by the presence of permafrost, which can influence soil processes such as cryoturbation (contoured and broken horizons resulting from mixing of soil due to freezing and thawing), rapid surface water runoff, restricted permeability, and ground subsidence. Thermokarst is a process resulting from irregular subsidence of permafrost that creates features such as mounds, hummocks, water-filled depressions, flooded forests, and mudflows on steeper slopes (USARAK 2004).

Figure 3-2 Region of Influence in Alaska for Geology, Soils, Wildlife Management, Cultural Resources, Land Use and Recreation, Hazardous Materials and Hazardous Wastes, Energy, and Facilities

3.2.1.1 Fort Richardson

Physiography

The FRA lies in the Cook Inlet–Susitna Lowland and Kenai–Chugach Mountains physiographic provinces on an alluvial plain called the Anchorage Lowland (Wahrhaftig 1965). The Anchorage Lowland is fed by the Chugach Mountains to the east and flows into to the Cook Inlet to the north, south, and west. The topography of the Anchorage Lowland has been primarily influenced by glacial activity and alluvial deposition and erosion by the four major drainages that originate in the Chugach Mountains – Ship Creek, Eagle River, Campbell Creek, and Chester Creek. The Anchorage Lowland is a triangular area located between the Knik and Turnagain Arms below 500 feet amsl in elevation. It is characterized by rolling hills with topographic relief ranging from 50 to 250 feet (Hunter et al. 2000). To the east, rolling uplands extend to elevations up to 3,000 feet amsl at the base of the Chugach Mountains (Hunter et al. 2000). A small portion of the western section of the Chugach Mountains, which rise abruptly to more than 5,000 feet amsl on the front, is contained within the FRA boundaries. The peaks of the Chugach Mountains are separated by northwest-trending, steep U-shaped valleys, which are occupied by the four major drainages mentioned above. The Anchorage Lowland is characterized by rolling hills with up to 250 feel of topographic relief in the eastern portion along the Chugach Mountains. The terrain flattens to the west into an alluvial plain that is inundated with broad, shallow streams and wetlands. The FRA contains many landforms that are characteristic of glaciated terrain, including moraines, esker deposits, outwash plains, and estuarine sediments (USARAK 2004).

Geology

Fort Richardson is covered by Quaternary age glacial, glacio-marine (estuarine), and glacio-alluvial sedimentary deposits, with bedrock outcrops occurring in the south and east along the Chugach Mountains. The deposits form a westward-thickening wedge beginning at the base of the Chugach Mountains to a thickness of approximately 656 feet locally (Hunter et al. 2000). Based on well logs, the thickness of sediments below the cantonment ranges from 230 to 322 feet (Cederstrom et al.1964). Because the glacial sediments underlying Fort Richardson were deposited during multiple ice advances, the stratigraphy is complex, particularly under the cantonment, where sediments deposited along the south margin of Elmendorf Moraine interfinger with alluvial fan sands and gravels (Hunter et al. 2000). The most common and spatially extensive deposits are end, lateral, and ground moraines; glacio-alluvial, alluvial, and alluvial fan deposits; and estuarine and lacustrine deposits. Loess (wind-deposited silt), colluvium (poorly sorted and uncompacted sand and gravel), and rock glaciers are less abundant in the high mountain valleys (Hunter et al. 2000).

Soils

Parent material that formed the various soil types on Fort Richardson varies widely and includes glacial moraines, glacial outwash, tidal flats, and peat bogs. These soils are shallow, recently formed, nutrient deficient, and have low water-holding capacity, which are all factors that limit vegetative growth during dry periods and limit the potential to reclaim land after surface disturbance. Surface soil horizons may be covered with peat in areas containing depressions, wetlands, and other saturated areas. The NRCS soil survey of the Anchorage area (Moore 2002) identifies two distinct climate zones and associated soil types for FRA: the lowlands surrounding Anchorage, and the neighboring Chugach Mountains. (USARAK 2004)

Along the coast and tidal plains, the Cook Inlet sediments are silty and clayey, with broad depressions in the area occupied by poorly drained bogs and fens. The soils on the lowland plains inland from the coast have less developed horizons because of lower precipitation, mid-winter thaws, and strong localized

winds, with the exception of wind-protected forested areas (Moore 2002). The uplands at the base of the Chugach Mountains are covered by a layer of silty loess, which is formed by deposition of fine glacial sediments from the floodplains and volcanic ash. The portion of the FRA that encompasses the Chugach Mountains contains soils that were formed because of weathering and leaching of minerals, which was influenced by high annual precipitation, deep snowfall, strong localized winds, and deep annual frost (USARAK 2004).

Permafrost is present on less than 1 percent of Fort Richardson, occurring primarily in patches of forested bogs along Muldoon Road as well as in the higher elevations of the areas within the Chugach Mountains. The effects of thermokarst, described above as irregular subsidence of permafrost that causes mounds, hummocks, water-filled depressions, flooded forests, and mudflows on steeper slopes, have been less than 0.1 percent in the last 200 to 300 years in the FRA.

Erosion Management

USAGAK conserves and manages soil resources as the foundation of other natural resources, through planning level soil and topographical surveys, soil resource monitoring, and soil resources rehabilitation and management strategies. The Draft Natural Resources Guidance from Army Chief of Staff for Installation Management (USARAK 2002e) requires the installation to identify and map soils, correlate soils to permafrost areas, and establish relationships among components of terrain. The data from these efforts are required for input into the military training and scheduling process. Army Regulation 200-3 requires 10-year updates of topographical planning level surveys to implement the INRMP, as mandated by the Sikes Act (USARAK 2002e).

Soil monitoring is conducted through the Range and Training Land Assessment Program, which is the monitoring component of ITAM. Annual Range and Training Land Assessment reports detail the levels of current and past disturbance and land condition resulting from military training and recreational use on Fort Richardson. Soil resources management on Fort Richardson is achieved through prevention activities and actual restoration of disturbed areas by implementing Best Management Practices (BMPs) in agreement with industry standard installation storm water prevention techniques. Disturbed areas are restored by both erosion control and streambank stabilization activities, which control installation sources of dust, runoff, silt, and erosion debris to prevent damage to land, water, and air resources; equipment; and facilities (including those on adjacent properties). Relevant BMPs used at Fort Richardson are detailed in Volume II, Annex B, Section B2.1 of the USAGAK INRMP (USARAK 2002e) and in the ITAM Five Year Management Plan (USARAK 2002e).

Chemical Constituents in Soils

The Army has identified three sources of contamination on FRA, but they do not represent all known or suspected sources of contamination at the installation. The sources are the Eagle River Flats (ERF) ordinance impact area, the Pole Line Road Disposal Area (PRDA), and the Roosevelt Road Transmitter Site (RRTS). The ERF ordinance testing area, located in the northwestern corner of the FRA, consists of approximately 2,500 acres of wetlands associated with the Eagle River Delta. Soil and surface water samples collected in 1989 and 1991 showed elevated levels of heavy metals, explosive compounds, and white phosphorous. Concentrations of the heavy metals copper, cadmium, nickel, zinc, and mercury in surface water samples exceeded the National Ambient Water Quality Criteria (Global Security 2007a). A site investigation conducted in 1990 by the Army in the PRDA, located southwest of the Eagle River, identified volatile organic compounds (VOCs) in soil and shallow groundwater as a result of a hazardous substances disposal area used in the 1950s (Global Security 2007a). The RRTS is a former bombproof underground bunker and associated support facilities constructed in the 1940s. The Army conducted sampling at the RRTS in May and June 1990 as part of a site investigation follow-up. Analytical results from the follow-

up investigation revealed elevated concentrations of PCBs, VOCs, SVOCs, dioxins, asbestos, and inorganic elements throughout the site (Global Security 2007a).

Geologic Hazards and Seismicity

The FRA is seismically active and has experienced at least nine major earthquakes in the last 85 years, including the largest earthquake in U.S. history. Two faults border Anchorage: the Border Ranges Fault and the Bruin Bay-Castle Mountain Fault. The Border Ranges Fault bisects FRA, running parallel to the base of the Chugach Mountains. The Castle Mountain fault zone is located between Anchorage and the Alaska Range. The Castle Mountain Fault is a recently active, high-angle fault that runs northeast-to-southwest for more than 100 miles. Three of the 10 strongest earthquakes recorded in recent history occurred in Alaska. The earthquake of 1964 was the result of the northwestward motion of the Pacific Plate (compression) over a period of tens to hundreds of years that was relieved by the sudden southeastward motion of portions of coastal Alaska as they moved back over the Pacific Plate. As a result, the Pacific Plate moved under the North American Plate by about 30 feet on average. The epicenter of the earthquake was about 75 miles east of Anchorage, but the effects were widespread. The area has also experienced tremors and ash fall from volcanic eruptions of Mount Spurr, Mount St. Augustine, and Mount Redoubt since 1954.

3.2.1.2 Donnelly Training Area

Physiography and Geology

The DTA is located within the Yukon-Tanana terrain of the Yukon physiographic province. The Yukon-Tanana terrain is the largest of the terrains in the Yukon, extending from interior British Columbia into Eastern Alaska (Hart 2002). DTA lies in the northern foothills of the Alaska Range and on the alluvial plains north of the foothills. South of the DTA, the Alaska Range is characterized by rugged, snowcapped peaks that rise to 10,000 feet amsl, with glaciers up to 5 miles wide and 40 miles long that flow north from the mountains. The glaciers feed sediment-laden rivers, which create broad, braided stream valleys and alluvial fans covered by thick layers of sediments. The glaciers slope north at a gradient of 20 to 50 feet per mile and eventually flow to the Tanana River. The braided streams are spaced 5 to 20 miles apart and fan across the plains, while the outwash areas contain porous gravel beds that facilitate surface water infiltration to groundwater aquifers.

The terrain of the DTA encompasses a diverse geomorphic landscape, topography, and sediment parent material, but primarily is generally flat to gently sloping, ranging from 1,200 to 1,600 feet above amsl. The southwestern portion of DTA West encompasses a small portion of the Alaska Range foothills, which range in elevation from 4,000 to 6,200 feet amsl and contain some valley glaciers that extend onto the installation. The southern half of DTA West is composed of largely unglaciated, flat-topped, eastern trending foothill ridges ranging from 2,000 to 4,500 feet amsl and 3 to 7 miles wide. Rolling hills separate the foothills from the alluvial plains and range from 2 to 10 miles wide and 700 to 1,500 feet amsl. There are no glaciers on the rolling hills or alluvial plains; however, the wide valleys were formed by historical glacial advances.

Soils

Glacial and alluvial processes, as well as isolated discontinuous patches of permafrost, primarily formed soils in the DTA. The NRCS has only mapped soils in the Main Post cantonment area, in which 12 soil associations have been identified. The USGS maps produced for the 2004 USARAK Transformation FEIS maneuverability model and subsequent USAGAK 2006 BAX and CACTF FEIS evaluation show the distribution of a wide variety of soil engineering types on DTA because of the diverse geomorphic

landscape (USARAK 2004 and 2006). Glacial moraine areas were classified as gravelly sand with well-drained, well-graded, gravelly sand outwashes. Lowland and floodplain areas were classified as organic silts with varying wetness. Soil associations in the northern, west-central, and eastern portions of the DTA have been identified as silt-loam, while soils in the DTA East have been identified as shallow silt-loam over gravelly sand. Soils on river floodplains in the DTA comprise alternate layers of sand, silt-loam, and gravelly sand. Soils in muskeg areas have a high water table and are high in moisture and organic material. Soils on the upland foothills are moist and loamy compared to the mountain soils, which are rocky, steep, and unvegetated. Floodplain soils are known to have moderate erosion potential, while foothill soils have moderate to high erosion potential.

Permafrost is found in irregular patches throughout a large portion of the DTA, particularly in morainal areas where slope and aspect change abruptly (Jorgenson et al. 2001). Predicting permafrost in the DTA is difficult due to heterogeneous soil types, topography, and microclimate variability. Areas containing existing and abandoned river channels, lakes, wetlands, and other low-lying areas tend to be free of permafrost. Known isolated patches of permafrost are found from 2 to 40 feet below ground surface (bgs), with thicknesses varying from 10 to 118 feet, underlying sandy gravel in the alluvial plains. Permafrost controls groundwater movement in these areas. Permafrost degradation, evidenced by thaw ponds, is known to occur only in a small portion of the DTA. However, other areas characterized by loess or other silty sediments may also be vulnerable to permafrost degradation. Disturbance of the ground surface or continued climatic warming is likely to increase the amount of thermokarst in the DTA.

The 2006 BAX and CACTF FEIS evaluated permafrost by sub-areas identified in the eastern portion of DTA, including the North Texas Range, the Donnelly Drop Zone, and the Eddy Drop Zone, with BAX and CACTF areas within each sub-area (USARAK 2006). Detailed geotechnical exploration programs conducted in 2002 for the Eddy Drop Zone Area (R&M Consultants 2002, 2004 and USACE 2004) supplemented NRCS soil survey information. According to the BAX and CACTF FEIS, the Eddy Drop Zone study area has a low permafrost occurrence and less permafrost compared to the Donnelly Drop Zone sub-area and the North Texas Range sub-area. The Donnelly Drop Zone study area has less permafrost than the North Texas Range study area. Although geotechnical surveys were not conducted for the Donnelly Drop Zone or North Texas Range study areas, several other factors were used to supplement the NRCS soil survey information to determine the probability of permafrost, including previous investigations in the area.

Erosion Management

As with Fort Richardson, soil resources management on DTA is mandated by and detailed in the USAGAK INRMP and ITAM Five Year Management Plan.

Chemical Constituents in Soil

The USAGAK 2006 BAX and CACTF FEIS detailed existing hazardous materials and other contaminants in soils on the DTA, which are summarized here. Sampling at DTA firing points has detected low levels of 2,4-DNT on the surface, but not at depth in the soils, and not in groundwater or surface water. The low mobility of 2,4-DNT in the soil is likely due to its low solubility, low precipitation in the region, and frozen soil conditions most of the year. Various heavy metals (including lead, zinc, antimony, copper, manganese, and iron) are used in munitions components and found in primers, shell casings, and various projectile components. These metals are also naturally found in background levels on soils in DTA. Soil samples collected from various training areas of DTA detected low levels of zinc, copper, lead, and antimony within impact areas and target berms where munitions were used. The concentrations were above natural background levels, but were well below levels of concern (Walsh 2004). Soils on DTA in the areas of firing points and target berms are primarily sandy and gravelly with neutral pH values, making

them unconducive to dissolution and mobilization of metals deposited from munitions components. While soils in permafrost areas covered by black spruce and sphagnum moss are often acidic (pH 4.0 to 5.0), the shallow active layer and impermeable underlying permafrost limit the mobility of dissolved metals in these areas.

Geologic Hazards and Seismicity

On November 3, 2002, a magnitude 7.9 earthquake affected most of the State of Alaska, with the strongest ground motion felt in the region north of the Alaska Range. The areas around DTA were all in the moderate zone (V-VII) on the Mercalli Scale of earthquake intensity (see http://pasadena.wr.usgs.gov/shake/ak/STORE/X20852/ciim_display.html, for more information). Minor to moderate damage occurred to roads, runways, and some buildings. Support structures for the Trans-Alaskan pipeline were also damaged. Portions of the Richardson Highway between DTA and Fort Wainwright (FWA) were closed or partially closed for 2 days. The epicenter of this earthquake was located along the Denali Fault, about 40 miles south of DTA. Movement was felt in a large area from north of Fairbanks to the Kenai Peninsula south of Anchorage. This was the largest earthquake on record to strike the area.

FWA and DTA are located on a geologic terrain bounded to the north and south by active faults. Unlike the subduction zone tectonics that cause earthquakes in southern portions of the state (see FRA discussion), the activity along Denali Fault is strike-slip. The areas bounding this fault and the related Tintina Fault are characterized by seismic zones that likely are a result of block rotation between these two larger faults, ultimately driven by the collision of the North American and Pacific Plates further south in the state (USARAK 1999a; Page et al. 1995).

The northwest corner of DTA is at the edge of the 200-mile-wide Salcha seismic zone that extends from Fairbanks southward through Prince William Sound. The Fort Greely (DTA) installation lies immediately north of the active Denali Fault, which runs roughly west-northwest near the southern boundary of the West Training Area and the northern edge of the Alaska Range (USARAK 1999a). Slip on this fault is less than 0.5 inch per year (USARAK 2002e).

Prior to the November 3, 2002 earthquake, only three earthquakes larger than magnitude 4 have been recorded in or immediately adjacent to the installation since 1973. Recent deposits of sand, gravel, and silt mask faults can be found on DTA. Damage from the November 3, 2002 earthquake is still being assessed and repaired. Continuing research into this most recent and strong earthquake may reveal more information about the potential hazards along the Denali Fault and associated seismic zones to the north.

3.2.2 WATER RESOURCES

The ROI for surface water resources includes portions of watersheds containing FRA and DTA. More specifically, the areas from the upstream military boundary to the downstream watershed boundary of Tanana and Cook Inlet watersheds. The ROI for surface water is not necessarily the same as the ROI for groundwater. Because groundwater often crosses topographic (watershed) boundaries, the ROI for surface water is expanded to include the aquifers underlying these watersheds and any aquifers downgradient (in the direction of groundwater flow) from these areas.

3.2.2.1 Fort Richardson

Surface Water Occurrence

Fort Richardson is located within the Cook Inlet watershed. Two major waterways on Fort Richardson include Eagle River and Ship Creek. Eagle River is a glacial waterway that originates at the base of the Ea-

gle Glacier in the Chugach Mountains, and then meanders across FRA west towards the Knik Arm. Ship Creek, a non-glacial stream, originates at Ship Lake in the Chugach Mountains and flows 25 miles to the Knik Arm. The stream is diverted by a water supply diversion dam located at the base of the Chugach Mountains on FRA, approximately 10 miles from the mouth of the river for U.S. army base use (USARAK 2004).

Other perennial streams at FRA include Chester Creek and North Fork Campbell Creek flowing through the southwestern portion, McVeigh Creek and Snowhawk Creek (tributary to Ship Creek) draining the central portion, and Otter Creek (tributary to Eagle River) draining the northwestern portion of FRA. Numerous seasonal tributaries and drainage ditches also exist at FRA. A portion of North Fork Campbell Creek from Long Lake in the Chugach Mountains to the southwestern corner of FRA is an important source of recharge for the groundwater aquifer (Cederstrom et al. 1964).

FRA also has 12 named lakes and ponds and several unnamed water bodies. The combined area for the named lakes and ponds is 359 acres. Five relatively large lakes managed for recreational fishing include Clunie, Otter, Gwen, Thompson, and Waldon. The other seven lakes and ponds on FRA include Chain Pond, Web Pond, Lake Kiowa, Dishno Pond, Cochise Lake, Diablo Pond, and Tanaina Lake (USARAK 2004).

No ice bridges are constructed on FRA, and no permits exist for creating ice bridges. Permanent bridges exist as necessary at all maneuver trail crossing points over Eagle River, Ship Creek, and the smaller waterways on FRA (USARAK 2004).

Surface Water Quality

The waters on FRA are protected by freshwater use classes (A), (B), and (C) as assigned by the State of Alaska. These include Class (A) Water supply; (B) Water recreation; and (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife. If any exceedances of the water quality standards are found, the state designates the water body as "water quality limited."

Two stream segments on FRA have been listed as water quality limited by the Alaska Department of Environmental Conservation (ADEC) (ADEC 1996). Eagle River Flats was listed as a Tier II water body due to white phosphorous contamination, and a comprehensive water quality assessment to determine the best methods for restoration and recovery has been implemented. Contamination was determined to be the result of prior military activities; therefore, the chemical is no longer used by USARAK. Remediation activities began in 1999 and are ongoing. Upstream of the FRA boundary, the Eagle River was found to be typical of a pristine glacial-fed stream in Alaska (USARAK 2004).

Ship Creek is listed as a Tier I water body from the Glenn Highway Bridge down to its mouth, and it is currently being assessed to determine the degree to which contaminants exceed water quality standards (ADEC 1998). The Water Quality Assessment of Ship Creek in 1996 prepared by ADEC determined that fecal coliform bacteria, petroleum products, and contaminants contributed by biological community alteration at sites downstream of FRA exceeded water quality standards (ADEC 1996). According to ADEC studies, most of the pollutants entered Ship Creek as nonpoint sources from surface water runoff and groundwater downstream of the post, where the watershed is increasingly urbanized. After compiling and reviewing the data, the state concluded that no cumulative or increasing water quality degradation was occurring in the lower portion of Ship Creek (ADEC 1996). There are currently no restoration plans for Ship Creek.

Groundwater Occurrence

Groundwater on FRA is located in both an unconfined and a deeper, confined aquifer. Water recharges the groundwater on FRA and the Anchorage Bowl in several ways. Along the mountains, groundwater seeps from bedrock fractures into the sediments. In the foothills and lowlands, water flows from streams into the unconfined aquifer where the water table is above the stream elevation. In the lowlands, rain and snowmelt percolate from the surface into the groundwater.

The hydrogeology of FRA is complicated due to deposits from multiple glacial advances through the region. There are multiple confined aquifers and an unconfined aquifer that connect in some places. The low-permeability confining clay layer is present at depths ranging from 30 to 175 feet (Astley et al. 2000). The hydraulic gradient of the unconfined aquifer trends northwesterly, generally following the area's topography surface elevation. The overall trend in flow direction in the confined aquifer is to the northwest except north of Bryant Airfield, where groundwater flow patterns are unclear. Perched groundwater tables are common on FRA and are found at a higher elevation than the main unconfined groundwater table. Measured groundwater depths on FRA range from near the surface near Ship Creek to 200 feet deep near Bryant Airfield (Astley et al. 2000).

As mentioned above, Ship Creek loses more than 16 million gallons per day to the unconfined aquifer between the reservoir at the base of the mountains and the eastern boundary of Elmendorf Air Force Base (AFB) (Barnwell et al. 1972). Therefore, the aquifer is greatly influenced by stream discharge (Astley et al. 2000).

Groundwater Quality

Industrial activities associated with USARAK's use of FRA have had some effects on groundwater. Monitoring has found pollution associated with underground storage tanks, chemical storage facilities, and chemical dump sites. FRA has been identified as a CERCLA site and put on the NPL in 1993. Identified groundwater pollutants included TCE and arsenic. Water quality has improved since due to Army restoration projects to mitigate previous damage to groundwater quality. Cleanup activities were completed in September 2006, and currently contaminated groundwater migration at the site is under control and no significant risks to human health have been found (USEPA 2007).

3.2.2.2 Donnelly Training Area

Surface Water Occurrence

DTA is located within the Tanana Basin, an interior glacial waterway. The major waterway at DTA is Delta River. The Delta River originates at Tangle Lakes, flows north 50 miles to DTA's southern boundary, then flows 26 miles through the installation, and then another 9 miles to its confluence with the Tanana River. The Delta River receives significant meltwater from several glaciers as it flows through the Alaska Range (USARAK 2004).

Jarvis Creek originates at the terminus of Jarvis Glacier on the north side of the Alaska Range and flows northward for 40 miles through a narrow valley before passing through DTA East and converging with the Delta River. Other streams within DTA include non-glacial Granite Creek, which forms the eastern border of DTA and glacier-fed Buchanan Creek on the south. Glacier-fed Delta Creek drains the interior portion of DTA West and flows directly into the Tanana River.

There are 16 lakes managed by Alaska Department of Fish and Game located within DTA. These lakes are used for recreational fishing. Bolio Lake is the largest of these, at approximately 2.5 miles in length.

Most other lakes on DTA are not suitable for stocking due to poor accessibility or their susceptibility to freezing. The combined area for the lakes and ponds on DTA is 8,752 acres (USARAK 2004).

Ice bridges are constructed across the Delta River west of Fort Greely. These bridges allow access to winter training areas, which otherwise would be unreachable from the ground.

Water Quality

Based on a site-specific United States Army Environmental Hygiene Agency (USAEHA 1990) study, surface water quality of streams flowing through DTA meets the state primary drinking water standards. However, aluminum, iron, and manganese concentrations exceed the state's secondary standards. DTA water is of the calcium carbonate type and is slightly basic. Dissolved oxygen values measured at DTA also exceeded the state's minimum level of 4.0 mg/L.

USACE conducted a study of Jarvis Creek, which runs through the most heavily used part of the training area (Bristol Environmental and Engineering Service 2003). Based on this study, most of the parameters, including arsenic levels and pH, were within the state drinking water quality standards. Dissolved oxygen and temperature narrowly exceeded the state standard for drinking water, but not the temperature standard for the general water supply.

The average annual suspended sediment yield for the Delta River is 1,200 tons per square mile (Dingman et al. 1971), and the sediment load ranges from 100 to 1,000 mg/L during the open-water (not frozen water conditions) season. Sediment load concentrations also change rapidly with changes in stream discharge. Thus, more than 99 percent of the annual sediment load is transported during the summer, and it is evenly distributed during this period (Anderson 1970).

There are no streams within the DTA that have been designated as Wild and Scenic Rivers (National Park Service [NPS] 1999); however, the upper reach of the Delta River was designated as part of the National Wild and Scenic River System in 1980. The Delta River designation terminates approximately 15 miles upstream of DTA. The total length of Delta River within DTA boundaries is approximately 30 miles, however no portion of this reach has been designated.

Lakes are abundant on DTA, but information on their water quality is scarce. Water samples collected from Bolio Lake had pH beyond acceptable alkalinity levels as defined by the State of Alaska and the majority of nitrogen occurred in organic form (USARAK 2004).

Groundwater Occurrence

The alluvial aquifer system underlying DTA is believed to comprise several aquifers that are separated by leaky confining layers. However, data supporting this hypothesis are lacking and, as a result, this system is classified as a single aquifer with varying local confinement. Silty sediments and glacial till may be the source of local confinement.

The alluvial aquifer system underlying part of DTA is recharged through streambeds of Jarvis Creek and Delta River as well as other streams. The volume of groundwater recharge from DTA is directly related to the amount of surface flow (Wilcox 1980). Recharge is greatest during annual high flow periods. Small amounts of infiltration of precipitation may also contribute to aquifer recharge.

In the northern, western, and eastern portions of DTA East, as the aquifer approaches the surface and the Tanana River, water is discharged from the alluvial aquifer system through a series of springs near Clearwater Creek and near the mouth of the Delta River. The annual groundwater discharge rate in DTA

East is estimated to exceed 1,200 cubic feet per second not including the unmeasured seepage rates to the Tanana River (Wilcox 1980).

Well data within DTA indicate that permafrost does not generally extend into the saturated zone and usually does not act as a confining layer. Stratification due to deposits of silt, sand, gravel, and boulders causes permeability within the alluvial sequence to vary widely. Well yields in DTA are as high as 1,500 gallons per minute (Wilcox 1980).

In this region, the water table is generally located closer to the land surface with increasing distance from the Alaska Range. The water table near eastern DTA slopes north with gradients ranging from 1 to 25 feet per mile. Seasonal water table fluctuation varies from 20 to 60 feet in response to recharge from river and stream channels and from precipitation (Wilcox 1980).

Groundwater Quality

Few wells have been drilled on the installation, and data for groundwater quality are limited to areas in the immediate vicinity of Fort Greely. According to the available data, groundwater quality is good at DTA. Water quality measurements were below concentrations recommended by the Alaska Drinking Water Standards (USARAK 2004).

3.2.3 WILDFIRE MANAGEMENT

3.2.3.1 Wildfire Management Direction

Fire management on USARAK installations is required by the Sikes Act and by Army Regulation 200-3. Fire management plans are required by the Resource Management Plan, which is mandated under Public Law 106-65, the Military Lands Withdrawal Act. Additional direction regarding fire management is stated in a 1995 Memorandum of Understanding between the Bureau of Land Management (BLM) and USARAK as well as in the Army wildland fire policy guidance document (U.S. Army 2002). Wildland fire management in Alaska requires multi-agency cooperation. Fire management is a joint effort by USARAK and the BLM, Alaska Fire Service (AFS). The agencies have developed two inter-service support agreements, which establish the AFS's responsibility for all fire detection and suppression on installation lands (AFS and USARAK 1995a,b). In exchange, the Army provides the AFS with use of certain buildings, utilities, land, training services, air support, and other support services.

The AFS also has a Reciprocal Fire Management Agreement with the State of Alaska's Department of Natural Resources, Division of Forestry (AFS and State of Alaska 1998). Under this agreement, the agencies have implemented a coordinated fire suppression effort and have identified areas where each agency has agreed to provide wildland fire suppression, regardless of whether the lands are under state or federal ownership.

The Alaska Wildland Fire Management Plan, which is reviewed each year, designated wildland fire management areas and allowed land managers to establish fire management options according to land use objectives and constraints. The Alaska Wildland Fire Management Plan also established four fire management options: Critical, Full, Modified, and Limited (USARAK 2004). Land managers may select among these options for different parcels of land based on evaluation of legal mandates, policies, regulations, resource management objectives, and local conditions (Alaska Wildland Fire Coordinating Group 1998). In addition, two additional fire management option categories have been developed specifically for lands managed by USARAK. Unplanned Areas are not officially designated but receive fire management equal to the Full management option. The AFS has responsibility for initial response in Unplanned Areas (USARAK 1999b). Restricted Areas or Hot Zones include impact areas and other locations where no "on

the ground" firefighting can be accomplished due to danger of unexploded ordnance. High-hazard impact areas are managed as Hot Zones with Limited management.

3.2.3.2 Fort Richardson

Fire Management Areas

The north post of FRA is classified for Full and Critical fire management options due the high value of resources at risk from fire, in addition to the post's proximity to Anchorage, Eagle River, and Elmendorf AFB (Alaska Wildland Fire Coordinating Group 1998). Most of the north post is classified for Critical fire management. The training areas along Knik Arm are classified for Full fire management. Many military resources at north post are at risk from wildland fire. Cultural resources staff identified sites in the north post area, and management options related to wildland fire have been developed. Cultural resources potentially at risk from wildfire have also been identified in DTA East and Main Fort Greely Post, and management options related to wildland fire have been determined. The north post is bounded by Elmendorf AFB, private parcels, railroad lands, and Native Corporation lands (USARAK 2002b).

The south post has areas classified under Critical, Full, and Limited fire management. Most of the south post is under Full fire management because the area is mainly used for military training and small arms ranges. The alpine zones are classified for Limited fire management because of their remote location. Many military resources are at risk from wildland fire in the training areas of the south post, including two small arms complexes. Additional surveys are needed to ascertain sites where ordnance has been used and disposed. Cultural resources staff identified sites in the south post area, and management options related to wildfire have been determined. The south post is bound by private parcels and state lands (USARAK 2002b).

Fire History and Firefighting Resources

The Alaska Fire Service maintains incident reports for fires on the lands used by USARAK. Record keeping has varied over the years. Some fires, therefore, have more information available than others. Eight fires were recorded between 1956 and 2000, and ranged from one to 25 acres. All fires were human-caused (USARAK 2004). Incendiary devices and lightning are the two major causes of fires on installation lands. Other less common causes of fire are field burning, exhaust, recreation, trash burning, and warming fires.

Three management actions are used to prevent wildfires. First, the likelihood of starting a fire is reduced by limiting military activities, as imposed by the fire danger rating system. Certain military activities are restricted when thresholds of risk are reached. Weather readings are collected by the USARAK Fire Department and used to calculate the fire danger rating according to the Canadian Forest Fire Danger Rating System. The fire department provides the rating to Range Control, which restricts the level of munitions and pyrotechnics as the fire danger increases. All munitions may be prohibited during extreme fire danger conditions. Second, wildfire danger is lessened by decreasing fuel hazard through the mechanical removal of fuels and through prescribed burning. The third management action to help prevent wildfires involves constructing and maintaining fire or fuel wood breaks.

Fire probably had a more important influence on ecosystem functions in the Anchorage area during presettlement times. Wildfires were found to be prevalent in the 1800s and early 1900s. Forty-eight percent of FRA over the past 200 years has been affected by fire (Jorgenson et al. 2002). This was indicated by the occurrence of early to mid-successional forest stages that have developed since the fires in the 1800s and early 1900s (Jorgenson et al. 2002). Although fires were relatively small and localized due to the

weather and climate, settlement resulted in fire suppression and the development of road systems that further reduced natural fire frequency at FRA.

Although wildfires are a concern at FRA, they are rarely a significant problem. Numerous fires have been recorded in the Matanuska-Susitna Valley to the north, but no major fires have occurred on FRA since 1950 (Jorgenson et al. 2002). Severe drought conditions occur about once every 20 years, and, in normal years, there is an average of less than five wildfires. These fires are usually mission-related, small, and easily contained.

The FRA Fire Department provides the initial response for wildfire suppression, which has traditionally been confined to areas behind the small arms complex. Because of the extensive mortality of white spruce in the area, fire prevention activities were conducted in 1999 and 2000 to reduce fuel loads adjacent to the small arms ranges (USARAK 2002b). When necessary, BLM reimburses the Alaska Division of Forestry to suppress wildfires in the southern half of the state, including FRA. The Division of Forestry also provides training for wildfire suppression at FRA. USARAK and Elmendorf AFB have a mutual aid agreement for fire suppression (USARAK 2002b).

There is some concern over the spruce bark beetle that killed most of the larger white spruce in the north and south post training areas. The dead spruce has resulted in high fuel load conditions on the forest floor. Additionally, the deaths of the larger spruce trees have allowed areas to be taken over by bluejoint reedgrass, another potential fire risk (USARAK 2002b). The absence of wildfires may be inhibiting the potential for optimal ecosystem development. The current infestation of spruce bark beetles in old-aged timber is one problem that may have been exacerbated by a lack of wildfires (USARAK 2002b). To reduce this threat, 60 acres of dead spruce were removed along the Stuckagain Heights residential area, and 10 acres of dead spruce were removed near another housing area. Additionally, Grezelka Range was recently treated with a 15-acre prescribed burn to reduce fuel loads.

3.2.3.3 Donnelly Training Area

Fire Management Areas

Most of DTA West is classified for Limited fire management because few resources are at risk from fire, and USARAK recognizes that fire is a natural process in ecosystem function (Alaska Wildland Fire Coordinating Group 1998). A private hunting lodge, located along the extreme western boundary of DTA West, is given Full fire suppression status. The northern boundary of DTA West is classified for Modified fire management to provide a buffer to adjacent state lands that are classified under Full management status. DTA West is bounded by private parcels and state lands (USARAK 2002a).

DTA East is a Full fire management area due to the close proximity of the community of Delta Junction. This area is subject to high winds and extreme fire behavior, further supporting the Full fire suppression status. The northern portion of the Fort Greely Main Post is a Critical fire management area due to the life and property at risk (Alaska Wildland Fire Coordinating Group 1998. The Army does have structures at risk throughout DTA East. These resources have been identified and mapped. DTA East and Fort Greely Main Post are bounded by allotments, private parcels, and state lands, including a portion of private and state land known as the “Key Hole” (USARAK 2002a).

Fire History and Firefighting Resources

Fires are common at DTA. Fifty-nine percent of DTA has burned since 1950, and a considerable portion has burned more than once (Jorgenson et al. 2001). Approximately 16 percent of DTA has burned within the past 30 years, and, based on fires recorded on the installation since 1950, 1.2 percent of the area has

burned annually. From 1980 to 2000, 89 fires were reported at DTA (USARAK 2002a). Of these, 78 were caused by humans and 11 were due to natural causes. Eighty-eight percent of all reported fires were caused by military training activities. Two large fires occurred between 1997 and 2000. The first was a 2,500-acre fire caused by lightning in 1997, and the second was a 53,720-acre fire in 1998. The average interval for recurrence of fire for any given area varies from 100 to 150 years (USARAK 2002a). In 1999, the Donnelly Flats Fire burned approximately 18,000 acres of DTA East and Main Post.

Recent fuels management projects on DTA include the removal of dead spruce, the creation of a fuel break on the northern portion of DTA East, and a 3,000-acre prescribed burn on Texas Range. These projects reduce fuels by removing highly flammable spruce and promoting regeneration of less flammable hardwoods.

3.2.4 CULTURAL RESOURCES

The ROI for Alaska includes the geographic extent of Fort Richardson and the DTA (Error! Reference source not found.). The DTA began as the arctic training area attached to Fort Greely southeast of FWA. Impacts within the ROI would result from stationing of additional personnel, construction of new SBCT-related projects, and increased training activity including increased quantity and frequency of traffic and increased munitions use. The baseline information for this discussion is summarized from the U.S. Army Alaska Transformation FEIS (USARAK 2004). More detailed discussions are available in the FEIS and in Robertson et al. (2006). Comparatively little systematic survey has been completed in the training areas of Fort Richardson or in the DTA. Consequently, generalizations about the cultural resources are tentative.

Prehistory refers to the investigation of cultures before the availability of written records. Alaskan prehistory varies by region due to conditions that enhanced or limited human occupation. The extent of glacial coverage, and the rate and directions of glacial retreat, largely influenced the availability of resources within each region to support prolonged human occupancy and activity. Interior Alaska was probably inhabited at least 13,000 years ago, and the coastal regions were probably inhabited later.

History designates that period following the introduction and use of written documents as a form of communication and preservation of knowledge, from which textural resources may also survive. The timing of the transition from prehistoric to historic periods varies from region to region. In interior Alaska, the historic period begins in the 1860s when traders began entering the area. In south-central Alaska, the historic period probably began in the late 1700s.

PTRCSs are those properties that are associated with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of that community. Examples of properties that may be considered as PTRCSs are locations associated with traditional beliefs of an Alaska Native group about its origins, its cultural history, or the nature of the world.

In the evaluation of the prehistoric and historic eras of interior and south-central Alaska, DTA and nearby Fort Wainwright are in the interior area and Fort Richardson is in the south-central area. The prehistoric eras for interior Alaska are Paleoarctic Tradition (12,000 to 6,000 years Before Present [BP]), Northern Archaic Tradition (6,000 to 2,000 BP), and Athabascan Tradition (2,000 to 150 BP). Those for south-central Alaska are Early Holocene (8,000 to 6,000 BP), Middle Holocene (6,000 to 3,000 BP), and Late Holocene (3,000 to 1,000 BP). The historic eras of interior Alaska are Early Contact (AD 1810 to 1880s), Gold Rush (AD 1880s to 1928), Development of Infrastructure (AD 1890s to 1910s), Military Activities (AD 1890s to present), and those of south-central Alaska are American Era (AD 1867 to 1938) and Military Era (AD 1939 to present).

The prehistoric and historic traditions for Fort Wainwright and DTA in the interior are summarized in the Transformation FEIS (USARAK 2004). The prehistory and history of FRA in south-central Alaska differs from the interior. The prehistoric and historic periods or traditions of this area are also summarized in the FEIS (USARAK 2004).

3.2.4.1 Fort Richardson

Prehistoric Context

The Early Holocene traditions of south-central Alaska were similar to those of the interior and may have been derived from them. In the Middle Holocene, there is a poorly represented shift away from terrestrial animals to marine resources. Sites of the Late Holocene represent a Pacific Eskimo adaptation with characteristic pottery and transverse knives (ulus). The Late Prehistoric is characterized by Athabascan material culture including house depressions, cobble spall scrapers, and fire-cracked stone. These archaeological traditions are thought to be associated with Dena'ina Athabascans.

The earliest known site in the Cook Inlet region (Component 1 of the Beluga Point site near Anchorage) dates to no earlier than 8,000 years ago. This site is associated with the Denali Complex. No sites of this era are known on Fort Richardson. The Middle Holocene Era is also poorly represented in the region. Findings of this era in Component 2 at the Beluga Point Site suggest an affiliation with the Ocean Bay Tradition. No sites of this era are known on Fort Richardson. Numerous sites of the Late Holocene Era have been identified in the Cook Inlet region. These sites show an affiliation with the Pacific Eskimo. No sites of this era are known on Fort Richardson. Many late prehistoric Athabascan sites are also known in the region. Most of these sites are believed to be associated with the Dena'ina people who were here when Cook arrived. No sites of this era are known on Fort Richardson.

Historic Context

Captain Cook searching for the Northwest Passage in 1778 encountered the Dena'ina in Cook Inlet. However, there had been Russian fur traders in the region since early in the century, and there had undoubtedly been earlier, undocumented contacts. The Dena'ina hunted caribou, seal, moose, bear, mountain goat, squirrel, and Dall sheep and harvested salmon. They shared many traits and tools with the neighboring Eskimo. Several Dena'ina villages had been located near Fort Richardson. Historically, the largest village in the area was Knik, near the mouth of the Knik and Matanuska Rivers.

The U.S. purchased the rights to Alaska from Russia in 1867. Beginning in the 1880s, Anglo-American trappers, miners, and settlers moved into the area, and the influx accelerated after the discovery of gold. The early gold rushes along the coast had little impact on Cook Inlet, but the rushes in the interior had a strong impact. Anchorage grew with the development of the Alaska Railroad beginning in 1913. Anchorage was established as a construction camp and headquarters for the railroad. Anchorage took its name from nearby Knik Anchorage, an important supply center for the interior during the gold rushes. The railroad was completed in 1923. During the Great Depression, schools, roads, bridges, trails, harbors, and water systems were built and developed throughout Alaska. The Old Richardson Highway from Matanuska Valley to Anchorage was built across what is now Fort Richardson in 1935.

Elmendorf Field was established in 1939 and renamed Fort Richardson in 1940. The location was chosen for its comparatively favorable weather and access to the transportation resources of Cook Inlet and the Alaska Railroad. In World War II, Fort Richardson was a coordinating spot for the Alaskan war effort and a strategic location for defending Alaska from invasion. Later in the Cold War, Fort Richardson preformed primarily a training and administrative support role.

Archaeology

At least six archaeological surveys were completed on Fort Richardson between 1970 and 2000. Four of these were small reconnaissance surveys that did not identify any archaeological sites. The cantonment area of Fort Richardson is considered to have a low potential for prehistoric sites. In contrast, six of the Fort Richardson training areas have been identified as having high archaeological sensitivity. A survey of selected sample zones in 1980 identified four historical archaeological sites. Six archaeological sites are known on Fort Richardson (USARAK 2004). One site is prehistoric (ANC-01175), four are historic (ANC-00263, ANC-00264, ANC-00265, and ANC-00668), and one was reported as both prehistoric and historic (ANC-00822). Later reports list the last site as prehistoric. All of the sites are recommended as not eligible. Portions of the Seward to Susitna segment of the Iditarod Historic Trail cross Fort Richardson, and may have associated historical archaeological sites. Many areas need to be surveyed and there is a strong potential for newly discovered sites, particularly in those settings identified as having high archaeological sensitivity.

Several areas on Fort Richardson were excluded from the list of areas identified for archaeological inventories in the Integrated Cultural Resources Management Plan (ICRMP) because of mission considerations (including hazards), low site potential, or low potential for mission impact. These areas include:

- The Eagle River Flats impact area, which contains UXO and is off-limits to cultural resource management;
- The Alpine Tundra zone, which is an ecologically sensitive zone protected by restrictions on training;
- Wetlands, including freshwater and saltwater marshes, bogs, and lakes that are often covered by standing water and have a low potential for undisturbed archaeological sites. This does not include riparian areas along drainages; and
- Cantonment developed areas that have been extensively disturbed for development and are unlikely to retain undisturbed archaeological sites. Some isolated portions of the cantonment near Ship Creek and Camp Carroll are comparatively undisturbed.

Historic Built Environment

Two historic building surveys have been completed on Fort Richardson for the Nike Site Summit and Cold War era buildings. The Nike Summit Inventory documented 27 contributing buildings and structures (USARAK 2004). Nike Site Summit has been listed on the NRHP as a historic district. CEMML developed a Cold War historic context for Fort Richardson so far only the buildings associated with Nike Site Summit have been identified as contributing to the context. Additional studies of Cold War era historic buildings on Fort Richardson are currently underway. Fifty-four buildings and structures currently exist in the Fort Richardson Historic Area.

Properties of Traditional, Religious, or Cultural Significance

Several groups of Dena'ina Athabascans traditionally used lands on Fort Richardson including the Knik Tribe, Eklutna Village, the Chickaloon, and the Tyonek. Dena'ina Athabascans have been investigating PTRCSs on Fort Richardson. These include traditional use locations, coastal bluff locations, and shoreline locations, many of which may have associated archaeological remains. Some of these sites may be eligible to the NRHP as TCPs, but to date, none of them have been identified as TCPs.

3.2.4.2 Donnelly Training Area

Prehistoric Context

The prehistory of interior Alaska is characterized by a varied, often nomadic settlement pattern with a focus on hunting of terrestrial animals. The Paleoarctic and Northern Archaic tool traditions included stone, bone, antler, and ivory tools. The lithic technologies included the use of microblades. With the Athabascan Tradition, materials culture begins to reflect distinct cultural groups.

In the late Pleistocene, the interior of Alaska was a relatively ice-free bowl surrounded by the extensive continental ice sheet to the east and the Cordilleran glacier to the west. The Alaska Range forced storm systems from the south upwards creating a rain shadow and a broad, ice-free, steppe-tundra environment to the north. This environment supported large herbivores such as bison, mammoth, mastodon, horse, camel, moose, caribou, antelope, elk, and yak. Most of the earliest evidence of human occupation in Alaska is found in the interior. The first humans could have crossed from Asia into Alaska as early as 30,000 BP, but the earliest known sites in the interior date from 11,000 to 12,000 BP.

Paleoarctic Tradition sites (12,000 to 6,000 BP) are typically camps on terraces, buttes, and bluffs or other high ground from which they could locate and track large mammals, such as bison and mammoth, in the treeless environment. The nomadic lifestyle of these groups, the perishable organic materials that they used, and subsequent environmental changes have made it difficult to find traces of their cultures. This tradition includes the Denali Complex and the Chidadn Complex. The Denali Complex includes distinctive microblade cores, core tablets and their derivative microblades, large blades, biconvex bifacial knives, certain end-scraper forms, and burins. The Chidadn Complex is characterized by Chidadn points, and bifacially flaked triangular or teardrop shaped projectile points.

The Northern Archaic Tradition (6,000 to 1,000 BP) was an adaptation to expanding boreal forests. Settlement patterns and the range of terrestrial animals exploited were more varied in this period. The hallmark of the Northern Archaic Tradition is the presence of side-notched points.

The Athabascan Tradition (2,000 to 150 BP) begins to exhibit distinct traits of subgroups within general geographic areas. These traditions develop into the historic subgroups of the region. The Athabascan Tradition includes a reorganization of raw materials, which de-emphasized stone tool making and increased the emphasis on the manufacture of items from native copper and organic materials. More detailed descriptions of these traditions can be found in Section 2.4.1 of the ICRMP for Fort Wainwright and Fort Greely.

Historic Context

First contact between the Athabascan and European cultures probably commenced with trade goods from Russian fur trading posts on the Copper and Yukon Rivers and a British trading post established where the Porcupine River joins the Yukon River in 1847. Contact between Tanana Athabascans and white traders increased steadily in the 1860s. Several village sites associated with the early contact period have been reported near the Fort Wainwright Main Post, two just northwest of the fort's boundary and one near Fairbanks. With the U.S. Purchase of Alaska in 1867, control of the trading stations fell to the Americans, and American traders established new posts on the Yukon and Tanana Rivers. Natives became increasingly exposed to trade and established permanent settlements.

Gold discoveries in 1886 and 1894 northeast of Fairbanks led to an influx of Anglo-American settlements in the Tanana Valley. The first settlers established themselves in the Tanana Valley in the 1890s. A trading post was established at Chena in 1900, and another was established by E. T. Barnette at the future

town site of Fairbanks in 1902. Further gold discoveries in 1902 and 1903 near Fairbanks led to a dramatic increase in the town's population to 15,000 in 1909. Most of the mining activity occurred on creeks north of Fairbanks, and no workings associated with early mining have been found in the in DTA. Cabin remains, sites, and trails from the Gold Rush period have been identified.

The initial means of transport to interior Alaska was by riverboat along the Yukon River to the Tanana River, either upstream from St. Michael or downstream from the White Pass and Yukon railhead at Whitehorse in Canada. An overland trail was established in by the U.S. Army 1899, from Valdez to Eagle, and later to Fairbanks. The original Valdez to Fairbanks Trail crossed the Main Post and followed what is now Gaffney Road. Portions of the trail were upgraded to a wagon road and an automobile road over the years. Roadhouses were established along the route to cater to the travelers. Traces of several of these roadhouses have been identified including Gordon's Roadhouse and Sullivan's Roadhouse on Fort Greely (DTA). The Alaska Railroad was later completed, linking Fairbanks to Anchorage.

Military aviation activities began in the Fairbanks area in 1913. The town became the aviation hub for interior Alaska by 1928. Federal legislation in 1935 and 1937 established Ladd Airfield near Fairbanks, which became the home of the Cold Weather Detachment in 1940. Ladd Field was affected by World War II, following Japan's invasion of the Aleutian Islands in June 1942. The facilities at Ladd Field expanded rapidly due to increased activities of the Sixth Air Depot Group, the Cold Weather Test Station, and the Air Transport Command. Auxiliary bases were established to assist Ladd Field with the traffic of the Alaska-Siberia Lend-Lease Program between 1942 and 1945, including Big Delta (Fort Greely). After the formation of the U.S. Air Force in 1947, Ladd Field was designated Ladd Air Force Base. However, the Army's mission at Ladd Field continued, with anti-aircraft and ground defense and cold-weather testing and training. The Army's cold-weather testing and training missions shifted from Ladd Field to the Arctic Training Center at Fort Greely, including Donnelly Flats, in the mid-1950s. Construction at Fort Greely in the 1950s included the military's first nuclear power plant. In 1961, the U.S. Air Force transferred Ladd Air Force Base to the Army, which was then renamed Fort Jonathan Wainwright.

With the introduction of the Intercontinental Ballistic Missile in the 1960s, Fort Wainwright's anti-aircraft mission diminished, and the post's primary mission became peacetime Army deployment, the defense of Alaska, and coordination of Army National Guard and Reserve activities in Alaska. In the 1970s, Arctic training, including exercises at Fort Greely began to be emphasized. In 1986, the 6th Infantry Division (Light) was activated at Fort Wainwright to function as a rapid deployment force.

Archaeology

Known sites in interior Alaska have been identified predominantly through discoveries by area residents and road construction crews, and other chance discoveries. Systematic investigations in the DTA area began with site investigations around Donnelly Ridge in 1964. In the 1970s, several studies involved a pipeline route and upgrades on Fort Greely. Less than 1 percent of the DTA had been systematically surveyed prior to the FEIS. Twelve surveys were conducted on DTA. Through these surveys, 105 known sites were recorded. Eighteen of the sites are recommended eligible for the NRHP, 56 need to be evaluated, and 31 are recommended not eligible.

CEMML began archaeological surveys of large blocks, particularly in DTA East, in 2002. In contrast to earlier surveys, these block surveys covered entire areas and employed an aggressive sub-surface testing strategy (Robertson et al. 2006). Robertson et al. 2006 lists 52,617 acres of new archaeology surveys on DTA between 2002 and 2005. This is approximately a tenfold increase in the percentage of land surveyed on DTA, but still encompasses a small portion of DTA. These surveys recorded 265 sites, evaluated 108 sites (157 were not evaluated), and found 43 sites to be eligible for the NRHP. As of 2005, 380 sites have been recorded. Of these sites, 167 have been evaluated and 61 have been recommended as eligible for

listing on the NRHP and 213 sites still remain to be evaluated for the eligibility for listing on the NRHP. Twenty of the eligible sites are located with the Donnelly Ridge Archaeological District and are all recommended as eligible due to their contributing significance in the definition of the Denali Complex.

Historic Built Environment

No systematic historic building surveys have been completed for DTA. There are no areas of historic buildings in DTA outside of Fort Greely, which is the built environment in the northeast of the DTA. Several historic building surveys have been completed Fort Greely and at nearby Fort Wainwright and Ladd Field.

Properties of Traditional, Religious, or Cultural Significance

The USAG-AK has been working with many tribes in Interior Alaska, especially those that may be impacted by actions on FWA or DTA. These include Nenana, Dot Lake, Eagle, Healy Lake, Northway, Tanacross, and Tetlin. Current projects are underway to identify TCPs. These projects may identify geographical features with Native place names, berry collecting localities, game migration routes important to subsistence practices, areas frequently used as camps or subsistence areas, places associated with oral histories, or locations of other cultural practices.

3.2.5 LAND USE AND RECREATION

This section discusses the existing land uses and recreational resources in and around FRA and the DTA (**Figure 3-2**).

3.2.5.1 Fort Richardson

The major land use categories for FRA were identified in the USACE's Master Planning Instructions and include range and training land, miscellaneous, maintenance, transportation, housing, community, installation support, and outdoor recreation (USARAK 2004). The land use categories were established as the framework for future land use decisions. Each land use category is evaluated against the established criteria to determine compatibilities, constraints, and opportunities. Land use categories are assumed to be compatible with adjacent land uses.

FRA includes 61,376 acres of land, of which 54,416 acres are designated as range and training land. In addition, 2,828 acres are designated as miscellaneous; 2,091 as maintenance; 339 acres as transportation; 563 combined acres for housing, community, and installation support; and 901 acres of outdoor recreation (USARAK 1999a, b, c). The central part of FRA is dominated by the cantonment area and several training ranges.

Public access and recreational use is allowed on FRA in certain areas. Most of northern FRA is available for public recreation. The southern part of the post is open to non-motorized forms of recreational use; however, the area has few roads or trails and mountainous terrain. Recreational uses of FRA include hunting, fishing, camping, hiking, picnicking, berry picking, bird watching, skiing, and dog sledding. In addition, off-road recreational vehicle (ORRV) use is allowed on maintained roadways and trails in designated areas and includes motorized vehicles, such as snowmobiles, all-terrain vehicles (three- and four-wheeled), and airboats, that do not require maintained roads or open waterways.

Recreational and subsistence hunting and fishing occur on FRA. However, trapping is no longer allowed on FRA because of human health and safety concerns. Conflicting recreational and training land uses, and a generally high volume of use per area, have led USARAK to ban trapping on FRA.

Hiking is also popular on FRA because of its proximity to Anchorage and its position next to Chugach State Parks. Some trails in the southern part of FRA connect directly to trails from Chugach State Park or Centennial Park. In addition, USARAK allows non-commercial rafting by permit along Eagle River.

Moose Run Golf Course and Otter Lake are important recreational areas on FRA. The main cantonment area contains hard-surfaced courts, manicured fields, and simple open spaces. A fitness center and three parks are also used for recreation.

Impact areas are those parts of military lands that are used for weapons targeting and firing practice. High hazard (dudded) impact areas are closed to the public. Dedicated impact areas are not permanently restricted from public access, although permission to enter these areas is limited. The ERF Impact Area is the only impact area on FRA and is off-limits to public access. Covering 2,165 acres on the estuarine tidal marsh at the mouth of the Eagle River, ERF has been used since the mid-1940s as an artillery shelling area. In addition, FRA has other non-dudded off-limits areas associated with small arms ranges. Warning signs are posted on areas of FRA that pose safety concerns, such as firing fans and ranges.

3.2.5.2 Donnelly Training Area

DTA includes 636,599 acres of land. All of the land within DTA is within the USARAK-designated land use range and training land use planning category (USARAK 1999a, b, c). Range and training land facilities are defined as areas of land or water set aside, managed, and used to conduct research; develop, test, and evaluate military munitions, explosives, other ordnance, or weapon systems; or to train military personnel in their use and handling of weapons systems. USARAK range and training land facilities information is summarized in the Range and Training Land Development Plan (Nakata 2001) and the Army Range Inventory Database.

Public access for recreational and subsistence uses is allowed in some areas at DTA, Hunting and trapping are allowed on DTA, and fishing is allowed at 16 lakes on DTA with stocked sport fish populations. DTA also contains many recreational trails east of the Delta River within the west part of the training area and throughout the east side of the training area. The most common hiking route at DTA is to the top of Donnelly Dome, east of the Washington Range along the Richardson Highway.

The eastern part of DTA is generally available year round for all forms of recreation, with the exception of some isolated wetland areas, as well as the Jarvis Creek channel in which no ORVV use is allowed. The 33-Mile Loop runs through this area and contains a number of additional trails within its confines. Other access west of Richardson Highway includes Windy Ridge Road and Meadows Loop.

Central DTA, a region that straddles the Delta River and lies primarily west of the river, is dominated by impact areas. Because of this, most of the central area is closed to the public; however, some recreational use is allowed in the areas north and south of these designations along the northern boundary of the training area and the foothills of the Alaska Range.

DTA West includes both motorized and non-motorized recreational areas. The areas just west of the Delta River along the foothills of the Alaska Range and the southern boundary of DTA are generally available year round for all forms of recreation.

DTA contains both high hazard and dedicated impact areas. The 48,494-acre Oklahoma Impact Area is the largest of the high hazard impact areas, and it is located in the center of the training area, between Delta Creek and One-Hundred Mile Creek, up to the confluence of these two waterways. The Delta Creek Impact Area covers 2,437 acres along Delta Creek, includes both banks, and is adjacent to the Oklahoma Impact Area. These two impact areas are used primarily by the U.S. Air Force as bombing and gunnery

ranges. Washington and Mississippi impact areas are contiguous elongated impact areas that cover 12,207 acres combined, and run along the Delta River for approximately 14.5 miles. These impact areas cover the river channel as well as adjacent lands on both banks. The 8,146-acre Allen Army Controlled Fire Area is north of these impact areas.

The dedicated impact area on DTA consists of the Lakes Maneuver Impact Area. This parcel covers 75,565 acres, and is situated between the Oklahoma Impact Area and the Washington and Mississippi impact areas along the Delta River. The Texas Range and Washington Range areas, southeast of and adjacent to the Washington Impact Area, cover 8,961 acres to the east of the Delta River. In addition to these, the Cold Regions Test Center complex at Bolio Lake is off-limits to public access and use.

Warning signs have been placed on DTA, most of them west of the Delta River. Eleven gates have been constructed along the eastern boundary of the Delta River, and one is located in the north portion of Allen Army Controlled Fire Area. The lands between Meadows Road and the impact area boundary are off-limits and are posted accordingly. Warning signage exists on all probable approaches to restricted areas.

3.2.6 TRAFFIC AND TRANSPORTATION

This section describes the affected environment for transportation resources near FRA and the DTA. The ROI for transportation resources in Alaska includes the transportation resources on and surrounding Fort Richardson and DTA.

3.2.6.1 Fort Richardson

USARAK currently deploys troops for training among its properties primarily using existing roadways. This requires use of the Glenn and Richardson Highways for convoys from FRA to DTA. USARAK deployment exercises may also include air, rail, and sea transport.

Traffic on Alaskan highways has risen steadily over the past decade, including the Richardson, Parks, and Glenn Highways. Vehicle counts along the Glenn Highway between Anchorage and the Matanuska Valley have increased because of development and commuting from the valley to Anchorage.

AR 55-2 provides detailed regulations for convoy preparation and implementation. Army convoys are subject to a permitting process in conjunction with the Alaska Department of Transportation (AKDOT). Convoy sizes vary based on the echelon deploying for training. Large convoys are usually segmented to reduce impacts to traffic on public roads. USARAK standard operating procedures call for large convoys to be broken into groups of no more than 20 vehicles. These groups are then separated by 30-minute gaps to alleviate traffic pressures on Alaska's highways. Highway speed for a military convoy is not expected to exceed 40 miles per hour with the exception of "catch-up speed," listed at 45 miles per hour. Convoys are normally not authorized to travel on post during peak traffic hours.

Deployment miles associated with FRA currently total approximately 212,400 miles per year and may also include air and rail deployment. Current deployment miles from FRA to DTA total 206,400 miles per year (USARAK 2004).

Roadways near FRA include the Glenn and Parks Highways. The Glenn Highway provides access to FRA from the northeast and connects with the Parks Highway in Palmer. This highway continues on to Glennallen, where it connects with the Richardson Highway, a primary route connecting ultimately with Fairbanks and FWA. The transportation infrastructure on FRA includes two gates to the main cantonment area; four primary roads; and secondary roads including Quartermaster Road, Arctic Valley Road, First

Street, Warehouse Street, Fourth Street, portions of Sixth Street, and a segment of Dyea Avenue. Two other small sections include Davis Highway between First and Second Streets and the headquarters.

3.2.6.2 Donnelly Training Area

The roadways serving the DTA and the Delta Junction areas are the Richardson and Alaska Highways and the Allen Army Airfield. Both two-lane highways are maintained year-round. In addition, a maneuver corridor connecting the southern corner of Tanana Flats Training Area (TFTA) and the northern corner of DTA has been established for training purposes (Nakata 2001).

Deployment of troops for training between FRA and the DTA requires use of the Glenn and Richardson Highways for convoys. Battalion- and brigade-sized training exercises on DTA currently occur approximately four or five times per year. DTA is not considered a USARAK property that has significant traffic issues.

Current convoy frequency and size is five company- or battalion-sized deployments per year to DTA. There are minimal traffic impacts associated with current deployment.

3.2.7 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PROTECTION OF CHILDREN

3.2.7.1 Fort Richardson

FRA is located 9 miles east of Anchorage. The ROI for socioeconomics for FRA is the Anchorage region. The Matanuska-Susitna Borough and a few nearby communities within the Kenai Peninsula Borough are also near FRA.

Population

In 2000, Anchorage had a total population of 260,283 (Alaska State Department of Community and Economic Development 2002). This represented more than 40 percent the population of the State of Alaska. Anchorage demographics are generally similar to the statewide averages; however, Anchorage has a lower proportion of Alaska Native and higher proportion of Caucasian population.

Economy, Employment, and Income

In 2000, the total payroll for statewide U.S. Army operations at FWA, DTA, and FRA is about $356.2 million, while the non-payroll expenditures account for about $294.5 million. Together, these total $650.7 million in economic activity for the State of Alaska.

Uniformed military at FRA and Elmendorf AFB total approximately 8,500 employees and comprise almost 24 percent of the total government work force. Including uniformed military, total industry employment is about 140,000.

A military expenditure survey was conducted for FRA personnel in 2002. The survey results indicated that FRA personnel spend 68 percent of their income off-post in the local economy. The proportion of off-post expenditures in the local economy has grown substantially during the years of military presence in Alaska along with the maturation of the local economies. The expenditure survey indicates that a high proportion of the military dollar is spent in the local economy.

In the Municipality of Anchorage, the average monthly earnings across all job classifications in the Anchorage Municipality are $3,037. Average monthly earnings for personnel on FRA are $3,550, about 10

percent higher. Anchorage area's income and poverty statistics are significantly better than the statewide average. Median household income is slightly above the national average, and poverty is significantly below the national average.

Housing

The family housing areas on FRA consist of seven specific neighborhoods, totaling 1,435 units on 273 acres. The neighborhoods are bound on the south and east by hills and a large forested area, blocking potential noise and pollution from the nearby Glenn Highway. The impact of the Army on housing demand in the Anchorage area is not large. In recent years, FRA families have been offered government on-post housing soon after their arrival in Alaska. The 2001 Family Housing Market Analysis (USARAK 2002h) indicated that about 1,400 families live off-post with about 1,300 of those renting. This was in comparison to more than 61,000 units in the Anchorage area.

An evaluation of USARAK's barracks and other troop facilities found that barracks facilities at FRA needed improvement and recommended a major revitalization program to construct new barracks and support buildings, as well as renovation of many existing facilities. FRA is implementing a housing revitalization and new construction program.

The Family Housing Master Plan for FRA proposes nine phases of replacement, revitalization, and housing construction to occur through 2021. As construction or renovation of FRA on-post housing occurs in successive phases, no more than 10 percent of the housing inventory will be unavailable at any time. Any temporary surges in off-post housing demand resulting from these construction projects would be easily absorbed by the Anchorage rental market.

Schools

FRA is located in the Anchorage School District. The school districts in Alaska are largely funded by the State of Alaska. In Anchorage and Fairbanks, the local contribution to the school operating budget is around 30 percent. The Anchorage School District operating budget is about $7,200 per student based on projected students for 2003-2004 (Anchorage School District 2003). The total Anchorage per-student cost, best viewed by the school district's operating costs and debt service, is about $8,200. The local property tax share is about $2,300 per student. The conservative 70 percent figure for debt reimbursement by the State of Alaska results in a total annual per-student cost for the local property taxpayer of $2,600 at most.

Federal Impact Aid has averaged $3,752 per on-post student at FRA over the past 3 years (Lobaugh pers. comm. 2003). Students living off-post are on properties that contribute to the property tax base just as other local residences do. Federal Impact Aid has made an additional payment of about $102 per off-post student over the past 3 years. Impact Aid more than offsets the lack of property tax paid by students living on post.

Environmental Justice

FRA lies 9 miles east of Alaska's largest city, the Municipality of Anchorage. Directly outside of Anchorage, and also relevant to this environmental justice analysis, is the Matanuska-Susitna Borough. In addition to communities from the Matanuska-Susitna Borough, a few nearby communities within the Kenai Peninsula Borough are listed due to their proximity to FRA. The ROI for FRA is based on the analysis of effects on air quality, the most geographically far-reaching potential effect. Communities within a 70-mile radius of the installation are included in this analysis.

Based on U.S. Census statistics from 2000, Anchorage had a population of 260,283 people. Of that total, 72,274 (27.77 percent) were minorities and 18,682 (7.18 percent) had incomes below poverty level. Based on year 2000 statistics, the population of the Matanuska-Susitna Borough had a lower percentage of minorities and a slightly higher percentage of people living below the poverty level compared to Anchorage. The total 2000 population of the Matanuska-Susitna Borough was 59,322, with 7,384 people (12.45 percent) identified as minority, and 6,149 people (10.82 percent) reported incomes below the poverty level.

Protection of Children

A number of children reside in the 1,435 family housing units on FRA. In accordance with the mandates of Executive Order 13045, training plans and construction site maps for projects undertaken on FRA are reviewed to ensure that no dangerous or hazardous activities occur near schools, child care facilities, or other areas with large populations of children.

3.2.7.2 Donnelly Training Area

DTA is located in the Southeast Fairbanks Census Area. Delta Junction is the closest community to DTA. The Army has frequent contact, both formal and informal meetings, with the federally recognized tribes located along the Alaska Highway (Dot Lake, Healy Lake, Tok, Northway, Tanacross, Tetlin) to determine Army impacts to their villages.

Most of the area is unincorporated and is not a well-defined region in terms of political, economic, or social boundaries. For census purposes, this Southeast Fairbanks area was defined to include the region surrounding the Alaska Highway between the Fairbanks North Star Borough and the Canadian border.

Historically, Delta Junction was the closest community directly affected by DTA. The economic impact of personnel using DTA for training operations is mostly felt in the Fairbanks North Star Borough, as these personnel are primarily stationed at FWA. There are also some minor economic influences in the Delta Junction area because of personnel training at DTA, traveling through Delta Junction, and frequenting local establishments.

Population

Delta Junction's racial profile indicates a higher proportion of white individuals and a lower proportion of Alaska Native individuals compared to the statewide average. Delta Junction also has a smaller proportion of black or Hispanic persons compared to statewide averages.

Economy, Employment, and Income

In the Southeast Fairbanks Census Area, about 40 percent of total jobs are governmental. The 13 uniformed military at DTA in 2001 had a monthly earnings average of $1,979. This is lower than pay in Fairbanks, Anchorage, and during the previous history of Fort Greely, where uniformed military pay exceeded the average for the area. Uniformed military are not tracked regularly in labor publications because they do not participate in the unemployment compensation program. Data provided by the Department of Labor do not include uniformed military in totals for government and all industries.

The average monthly earnings in the Southeast Fairbanks Census region in year 2000 were $2,559. In the previous year, payroll averaged $3,041, almost 20 percent higher than the census area in general.

Income and poverty data for the Southeast Fairbanks Census region in year 2000 indicate a substantially lower per-capita income and higher poverty level for Delta Junction. Family incomes are slightly higher than in Fairbanks, indicating that single individuals in poverty are weighing down the per-capita average.

Housing

There is no housing at the DTA. Regionally, housing is available at Delta Junction. Because of the construction of the Missile Defense System at Fort Greely, the vacancy rates for housing in the area have recently been very low. As a result, housing costs have increased in the area and there is currently a shortage of affordable housing near DTA.

Schools

The Delta School District shows a somewhat higher student/teacher ratio and lower expenditures per student than Fairbanks and Anchorage. Although it has a higher cost differential, it does not have the tax base that Anchorage and Fairbanks have to afford supplementing state educational expenditures. Therefore, less is spent per student.

Environmental Justice

DTA is located in the Southeast Fairbanks Census Area, which covers a large region. Several communities in this census area harvest subsistence resources from within the Alaska Department of Fish and Game's Game Management Unit 20D.

Based on census data from 2000, the Southeast Fairbanks Census Area had a population of 6,174. Of that total, 1,297 persons (21 percent) were minorities and 1,136 persons (18.4 percent) had incomes below poverty level.

Protection of Children

No children live on the DTA, and the DTA is secured to prevent trespassing. There are few residences immediately adjacent to the DTA.

3.2.8 HAZARDOUS MATERIAL AND HAZARDOUS WASTE

This section provides an overview of the hazardous materials and wastes typically used or generated within the ROI in Alaska (**Figure 3-2**). The hazardous materials and wastes at USARAK facilities include ammunition and live-fire, unexploded ordnance, POLs, contaminated and IRP sites, lead, asbestos, PCBs, pesticides, and radon.

USARAK has developed and implemented Pollution Prevention Plans to eliminate or reduce hazardous waste, hazardous substances, pollutants, and contaminants. The Army recycles fuel and oil, batteries, antifreeze, and brass from shell casings. In addition, USARAK has purchased an aluminum can recycling machine and actively works to substitute products that pose environmental risks. The Army also has worked to replace ozone-depleting refrigerants and fire protection equipment. The Ozone Depleting Chemical Management Plans for USARAK detail compliance with international and federal laws that restrict the production, purchase, and use of certain ozone-depleting substances.

Most activities that use or generate hazardous materials on USARAK lands are conducted within the cantonment areas. The hazardous materials used or generated at the Army facilities potentially affected by

the proposed project would primarily be at Fort Richardson. DTA is not considered a USARAK property having significant issues associated with hazardous materials or wastes.

3.2.8.1 Fort Richardson

Ammunition, Live-Fire, and UXO

The ERF impact area is off limits to unauthorized personnel. In addition, the impact area is posted with warning signs indicating the potential risks of unexploded ordnance on the impact area.

Petroleum, Oils, Lubricants (POLs) and Storage Tanks

FRA has 22 ASTs with capacities ranging from 300 to 50,000 gallons. All of these tanks are located within the cantonment area and contain diesel fuel, gasoline, aviation fuels (JP-8), and heating oil. Twenty-one of the tanks are double-walled. The exception is the 50,000-gallon tank located at the power plant, which is single-walled but contained within a secondary earthen dike.

The smaller, double-walled tanks are monitored and visually inspected on an annual basis, and the 50,000-gallon tank undergoes a monthly visual inspection. The total fuel capacity stored at FRA does not exceed 420,000 gallons, so an Oil Discharge Prevention and Contingency Plan is not required. However, FRA has a SPCC Plan that details spill response and prevention measures for all fuel storage areas.

Forty-two USTs are located on FRA. These tanks were inspected in 2002. Only a few of these storage tanks are located outside of the main cantonment area, but these are associated with activities on Bryant Army Airfield, Camp Carrol, and Camp Denali, all of which are National Guard facilities located within the confines of FRA. All of the underground storage tanks conform to the applicable Army, State of Alaska, and USEPA guidelines. These tanks are monitored monthly, and are equipped with electronic monitoring devices designed to detect leaks and overfills. Each is constructed of double-walled steel and protected from rust and corrosion.

Contaminated and IRP Sites

Groundwater and soil on some parts of FRA have been impacted by contaminant releases from a variety of sources. Maintenance operations in motor pools, aircraft hangars, and other industrial operations generate most of the hazardous waste on the post. Major sources of contaminants include releases of petroleum products, chlorinated solvents, white phosphorus, and PCBs.

The Army has investigated and conducted cleanup operations at 114 sites on FRA. Contamination at 65 of these sites was related to spills or leaks from underground storage tanks. Seventeen of these sites were grouped into five operable units (investigated as one action) under Superfund authority. Records of Decision have been signed for four of the operable units (A, B, C, and D) and the remedial investigation for Operable Unit E began in 2002.

Areas impacted by contamination include the Eagle River Flats Impact Area (an estuary contaminated with white phosphorus), Poleline Road Chemical Disposal Area (buried chemical agent identification sets and release of chlorinated solvents), former fire training areas, fuel storage facilities, disposal areas, and former PCB storage sites. All known or suspected major sources of contamination are located in either remote, unpopulated areas of FRA or in industrial operations areas. No off-site migration by any contaminant of concern has been detected.

As of 2004, the Army was conducting ongoing cleanup operations at 13 sites. All of the currently active sites, as well as 27 closed sites, are controlled to prohibit excavation of soil or use of groundwater. These institutional controls are implemented to manage access to the sites. The controls were established because contamination exceeded requirements for clean closure of the sites after remediation efforts were completed. All sites where institutional controls were established are tracked using a geographical information system that includes maps, site descriptions, and contaminant data for each site.

Any entity performing work on FRA must obtain permission, in the form of an Excavation Clearance Request, from the Army prior to excavating. Permission to excavate is granted only after a review of the environmental conditions. If proposed excavations are in areas where controls have been established, permission to excavate may be denied. Otherwise, the entity performing the excavation will be required to sample and remediate any contamination encountered during excavation.

Lead

Lead-based paint surveys (Hart Crowser 1997a) and risk assessments were also conducted in representative family housing units at FRA. The results of the surveys indicated that lead hazards were present in most family housing units, the most common type being deteriorating lead-based paint. Some of the surveyed units were identified with elevated lead levels in dust or exterior soils. Some testing has been conducted on other buildings outside of family housing. All buildings inspected have had lead-based paint on interior or exterior surfaces.

Asbestos

Limited asbestos surveys were conducted on family housing units on FRA (Hart Crowser 1997a). Asbestos-containing materials, such as floor tile, linoleum, mastic (adhesive), wallboard, pipe insulation, pipe-fitting insulation, and tarpaper, were found in most family housing units surveyed. Most material appeared to be in good condition, and any asbestos-containing material that was damaged was either abated or removed. Neighborhood revitalization programs have resulted in the removal of asbestos from many housing units. All asbestos materials that are removed are documented for disposal in asbestos cells at local landfills.

With the exception of the housing units, few buildings on the posts have been surveyed for asbestos. USARAK has developed an Asbestos Management Plan in accordance with Army Regulation 200-1. This is designed to reduce exposure to occupants and workers on post and to ensure compliance with federal laws.

Pesticides/Herbicides

USARAK has implemented an Integrated Pest Management Plan for FRA. The goal of the plan is to provide guidance to operate and maintain effective programs that ensure effective and environmentally safe pest control. The function of the Integrated Pest Management Plan is to provide acceptable management of pests.

Radon

Radon testing is common in many buildings throughout Alaska, including those on USARAK properties. All Army installations are required, under the Army Radon Reduction Program (AR 200-1), to maintain and update records pertaining to radon assessments. A radon survey was conducted at FRA during between 1989 and 1990. The survey indicated that many structures at FRA exceeded the 4 pCi/L regulatory limit and required mitigation actions to reduce radon levels.

Radon records for FRA were inadvertently destroyed, but radon monitoring and mitigation continue in an effort to replace documentation that was previously destroyed. Radon surveys are conducted for all newly constructed facilities.

Hazardous Wastes

FRA is registered with the USEPA as a "Large Quantity Generator" of hazardous waste, per the Resource Conservation and Recovery Act (42 U.S.C. 6901). Hazardous wastes at FRA are associated with equipment maintenance (e.g., vehicles, boats, and aircraft) and facilities operation. Hazardous materials include petroleum-contaminated absorbent pads, batteries, light ballasts, mercury-containing light bulbs, non-recyclable oils and fuels, compressed gas, non-recyclable hydraulic fluid, lead-based paint, paint, paint thinners and solvents, photo-developing chemicals, sandblast residue, solvents and degreasers, thermostats with mercury ampoules, and non-recyclable transmission fluid. The wastes are temporarily stored in drums at satellite accumulation points located around post. Satellite accumulation points are located where wastes are generated on a continual basis. Other locations or facilities that do not generate wastes are subject to on-call collection of hazardous wastes.

Currently, Building 45-125 on FRA serves as the centralized hazardous waste collection site. All hazardous wastes that are collected on post are brought to this facility to be processed for off-post disposal. During 2001, FRA generated 4,959,080 pounds of hazardous waste. This amount was artificially high because of off-site disposal of PCB-contaminated soil. On average, hazardous waste generated at FRA is less than 100,000 pounds per year.

Biomedical Waste

A small amount of biomedical or infectious waste would be generated and temporarily stored at the medical and dental facilities on FRA. The Army follows the AR-200-1 guidelines for the handing, use, and disposal of medical and dental supplies and wastes.

3.2.8.2 Donnelly Training Area

Because of the lack of a cantonment area, housing, and potential waste-generating facilities, DTA uses and generates fewer hazardous materials or wastes compared to FRA. The hazardous materials and wastes on training lands at DTA include ammunition, live-fire, unexploded ordnance, and lead contamination on small arms ranges. In addition, the maintenance facilities at Beales, Bolio Lake, and Texas Range have storage tanks for the POLs used at distributed at these facilities. Pesticides and herbicides have been used around the maintenance facilities and on the small arm ranges.

DTA contains both high hazard and dedicated impact areas. Impact areas are posted with warning signs indicating the potential risks of unexploded ordnance on the impact area. Warning signs have been posted on all probable approaches to restricted areas on DTA.

3.2.9 BIOLOGICAL RESOURCES

3.2.9.1 Fort Richardson

Vegetation Community Descriptions

An ecological survey of FRA conducted by Jorgensen et al. (2002) indicates that the 61,972-acre post is covered by forest (55.3 percent), scrublands (23.7 percent), barren lands (5.5 percent), human disturbed lands (13.1 percent), bog and wetland (1.6 percent), meadow (0.7 percent), and water (0.5 percent).

Forests in the FRA area closely resemble the boreal forest of interior Alaska, but some tree species typically found in the coastal spruce/hemlock forest also occur. The distribution of forest types at FRA is heavily influenced by elevation, which ranges from sea level to more than 5,000 feet in less than 10 miles. The lowland interior forest zone exists below approximately 1,500 feet. The subalpine zone of intermittent forest, shrub, and meadow habitats exists from approximately 1,500 feet to 2,500 feet in elevation. The forest cover reflects the transitional nature of the climate between maritime and continental (Gabriel and Tande 1983).

Graminoid forb meadows, alder (*Alnus* spp.), and dwarf birch (*Betula glandulosa* and *B. nana*) dominate the upper elevations. Grasses, herbs, willows (*Salix* spp.), and alders dominate the vegetation in a narrow band along Cook Inlet and at elevations above 1,500 feet on the Chugach Mountain slopes. Wetlands are predominantly black spruce tree bogs and treeless bogs with a variety of low shrub and graminoid forb communities. Alder shrub is a dominant type of the Lowland Interior Forest Zone.

Low shrubs and dwarf shrubs occupy wet and mesic to dry habitats. The latter include mesic to dry vegetated sites and dry non-vegetated sites such as rock talus and blockfields. Wetter habitats include late-melting snowfields and snowbeds. Viereck et al. (1992) and Lichvar et al. (1997) provide detailed descriptions of tundra sites.

The cantonment area includes utility corridors, roadsides, railroad rights-of-way, borrow pits, woodcutting areas, small arms ranges, firing points, landing zones, and other human-modified areas. FRA contains a coastal halophytic zone. This area is influenced by salt water and includes shoreline tidal flats and the 2,137-acre ERF estuarine marsh on Cook Inlet.

The quality and quantity of marketable timber at FRA are limited. Spruce bark beetles (*Dendroctonus rufipennis*) have damaged many older stands on the post, and other stands are in a degraded condition (USARAK 2002e). Enhancing timber marketability would require intensive timber stand improvement and several decades for regrowth. Presently, there is little justification to improve forest resources at FRA.

Wetlands

Wetlands comprise approximately 8 percent (4,990 acres) of FRA (Lichvar and Sprecher 1998). Wetland types on the post include estuarine, marine, palustrine, riverine, and lacustrine.

ERF is the largest expanse of wetlands at FRA (2,165 acres). This site was identified by the USEPA to be on the National Priorities List for investigation and cleanup of hazardous substances (USARAK 1998). As a result, an ecological risk assessment was conducted (USARAK 1998). Aquatic plants that grew in the contaminated area did not contain sufficient concentrations of white phosphorus to be considered a risk to the environment or the food chain. Use of white phosphorus containing munitions was banned in all impact areas in Alaska in 1991, and is no longer used in any wetlands throughout the United States. Cleanup operations at ERF are ongoing.

Wetland types found on FRA include:

- ***Coastal Halophytic Zone*** (3 percent) – The marine wetland ecosystem includes the shoreline tidal flats and ERF, a 2,165-acre estuarine marsh. The tidal flats are typically barren except for some areas of rye grass (*Leymus mollis*) and Lyngbyei's sedge (*Carex lyngbyei*). Approximately 30 percent of ERF is composed of barren mudflats; an additional 30 percent is dominated by Lyngbyei's sedge. The remaining 40 percent would include glasswort (*Salicornia europea*), alkali

grass (*Puccinellia hultenii*), maritime arrow grass (*Triglochin maritima*), goose tongue (*Plantago maritima*), sedges, and rye grass communities (Lichvar et al. 1997).

- ***Lowland Forest Wetlands*** (3 percent) – These are palustrine wetlands. Open black spruce wetlands comprise about 62 percent of the lowland forest wetland. The understory is dominated by bluejoint grass, oak fern (*Gymnocarpium dryopteris*), red raspberry (*Rubus idaeus*), lowbush cranberry (*Vaccinium vitis idaea*), and red currant (*Ribes triste*). Graminoid/herbaceous wetlands cover about 21 percent of lowland forest wetlands; bluejoint re*edgrass (Calamagrostis canadensis*), and sedges (*Carex* spp.) dominate. Sweetgale-ericaceous shrub wetlands cover about 11 percent of the lowland forest wetland type. These wetland types are found bordering Ship Creek, McVeigh Marsh, in the Fossil Creek bottomlands, areas southwest of ERF, and drainages south and west of Clunie Lake.
- ***Lacustrine Wetlands*** (1 percent) – These areas surround open water and are vegetated with sedges (*Carex rhynophysa* and *Carex kelloggii)*. These wetlands also contain marsh five-finger (*Potentilla palustis*), marsh (*Equisetum palustre*) and woodland horsetail (*Equisetum sylvaticum*), Cahmiss' cottongrass (*Eriophorum russeolum*), shore sedge (*Carex limosa*), and sphagnum moss (*Sphagnum* spp.) (Lichvar et al. 1997).
- ***Alpine and Subalpine Wetlands*** – Alpine and subalpine wetlands comprise about 0.3 percent of FRA. Bluejoint meadow wetlands, found in subalpine areas, are the most common of these.

USARAK has obtained a 5-year wetland permit to conduct military training in wetlands at Fort Richardson. This permit allows limited maneuver or other military activities to occur in some wetland areas, where in the past, no activity was permitted at all. USARAK may not damage more than 40 acres per year of wetlands. If that amount is exceeded, training in wetlands will be prohibited, and individuals may be liable for fines and other penalties. Restoration of all damage is mandatory. Monitoring for 2000 and 2001 indicated that approximately 3.5 acres were damaged each year (USARAK 2004).

Noxious Weeds

Invasive species occur at Fort Richardson in Alaska; however, relative to military installations and federal lands in the lower 48 states, the invasive problem is currently minimal in nature. USARAK is committed to taking a proactive approach to managing invasive species.

In 2000, USARAK Environmental RTLA Coordinators met with other Alaska land managers (NPS, U.S. Forest Service [USFS], BLM, and U.S. Air Force) to discuss Alaska's weed management concerns. This was the first meeting among Alaska's plant scientists to assess invasive weed concerns. Area agencies decided that a cooperative and coordinated effort within the state was needed to monitor and manage invasive plants, and the Committee for Noxious and Invasive Weeds Management (CNIPM) was formed. The main goal of CNIPM is to heighten the awareness of the problems associated with nonnative invasive plants and to bring about greater statewide coordination, cooperation, and action to halt the introduction and spread of undesirable plants. The committee holds monthly teleconference meetings and an annual conference. USARAK participates regularly in these conferences and has presented their invasive plant monitoring efforts via poster and oral presentations (USARAK 2000e).

Wildlife

Wildlife and fisheries management on USAGAK lands has traditionally supported recreational and subsistence use, maintenance of populations and habitats, and preservation of biological diversity. Wildlife and fish populations and their habitats are managed cooperatively by USAG-AK, the Alaska Department of Fish and Game, and the U.S. Fish and Wildlife Service. More information on wildlife and fisheries can

be found in the Transformation of U.S. Army Alaska Final Environmental Impact Statement (USARAK 2004).

The Army's specific goals for wildlife include improving habitat quality for game and non-game species, using nesting structures to improve productivity of birds, and maintaining sustainable harvest of game populations. In addition, USARAK manages vegetation to ensure that the age class is diversified. The natural resources program encourages Watchable Wildlife by constructing viewing platforms and nest boxes, and it strives to integrate ecosystem management into planning (USARAK 2002d, e, f).

Mammals. Large mammals on Fort Richardson include black bear (*Ursus americanus*), grizzly bear (*Ursus arctos*), moose (*Alces alces*), and Dall sheep (*Ovis dalli dalli*). Small game and furbearers found on Fort Richardson include coyote (*Canis latrans*), lynx (*Lynx canadensis*), red squirrel (*Sciurus vulgaris)*, snowshoe hare (*Lepus americanus*), hoary marmot (*Marmota caligata*), pine marten (*Martes martes*), beaver (*Castor canadensis*), river otter (*Lutra canadensis*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*), porcupine (*Erethizon dorsatum*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), wolf (*Canis lupus*), and ermine or short-tailed weasel (*Mustela erminea*).

Two wolf packs inhabit the east side of the Glenn Highway, and another pack probably occupies the west side near ERF (Peirce 2002). The Ship Creek pack occupies the eastern portion of Fort Richardson, and the ERF pack occupies the western portion. In recent years, beluga whales (*Delphinapterus leucas*) have been sighted within ERF, as far as 1.25 miles up the Eagle River and in Cook Inlet adjacent to Elmendorf AFB. Beluga whales have also been observed pursuing salmon (*Oncorhynchus* spp.*)* along rivers (Quirk 1994). Harbor seals (*Phoca vitulina*) are sighted occasionally.

Avian Species. Surveys have identified 75 species of birds in the tidal salt marsh, including 24 species of waterfowl (USARAK 2004). Additionally, approximately 40 species of passerines and neotropical migratory birds and six species of raptors are found at Fort Richardson (Gossweiler 1984; CH2M Hill 1994; Andres et al. 2001; USARAK 2002d, e, f; Schempf 1995). Three species on the list of Priority Species for Conservation are confirmed to be on Fort Richardson (Boreal Partners in Flight Working Group 1999). These include the Northern shrike (*Lanius excubitor)*, varied thrush (*Ixoreus naevius*), and blackpoll warbler (*Dendroica striata*). The golden-crowned sparrow (*Zonotrichia atricapilla)*, also a priority species, is found on Fort Richardson.

Reptiles and Amphibians. One species of amphibian, the wood frog (*Rana sylvatica*), is commonly found in bogs, freshwater and saltwater marshes, and lake margins on post. Wood frogs are important prey species for sandhill cranes (*Grus canadensis*) (CH2M Hill 1994). No reptiles occur on Fort Richardson.

Fisheries. Ten species of fish are found in Fort Richardson's lakes and waterways. Four lakes on Fort Richardson (Clunie, Gwen, Otter, and Walden) are stocked under the Fort Richardson Army Base Subdistrict Plan (Alaska Department of Fish and Game [ADFG] 2002). In addition, Chinook (*Oncorhynchus tshawytscha*), and coho salmon (*Oncorhynchus kisutch* (Walbaum)) are stocked in Ship Creek under the Alaska Department of Fish and Game Enhancement Plan (ADFG 2002). Fort Richardson's only significant non-game fish are the three-spine stickleback (*Gasterosteus aculeatus*) and the slimy sculpin (*Cottus cognatus*).

Threatened and Endangered Species/Species of Concern

Federally listed threatened, endangered, and delisted plant and animal species in Alaska are presented in Appendix E of the Transformation of U.S. Army Alaska Final EIS (USARAK 2004). No federally threatened or endangered species have been found on USARAK lands (USARAK 2002d, e, f).

Species of Concern. The State of Alaska has a cooperative agreement with the Alaska National Heritage Program to identify "species of concern." Plants considered species of concern are vulnerable to extirpation at the global or state level due to factors such as restricted geographic range, small population size, low population density, specialized habitat requirements, loss of habitat, or extreme sensitivity to habitat disturbances (Alaska Natural Heritage Program [AKNHP] 2002). This list considers rare vascular plants that may be imperiled but require further analysis. The State of Alaska's listings of endangered species and species of concern do not provide legislative protection, but does provide management consideration during project planning.

The State of Alaska also maintains a list of sensitive species, endangered species, and species of special concern for wildlife. Although state listed species on may overlap those on the federal listing, the state listed species are not afforded the same legislative protection (ADFG 1998). Animal species may be imperiled, but because their status requires further analysis, the AKNHP monitors and evaluates these species (AKNHP 2002).

By definition, a Species of Special Concern is any species or subspecies of fish or wildlife or population of mammal or bird native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. The list of Species of Special Concern is an administrative listing established in May 1993 and amended in October 1998 by the Commissioner of Fish and Game (ADFG 1998).

Threatened and Endangered Plants. Conservationists in Alaska have become increasingly aware of the importance of rare plants and rare plant communities to ensure maintenance of biological diversity. Due to the vastness of the Alaskan landscape, the botanical profile in many areas is poorly understood. It is incumbent on land management agencies, including the Army, to survey, monitor, and conserve rare plants. The Alaska Natural Heritage Program helps agencies track rare plants. Moreover, the designations of rare, endangered, and species of concern are the same as with wildlife and fisheries.

The 1997 (Lichvar et al.) floristic inventory of FRA identified 26 rare plants on the post, and these are being tracked by the Alaska Natural Heritage Program's Biological Conservation Database.

A comprehensive survey of rare plants was included as part of a statewide floristic inventory conducted in 1994. Only one plant species on the federal endangered species list is known to occur in Alaska. FRA is not within the range of this species. However, the former candidate species fleshy dandelion *(Taraxacum carneocoloratum)* is found in alpine areas of the Chugach Mountains. This plant has been discovered at an increasing number of sites in Alaska, and its candidate status may be reevaluated.

FRA's alpine and wetland areas support plant species that are considered rare in Alaska or globally imperiled (Lichvar and Sprecher 1998). The alpine ecosystem is the most sensitive in terms of plant species and the most vulnerable to effects of military training. A rare plant, the luminous moss (*Schistostega pennata*), has been found on FRA. This is the first documented occurrence of this cryptogam outside of southeast Alaska.

Three types of vascular plants are listed as species of concern by USARAK. Selkirk's violet (*Viola selkirkii)* is rare in Alaska. Fleshy dandelion is rare globally and in Alaska, and this plant is taxonomically questionable. Although the status of small saxifrage (*Saxifraga adscendens oregonensis*) is secure globally, it is considered to be rare and imperiled in Alaska.

Threatened and Endangered Wildlife. Federal designations for animal species follow the same rankings as the plant species: endangered, threatened, proposed, candidate, and delisted. Listed species are man-

aged and monitored by the USFWS. There are no known federally threatened or endangered species on Army lands in Alaska. If a species is ever found on Army lands, or if an already identified species is listed, USAG-AK will follow the procedures listed in the U.S. Army Garrison 2007-2011 INRMP (USARAK 2007).

Several species have the potential to be near the ROI. Beluga whales have been seen swimming in the Eagle River, approximately 1 mile from the Cook Inlet (Quirk 1994). Harbor seals are sighted occasionally. Brown bears have also been seen on the post, and the population of brown bears on the Kenai Peninsula has been listed as being a species of concern.

Sightings of several avian species of concern and sensitive species have been reported at FRA (Andres et al. 1997). Trumpeter swans are fall and spring migrants through ERF, and a pair has successfully nested for several years near Otter Lake. American ospreys (*Pandion haliaetus*) are occasionally sighted on the post, although breeding sites are not confirmed. Olive-sided flycatchers (*Contopus cooperi*) are probable breeders in the vicinity, but nest sites have not been confirmed. The blackpoll warbler is a migrant and possibly breeds on the post. Although the primary habitat for the Townsend's warbler (*Dendroica townsendi*) (mature white spruce forests) has been altered due to spruce bark beetle outbreaks (Andres et al. 1997).

The olive-sided flycatcher, gray-cheeked thrush (*Catharus minimus*) (found on-site, but not a Priority Species in Region), Townsend's warbler, blackpoll warbler, American osprey, and American peregrine falcon (*Falco peregrinus*) are sensitive species and species of concern, as identified by the State of Alaska.

3.2.9.2 Donnelly Training Area

Vegetation Community Descriptions

The ecological survey of DTA by Jorgensen et al. (2001) reported an aerial cover profile of the post, which included areas of forest (29.0 percent), scrublands (58.1 percent), tundra (4.4 percent), barren lands/partially vegetated (3.6 percent), human disturbed (0.6 percent), and water (4.3 percent).

Forest cover at DTA is diverse and includes pure stands of spruce, hardwoods, and spruce/hardwood mixtures. The dominant types include white spruce (*Picea glauca*), paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), black spruce (*Picea mariana*), and spruce/hardwood.

Scrub communities occur at high mountain elevations, in small stream-valley bottoms, and as "pioneer" vegetation on disturbed sites. Typical scrub fields are composed of alder, willow, and dwarf birch (*Betula nana*). Krummholz spruce stands are relatively common at higher elevations. Dense thickets of scrub communities, dominated by willow and alder, exist along floodplains or disturbed sites such as gravel pits, road shoulders, rights-of-way, and military trails (USARAK 1980).

Most barren areas on DTA are located on gravel bars along the Delta River, the Little Delta River Delta Creek, Jarvis Creek, and Granite Creek (Jorgensen et al. 2001). Barren lands also occur above tree line, along ridges, and adjacent to rivers and streams. Barren sites are also located near the small portion of Trident Glacier that lies within DTA.

Higher elevation sites along the southern portion of DTA support moist tundra, which grades into alpine tundra, and then into barren land. These areas occur on MacArthur Mountain, Patton Mountain, Molyb-

denum Ridge, and Trident Glacier (USARAK 1980; Jorgenson et al. 2001). Small areas of tundra also exist in the northwest portion of DTA at elevations above 3,500 to 4,000 feet.

Many potential timber stands at DTA are not harvestable because they are located in impact areas contaminated by unexploded ordnance. Current commercial potential for the remainder is limited to firewood, sawtimber, and half-log white spruce markets.

Wetlands

Approximately 68 percent (431,940 acres) of DTA is wetland (Lichvar 2000), with palustrine, riverine, and lacustrine types included. The palustrine shrub wetlands are the most common types at DTA. According to Lichvar 2000, the most prevalent ecotypes likely to be wetlands at DTA include:

- ***Lowland Wet Low Scrub and Lowland Tussock Scrub Bog*** (35 percent of DTA) -– These palustrine wetlands are characterized by loamy soils that are poorly drained because of permafrost. The bogs contain sedges, tussock meadows, and lowland moist meadows with bluejoint reedgrass. Willows, dwarf birches, and forbs may also be present.
- ***Lowland Wet Needleleaf Forests*** (12 percent of DTA) – Soils are loamy, poorly drained because of permafrost, and moderately acidic. These forests are dominated by black spruce. This type of wetland is common in the Donnelly Drop Zone and Eddy Drop Zone.
- ***Alpine Wet Tussock Meadow and Alpine Wet Low Scrub*** (6 percent of DTA) - These ecotypes are characterized by loamy soils, underlain by permafrost, and are moderately to strongly acidic. These areas are found above tree line, primarily in the southern portion of DTA West, along the foothills of the Alaska Range.
- ***Riverine Wetland Complex*** (6 percent of DTA) – These areas are located along inactive floodplains of meandering and headwater streams with soils consisting of inter-bedded silts and sands. Wetlands located along the Delta River and Jarvis Creek are riverine.
- ***Lacustrine Wetland Complex*** (1 percent of DTA) – Lacustrine water bodies are ponds and lakes with or without emergent or floating vegetation, and wetland vegetation on the margins. This also includes basins in fine-grained lacustrine deposits with vegetation dominated by grasses.

Noxious Weeds

The RTLA program at DTA monitors for invasive plants. Recent surveys have not revealed any major invasive plant infestations (Clark 2005). At DTA, vegetation control is conducted along major roadsides and around range buildings, fences, and targetry infrastructure. Weeds, such as dandelions, knotweed, and crabgrass, are treated when requested through the USARAK DPW.

Wildlife

Mammals. Large mammals on DTA include black bear, grizzly bear, moose, Dall sheep, caribou, and bison. Donnelly Training Area typically has three or four wolf packs, although the structure, distribution, and numbers of packs in a given area are highly variable. Other furbearers on the training area include lynx, beaver, river otter, pine marten, muskrat, mink, coyotes, red fox, wolverine, and four species of weasel. Anderson et al. (2000) conducted a small mammal survey at DTA. Eleven species of small mammals were found in this study.

Avian Species. Several upland game species are found on DTA including three species of both ptarmigan (*Lagopus mutus*) and grouse. Twenty-eight species of ducks and geese use lands and waterways on the

training area. Approximately 300,000 sandhill cranes, a large portion of the world's population, migrate through DTA between late April and mid-May. Anderson et al. (2000) reported sightings of black-backed woodpecker (*Picoides arcticus*), gray-cheeked thrush, varied thrush, bohemian waxwi*ng (Bombysilla garrulus*), Townsend's warbler, blackpoll warbler, Smith's longspur (*Calcarius pictus*), and rusty blackbird (*Euphagus carolinus*). The dark-eyed junco (*Junco hyemalis*), savanna sparrow (*Passerculus sandwichensis*, Wilson's warbler, and orange-crowned warbler (*Vermivora celata)* were observed most frequently. A variety of other bird species are found on DTA including three loon (*Gavia* spp.), two grebe, three gull, one tern, one dove, one hummingbird, one kingfisher, and six woodpecker.

Reptiles and Amphibians. Wood frogs are the only amphibians on Donnelly Training Area. No reptiles exist on Donnelly Training Area.

Fisheries. DTA West is within the Fairbanks Management Area for fisheries, and DTA East is within the Delta Junction Management Area. Sixteen lakes on DTA, ranging in size from 3 to 320 acres, are stocked. Naturally occurring populations of lake chub (*Couesius plumbeus*), northern pike (*Esox lucius*), sculpin, and the northern longnose sucker (*Catostomus catostomus*) are found in lakes at DTA (BLM and U.S. Army 1994). Major streams on DTA are generally silt-laden and do not support fisheries. Jarvis Creek and the Delta River are glacially fed and flow from the north side of the Alaska Range to the Tanana River. Downstream of DTA, the Tanana River provides year-round habitat for some species, overwintering habitat for others, and supports migratory species. The mouth of the Delta River is important to chum salmon (*Oncorhynchus keta*). Grayling (*Thymallus arcticus (Pallus*)) migrate through these glacial streams to clear tributaries to spawn, and a few clear streams provide summer habitat for grayling (Parker 2004).

Threatened and Endangered Species/Species of Concern

There are no known federally endangered or threatened species on DTA, but there are several rare, uncommon, or priority species (USARAK 2002d).

Threatened and Endangered Plants. The AKNHP's Biological Conservation Database tracks rare plants and is updated regularly. At least eighteen species of rare vascular plants being tracked by AKNHP (2006) occur on DTA (USARAK 2007). *Carex sychnocephala* is currently the only one of these 18 plant species ranked on USAG-AK's short list of species of concern for ecosystem management. It is considered rare and critically imperiled in Alaska.

Threatened and Endangered Wildlife. State and/or federal species of concern and sensitive species include the American peregrine falcon, gray-cheeked thrush, trumpeter swan (*Cygnus buccinator*), American osprey, Townsend's warbler, blackpoll warbler, and the olive-sided flycatcher. Suitable nesting habitat for peregrine falcons occurs along the bluffs of the Little Delta River on the western boundary of DTA and along the Delta River Bluffs (USARAK 1999a, 2002e; Anderson et al. 2000; Mason 2004).

The olive-sided flycatcher, Townsend's warbler, blackpoll warbler, American osprey, and American peregrine falcon are sensitive species and species of concern, as identified by the State of Alaska, that are found at DTA (USARAK 2004).

3.2.10 AIR QUALITY

3.2.10.1 Air Quality Standards

Air quality in Alaska is regulated by the CAA Amendments of 1990 and the ADEC.

3.2.10.2 Clean Air Act Conformity

The only non-attainment areas in Alaska are the PM_{10} non-attainment areas in Anchorage and Juneau. However, the Fairbanks area (North Star Burough) monitors air quality for CO and $PM_{2.5}$. For the years 2004 through 2006, there were no periods during which the CO NAAQS was exceeded. During this period, there were no periods when the $PM_{2.5}$ standards were exceeded (excluding natural events).

3.2.10.3 Climate and Meteorology Conditions

Temperature inversions resulting from high latitudes, long winter nights, and weak daytime solar insulation are common in some areas of Alaska. During temperature inversions, cold air masses are often held in lowland areas by surrounding hills and mountains, and covered by a blanket of warm air masses. These conditions result in very stable atmospheric conditions that leave the air stagnant and trap pollutants near the ground, preventing winds from dissolving and dispersing the pollutants. Exceptionally strong inversions are almost always present when surface air temperatures fall below -30°F, and their strength increases as temperatures drop further (Benson 1970).

When the ambient temperature drops below -20°F, ice fog, a condition unique to frigid climates, may form and contribute to pollution and visibility problems. Ice fog forms when water vapor is exposed to completely saturated air. Water vapor from sources such as automobiles is cooled so quickly when it is exposed to ambient air that tiny ice particles are formed. Ice fog is a form of air pollution in populated areas where the topography, combined with strong inversions, causes air to stagnate (Benson 1970). In a study by Benson (1970), the largest source (64 percent) of ice fog in Alaska was cooling water dumped into rivers from power plants. Combustion of fuels from automobiles, power plants, and fuel oil accounted for 32 percent of localized ice fog. The remaining 4 percent was contributed by miscellaneous sources such as people, animals, and leaks from houses and steam lines.

3.2.10.4 Fort Richardson

FRA is in attainment with all criteria air pollutants and is therefore subject to the prevention of significant deterioration (PSD) regulations. The installation is a major source of criteria air pollutants and, until recently, was a major source for hazardous air pollutants. The facility has the potential to emit more than 250 tons of at least one criteria pollutant. FRA has submitted an application for a Title V Operating Permit to the ADEC and must comply with several National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for several hazardous air pollutants and source categories. FRA also has to comply with 40 CFR 60.116b for fuel tanks. This standard requires maintaining records for the life of the tank. The records include a copy of the tank design, capacity, and throughput.

FRA has decentralized the central heating and power plant and pursued an Alaska State Air Quality Control Plan (#237CP02) in order to install 523 small boilers and water heaters. The boilers and heaters are distributed throughout the installation to provide heat. Any new buildings constructed at FRA will have to include the installation of a boiler to provide heat to the building.

FRA must comply with the permit conditions identified in its Air Quality Control Plan and the provisions in the Title V Permit Application (submitted by USARAK to the state in 1997). Compliance with the Air Quality Control Plan must be monitored and certified annually. Compliance with the Title V Permit Application's provisions must be monitored and reported annually. Compliance is monitored through internal Department of Army audits. The results of these audits are submitted to ADEC upon completion. A National Emissions Standards for Hazardous Air Pollutants (NESHAP) applicability determination was conducted to identify the unpromulgated Most Available Control Technology standards that could apply to the USARAK installations if the standard(s) had been written within the legislated timeframe.

There are 16 significant sources of air pollution listed in the emissions inventory section of FRA's Title V Operating Permit Application. In addition, there are many smaller insignificant sources listed in the inventory. Insignificant sources include small diesel generators used for backup power in individual mission-critical buildings, paint booths, small boilers, storage tanks, etc. The ADEC defines many air emission sources as insignificant and requires minimal information on these operations. The original state permit to operate (9421-AA006) imposes several limitations on the emission sources at FRA's central heating and power plant.

FRA coordinates prescribed burning activities with BLM. There is a prescribed burn plan in place for the installation. When necessary, USARAK and BLM coordinate with the state to obtain burn permits. USARAK adheres to the provisions in the burn permit.

The USARAK installations are currently subject to source category NESHAPs. FRA is subject to the National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities (40 CFR 63 Subpart M) because this NESHAP was regulated prior to FRA establishing a minor source status. FRA was subject to the Revised Standard for Hazardous Waste Combustors (40 CFR 60; 40 CFR 63-Proposed Rule) and the NESHAPs Off-Site Waste and Recovery Operations (40 CFR 63) while the deactivation furnace (EU13 in the Title V Permit Application) was in operation. The deactivation furnace was decommissioned and dismantled, and these requirements no longer apply at the facility. In a letter dated 16 February 2001 to the ADEC, this emission source was formally removed from FRA's list of significant sources in its Title V Permit Application. FRA is also subject to the asbestos NESHAP. The asbestos NESHAP establishes work practices to minimize the release of asbestos fibers during activities involving the processing, handling, and disposal of asbestos and asbestos-containing material when a building is being demolished or renovated. The requirements and standards are described in 40 CFR Part 61, Subpart M.

FRA does not store hazardous chemicals above threshold amounts described in 40 CFR 68. Preparation of a risk management plan and a full risk assessment was therefore not required under the accidental release program.

FRA had two outstanding Clean Air Act notices of violations and one closed Clean Air Act notice of violation. One violation pertained to the central heating and power plant, while the other violation involved the operation of the munitions deactivation furnace. Both of these violations were resolved in August 2003. The violation for the deactivation furnace was received before the emission source was decommissioned. The notice of violation associated with the dry cleaning plant pertained to recordkeeping violations, but the recordkeeping problems were resolved, and the plant is currently in compliance with the provisions outlined in the Title V Permit Application. The notice of violation at the dry cleaning plant has since been closed through formal correspondence with the USEPA Region 10 and ADEC.

3.2.10.5 Donnelly Training Area

No air quality monitoring data exist for DTA or for any of the surrounding communities. Air quality is assumed to be near baseline conditions due to the low density of human development and emission sources. This training area is in attainment for all criteria air pollutants. Ice fog forms under the same conditions at this location as in FWA, but the duration of the episodes at DTA are generally shorter. Temperature inversions do occur, but due to the limited number of emission sources, the inversions are not likely to cause CO levels to exceed the NAAQS.

Primary power is provided by the local utility (GVEA), with backup from the Fort Greely central heating and power plant. DTA is not covered under FRA's Title V permit. To date, DTA has not triggered permitting thresholds under the Clean Air Act.

Black Rapids uses generators for primary power. USARAK is requesting a Permit by Rule for the storage tanks at this location. No emission sources exist at Gerstle River Training Area.

Most of the emission sources associated with 7,000 acres of Fort Greely were transferred to the Space Missile Defense Command on 01 October 2002. The Title V Permit Application originally submitted by USARAK in December 1997 was formally transferred from USARAK to Space Missile Defense Command.

3.2.11 NOISE

3.2.11.1 Fort Richardson

The existing noise environment for FRA is documented in the Installation Environmental Noise Management Plan (Montgomery et al. 2001a). Noise sources include traffic, aircraft, and small- and large-caliber weapons. The Installation Environmental Noise Management Plan concluded that no significant noise problems were associated with existing operations at FRA.

The noise contours for both small arms and larger caliber weapons are contained within military lands (FRA or Elmendorf AFB), but some Zone II and Zone III contours do overlap a small portion of the ocean near Eagle River Flats

3.2.11.2 Donnelly Training Area

Routine noise generating operations at DTA involve rotary-wing aircraft, artillery training, and bomb detonation. In addition, other minor sources of noise include construction, traffic, and recreation. Some of the noise reported on and off the Army installation is due to Air Force aircraft flying over DTA airspace. The current noise environment at DTA is documented in the Installation Environmental Noise Management Plan that was prepared for Fort Greely in 2001. The DTA noise contours stay within the installation.

3.2.12 AIRSPACE RESOURCES

No MOAs are located above FRA, but Restricted Area R-2203 covers portions of the post. This restricted area is divided into three subunits. R-2203A covers the southern tip of Eagle River Flats Impact Area, as well as central parts of FRA training areas. R-2203B covers the eastern half of Eagle River Flats and extends across the northern portion of FRA. R-2203C covers the western half of Eagle River Flats. The vertical limits for R-2203A and R-2203B are from ground level to 11,000 feet above sea level, and R-2203C's vertical limits range from surface to 5,000 feet above sea level (USARAK 2004).

Military deployment requirements are met by Elmendorf AFB, one of the largest airfields in Alaska. It is a critical refueling point and personnel and cargo transfer point along the shortest air traffic route between military installations in the United States and the Far East. Elmendorf AFB is located adjacent to FRA and roughly two miles from the center of the cantonment area. The airfield can support any type of military aircraft, including C5 Galaxies.

Bryant Army Airfield, located adjacent to the cantonment area and the Glenn Highway, has a main, hard-surfaced, north/south runway, which is 3,000 feet in length. It also has a hard-surfaced crosswind runway oriented east/west. Bryant Army Airfield is used primarily by the Alaska Army National Guard as a base for its fixed-wing and rotary aircraft.

Anchorage International Airport, 15 miles southwest of FRA, is the nearest commercial airport. It is the largest airport in Alaska for both passenger and air cargo operations. More than 30 carriers provide pas-

senger service in the recently renovated airport. It is the largest air cargo handler and transfer site in the United States.

The types of special use airspace within the DTA area are restricted areas and MOAs, including civilian flight corridors. Buffalo MOA overlays DTA East located east of the Richardson Highway (USARAK 2004). The special airspace limits range from 300 feet above ground level to 6,999 feet above mean sea level.

Most of DTA West is within the Restricted Area R-2202 (USARAK 2004). The western two-thirds of DTA West, including the Oklahoma and Delta Creek impact areas, lie under R2202B and R2202C. The remainder of DTA West lies under the restricted areas R2202A and R2202C. The Oklahoma and Delta Creek impact areas, which are under R2202 B and C, are used for military aircraft training and are designated as air restricted areas (USARAK 2004). The areas are closed to all civilian aviation during periods of scheduled activity.

Two civilian flight corridors have been established. One is along the Alaska Highway near Delta Junction and the other is along the Richardson Highway near Donnelly Dome. These corridors, which extend from ground surface to 3,500 feet amsl, were established to maintain civil aviation access along major VFR flyways along the Alaska Highway, Richardson Highway, and the Trans-Alaska Pipeline. Both the corridors are highly used for civil aviation. For example, the corridor along the Richardson Highway leads to Isabel Pass, which is one of two passes through the central Alaska Range between Fairbanks and south-central Alaska. Civilian air traffic primarily uses Isabel Pass because of its higher probability of favorable weather conditions.

3.2.13 ENERGY

From 1952 until 2003, FRA had a central steam plant that provided for the Post's heating and electricity needs. The plant used natural gas supplied by Enstar Natural Gas Company. However, between 2001 and 2003, FRA transitioned from the central steam plant to a distributed heating system. In 2003, FRA completed the transition. Now, buildings on FRA are heated by a more energy-efficient distributed heating system and most of the electric power is supplied by Anchorage Municipal Power and Light. Anchorage Municipal Power and Light has sufficient capacity to meet the needs of FRA and other customers in its market.

Requirements for electrical power at DTA are met through a combination of power supplied by the Golden Valley Electric Association and on-post generators run by Army personnel. The output from these sources is sufficient to meet the demand for USARAK without crimping public services.

3.2.14 FACILITIES

This section summarizes the real estate, existing facilities, public services, infrastructure, and utilities for the Army installations within the ROI in Alaska.

3.2.14.1 Fort Richardson

This section describes the Army real property and facilities at FRA. The topics addressed include real estate, facilities, public services, and infrastructure and utilities for water supply, wastewater treatment, communications, and solid waste collection and disposal.

Real Estate

FRA includes a total of 61,376 acres of federal land. Existing land use boundaries are defined for the major land use categories identified in the USACE's Master Planning Instructions (USARAK 2004). FRA includes 54,416 acres of land designated as range and training land. In addition, 2,828 acres are designated as miscellaneous; 2,091 as maintenance; 339 acres as transportation; 563 combined acres for housing, community, and installation support; and 901 acres of outdoor recreation (USARAK 1999a, b, c). The land use categories have been established as the framework for future land use decisions.

The FRA Central post is dominated by the Cantonment area, as well as several training ranges. The southern part of the post has few roads or trails in part because of the mountainous terrain of southern FRA. The rights-of-way (ROWs) on FRA include the Alaska Railroad and the Glenn Highway as well as power transmission lines.

Facilities

Facilities at FRA include buildings and improvements, such as housing, community support facilities, installation support facilities, and training and range facilities. Community facilities include shopping, banking, education and recreation activities to police, fire protection and health care facilities. Installation support facilities include range maintenance, vehicle maintenance, administrative support, and supply and storage facilities.

The cantonment area includes utility corridors, roadsides, railroad ROWs, borrow pits, woodcutting areas, small arms ranges, firing points, landing zones, and other developed areas. The cantonment area also has eight individual supply/storage areas (three large and five small) exist within the extended main cantonment area. Two of the large areas are used for ammunition storage. The other large area contains facilities for general-purpose storage, cold storage, deployment equipment storage, and general shipping/receiving.

The overall condition of impact areas at the FRA training ranges is good. Preliminary findings from Palazzo et al. (2002) found minimal contamination from explosive residues and heavy metals because of munitions firing into Washington and Delta Creek impact areas at DTA.

Preliminary results indicate that no contaminants are migrating outside of impact areas in surface water, groundwater, soils, or in plant uptake (Palazzo et al. 2002). Physical impacts from high explosive munitions have resulted in cratering within some areas.

Public Services

Fire management on USARAK installations is required by the Sikes Act and by Army Regulation 200-3. Fire management plans are required by the Resource Management Plan, which is mandated under Public Law 106-65, the Military Lands Withdrawal Act. Additional direction regarding fire management is stated in a 1995 Memorandum of Understanding between the BLM and USARAK as well as in the Army wildland fire policy guidance document (Army 2002).

Wildland fire management in Alaska requires multi-agency cooperation. Fire management is a joint effort by USARAK and the BLM, AFS. The agencies have developed two inter-service support agreements, which establish the AFS's responsibility for all fire detection and suppression on installation lands (AFS and USARAK 1995a, b). In exchange, the Army provides the AFS with use of certain buildings, utilities, land, training services, air support, and other support services.

The AFS also has a Reciprocal Fire Management Agreement with the State of Alaska's Department of Natural Resources, Division of Forestry (AFS and State of Alaska 1998). Under this agreement, the agencies have implemented a coordinated fire suppression effort and have identified areas where each agency has agreed to provide wildland fire suppression, regardless of whether the lands are under state or federal ownership.

The Alaska Wildland Fire Management Plan, which is reviewed each year, designated wildland fire management areas and allowed land managers to establish fire management options according to land use objectives and constraints. Additional information regarding wildfire management is provided in Section 3.2.3.

Outpatient and routine medical/dental services are provided to all active duty military, family members and retirees at the Troop Medical and Gemini Clinic located on post. In addition, Bassett Army Community Hospital is the hub for medical care for more than 10,000 military personnel north of the Alaska Range. This facility provides a variety of medical services for all military and eligible civilians. Two other troop medical/dental facilities exist as well, one in South Post and one in North Post.

Infrastructure and Utilities

Infrastructure and utilities at FRA are currently sufficient to meet the needs of USARAK. Utilities on FRA include water supply, wastewater treatment, communications, and solid waste collection and disposal.

3.2.14.2 Donnelly Training Area

This section describes the Army real property and facilities at DTA. The topics addressed include real estate, facilities, public services, and infrastructure and utilities.

Real Estate

DTA encompasses 636,599 acres of federal land. All of the land on DTA is within the USARAK-designated land use range and training land use planning category (USARAK 1999a, b, c).

The Trans-Alaska pipeline transports crude oil from Prudhoe Bay to Valdez, and the pipeline passes through DTA West. The right-of-way is 50 feet wide plus a four-foot ground area occupied by the pipeline (USARAK 1999a). Other rights-of-way include the natural gas lines (Trans-Alaska Gas System), the Richardson Highway, and various power transmission lines.

Facilities

No family housing or enlisted unaccompanied personnel housing exists on DTA. One range maintenance building (Beales) is located at DTA. The range and training land facilities at DTA include both high hazard and dedicated impact areas.

Public Services

No police, fire protection, health care facilities, or other community facilities exist at DTA. However, the Army performs fire management for the area. Additional information regarding wildfire management for DTA is provided in Section 3.2.3 of this document.

Bassett Army Community Hospital is the hub for medical care for more than 10,000 military personnel north of the Alaska Range. This facility provides a variety of medical services for all military and eligible civilians. Two other troop medical/dental facilities exist as well, one in South Post and one in North Post.

Infrastructure and Utilities

Infrastructure and utilities at DTA is currently sufficient to meet the needs of USARAK. Utilities on DTA include water supply, wastewater treatment, communications, and solid waste collection and disposal.

3.2.15 SUBSISTENCE

3.2.15.1 Fort Richardson

Proximity and Access

FRA is located within the traditional lands of the Dena'ina, northern Athabascan Tribes of Cook Inlet. The Dena'ina traditionally pursued a semi-permanent lifestyle, spending winters in permanent settlements and dispersing in the summer months with the onset of summer fish runs. Seasonal camps at favorable fishing locations were established along riverbanks, coastal edges, and lakeshores. A number of these traditional fish campsites are known to lie within what is now FRA. Once salmon runs had ended, groups would often travel into the mountains to hunt caribou and mountain sheep. Moose, bear, mountain goats, and Dall sheep were often hunted year-round in areas outlying winter village settlements.

The only Dena'ina village remaining in the FRA vicinity is the Native Village of Eklutna, located approximately 10 miles north of the cantonment area and post entrance. However, the Native Village of Knik and many other communities from further up Knik Arm traditionally traveled to the Anchorage area with the June king salmon runs. It is known that many communities in the Cook Inlet region traditionally used a wide variety of subsistence resources that are present today on FRA. Contemporary communities extend through kinship ties into Eagle River and Anchorage, for example. Any reference to specific communities here is based on current proximity of federally recognized tribal governments to USARAK managed lands. It is hoped that a better understanding of subsistence use and traditional use areas on FRA will be gained through ongoing coordination efforts.

Resource Availability

The Federal Subsistence Board has delineated a FRA and Elmendorf AFB Management Area (consisting of FRA and Elmendorf military reservations). Under the "special provisions" for Management Unit 14, the FRA and Elmendorf Management Area is closed to subsistence taking of wildlife per the 2002-2003 Subsistence Management Regulations. Subsistence take under the customary and traditional use determinations are permitted for areas in Management Unit 14C other than FRA and Elmendorf AFB. Hunting on FRA is permitted under State of Alaska harvest management regulations. There are restrictions to season, take, and which rural residents may participate.

3.2.15.2 Donnelly Training Area

Proximity and Access

Healy Lake residents live a subsistence lifestyle (Alaska Department of Community and Economic Development 2002). The village is 29 miles east of DTA.

The towns of Delta Junction and Big Delta are located adjacent to DTA at the junction of the Richardson and Alaska highways. These towns are rural and therefore qualify for subsistence preference under current law. The towns have a developed economic infrastructure.

Approximately 45 miles east-southeast of Delta Junction is the nonnative community of Dry Creek. According to the Alaska Department of Community and Economic Development (2002), at least 15 adult residents rely on the exploitation of natural resources and a number of Dry Creek residents can be characterized as subsistence hunters/trappers.

The Native Village of Dot Lake is about 60 miles east-southeast of Delta Junction along the Alaska Highway. Most of the village's historic subsistence harvest areas end at the Gerstle River (Marcotte 1991). Some residents of Dot Lake, however, travel the extra distance to hunt on DTA.

Resource Availability

Subsistence resources are readily available on DTA. DTA annually hosts a variety of hunting activities based on access and available big game populations. Customary and traditional use has been determined for the following species: brown bear, moose, beaver, coyote, red fox, hare, lynx, marten, mink & weasel, muskrat, otter, wolf, wolverine, grouse and ptarmigan. Subsistence permits can be obtained for the take of these species. Anadromous fish stocks are not available on the training areas, but other freshwater fish can be harvested.

3.3 ALTERNATIVE C – COLORADO

3.3.1 GEOLOGY, SOILS, AND SEISMICITY

The geologic, soil, and seismic conditions of the Fort Carson area and PCMS are detailed in the Fort Carson Transformation Draft Environmental Impact Statement (ASACEl 2007a) and the Piñón Canyon Maneuver Site Transformation Draft Environmental Impact Statement (USACE 2007b), and are summarized below as they pertain to the existing conditions that are used later in Chapter 5 to assess the potential effects of implementation of Alternative C. The ROI includes Fort Carson and PCMS (**Figure 3-3**).

3.3.1.1 Fort Carson

Physiography

The eastern portion of Fort Carson lies within the Colorado Piedmont section of the Great Plains Province, while the western portion is located in the foothills of the Rampart Range section of the Southern Rocky Mountains Province. The Colorado Piedmont section differs from the High Plains to the east and north by its lack of former Tertiary sedimentary deposits, which have been removed by the alluvial forces of the Platte and Arkansas stream systems when they cut valleys several hundred feet below the level at which they formerly flowed (Thornbury 1965). The Rampart Range section commonly refers to the portion of the Colorado Front Range between the South Platte River and the Colorado Springs area, which is interspersed with fault-bounded blocks of Precambrian granites, schists, and gneisses bordered on the east by a belt of Paleozoic and Mesozoic rock foothills 2 to 4 miles wide that dip steeply eastward toward the Denver Basin. Dominant landforms in the Fort Carson area consist of low plains (eastern portion dominated by the drainage of Fountain Creek and its tributaries), and high plains and low hills (southeastern, west central, and western portions) characterized by gently rolling to sharp-crested hills and rocky outcrops of the Rampart Range foothills (Directorate of Environmental Compliance and Management [DECAM] 2003). Landforms on Fort Carson consist of high plains (5,400 to 6,400 feet), low plains (5,400 to 6,200 feet), and steep terrain including Timber Mountain (6,897 feet), Wild Mountain (6,695 feet), and Booth Mountain (6,454 feet) (Topozone 2006).

Figure 3-3 Region of Influence in Colorado for Geology, Soils, Wildlife Management, Cultural Resources, Land Use and Recreation, Hazardous Materials and Hazardous Wastes, Energy, and Facilities

Geology

Geologic units at Fort Carson range in age from the Quaternary period (1 million years ago through present time) to the Pennsylvanian (200 to 250 million years ago). During the Quaternary period, consolidated sediments (shale, limestone, hard sandstone, siltstone, claystone, and conglomerate sandstone and shale) and unconsolidated sediments (fluvial and alluvial sands, silts, gravels, and wind-deposited silts and sands) were deposited in the Fort Carson area (CH2MHill 2005).

Soils

Soil types commonly occurring in the region are aridisol (dry, desert-like soils) and entisol (soils that do not show any profile development and which are largely unaltered from their parent rock soils (USACE 2002a). These soil types are characterized by moderate-to-severe erodibility, landslides, and unstable clay formation movement due to variations in moisture content and temperature (USACE 2002a).

NRCS has identified 34 soil categories and 65 soil associations on Fort Carson. The predominant soil categories found on Fort Carson include the Penrose-Minnequa Complex, Penrose-Rock Complex, Schamber-Razor Complex, and Razor-Midway Complex (Larsen 1981). Additional information on Fort Carson soil types can be found in the INRMP (DECAM 2002a) and information specific to El Paso, Fremont, and Pueblo Counties can be obtained from the NRCS Soil Surveys.

Soil erosion has been a documented problem on Fort Carson, particularly erosion caused by surface water runoff. Soils that present the greatest potential for runoff erosion are clays, silty clays, and clay loams (DECAM 2003a). The eastern portion of Fort Carson, located within the Fountain Creek Watershed, contains soils that have been identified as moderate to high potential for erosion. Specific soil types on Fort Carson of greatest concern for erosion are Wiley-Kim, Penrose-Manvel, and Rizozo-Neville (DECAM 2002a). The Razor-Midway Complex and Schamber-Razor Complex soils range from clay to clay loam and are also highly erosive (DECAM 2006a). Soil erosion is greatest in areas where vegetation has been removed and soils have been disturbed due to construction or training activities. Native soils and vegetation occur throughout the cantonment, primarily in the southern portion, and are broken up by local areas of disturbed soils resulting from construction of post housing and other support facilities. The range areas (non-cantonment) on Fort Carson cover the majority of land on post and supports the greatest area of native undisturbed soils because of its lack of development. Severe wind erosion is a problem in the western portion of the range areas, where areas have been cleared, and modified in the case of berms, for training operations (USACE 2007a). Additional discussion regarding existing soil erosion and ongoing prevention and mitigation activities is presented below in the section on Erosion Management.

Soils occurring at Fort Carson also exhibit high shrink-swell potential because montmorillonitic clays dominate the composition of most of the soil associations on the installation. Shrink-swell potential is the loss or gain of moisture in soil, which causes the potential for soil to change volume in such a manner that increasing soil moisture results in increasing volume and the opposite effect for decreasing soil moisture. Soils with high shrink-swell potential can result in problems with building foundations and stability (DECAM 2003a).

Erosion Management

Removal of vegetative cover throughout Fort Carson has caused gully erosion up to 15 feet deep and 20 feet wide on water courses and minor drainages. Sheet and rill erosion also occurs on Fort Carson, which is erosion of soil by concentrated water running through small streamlets, or headcuts. Detachment in a rill occurs if the sediment in the flow is below the amount the load can transport and if the flow exceeds the soil's resistance to detachment. As detachment continues and flow increases, rills become deeper and

wider. These erosive features have increased the rates of stormwater runoff, erosion of unstable soils, and the transport of sediments on Fort Carson (USFWS 1998). Erosive areas on the Range are typically associated with current military training operations including troop, mechanized, and live-fire training events (USACE 2007a).

Fort Carson currently follows regulations and implements management plans that include BMPs designed to sustain training resources and offset or reduce adverse effects to soils on the post associated with military training. For example, approximately 350 erosion control dams have been constructed to mitigate erosion on Fort Carson (DECAM 2002a). In addition, the USGS monitors four erosion control reservoirs on Fort Carson, as funding resources are available (Kuzmiak 2006). Information on sediment monitoring associated with these erosion control reservoirs is detailed in the Fort Carson Master Draft Transformation EIS (USACE 2007a).

The major plans and regulations implemented to reduce the effects of erosion and sedimentation on Fort Carson (FTC) are FTC Regulations 350-10, 385-63, and 350-19; AR 350-9; the INRMP and EA 2002 – 2006 (DECAM 2002a); the Fugitive Dust Control Plan (DECAM 2004b); and the Section 404 Regional Permit (USACE 2002b). The Draft 2007-2011 INRMP is currently being prepared, but has not yet been finalized. In addition, the EA for the Erosion and Sediment Control Program at Fort Carson (USFWS 1998) identifies mitigation measures that would minimize erosion on the installation. Fort Carson implements erosion control BMPs and specific mitigation measures on the installation under the direction of these plans and regulations, which are detailed in the INRMP (DECAM 2002a).

In addition to the programs described in the INRMP, DECAM's Resource Sustainment Team conducts erosion control management projects at Fort Carson under specific work plans as erosion control needs are identified (Goss 2006). Prior to implementing erosion control projects, the work is subject to environmental review, which may include a Categorical Exclusion/Record of Environmental Consideration, EA, EIS, and/or permitting (Goss 2006). BMPs implemented by DECAM include, but are not limited to:

- Grading of existing roads to ensure proper drainage;
- Installation and maintenance of erosion control structures, such as erosion control dams, rock check dams, waterbars, and hardened (bed of rock) crossings in existing drainages at intersections with established dirt roads;
- Revegetation of disturbed land;
- Bank sloping to reduce gully erosion and to increase military training opportunities; and
- Installation and maintenance of water diversions.

Chemical Constituents in Soils

As described in the INRMP, Fort Carson and the PCMS have some of the highest naturally occurring documented levels of selenium (Se) in the United States. Naturally occurring selenium can acutely and chronically impact both aquatic and terrestrial wildlife when land disturbances, such as military mechanized maneuvers, and excessive erosion occur. Selenium that has leached into lower soil profiles over millions of years is exposed by land disturbance and taken up by selenium receiving plants that are uniquely adapted to these sites. The two most common plants we find as indicators are two native species, desert princess plume (*Stanleya pinnata*), and two-grooved milkvetch (*Astragalus bisulcatus)*. When selenium-loaded soils are exposed to water, selenium can directly enter surface water systems and biologically accumulate in the systems of aquatic and terrestrial animals. Deep-rooted, selenium receptor plants can also redistribute selenium onto the ground surface and into the soil. Other heavy metals naturally oc-

curring at high levels on Fort Carson, such as mercury, follow the same geological and biological pathways as selenium.

There are no government standards or regulations for terrestrial and non-point source selenium, because the understanding of selenium distribution in soil and plant communities is complex and studies are limited. The DECAM completed and implemented a selenium reception study in 1998 in conjunction with the University of Wyoming. The study defined the distribution of selenium in soils and vegetation, and subsequent academic work defined the relationship of selenium concentrations to geologic distribution (DECAM 2002). Additional academic study is ongoing, including a study conducted by the University of California, Riverside in 1999, for which known selenium plant receptor tissues collected from all over the United States led to the observation that princess plume plant tissues from Fort Carson had the highest levels of selenium accumulation. The university then collected genetic material from Fort Carson princess plume populations in 2000 and 2001 to establish a strain of superior selenium receptors for use in biological soil amendments. Additional academic work has quantified selenium in aquatic systems at Fort Carson. Selenium study results provide DECAM managers with site-specific selenium knowledge. Resulting management decisions ensure that land user activities do not create a selenium environmental reception hazard.

In 1998, the DECAM initiated its first major selenium remediation project that dramatically reduced aquatic selenium reception in Training Area 11. About 136,000 cubic yards of selenium-contaminated soil were buried and stabilized (DECAM 2002a). Selenium management is a byproduct of good watershed management considering current knowledge of the issue. Thus, selenium exposure is controlled through the implementation of projects within watershed management plans.

Geologic Hazards and Seismicity

Earthquake potential for the region that includes the Fort Carson area is classified as Zone 1 on a rating scale from 0 to 4, with a rating of 4 indicating the greatest potential. Three main faults — the Oil Creek, Ute Pass, and Rampart Range faults — exist within the Fort Carson area, although none cross into Fort Carson (USGS 2005; Widmann et al. 2002). Documented seismic activity in the region has been limited to small earthquakes with generally undetectable effects (CH2MHill 2005). According to the Colorado Geological Survey (CGS) and USGS, faults in the Fort Carson area could have a low to moderate potential for causing damaging earthquakes (CGS 1999, USGS 2005). It is estimated that several thousand faults within the state have not been extensively mapped or studied; therefore, an accurate estimation of timing or location of potentially dangerous earthquakes is not possible (CGS 1999).

Since 1973, most earthquakes within 60 miles of Fort Carson registered at a magnitude of less than 4.0 on the Richter Scale. The largest earthquake in the area was recorded at a magnitude 4.0 approximately 75 miles from the center of Fort Carson (USGS 2005). The Oil Creek fault, located northeast of Fort Carson, is potentially associated with the Divide earthquake that occurred in the vicinity in 1979. The Oil Creek fault may also be associated with other nearby faults based on its present-day northeast-southwest-directed stress regime orientation (CGS 1997).

No landslides are known to have occurred on Fort Carson within the past few years (Goss 2006), although localized slides resulting in hillwash have occurred in the past given the colluvium nature of soil deposits.

3.3.1.2 Piñon Canyon Maneuver Site

Physiography

The PCMS is located within the Raton basin, along the western margin of the Great Plains Physiographic Province. Topographic features, such as mesas, cuestas, dissected plateaus, deep canyons, and volcanic

formations, are the typical landscape within this section. The basin gradually slopes downward, to the east, with elevations ranging from 5,500 feet amsl in the west to 2,500 feet amsl in the east (USACE 2002a). The topography of PCMS is divided into four general regions, as shown on Figure 3-3 of the PCMS Master Draft Transformation EIS (USACE 2007a). Woodlands made up of primarily piñon pine and juniper cover limestone highlands in the north and northwest. The Hogback, which consists of a basalt dike of volcanic origin, runs east-to-west along the southern boundary of the PCMS. Grassy plains cover the area between the Purgatoire River and the woodlands. The fourth region along the eastern boundary of PCMS consists of canyons that drain to the Purgatoire River. Elevations on the PCMS range from 4,262 to more than 5,576 feet amsl (DECAM 2002a).

Geology

The Raton basin is one of a series of intermontane basins that developed during the late Cretaceous and early Tertiary (approximately 66 million years ago) along the eastern margin of the Rocky Mountain foreland, because of compression associated with the Laramide Orogeny. Numerous volcanoes intruded the Raton basin, forming lone mountain peaks. Volcanic vents, cinder cones, and lava fields typify the geology of the area. Geologic structures at the PCMS are generally associated with the Apishapa Uplift, which is oriented southeast to northeast across the southern portion of the PCMS. Sedimentary rocks associated with the uplift typically dip northeast ranging from 1 to 3 degrees up to 36 degrees (DECAM 2002a). The Black Hills (5,365 feet amsl), Sheep Canyon, and Muddy Creek Monoclines (strata inclined in the same direction) are major smaller structures within the PCMS. Several smaller synclines and anticlines are also associated with these monoclines, including the Model Anticline in the western portion of the PCMS (Nakata Planning Group, LLC 2000).

Soils

Soil types commonly occurring in the Raton section are aridisol and entisol soils. These soil types are characterized by moderate to severe soil erodibility, landslides, and unstable clay formation movement attributable to variations in moisture content and temperature (USACE 2002a). NRCS recognizes 31 soil series and associations and four major landscape types on PCMS (DECAM 2002a). Soils range from shallow to deep and are well drained. The soils are formed primarily from shale, sandstone, and limestone. Each of the four landscape types on PCMS has a characteristic pattern and coverage of soils, which are briefly described below. Additional information on the PCMS soil types can be found in the INRMP, and specific information can be obtained from the NRCS soil surveys for Las Animas County.

Flat to sloping plains in the western portion of the PCMS contain soils formed in wind-deposited lips with intermittent small ridges of limestone that outcrop in some areas (DECAM 2002a). These soils are generally silty, weakly developed, and calcareous throughout. The dominant soils in this landscape are loamy plains on upland flats, saline overflow in the depressions and along intermittent drainages, and sandy plains in sand dunes. This landscape is characterized by medium stability, with moderate soil losses from water erosion and high soil losses from wind in areas where soil is disturbed (DECAM 2002a).

Limestone ridges cross the northwestern corner of the PCMS. Major soils found in this landscape are limestone breaks on steep sideslopes and saline overflow along intermittent drainages. These soils are unstable, experiencing moderate to high water erosion and moderate wind erosion in disturbed areas (DECAM 2002a).

The upland valley that crosses the installation from southwest to northeast, between limestone ridges and the Purgatoire River, contains soils that range from wind-deposited silty soils in flat areas to clayey soils formed from weathered shale in broad depressions. Major soils in this landscape consist of loamy plains,

alkaline plains, and saline overflow. Soils in this landscape are characterized by medium to low stability, moderate water erosion, and high wind erosion rates in disturbed areas.

Soils occurring in the landscape where the Purgatoire River and the associated side canyons form a series of rock-strewn cliffs and rolling mesa tops are predominantly loamy plains and sandstone breaks interspersed with rock outcrops with some areas of loamy plains, saline overflow, and salt meadow soil types. These soils are moderately stable and water erosive in gently sloping areas, but are unstable and severely erosive in steep areas. Soil loss from wind erosion is low on almost all disturbed soils in this landscape.

Erosion Management

The PCMS currently follows regulations and implements the same management plans that were discussed previously for Fort Carson. Banksloping to reclaim incised erosion courses is a type of project implemented by DECAM and ITAM specifically to areas affected by training activities on PCMS. The main dirt roads in the training areas are maintained by contractors or in-house personnel (Goss 2006).

Chemical Constituents in Soil

Chemical constituents in soils on PCMS include naturally occurring selenium, similar to Fort Carson, which was described above in Section 3.1.3.1.5.

Geologic Hazards and Seismicity

The Great Plains Physiographic Province may be seismically active. According to the CGS, some of the 90 potentially active faults in Colorado may be near the Raton Basin (CGS 1999). USGS and CGS databases indicate that faults in the area could have a low to moderate potential to cause damaging earthquakes (USGS 2005, CGS 1999). It is estimated that there are several thousand faults within the state that have not been extensively mapped or studied; therefore, predicting the timing or location of potentially dangerous earthquakes is not possible (CGS 1999).

The PCMS is located within the low-risk Seismic Zone 1 (DECAM 2002a). Several seismic faults are located within the vicinity of the PCMS, although none cross through the installation (USGS, 2005, Widmann et al. 2002). Small faults potentially associated with the Apishapa Uplift are found in the northern edge of the PCMS (DECAM 2002a). As described for Fort Carson, small earthquakes are known to occur in the southeastern portion of Colorado, with generally undetectable effects (DECAM 2002a). Since 1973, most earthquakes within 60 miles of the PCMS registered a magnitude of less than 4.0. The largest earthquake in the area recorded a magnitude of 5.0 approximately 50 miles from the center of the PCMS (CGS 1997). There is low potential for significant seismic activity near the PCMS.

A major landslide occurs every 20 to 40 years at the PCMS, affecting soils with slopes that are greater than 30 percent. Landslides tend to occur at the PCMS from approximately the middle of the western boundary, southwest to Dillingham Ridge (Goss 2006).

3.3.2 WATER RESOURCES

The ROI for surface water resources includes portions of watersheds containing the Fort Carson and PCMS. More specifically, the areas from the upstream military boundary to the downstream watershed boundary of Fountain Creek, Upper Arkansas and Purgatoire watersheds. The ROI for surface water is not necessarily the same as the ROI for groundwater. Because groundwater often crosses topographic (watershed) boundaries, the ROI for surface water is expanded to include the aquifers underlying these watersheds and any aquifers downgradient (in the direction of groundwater flow) from these areas.

3.3.2.1 Fort Carson

Surface Water

Fort Carson is located on the eastern side of the Rocky Mountains adjacent to and south of Colorado Springs. The northern and eastern portions of the installation are located within the Fountain Creek watershed of the Arkansas River Basin and drain eastward into Fountain Creek. The southern and western portions of the installation are located in the Upper Arkansas watershed of the Arkansas River Basin and drain into the Arkansas River to the south (USACE 2005).

Annual precipitation on the installation ranges from approximately 12 inches in the south to 15 inches in the north. Approximately 80 percent of precipitation occurs between early April and late September. Short, intense thunderstorms, typically 2 to 6 hours in duration, are the principal source of flooding on post. Snowfall at Fort Carson averages 42.4 inches annually (DECAM 2002a), and spring snowmelt runoff is generally not a source of flooding.

All of the streams entering and originating in Fort Carson are intermittent. Most of the stream flow consists of runoff from precipitation, although groundwater seepage to streams occurs in some areas. No flow occurs in most reaches of the streams for long periods during the year, with most stream flow occurring between April and June (USACE 2005). Streams generally flow from the northwest to the southeast.

Stormwater in the cantonment area flows into one of three main ditches. These include “B” Ditch, “I” Ditch (Clover Ditch), and the unnamed “U” Ditch. All three ditches are tributaries to Fountain Creek. A FEMA-regulated 100-year floodplain is associated with these three ditches (USACE 2000). Flash floods can occur intermittently during high rainfall-runoff events; however, flooding is rare and not severe (USACE 2007a).

The downrange area includes Rock Creek and Little Fountain Creek, intermittent streams that converge and drain into Fountain Creek approximately 10 miles east of Fort Carson. Turkey Creek flows through the center of the installation and enters the Arkansas River to the south. Red Creek flows through the western portion of the installation and enters Beaver Creek to the south. In general, the sites drain to the south through Beaver Creek and Turkey Creek, eventually emptying into the Arkansas River south of Fort Carson. Floodplains in the southern part of the installation have not been delineated (USACE 2007a).

Surface Water Quality and Use

Teller Reservoir, the largest downrange water body, is listed as an impaired water body on Colorado’s Section 303(d) list. The impairment has resulted in a fish consumption advisory that has been imposed because of a biological accumulation of mercury in soil, terrestrial plants, and fish tissues. Fort Carson has mandated a catch-and-release fishing program in this body of water to reduce the potential for a public health issue. Although the Teller Reservoir has a capacity of approximately 2,600 acre-feet, it frequently contains no water and, in fact, has been dry since 2002 (USACE 2007a).

Although the quality of the surface water is good, it is not a source of domestic water at Fort Carson (DECAM 2002a). Water from most streams and surficial aquifers on the western portion of the installation is suitable for irrigation and would be potable. Surface water that flows eastward across Fort Carson accumulates sediments (i.e., dissolved and suspended solids) that are then concentrated through evaporation. Water from the eastern portion of Fort Carson, however, is still suitable for irrigation with proper management practices. Fort Carson retains 34 surface water rights as specified by the Colorado Division of Water Resources. Of these surface water rights, 20 are surface diversion ditches and 14 are reservoir storage rights (DECAM 2002a).

Groundwater Occurrence

Groundwater at Fort Carson exists in both alluvial and bedrock aquifers. Alluvial aquifers are formed from unconsolidated deposits of stream alluvium and residuum derived from Pierre Shale that are moderately permeable. The alluvial aquifers can provide well yields from 10 to more than 100 gallons per minute (gpm) (Leonard 1984).

In much of the Arkansas River Basin, hydraulic heads are lower in the deep bedrock aquifers than those in the shallow formations, which indicates that deep bedrock aquifers are not in communication with the shallow formations. The primary bedrock aquifer at Fort Carson is the Dakota-Purgatoire aquifer, which can yield 10 gpm, although local fracturing can increase permeability and yield more than 200 gpm. Precipitation and stream flow infiltration recharge the bedrock aquifers (Leonard 1984).

Groundwater Quality and Use

Historically, the quality of groundwater on Fort Carson has been good. Nitrates, however, have recently been detected in the groundwater at multiple locations higher than the regulatory standard of 10 milligrams per liter (mg/L). Currently, Fort Carson and the Colorado Department of Public Health and the Environment (CDPHE) are collaborating to evaluate the possibility that elevated concentrations of nitrates may be naturally occurring as a result of groundwater coming in direct contact with the shale bedrock (DECAM 2005c).

The Army has 16 subsurface water rights, including nine wells for domestic or military use, at Fort Carson. Seven wells classified as future wells are planned for installation when determined to be needed (DECAM 2002a). Water rights directly support the training mission by ensuring adequate water supply for the support and rehabilitation of natural resources on Fort Carson and to provide training capabilities and fire suppression.

3.3.2.2 Piñon Canyon Maneuver Site

Surface Water

The PCMS is located in the Purgatoire watershed of the Arkansas River basin and includes several major drainages. Water from the PCMS ultimately drains into the Arkansas River via the Purgatoire River or the Big Arroyo drainage. A figure depicting surface water features at PCMS is available in the PCMS Transformation EIS (USACE 2007b).

The majority of the drainages at the PCMS flow from the northwest to the southeast and drain into the Purgatoire River, which flows to the northeast along the southern and eastern boundaries of the PCMS. The Purgatoire River and its tributaries within the PCMS have periodic high flows, including the potential for flash floods. Smaller creeks and drainages might be dry much of the year. The Big Arroyo drainage system is located in the northwest region and flows northeast into Timpas Creek, which is approximately 3 miles northwest of the PCMS.

Floodplains have not been mapped on the PCMS. However, flash floods occur intermittently during heavy rainfall events, typically between May and October (DECAM 2002a). Flood-prone areas occur along the drainages in the training areas. The cantonment is not subject to flooding (USACE 2007b).

Surface Water Quality

To control and monitor sediment transport and loading, as a part of USACE Section 404 regional permit, the USGS operates approximately 70 erosion control reservoirs, a streamflow gauge on the Purgatoire

River, and five streamflow sediment gauges on Purgatoire River tributaries that drain more than 60 percent of the PCMS. The erosion control reservoirs are used to assess sediment yields from small watersheds in the training areas, while the streamflow sediment gauges quantify water and sediment leaving the PCMS (DECAM 2002a).

The USGS has monitored water quality, including sediment yield, at the PCMS since 1983 in cooperation with the Army and Fort Carson. Statistical analysis comparing water quality data from periods before military training activities with those from periods after the training demonstrated no statistically significant effect on water quality in the Purgatoire River (USGS 1993). Another study sought to evaluate erosion and sedimentation for potential TMDL compliance (USDA 2001b). The TMDL study did not result in a TMDL for sedimentation, but it outlined further steps for study.

Even though the quality of surface water at the PCMS is generally high it is not a source of domestic water supply (DECAM 2002a).

Groundwater Occurrence

The majority of regional groundwater at or near the PCMS occurs in the Dakota Sandstone and the Purgatoire Formation (DECAM 2002a), which are part of the Arkansas River basin. Much of the Arkansas River basin has a hydraulic head difference in the deep bedrock aquifers that is lower than that in the shallow formations. This indicates that the deep bedrock aquifers are not in communication with the shallow formations.

Groundwater movement in the northeastern corner of the PCMS is toward the northeast; groundwater movement throughout the remainder of the installation is toward the east and southeast. Groundwater is recharged primarily from precipitation and subsurface inflow from neighboring aquifers (DECAM 1998).

Groundwater Quality

Previous groundwater quality testing determined that the groundwater beneath the PCMS contains concentrations of dissolved solids, sulfate, iron, manganese, nitrate, chloride, fluoride, selenium, and radionuclide constituents that exceed domestic or public use water quality standards. The water quality in the aquifer is adequate for wildlife and livestock and for fire suppression (DECAM 2002a and 1998). There are approximately 95 wells on the PCMS, and approximately 30 wells are functional. Some of the major wells are connected to distribution lines that fill stock tanks for wildlife management and fire suppression (DECAM 2002a).

3.3.3 WILDFIRE MANAGEMENT

3.3.3.1 Wildfire Management Direction

The DECAM has three roles in the Fort Carson and the PCMS fire management policy. The first role is as an on-site advisor to the Incident Commander. When a fire occurs, a DECAM representative recommends fire suppression options as they relate to resource protection. The second role is to assist the Fire Department actively with suppression and prescribed fire management and planning. The third role is selecting locations for prescribed fires (DECAM 2001a). Generally, prescribed fires are used on Fort Carson and the PCMS to reduce natural fuels on the range. If the fuels are not controlled, rangeland wildfires may get out of control. Between 1998 and 2000, the DECAM participated in more than 150 wildland and prescribed fires.

Unacceptable resource impacts are avoided as much as possible through rapid, aggressive suppression. When a large and/or potentially significant resource impact wildfire occurs, a DECAM member responds to the fire site. A full range of initial suppression actions, from high-intensity aggressive actions to low-intensity surveillance activities, are planned to meet the management objectives of individual land units, while being cost-effective. The application of options is flexible and subject to revision as conditions change. Such planned actions are based on land management objectives, values at risk, and costs associated with suppression strategies.

Suppression actions are based on planned analysis consistent with land management objectives including the threat to life and property. DECAM personnel advise the on-site Incident Commander concerning suppression methods that may be used to minimize resource losses. No wildfire situation, with the possible exception of a threat to human life, requires unnecessary exposure of firefighters and equipment to dangerous situations.

In areas where a high level of protection has been identified, fire suppression consists of responses that usually completely suppress or control the fire. High suppression protection is broken into three resource protection subcategories of critical, high, or moderate. For example, housing areas or other structures on Fort Carson and the PCMS may be classified as "critical" protection, but training areas may be classified as "moderate" protection. Therefore, each would have a different response mode. Regardless of the level of protection, the Incident Commander decides "how" each fire is to be handled for initial response. The DECAM representative is at the fire site to advise the Incident Commander on suppression options that would protect resources.

Specific tactics for the suppression of wildland fires are generally taken or adapted from the *Field Reference Guide for Control of Wildlife Fires* (National Wildfire Coordinating Group 1989).

The DECAM performance goal with regard to wildland fire management is to facilitate military personnel with planned training opportunities while reducing the possibility of uncontrolled wildland fire escaping the boundaries of Fort Carson and the PCMS (DECAM 2001a). Components of wildfire management include prescribed fire operations conducted on live fire ranges at Fort Carson to create buffer zones, PCMS prescribed fires conducted for noxious weed control, Mountain Plover habitat improvement on Training Area 54, and protection of Mexican Spotted Owl habitat.

Prescribed fires are used to reduce fuel loading on perimeters of main firing ranges on Fort Carson in support of training/readiness. These ranges include the Multi Purpose Range Complex and the small and large impact areas. Prescribed fires also protect the high value resources on the installation, as well as adjoining private land. Prescribed fires are used in an integrated management approach to control noxious weeds. Fires reduce the amount of vegetative matter present on a noxious weed site, improving the efficacy of herbicides used to control the weeds. Fire may also be used to reduce some weed species while stimulating native grasses and forbs. Prescribed burning can be used to enhance or create Mountain Plover habitat. These birds are attracted to burned areas.

3.3.3.2 Special Fire Management Areas

The areas listed below possess qualities that affect fire planning or fire suppression activities. Site-specific guidelines and identification and location of special fire management areas are developed annually as directed by the Fire Management Plan.

- **Watersheds**. Negative erosion impacts usually occur if slopes are steep, soils are shallow and/or coarse, and burn intensities are high. In these instances, suppression is the desired method of control, if practical and cost-effective.

- **Riparian Areas and Wetlands**. On perennial streams or other waterways, chemical fire retardants should not be used. On all riparian habitat, surface-disturbing equipment should be totally restricted or areas should be flagged where equipment has to be used, such as at a new stream crossing.
- **Other Land Ownerships**. Fires on Fort Carson or the PCMS that have the potential to burn onto other ownerships will be suppressed. As a general "rule of thumb," fires should be initially attacked immediately if they are within 0.5 mile of ownerships with housing developments or within 0.25 mile of undeveloped ownerships. Unless otherwise indicated in the plans, military lands adjoining housing subdivisions will be classified as critical protection, and all other adjoining lands will have a moderate protection classification.
- **Cultural Sites**. Wildfires will be attacked if they are within 0.25 mile of identified cultural sites. The responsible fire manager and/or archaeologists will be contacted before any fire line construction is initiated.
- **Forested Sites**. In general, all forested sites on Fort Carson and the PCMS have a very high resource value due to use for military training activities, mitigation of accelerated erosion, and wildlife habitat. Also, the pinyon-juniper vegetation type is very slow growing and practically impossible to re-establish. Fires should be initially attacked within 0.25 mile of any forested site, and any fire occurring within a forested site will be classified as critical protection, unless previously identified as a let-burn area for management purposes.

3.3.3.3 Fort Carson

Fire Management Areas

Management of wildland fires protects and enhances natural resources on Fort Carson. Fire is suppressed or controlled where necessary for safety and for protecting high-value resources. Prescribed fires accomplish predefined resource management objectives (DECAM 2002a) including:

- Reducing the fuel load contributed by excessive understory vegetation, thereby preventing larger and less easily controlled wildfires;
- Creating buffer zones in and around live-fire training areas to reduce the risk of fire from training activities;
- Manipulating the composition of existing plant communities;
- Enhancing or creating specific wildlife habitats; and
- Controlling noxious weeds.

Fires occurring in impact areas will have a let-burn suppression strategy. Roads, firebreaks, or natural barriers will be sufficient to contain the fire. Safety considerations should be given to all areas within 0.5 mile of impact areas. These areas may also impose safety hazards to firefighters due to live, unexploded ordnance or incendiaries within or adjacent to these areas.

Approximately 72 miles of firebreaks encompass Fort Carson. They are maintained by removing the vegetation 3 to 4 times annually. This practice has resulted in fugitive dust and soil erosion problems, as well as an increased maintenance cost. There are numerous eroded areas along firebreaks that have resulted from the removal of vegetation.

Fire History and Firefighting Resources

The Fort Carson Fire Department provides DECAM wildland fire personnel annual fire shelter and Standards of Survival Training. In addition, DECAM wildland fire personnel annually attend at least one course offered by the National Wildfire Coordinating Group. The DECAM provides training to Fire Department personnel on chainsaw safety and use. Both departments work together to keep abreast of current techniques, training, and equipment.

The DECAM coordinates and consults with the National Wildfire Coordinating Group, federal and state agencies, universities, DPW, the Fort Carson Fire Department, local land owners, or any other agency or organization that will have concerns or input. Applicable permits, such as an air quality burning permit or Section 404 permit, will be acquired prior to any fire management activity. Fort Carson has cooperative agreements with the Colorado Springs Fire Department, El Paso County, and the U.S. Forest Service to provide mutual aid for the suppression of wildland fires on the installation and surrounding area.

The Directorate of Public Works operates the Fort Carson Fire Department, and includes the PCMS. Fort Carson maintains mutual aid agreements with several cities in the area (e.g., Colorado Springs Fire Department and El Paso County) as well as a mutual firefighting assistance agreement with the North American Aerospace Defense Command. These mutual aid agreements include both Fort Carson and PCMS. Directorate of Plans, Training, and Mobilization (DPTM), and DECAM personnel provide assistance with wildland fire suppression.

3.3.3.4 Piñon Canyon Maneuver Site

Fire Management Areas

Management of wildland fires protects and enhances natural resources on the PCMS. Prescribed fires accomplish predefined resource management objectives that include: reducing the fuel load contributed by excessive understory vegetation, thereby preventing larger and less easily controlled wildfires; creating buffer zones in and around small arms live-fire ranges to reduce the risk of fire from training activities; manipulating the composition of existing plant communities; enhancing or creating specific wildlife habitats; and controlling noxious weeds (DECAM 2002a). Prescribed burns are conducted on the PCMS in the spring, fall, and winter months (Klavetter 2006). Fire is suppressed or controlled where necessary for safety and to protect high-value resources. Wildfires are typically suppressed on the PCMS because they generally occur when existing conditions are favorable for large, uncontrollable fires (Klavetter 2006). A firebreak is being constructed along part of the northern boundary of the PCMS.

3.3.4 CULTURAL RESOURCES

The ROI in Colorado includes the geographic extent of Fort Carson and the PCMS. Impacts within the ROI would result from troop level increases, facility demolition, and construction associated with the SBCT, and increased live-fire and maneuver training. Baseline information for this discussion is summarized from the Fort Carson and Piñon Canyon Maneuver Site Transformation DEISs (USACE 2007a, b). Stationing of the SBCT at Fort Carson and their use of the PCMS is part of a larger transformation is addressed in the DEIS documents.

Fort Carson is located south of Colorado Springs, Colorado, east of the Rocky Mountain Front Range, and occupies portions of El Paso, Pueblo, and Fremont Counties. The PCMS is located in southeastern Colorado in Las Animas County, approximately 150 miles southeast of Fort Carson. The prehistoric and historic contexts of these areas are summarized here from the more detailed discussions in the transformation DEIS documents.

3.3.4.1 Prehistoric Context

Both Fort Carson and PCMS are in the Arkansas River Basin prehistoric context area. Three general stages of prehistory have been delineated for the Arkansas River Basin of southeastern Colorado: the Paleoindian (11,500 to 7,800 BP), Archaic (7,800 to 1,850 BP), and Late Prehistoric (1,850 to 225 BP). More detailed discussions of these stages of prehistory can be found in Zier and Kalasz (1999). An earlier stage, the Pre-Clovis, has been proposed, but direct evidence of this stage in the region is lacking. The Paleoindian, Archaic, and Late Prehistoric stages in southeastern Colorado are each subdivided into three periods. These periods represent specific changes or innovations in the material culture of prehistoric peoples that suggest broader changes in environmental conditions or political and socio-economic structure.

The Paleoindian (11,500-7,800 BP) represents the earliest stage of cultural evolution in the archeological record of southeastern Colorado. This stage spans climatic and environmental transitions from the end of the Pleistocene into early Holocene warming. Many large Pleistocene mammals became extinct during these transitions. This stage in southeastern Colorado is commonly divided into three periods based on diagnostic projectile points: Clovis (11,500 to 10,950 BP), Folsom (10,950 to 10,250 BP), and Plano (10,250 to 7,800 BP).

The beginning of the Archaic Stage (7,800 to 1,850 B.P.) is marked by another turning point in the natural environment with the onset of the Altithermal climatic episode, a prolonged early Holocene period of general warming and drying in western North America. The Archaic Stage represents a shift from economies geared toward big game hunting to more generalized hunting and gathering. Based on changes in projectile point morphology, the Archaic stage has been divided into Early Archaic (7,800 to 5,000 BP), Middle Archaic (5,000 to 3,000 BP), and Late Archaic (3,000 to 1,850 BP) periods. Archaic projectile points are nearly all stemmed and are not as delicately flaked as those of the earlier Paleoindian stage. In the general region, more sites of the Late Archaic period have been reported than sites of the earlier periods.

The Late Prehistoric Stage (1,850 to 225 BP) is associated with important changes in subsistence patterns, artifact complexes, and demographics. The beginning of the stage coincides with innovations like the bow and arrow, ceramics, and permanent or semi-permanent houses. The use of cultigens reached a significant level during this time, though few pollen or macrobotanical samples attest to this change in southeastern Colorado. The Late Prehistoric Stage is divided into three periods: the Developmental Period (1,850 to 900 B.P.), the Diversification Period (900 to 500 B.P.), and the Protohistoric Period (500 to 225 B.P).

The Developmental Period corresponds with what has traditionally been referred to by archeologists as the Plains Woodland Period or the Early Ceramic Period. Developmental Period sites are much more numerous in the region than those of earlier periods. At this time, cord-marked and plain pottery, small corner-notched arrow points (Scallorn, Reed, Bonham, Alba, Washita, Fresno, Chaquaqua types), circular slab masonry architecture, and some agriculture first appeared.

The Protohistoric Period (500 to 225 B.P) extends from roughly 1450 A.D. to 1725 A.D. The earliest European incursions into the region occurred during the first half of the sixteenth century, and the material cultures of indigenous populations were altered significantly over the course of the ensuing three centuries. Three principal indigenous groups entered southeastern Colorado during this period. In chronological order of appearance, they are the Apache, Comanche, and Cheyenne-Arapaho. In addition, southeastern Colorado was on the margin of Ute territory throughout protohistoric times. The Protohistoric Period corresponds with the Plains Nomadic Tradition. Material remains include metal artifacts, micaceous pottery, Pueblo pottery, chipped glass artifacts, and side-notched points.

3.3.4.2 Historic Context

The first documented European incursions into the Northern Plains and Rocky Mountains were Spanish entradas in the mid-sixteenth century. Spain claimed the region and sent occasional expeditions, but did not establish permanent settlements on the northern frontier until early in the following century. Spain was temporarily driven out by the Pueblo Revolt of 1680, and returned in 1694. Permanent Spanish settlement remained south of Colorado well into the eighteenth century. Spain continued to send expeditions north, including the punitive expedition of Anza that defeated a Comanche band led by Cuerno Verde near Rye, Colorado in 1779. When peace was established between Spain and the Comanche in 1786, trade and bison hunting flourished on the Plains and northern frontier. In the eighteenth century, the territorial claims of Spain and France overlapped in this region, but no direct confrontations occurred. When the United States obtained Louisiana from France in 1803, the boundaries of Louisiana, largely disputed by Spain but claimed by the United States, included the land extending west from the Mississippi River to the Rocky Mountains and the Rio Grande. It was not until 1819 that the Adams-Onis Treaty established the Arkansas River as the northern boundary of Spanish New Mexico. Few traces of these early historic periods have been documented in the area of Fort Carson and PCMS.

Beginning with Lewis and Clark in 1805, the United States sent expeditions west to explore Louisiana and to identify a practical route west to the Pacific coast. Two subsequent expeditions are directly associated with the Fort Carson area. The expedition of Captain Zebulon Pike of 1806 and the Long expedition of 1820. A winter camp described by Pike believed to have been located east of Colorado Highway 115 between Turkey Creek and Little Turkey Creek within the Fort Carson area has not been archaeologically verified. Long's expedition in 1820 explored the western mountains in search of the source of the Platte River, returning by way of the Arkansas and Red Rivers. Long's expedition skirted the eastern boundary of Fort Carson. No archaeological remains of this expedition have been verified.

In the early 1800s, the American fur trade also expanded into the Rocky Mountains. Spain discouraged the American traders that ventured into their northern territories and often detained them and confiscated their goods. This ended in 1821, when Mexico achieved independence after more than a decade of fighting. Portions of traditional trails between the Pueblos of New Mexico and the Plains became known as the Santa Fe Trail, connecting the trade of northern Mexico with American trade centers along the Mississippi and Missouri Rivers. The northern or Mountain Branch of the trail crossed through southeastern Colorado along the south side of PCMS. Bent's Fort was established in 1830 along the Mountain Branch at the Arkansas River, which marked the international border. In the Mexican Period, from Mexican Independence to the Treaty of Guadalupe Hidalgo (1821 to 1848), Hispanic settlement in southeastern Colorado expanded. American exploration of the area continued. In 1846, war erupted between Mexico and the United States, culminating in the Treaty of Guadalupe Hidalgo in 1848, and Colorado and New Mexico became part of the United States. However, several large Mexican land grants, including the Tierra Amarilla, Conejos, Sangre de Cristo, and Luis Baca Grant No. 4, were recognized and confirmed by the United States, and immigration from Mexico continued. Anglo-American and Hispanic settlement in the area and a decline in the fur trade caused tension between Native Americans and emigrants. In the area of the PCMS, Kiowa, Comanche, and Arapaho continued raiding along the Santa Fe Trail. There was a fair amount of activity around the Mountain Branch of the Santa Fe Trail associated with the declining fur trade and growing settlement, but there is no clear evidence that this reached west to the smaller waterways of Fort Carson.

The attraction of the Oregon Territory and the California Gold Rush brought many emigrants across the continent in beginning of the 1840s. In the early years, the majority crossed the continent by way of more northerly routes through Wyoming, but smaller feeder trails, such as the Trappers Trail and the Cherokee Trail, came up the Arkansas River and along Fountain and Jimmy Camp Creeks, across the Fort Carson area to the headwaters of the South Platte drainage.

Settlement throughout eastern Colorado expanded because of the gold rush of 1859, bringing with it population and economic fluctuations, and declined again after readily accessible minerals were depleted. The Colorado Gold Rush and the Homestead Act of 1862 lured merchants, miners, and settlers into the area. In an attempt to prevent further Indian hostilities and secure the region for settlement, several military posts were established. Despite the military presence, hostilities continued until a major military campaign in the winter of 1868-1869 that resulted in the relocation of most of the Southern Cheyenne and Arapaho to an Oklahoma reservation. After the expulsion of the Southern Cheyenne and Arapaho, a resurgence in population and community development resulted from the mining industry in Leadville in the 1870s and discovery of large gold deposits in Cripple Creek in the 1890s.

The emergence of lode mining in the 1870s stimulated the expansion of railroads in Colorado, which in turn gave ranchers increased access to markets and contributed to renewed growth in the general area. The expansion of railroads also stimulated the development of recreation, tourism, and utopian settlements such as the Fountain Colony. Southern Colorado's coal mining industry began in 1875, primarily to the west along the Front Range. Coal mining emerged in support of mining and the steel industry, which first supplied the railroads and then expanded its markets.

3.3.4.3 Fort Carson

Prehistoric Context

A few Clovis finds have been reported in southeastern Colorado, but not at Fort Carson. No Folsom materials have been reported from Fort Carson. Evidence of Plano occupation in southeastern Colorado is more plentiful. On Fort Carson, two Cody complex projectile points and two unidentified Plano projectile points fragments have been recorded as surface finds.

On Fort Carson, a component of the Gooseberry Shelter site has been radiocarbon-dated to the Early Archaic. On Fort Carson, components of the Recon John Shelter site, the Gooseberry Shelter, and the Two Deer Shelter have been radiocarbon-dated to the Middle Archaic. On Fort Carson, Late Archaic components have been discovered at many locations, including some with Middle Archaic components such as the Recon John Shelter, the Gooseberry Shelter, and the Two Deer Shelter.

Many Diversification Period sites are found on the Army controlled lands in Colorado.

Historic Context

Fort Carson does not include locations of known outstanding events in the early history of the region or the nation, but areas within and adjacent to the military reservation are directly associated with important historical themes and eras. However, the Fort Carson Military Reservation itself was important in the United States' role in World War II and in the Korean and Vietnam wars.

Settlement in the Fort Carson area expanded as a result of the gold rush of 1859, bringing with it population and economic fluctuations, and declined again after readily accessible minerals were depleted. The cattle industry developed gradually in the Fort Carson area beginning in 1860. The Civil War, depletion of readily accessible minerals, the difficulty in transportation of people and goods, and growing conflicts between settlers and native tribes tempered growth until the late 1860s. With the cessation of Indian hostilities in 1868 and the development of better transportation alternatives and communication mechanisms, settlement gradually increased within the region. Resurgence in population and community development resulted from the mining industry in Leadville in the 1870s and discovery of large gold deposits in Cripple Creek in the 1890s. A few communities developed to serve as supply points and agricultural centers near the present boundaries of Fort Carson: Fountain City (Pueblo), Cañon City, El Dorado, and Colorado

City. Cañon City and Colorado City were located along the foot of the mountains on trails that lead to the gold mines in South Park and along the Blue River. Scattered and usually isolated ranches were established throughout the Fort Carson area in the early 1870s, but most of the southern and eastern portions of the area were hinterland ranges for ranches headquartered along Fountain, Beaver, Red and lower Turkey Creeks.

The expansion of railroads in Colorado beginning in the 1870s contributed to renewed growth in the area around Fort Carson. Colorado Springs, originally Fountain Colony, established by General William Jackson Palmer in 1871 near the nearly abandoned town of Colorado City, was located on the new Denver and Rio Grande Western route from Denver to Pueblo. By 1879, the population of Colorado Springs had grown to about 5,000 people and included members of Fountain Colony, a Quaker agricultural colony within the environs of the township. Recreation, tourism, and utopian settlements such as the Fountain Colony also greatly influenced the early development of Colorado Springs.

The mining and quarrying industries in the Colorado Springs area are represented at Fort Carson by only one recorded site, Stone City (5PE793), located at the extreme southern end of the reservation in the vicinity of lower Booth Gulch and the southernmost reaches of Booth Mountain. Other smaller stone quarries and clay mines are known to exist inside the Fort Carson Military Reservation, but have not been formally recorded. Records of mineral entries on public lands indicate that several claims were filed between 1915 and 1919 in areas removed from stream courses, which probably means that the claims were filed to reserve mining rights to stone or clay.

Nearly all of the historic period sites recorded to date in the Fort Carson Military Reservation are related to the settlement theme. Most of the sites consist of remains of stone or concrete foundations, depressions, and scatters of domestic and agricultural artifacts. The only known intact standing structures related to settlement remaining in Fort Carson include Turkey Creek Ranch, one building in the Fort Carson cantonment area, and possibly several buildings at the Fort Carson Rod and Gun Club and at Camp Red Devil. All but a very few of the recorded settlement sites appear to have had stock raising as the primary economic base; the remainder appear to have had a partial fruit-growing economic base.

The modern history of the Fort Carson region began in 1940 when a group of Colorado Springs business and community leaders started lobbying for a military installation near their city in hopes of reviving a sagging economy. During World War II, four infantry divisions prepared for combat at Camp Carson. The camp's troop strength peaked in late 1943 with approximately 43,000 military personnel. In June 1942, the 89th Infantry Division from Jefferson Barracks, Missouri, reactivated at Fort Carson on July 14, and deployed in 1944. Also in 1942, Camp Hale, constructed west of Pikes Peak near Leadville, Colorado, operated as a sub-installation of Camp Carson during the war. The Mountain Training Command, activated at Camp Carson on September 2, 1942, moved to Camp Hale in November. An increased need for troops trained in the art of mountain warfare led to the formation of the 10th Mountain Division. The Carson Hospital Center, the largest of nine medical centers built in the nation during World War II, opened to provide immediate medical care for Camp Carson's Soldiers. The Old Hospital Complex at Fort Carson was determined eligible for the National Register in 1991.

By 1946, with activities greatly reduced, it appeared that Camp Carson would close. The military strength at the camp had dropped to around 600, not including 320 patients at the hospital. In 1950, at the onset of the Korean War, activities at Camp Carson increased. As the nation emerged from war to peace in the early 1950s, Camp Carson continued to serve as duty station for approximately 25,000 troops. The post was officially designated as Fort Carson on August 27, 1954. The role of Fort Carson has evolved over the years.

Archaeology

To date, 1,693 archeological sites have been recorded on Fort Carson (USACE 2006a), of which 131 are considered eligible for the National Register. Approximately 81 percent (1,374) of the total number of recorded archaeological sites on Fort Carson are prehistoric. An additional 3 percent (55) contain both prehistoric and historic materials. Prehistoric site types include complex habitation sites, temporary field camps, and lithic as well as food procurement and processing locations. Historic site types include ranching and homestead complexes and small mining operation sites. Both prehistoric and historic rock art is found on Fort Carson, again, with prehistoric elements predominating. The Turkey Creek Rock Art District, designated as eligible for the National Register in 1976, contains at least 31 archaeological sites, five of which are known to have rock art. Because of problems with the delineation of the District's boundaries, a re-evaluation project is ongoing to properly identify contributing sites and provide clear boundaries for management purposes. Based on densities of known sites in different geographic settings of Fort Carson, it is anticipated that 34,594 acres of unsurveyed areas may contain approximately 792 undocumented sites, and 183 of those may be eligible for the National Register.

Historic Built Environment

Three National Register-eligible Historic Districts are also located on Fort Carson: the Old Hospital Complex, the Wastewater Treatment Plant and Incinerator Complex, and the Turkey Creek Recreation Area. In all, 68 buildings are contributing properties of these Historic Districts.

Properties of Traditional, Religious, or Cultural Significance

Eleven federally recognized tribes have expressed a cultural affiliation with land at Fort Carson. In 2005, 10 of the tribes signed a comprehensive agreement (CA), and the following year, the Jicarilla Apache signed a separate CA (USACE 2006a). The CA establishes the consulting parties for Native American issues, including issues covered under American Indian Religious Freedom Act (AIRFA) and NAGPRA, and establishes protocols for consultation.

TCPs and sacred sites were also identified during the consultation process. On Fort Carson, one sacred site was identified within the Turkey Creek Rock Art District. Although only one site was identified as having direct religious significance for culturally affiliated tribes, the sacred site associated with this District may be expanded in the future pending consultation with other tribes.

3.3.4.4 Piñon Canyon Maneuver Site

Prehistoric Context

No Clovis materials have been reported to date at PCMS. No Folsom sites have been reported in southeastern Colorado, but three Folsom point fragments have been recovered. On the PCMS, Hell Gap points are quite common and have been found on eight sites and twice as isolates. Recently, an Agate Basin site with four diagnostic projectile points, highly patinated debitage, and chipped-stone tools has been identified.

No Early Archaic archeological sites have been found at PCMS, and only a few projectile point isolates have been identified. Although isolated Middle Archaic projectile points are quite common, only one PCMS site can be attributed to the McKean Complex. Middle Archaic age rock art, in the form of Pecked Curvilinear and Pecked Rectilinear elements, is quite common on the PCMS. PCMS contains many Late Archaic period surface sites; and those excavated indicate that communal plant collecting and processing

were dominant activities. In the area around PCMS, Late Archaic remains are plentiful, especially in the canyons.

The canyon settings of the PCMS exhibit defensive sites that may date to the Diversification Period on every isolated high ridge point surrounded by a steep slope. Protohistoric ceramics have been found at two sites on the PCMS, but generally few sites can be attributed to the Protohistoric.

Historic Context

PCMS developed along somewhat different lines than Fort Carson. In the late 1860s, the Piñon Canyon region went from being nearly uninhabited to a viable ranching community. Hispanic pioneers came north from New Mexico with their sheep and goats to found plazas along the Purgatory River and its drainages. As transportation to the area improved in the 1870s with the service from the stage line and railroad, Anglo settlers increased and cattle were introduced. In the 1880s, large Anglo-owned cattle ranches began to challenge for control of the range, often buying up water sources and allowing their herds to roam across public and private land.

Stage stations had been established near PCMS in the 1860s along stage routes following the Santa Fe Trail. In the spring of 1871, Barlow & Sanderson's Southern Overland Mail & Express Company established a new route that left the Santa Fe Trail at Iron Spring and meandered southeast through Sheep Canyon to what would later be PCMS lands. The stage line was soon superseded by the arrival of the Atchison, Topeka, and Santa Fe Railroad.

Southern Colorado's coal mining industry began in 1875, primarily to the west along the Front Range. Several small-scale mining operations have been recorded in the Welsh Canyon area of the PCMS. In 1927, the Colorado Interstate Gas Company constructed a natural gas pipeline between Clayton, New Mexico and Denver, Colorado. The pipeline crosses PCMS from north to south, and one of its booster stations is near the southern boundary. PCMS remained largely a ranching region with scattered small mining operations. In 1985, PCMS was obtained for the expansion of military exercises from Fort Carson.

Archaeology

Archaeological resources had been identified in PCMS prior to 1980, but in the early 1980s, preparation for the opening of PCMS and amended regulations implementing the NHPA generated a series of large-scale archaeological investigations. To date, 5,113 archaeological sites have been recorded on PCMS (USACE 2007a 2006b). Of these, 488 are considered eligible for the National Register. Seventy-seven percent (4,037) of the archaeological sites are prehistoric. Prehistoric site types include habitation sites, temporary camps, lithic sites, and food procurement and processing sites. Historic archaeological site types include stage route and stage station, ranch complexes, farms, and small mines. Both prehistoric rock art and historic inscriptions and rock art have been recorded. Based on densities of known sites, 65,600 acres of unsurveyed areas may contain approximately 2,040 undocumented sites, and 406 of those may be eligible for the NRHP.

Historic Built Environment

Intact architectural properties at PCMS are predominantly farms, ranches, or related rural sites. These were all abandoned by 1983. There is also an early pipeline booster station with an associated company settlement. These sites are treated as both archaeological sites and historic architectural properties. They include 11 eligible historic districts.

Properties of Traditional, Religious, or Cultural Significance

The same eleven federally recognized tribes that expressed cultural affiliation with Fort Carson also expressed cultural affiliation with PCMS. In 2005, 10 of the tribes signed a CA, and the following year, the Jicarilla Apache signed a separate CA (USACE 2006b).

TCPs and sacred sites identified for PCMS during consultation comprised five sacred sites, three TCPs, and two PTRCSs. Several rock art sites were also linked to the traditions of the Jicarilla Apache, Kiowa, Comanche, and Southern Cheyenne.

3.3.5 LAND USE AND RECREATION

This section discusses the existing land uses and recreational resources in and around Fort Carson and PCMS.

3.3.5.1 Fort Carson

Fort Carson occupies portions of El Paso, Pueblo, and Fremont Counties in east central Colorado. Fort Carson covers approximately 137,000 acres, and extends from 2 and 15 miles east to west and approximately 24 miles north to south. Fort Carson is bounded by Interstate 25 (I-25) and mixed development to the east and State Highway (SH) 115 to the west. Colorado Springs and Denver lie 8 miles and 75 miles, respectively, to the north, while the City of Pueblo is located 35 miles south of the Fort Carson Cantonment area. The following subsections describe the current land uses in and around the Fort Carson installation, and land use management plans that provide guidance for operations at Fort Carson.

Fort Carson is an active military training facility for both weapons qualification and field training. Land use on Fort Carson can be divided into three primary categories: cantonment, training areas, and non-military/recreation uses.

The cantonment consists of developed land and the training areas and non-military/recreation areas are undeveloped land. The cantonment, located in the northern portion of the installation, covers approximately 6,000 acres.

Military field training areas encompass approximately 96,000 acres of unimproved or open lands that are used for live-fire artillery practice, small-arms practice, tank and Bradley Fighting Vehicle maneuver operations, and bivouac training. Air operation ranges on Fort Carson consist of the Air Burst Range and Butts Army Airfield. Remaining land is used for recreation and other purposes (DECAM 2005a). The primary training activities that occur within the range area include maneuver training and live-fire training. Other areas within the range are restricted from training.

Although Fort Carson's primary land use is for military training, Fort Carson also has approximately 3,710 of special use lands, including recreation areas and a wildlife refuge (DECAM 2002a). Recreational uses on Fort Carson include hunting, angling, dog training, and activities such as picnics and trail rides. Military training is generally off limits at these sites, and the intensity, level, and type of recreational activities vary by site. Most of the sites that support recreational uses are also waterfowl nesting refuges; some sites also protect other species including fish. Recreational uses are also allowed on training rangelands (with the exception of firing ranges and impact areas) when they are not being used for military activities (DECAM 2001b, 2002a).

As part of the ACUB program, Fort Carson is implementing a comprehensive strategy to mitigate physical encroachment and environmental regulatory issues at Fort Carson. The goal of this project is to en-

hance military utility of DoD's primary military training areas through protection of properties adjacent to Fort Carson boundaries. These properties have been identified as having high conservation value and/or high potential for current and future encroachment from development along Installation boundaries. The strategy entails working with activities/agencies such as TNC and El Paso County to encumber upwards of 82,000 acres of permanent conservation easements, annual leases and acquisitions by collaboratively initiating administrative actions on private lands adjacent to the Installation.

The project was initiated during 2002 and focuses on private lands that border Fort Carson primarily along the Installation southern and eastern boundaries within 1.5 to 2.0 miles. The ACUB protects available habitats, open space values and reduces current and future training restrictions by providing conservation easements that protect the threatened short-grass prairie ecosystem and prevent incompatible land use along the installation's boundary. To date, the Fort Carson ACUB has protected more than 65,000 acres through innovative deployment of the above-identified strategies. Of this total, permanent conservation easements have been acquired or are currently under contract on 16,000 acres. As part of the ACUB, Fort Carson has partnered with TNC, El Paso County, USFWS, Colorado Department of Natural Resources, Great Outdoors Colorado, Colorado Department of Transportation (CDOT), and the Greater Colorado Springs Economic Development Cooperation.

Other land uses at Fort Carson include two small clay mines in operation near Stone City. Fort Carson is required by law to allow mining at existing sites provided that permittees continue to meet permit conditions (DECAM 2002a).

According to the NRCS (USDA 1979), prime farmland designations occur within portions of El Paso, Fremont, and Pueblo Counties. No farming has ever occurred on Fort Carson.

Lands surrounding Fort Carson include developed and undeveloped lands. Developed land and land planned for future development surround approximately the northern third of Fort Carson. These lands are part of unincorporated El Paso County to the west, the City of Colorado Springs to the north and west, and Security-Widefield and the City of Fountain to the east. Land use surrounding the southern portion of the installation consists primarily of undeveloped agricultural land. The town of Penrose, however, is located west of the southwest corner of Fort Carson.

El Paso County recognizes Fort Carson as a special land use dedicated for military training. Several areas in El Paso County, including Turkey Canyon Ranch, Red Rock Valley Estates, El Rancho, and Midway Ranch, are located adjacent to Fort Carson and zoned by the county as a residential land use. These areas are considered noise-sensitive land uses and are described in further detail in the Noise Section (Section 3.3.11) of this document. El Paso County is responsible for regulating land use in these communities.

The City of Fountain's future land use plan indicates that business park, industrial, and parks and open-space uses will abut the east boundary of Fort Carson. While several small pockets of residential land use will be maintained near Fort Carson according to this plan, most of the existing land zoned for residential use near the installation's eastern boundary will be changed to industrial or open space uses in the future (City of Fountain 2005).

The City of Colorado Springs future land use plan indicates that the city plans to annex land adjacent to the western boundary of Fort Carson near Gate 2. Land uses planned include general residential use to the west and north of Fort Carson, existing park/open space, and community activity centers (City of Colorado Springs 2005).

3.3.5.2 Piñon Canyon Maneuver Site

The PCMS is an approximately 235,000-acre Army site dedicated to training units stationed at, or otherwise under the responsibility of Fort Carson. The PCMS is located in southeastern Colorado in Las Animas County, approximately 150 miles southeast of Fort Carson. The PCMS is bounded by U.S. 350 to the west, Purgatoire River Canyon to the east, Las Animas County Road 54 to the south, and Otero County to the north. Lands south of PCMS are primarily privately owned undeveloped lands. Nearby cities include Trinidad to the southwest and La Junta to the northeast.

PCMS is a military training facility. Land use on the PCMS has been divided into three primary categories: cantonment, training areas, and non-military/recreation uses. The cantonment consists of developed land; the training areas consist of open land. The cantonment area comprises approximately 1,660 acres of the PCMS. The cantonment provides limited, functional Soldier and support facilities. Military training is restricted in this area.

The training areas comprise approximately 223,000 acres (DECAM 2002a) of PCMS and consist of unimproved or open lands that are used for military training maneuvers and small arms, live-fire activities. The four main training land use types within the training areas include Maneuver Training, Dismounted Training, Small arms, Live-fire Ranges, and Restricted Areas. Maneuver Training Areas comprise the majority of training land available at the PCMS.

Some areas within the PCMS are open to the general public for recreational use when training activities are not occurring. Currently, the recreational uses on the PCMS include hunting and camping (hunters only). Recreational uses are allowed in the training areas and also occur at a dedicated campground near the intersection of Military Supply Routes (MSRs) 1 and 3 (DECAM 2002a).

The PCMS offers the single largest contiguous parcel of public lands available for hunting in the region. The abundance of game, the timing of hunting seasons (close to the rut), and the hunt success rate make the PCMS a highly desirable hunting area. Licenses are granted to hunt on the PCMS annually. On average, 300 to 500 licenses are issued each year. Licenses to hunt buck deer with a rifle on the PCMS are difficult to obtain; only 19 licenses were granted for 384 applicants in 2006 (Colorado Division of Wildlife [CDOW] 2006). The waitlist for these licenses is more than 13 years.

According to the NRCS (USDA 1979), Prime farmlands occur north of the PCMS in Otero County. Prime farmland in Las Animas County is generally associated with the Purgatoire River and land that is irrigated. Land is not irrigated on the PCMS, and prime farmland does not occur on the installation (Mendez 2006).

The PCMS is surrounded on three sides by land that is zoned for agricultural uses and used for dryland cattle grazing. The Comanche National Grassland, which is managed by the USFS, lies immediately north of the PCMS; it consists of undeveloped open land and several recreation sites. Several small communities are located near the PCMS to the west along U.S. 350, including Model, Timpas, Thatcher, Houghton, and Delhi, all of which have populations of less than 50. Trinidad, which has a population of less than 10,000, is located 40 miles southwest of the PCMS; and La Junta, with a population of approximately 7,000, is located approximately 42 miles northeast.

Comprehensive planning and land uses in Las Animas County are governed by the Las Animas County Development Guide (Las Animas County Planning Commission 1994). Las Animas County recognizes the land use at the PCMS as a military training facility. For Forest Service (USFS) lands, the Draft Cimarron and Comanche National Grasslands Land Management Plan (USFS 2005) defines the land manage-

ment goals. The plan describes existing conditions, identifies desired conditions, and articulates the management goals. These plans recognize the PCMS as a military training installation.

3.3.6 TRAFFIC AND TRANSPORTATION

This section describes the affected environment for transportation resources near Fort Carson and the PCMS. The regional roadways, air transportation, and other transportation facilities providing access to each installation are described in the following subsections.

The ROI for transportation resources in Colorado includes the transportation resources on and surrounding Fort Carson and PCMS.

3.3.6.1 Fort Carson

This section describes the affected environment for transportation resources on and surrounding Fort Carson. The Fort Carson Comprehensive Transportation Study was completed in September 2005 (DPW 2005).

Fort Carson is located on the southern edge of the City of Colorado Springs and is bounded by I-25 and mixed uses to the east, SH 115 to the west, Academy Boulevard to the north, and privately owned undeveloped land to the south. The City of Pueblo is approximately 10 miles south of the southern boundary of the installation. I-25 is a north-south highway that bisects the Colorado Springs metropolitan area and is a major north-south highway along Colorado's Front Range. In addition to I-25, the primary north-south routes in Colorado Springs are along Academy Boulevard and Powers Boulevard. The Colorado Springs roadway network offers few continuous east-west routes, with this movement primarily accommodated by Fountain Boulevard, Platte Boulevard, Austin Bluffs Parkway, and Woodmen Road. The only access from Colorado Springs to the west is on US 24, while the primary access to the east of Colorado Springs is provided along US 24 and SH 94.

The roadway network on Fort Carson consists of 696 miles of roads, 266 miles of which are paved. Access to Fort Carson is provided through the following six active entry control points: Gates 1, 2, and 5 on SH 115; Gates 3 and 4 on Academy Boulevard; and Gate 20 on I-25 (USACE 2007a).

Cantonment area roadways generally form a grid pattern that is laid out in a crescent shape from northwest to southeast. Primary east-west access within the cantonment area to SH 115 is provided by O'Connell Boulevard and Titus Boulevard, while primary north-south access within the cantonment is provided by one-way roads (Magrath Avenue and Barkeley Avenue). Butts Road, meanwhile, provides access from the cantonment to areas downrange (DPW 2005).

The road network in the cantonment area is generally well maintained and adequate for supporting assigned mission activities. Nearly all major roads within the cantonment area have bituminous surfaces and are capable of accommodating all types of wheeled vehicles. The main roads downrange are unpaved and reasonably well maintained, while secondary downrange roads are maintained to varying degrees (DECAM 2002a).

Based on the Pikes Peak Area Council of Governments (PPACG) Regional Travel Demand Model (year 2000), Fort Carson contributed approximately 62,000 trips to the regional roadway network daily (PPACG 2006a). Based on a 2005 travel survey (PPACG 2006b), much of the traffic generated by Fort Carson is concentrated on roadways to and from several nearby residential areas in which large populations of Soldiers reside off post, including the Fountain community to the east.

According to the CDOT, there is sufficient excess roadway capacity along the majority of the segment of I-25 between Fort Carson and Pueblo. However, in the immediate proximity of Fort Carson at SH 16, I-25 is near capacity (CDOT 2006a) and SH 16 is currently operating at Level of Service (LOS) E (over capacity). Reconstruction of SH 16 is currently proposed by CDOT.

With the exception of Magrath Avenue and Barkeley Avenue, all FTC roadways have one lane for each direction of travel. Magrath Avenue and Barkeley Avenue have two one-way lanes. Existing traffic data indicate that congestion exists on select installation roadways during peak periods, and that all signalized intersections operate at acceptable levels of service based on 2005 traffic volumes (DPW 2005).

The amount of use of downrange roadways fluctuates due to the nature of the maneuver training and variations of training mission requirements. Therefore, it is not possible to determine the volume of traffic on any given section of road downrange with accuracy.

Peak commuting periods on Army installations differ from traditional morning, afternoon, and evening peaks on off-post roadway systems. At Fort Carson, inbound peaks occur prior to morning physical training (usually before 6:00 a.m.), during morning off-post commuter times for the on-post civilian workforce, mid-morning as the Soldiers return to the installation for the day, and prior to the lunch hour. Outbound peaks generally occur in the morning after physical training, around the lunch hour, and again at the end of the day prior to evening off-post commuter peak periods.

3.3.6.2 Piñon Canyon Maneuver Site

U.S. 350 provides access to PCMS, which is located approximately 30 miles northeast of Trinidad. I-25 is a four-lane, designated truck route that connects Fort Carson and Trinidad. Deployments from Fort Carson follow a fixed route along I-25 approximately 117 miles south to U.S. 160, along U.S. 160 approximately 7 miles northeast to U.S. 350, and along U.S. 350 approximately 24 miles northeast to the main gate at the PCMS Cantonment area.

The roadway network at the PCMS is divided into three categories: cantonment area roads, MSRs, and secondary roads in the training areas. Each roadway category serves a specific function in moving people and freight at the PCMS Cantonment area. Roads serve the movement of people and freight within the cantonment area and funnel them onto the MSRs. The cantonment area roads directly connect the off-post deployment route and the MSRs. The MSRs serve the movement of Soldiers' equipment and supplies over extended distances throughout the PCMS. Secondary roads provide access from the MSRs to adjacent training areas and move vehicle traffic through the training areas (DPW 2006).

With the exception of 1 mile of paved road in the cantonment area, the roadway network at the PCMS consists almost entirely of unpaved roads. There are approximately 107 miles of MSRs and 490 miles of secondary roads on the PCMS (DPW 2006).

Traffic volumes on I-25 vary from a high of 72,200 average daily traffic (ADT) through downtown Pueblo to a low of 8,300 ADT near Walsenburg, which is west of PCMS. Volumes on I-25 between Fort Carson and Pueblo range from 28,100 ADT to 44,300 ADT near SH 16. According to the CDOT, there is sufficient excess roadway capacity along the majority of this segment of I-25. However, through Pueblo and in the immediate proximity of Fort Carson at SH 16, I-25 is near capacity (CDOT 2006a) and SH 16 is currently operating at LOS E (over capacity).

U.S. 160 is a two-lane, designated truck route between I-25 and U.S. 350. U.S. 350 is a two-lane, designated truck route between U.S. 160 and the main gate at the PCMS Cantonment area. According to

CDOT, there is excess roadway capacity because of minimal traffic volumes on both U.S. 160 and U.S. 350 (CDOT 2006b and 2006c).

The full-time staff at the PCMS is limited to fewer than 15 civilian maintenance and administrative staff (DPW 2006). No troops are stationed at the PCMS; therefore, traffic to the installation is primarily generated by training deployments from Fort Carson.

Military convoy traffic between Fort Carson and the PCMS is generally limited to wheeled vehicles. Tracked vehicles are transported to and from the PCMS by rail. Special circumstances could require the movement of a limited number of tracked or other vehicles that cannot travel on public roads or by commercial transport truck. The use of the Heavy Equipment Transporter System in support of deployments between Fort Carson and the PCMS is prohibited by CDOT. To reduce traffic conflicts, current military convoy movements are scheduled to avoid peak traffic periods in the Pueblo metropolitan area.

Traffic volumes on the PCMS road network vary widely between training deployment and non-deployment periods. During non-deployment periods, traffic on the PCMS is limited to a small number of maintenance and administrative vehicles, and traffic on the main entrance road is limited to light administrative and maintenance-related traffic totaling fewer than 25 vehicles per day (DPW 2006).

3.3.7 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PROTECTION OF CHILDREN

3.3.7.1 Fort Carson

The ROI for the Proposed Action at Fort Carson comprises four counties: El Paso, Fremont, Pueblo, and Teller. The cantonment area of Fort Carson, where most of the construction activity would be concentrated, is located in southern El Paso County. Virtually the entire Colorado Springs urbanized area is located north of the post and contained within El Paso County. Adjacent portions of surrounding counties are also a part of the Colorado Springs functional economic region, including Fremont County to the southwest, Pueblo County to the south, and Teller County to the west.

Population

The population of the ROI totaled 773,881 in 2004, an increase of more than 209,000 since 1980 (USACE 2007a). Two large communities are located within the ROI: the City of Colorado Springs, located north of Fort Carson, with a population of just more than 380,000 in 2004; and the City of Pueblo, located southeast of Fort Carson, with a population in 2004 of more than 104,000 residents (USACE 2007a).

More than 4,800 civilian workers are employed at Fort Carson (appropriated, non-appropriated, contractor, and others). Assuming each is a head of household, this would represent a population of more than 12,500 persons (applying an average household size of 2.61 as reported in the 2000 Census). The 20,145 active duty military personnel are accompanied by nearly 41,300 dependents, which results in a total connected population of 74,000 persons, or nearly 10 percent of the entire 2004 population of the ROI.

During 2005, slightly more than 15,000 persons lived at Fort Carson. This number was composed of 7,400 active duty military personnel (of which 4,600 were unaccompanied personnel residing in barracks and 2,800 who were living in military family housing) and just more than 7,770 family members (also residing in the family housing; DECAM 2005b).

Many of the active duty military personnel (and their dependents) reside off post within the residential areas closest to the installation. Nearly 70 percent of off-post personnel reside within the residential areas in El Paso County nearest to Fort Carson.

Economy, Employment, and Income

The largest employers in El Paso County are the major military installations, with the proportion of military employment in the county being much higher than the ROI and the state. Five major military installations are within the ROI including Fort Carson, U.S. Air Force Academy, Schriever AFB, Peterson AFB, and the Cheyenne Mountain Air Station. These installations are important to the health and stability of the regional economy and support businesses and jobs through 1) payroll expenditures by military and civilian personnel; 2) direct procurement of goods and services by the installations for operations and maintenance functions; and 3) government contract awards to private firms located in the region.

Non-farm wage and salary earnings in the ROI totaled nearly $18 billion in 2004, approximately 81 percent of which was contributed by El Paso County. The contribution to total earnings by the military sector is highly concentrated in El Paso County, where it reaches 15 percent compared to 2 percent for the state and less than 1 percent for the other ROI counties.

Between 1999 and 2004, the total number of active duty military personnel assigned to the five installations varied from a low of 25,850 to a high of 28,191, and the number of civilian personnel ranged between 5,250 and 6,240. Fort Carson accounted for the largest share of active duty military personnel among the five installations. Between 1999 and 2004, the number of active duty military personnel assigned to Fort Carson remained relatively constant (between 14,220 and 15,730), and the number of civilian personnel on post ranged from 1,805 to 2,025.

More than 365,000 people were employed in the ROI in 2005, 75 percent of whom worked in El Paso County. This is an increase of 20 percent from 1995, which equaled the job growth in the state as a whole. In El Paso County, the largest share of employment is concentrated in the federal government, with 11 percent accounted for by military and civilian jobs. The retail trade sector employed 11 percent, and state and local government accounted for a 9 percent share. The accommodation and food services sector is the largest employer (16 percent of jobs) in Teller County, while in Fremont and Pueblo Counties, employment in state and local government contributes substantially to both economies.

The unemployment rate in all counties of the ROI gradually fell from highs of between 6 and 9 percent in 1992 to lows between 3 and 4 percent in 2000. In virtually all years, the unemployment rate for each county in the ROI exceeded that of the state.

Housing

As of 2000, nearly 289,000 housing units were located in the ROI. The proportion of owner-occupied housing units was 67 percent, with the lowest concentration in El Paso County (65 percent) and the highest in Teller County (80 percent). Overall, the quality of housing in the ROI is considered good. The proportion of units lacking complete plumbing and kitchen facilities (a surrogate measure for quality) is low for all counties within the ROI.

Vacancy rates for rental units fell in all areas between 1998 and 2001, from about 5 percent to 3 percent, after which they climbed to 10 percent or more by 2006. Vacancy rates and rents in all areas within the Colorado Springs metropolitan area are highly cyclical.

Residential construction activity is also cyclical and highly responsive to economic conditions. Building activity fell sharply between 1985 and 1989, and the level of building at the start of the period was not repeated until 10 years later. Construction activity peaked in 2001 and has declined slightly since then. The region has seen the construction of more than 6,000 units annually during 13 of the 21 years for which data are presented. The large majority of housing units constructed are single-family dwellings, which have comprised more than 50 percent of the units constructed during 8 of the 21 years for which data are presented. Although multi-family units were constructed in all years, construction levels of these units comprise a high (more than 25 percent) share in only 6 of the years studied.

Fort Carson has on-post housing units for both unaccompanied and accompanied personnel. There are currently 2,664 family housing units of various types contained in numerous clusters or "villages", with approximately 400 more units under construction. According to a recent Housing Market Analysis (Niehaus 2005), there is a serious housing deficiency on post that will grow over the next 5 years. Because of the severe shortfall in barracks spaces, a number of projects are planned or underway to provide more billeting for unaccompanied Soldiers. By 2011, 2,618 additional barracks spaces should be available (Davis 2006).

Schools

There are 22 school districts in the ROI with a total combined student membership in 2005 of nearly 139,300 (Colorado Department of Education 2006).

Three elementary schools and one middle school located on Fort Carson are part of the Fountain-Fort Carson School District 8. Most of the enrollment in the on-post schools comes from on-post and off-post military dependents, with a small percentage of non-military children (Walker 2006). High school students residing on post are bused to the nearby Fountain-Fort Carson High School.

Personnel assigned to Fort Carson reside throughout the ROI, and their children make up sizeable portions of the student membership in some school districts (National Association of Federally Impacted Schools 2006). There can be substantial fiscal implications for school districts that have a high proportion of their student members residing on military installations. The major installations in the region, reflected in the number of "federally connected" students, include Fort Carson, Peterson AFB, and Schriever AFB.

School districts rely on a number of funding sources, especially local property tax assessments, funds from the state, and federal funds. Military installations are exempt from local taxes and, thus, local school districts are eligible for Federal Impact Aid funds. These payments are designed to offset the potential loss of property tax payments to affected school districts. The impact aid received is highly weighted in proportion to the students who reside on the military installations, not in the communities.

The number of federally connected students, attended primarily by children of military and appropriated fund civilian personnel in this area, is highly concentrated in Fountain-Fort Carson School District 8 adjacent to Fort Carson, which also operates the four on-post schools. For this school district, more than half of the average daily attendance (ADA) consists of federally connected students, and they directly account for 30 percent of the budget, through impact aid.

Smaller, yet noticeable, concentrations are evident in the Academy School District (24 percent of ADA and 5 percent of budget), Widefield School District 3 (18 percent of ADA and 2 percent of budget), and Falcon School District (14 percent of ADA and 3 percent of budget).

Although the share of ADA comprised by federally connected students is high, the impact aid contribution to the budget in these three school districts is smaller. This is explained by the fact that the great ma-

jority of the students do not reside on the military installation; therefore, less impact aid is directed to these school districts. Their contribution to the school district budgets is through property tax payments associated with their places of residence in the community.

Environmental Justice

Because the impacts of construction are more likely to affect nearby populations adversely than other aspects of the Proposed Action, it is necessary to examine an area smaller than the ROI. Census blocks and block groups, which are subsets of census tracts, were not used in this analysis because the exact locations of the construction projects are unknown at this time. Therefore, census tracts were deemed the appropriate geographical reporting area for analyzing potential environmental justice impacts associated with the proposed construction activity on Fort Carson.

The population of the census tracts including and immediately adjacent to Fort Carson has a higher percentage of minority population than El Paso County and the ROI. The proportion of minority population, however, was lower than the 50 percent threshold. Fort Carson's residential population, as with other military populations, contributes to that higher minority percentage in the immediate area of the post. Of the total U.S. military, 36 percent of active duty members identify themselves as minorities (Army 2005).

The poverty levels at Fort Carson and other surrounding areas are below 20 percent. Although the poverty rate in the Fort Carson area was slightly higher than the rate for El Paso County, the ROI, and Colorado, it did not meet the 20 percent definition of a poverty area. Approximately 8 percent of El Paso County's population lived below the poverty line as of the 2000 Census. Small geographical areas, where more than 20 percent of the population lives below the poverty level, are scattered throughout the Colorado Springs metropolitan area (DECAM 2002a).

Protection of Children

Children are present on Fort Carson in a number of settings including family housing neighborhoods, three elementary schools, one middle school, day care centers, and recreational areas. As of 2000, there were nearly 2,400 children (18 years and younger) living on Fort Carson, including 1,300 who were under the age of 5 years (U.S. Census Bureau 2000d).

3.3.7.2 Piñon Canyon Maneuver Site

The ROI for the Proposed Action at the PCMS comprises Huerfano, Las Animas, and Otero Counties. The major communities near the PCMS are Trinidad in Las Animas County, and La Junta in Otero County.

Population

The PCMS does not support a resident population. All troops that train at the PCMS are permanently stationed either at or near Fort Carson or other Army installations.

Demographic information for the area is based on data from the U.S. Census Bureau (U.S. Census Bureau 2000d, e and 2006b, c) and the Colorado State Demography Office (State of Colorado 2006b). The population of the ROI declined slightly between 1980 and 2004 (from 43,904 to 43,875). Growth was highest in the 1990s, with an average annual growth rate of 0.82 percent. This rate slowed to 0.28 percent between 2000 and 2004. All three counties lost population between 1980 and 1990.

The share of the regional population contributed by Otero County decreased steadily from 51.4 percent in 1980 to 44.8 percent in 2004. The contribution from Las Animas County increased slightly from 33.9 percent in 1980 to 37.0 percent in 2004. Huerfano County's contribution, the smallest of the three counties, increased from 14.7 percent to 18.3 percent between 1980 and 2004.

Each of the three counties in the ROI is characterized by a single population concentration that comprises a large percentage of their respective county populations. Walsenburg in Huerfano County supports 46 percent of the county population, Trinidad in Las Animas County supports 58 percent of the county population, and La Junta and Rocky Ford in Otero County together support 59 percent of the county population.

Economy, Employment, and Income

Little permanent employment is directly associated with the PCMS. The majority of supplies needed for training activities at the PCMS are assembled at Fort Carson and transported to the PCMS with the troops. No other military installations exist within the ROI.

The counties in the ROI are rural; ranching and agriculture support much of the local economy. Major employers in Las Animas County include Burlington Northern/Santa Fe Railroad, Trinidad State Junior College, oil and gas drilling enterprises, and related support businesses. A new minimum-security correctional facility opened in 2003. The economy of Otero County is closely linked to agriculture including livestock (primarily cattle) production and farming. Major crops include dry land wheat, irrigated corn, and alfalfa hay. The largest employers are local and county government entities. Huerfano County has a larger medium-security correctional facility that provides employment in the area.

Employment data for the ROI were obtained from the Colorado Department of Labor and Employment (State of Colorado 2006a). Between 1995 and 2005, the number of jobs increased from approximately 17,400 to approximately 19,400 at an average annual rate of 1.1 percent (almost 12 percent over the 10-year period). This pace of growth was well below that exhibited by the State of Colorado, which experienced an increase of approximately 21 percent over the same period. Most of the growth took place in Las Animas County, which accounted for more than 80 percent of the growth in employment.

Compared with the State of Colorado, where only 1.5 percent of the work force is engaged in farming, the three counties in the ROI have high employment in farming - almost 10 percent in Huerfano County and almost 8 percent in Las Animas and Otero Counties. Employment in government and government enterprises (federal, state, and local) is high in Las Animas County (25.6 percent) and Otero County (20 percent). Huerfano County (13.2 percent) is slightly below the state average (13.6 percent). Federal, civilian, and military employment is below the state average, whereas employment in state and local government is high in Las Animas and Otero Counties (24.2 percent and 18.5 percent, respectively) compared to the state (10.4 percent).

The unemployment rate in all counties of the ROI has consistently been above that of the state. The rate gradually fell from highs between 7.5 and 10 percent in 1992 to lows between 4 and 5.5 percent in 2000. Between 2000 and 2003, the unemployment rate ranged between 6.5 and 9 percent, and it fell again slightly through 2005 (State of Colorado 2006b).

Non-farm wage and salary earnings in the ROI in 2004 totaled more than $544 million. The majority was contributed by Otero County (46 percent) and Las Animas County (40 percent). The concentration of well-paying jobs in the government sector is evident when comparing the share of earnings contributed by the sector to the share of employment in the same sector. The share of earnings is noticeably higher than the share of employment.

Earnings from the private sector are lower for each of the three counties in the ROI than for the state. This is also true for earnings in the federal, civilian, and military sectors. Earnings in the state and local government sectors are noticeably higher than the state average, especially for Las Animas County, where this category comprises almost 30 percent of total earnings.

Housing

There is no housing at the PCMS. Family housing and barracks for personnel training at the PCMS are located at Fort Carson.

In 2000, approximately 21,041 housing units were documented in the three-county ROI. The vacancy rate varied from 10 percent in Otero County, to 19 percent in Las Animas County, and 33 percent in Huerfano County. The high vacancy rate in Huerfano County is attributable to the high number of units having seasonal, recreational, and occasional use. The proportion of owner-occupied housing units was about 70 percent in all counties. Of these housing units, between 75 and 80 percent were single-family units. Few structures contain 10 or more units. Mobile homes comprise between 8 and 15 percent of the housing units. The housing stock is relatively old; the median year built of the units is oldest in Las Animas County (1953) and newest (1967) in Huerfano County. The proportion of units lacking complete plumbing and kitchen facilities (a surrogate measure for quality) is low in Otero County, but rises to 4 percent in Las Animas County and 5 percent in Huerfano County. Median rent values are $351 per month in Huerfano County, $316 per month in Las Animas County, and $301 per month in Otero County. Median home values are approximately $80,000 in Huerfano County, $86,000 in Las Animas County, and $68,000 in Otero County.

Residential construction activity is cyclical and highly responsive to economic conditions. The number of housing units authorized for construction in the ROI varied between 1985 and 2005 (Department of Housing and Urban Development 2006). Building activity remained relatively constant between 1985 and 1993, and then rose rapidly to peak in 1999. This was followed by an equally steep decline in building activity through 2005.

Schools

The ROI contains 14 school districts, with a total combined student population of more than 8,000 in 2005 (State of Colorado 2006a). The student/teacher ratio varies among school districts from a high of 18.5:1 (Branson School District in Las Animas County) to a low of 9:1 (Aguilar School District, also in Las Animas County).

Environmental Justice

The populations of the census tracts surrounding the PCMS have a slightly lower percentage of minorities than Las Animas County and the ROI (U.S. Census Bureau 2005). For the counties in the ROI, the Black population comprises less than 1 percent. The Hispanic or Latino share of the total population ranges from 35.3 percent in Huerfano County to 37.9 percent in Otero County and 41.7 percent in Las Animas County.

None of the census tracts surrounding the PCMS meets the 20 percent definition of a poverty area (U.S. Census Bureau 2006c). The poverty rate in these areas was about the same as those for Las Animas County and the ROI; however, the poverty rates in these three areas combined are about twice the state level.

Protection of Children

No children live on the PCMS, and the PCMS is secured to prevent trespassing. There are few residences immediately adjacent to the PCMS.

3.3.8 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

This section provides an overview of the hazardous materials and wastes typically used or generated within the ROI in Colorado. The hazardous materials and wastes at Fort Carson and PCMS include ammunition and live-fire, unexploded ordnance, POLs, contaminated and IRP sites, lead, asbestos, PCBs, pesticides, and radon.

3.3.8.1 Fort Carson

This section identifies the affected environment for hazardous materials and wastes at Fort Carson. A wide variety of hazardous/toxic materials is used on the installation including petroleum, oil, and lubricants; chemical agents; explosives; and pyrotechnics (DECAM 2002b). Such products are used in military training and normal maintenance activities/operations.

The principal industrial operations involving the use of hazardous materials and petroleum-based products at Fort Carson are the painting, repair, and maintenance of vehicles and aircraft at the Consolidated Maintenance Facility housed in Building 8000 and maintenance facilities. Lists B-1 through List B-7 within the SPCC Plan (DECAM 2004) provide a detailed chemical inventory and chemical storage locations areas within Fort Carson. Hazardous materials are stored securely in maintenance areas, flammable storage lockers/areas, and mobile transfer units (tank trucks) (DECAM 2004f).

In accordance with RCRA, Colorado law, implementing regulations, and its Part B permit, Fort Carson has a comprehensive program to address management, use, and storage of hazardous waste and toxic substances, as well as a systematic program to investigate and remediate, if necessary, known or suspected contaminated sites across the installation.

Hazardous and toxic materials used at Fort Carson include gasoline, batteries, paint, diesel fuel, oil and lubricants, chemical agents, explosives, JP-8 jet fuel, pyrotechnic devices used in military training operations, radiological materials at medical and dental facilities, radioactive materials, pesticides, and toxic or hazardous chemicals used in industrial operations (USACE 2006c). Some of these materials end up as wastes through certain processes, or they are off-spec or become contaminated and unusable.

To minimize hazardous waste disposal, Fort Carson maximizes recovery of waste for reuse and recycles applicable materials.

Ammunition, Live-Fire, and UXO

Ammunition is stored at the ASP storage area located just north and east of Townsend Reservoir and is classified as Class V material according to the Army's supply categories. The ASP contains 20 standard ammunition storage igloos, two aboveground magazines, the ASP office, and a utility building (DECAM 2001b).

UXO is found in one large impact area within the southeastern portion of Fort Carson, which is the only area within Fort Carson authorized to be fired into with dud-producing ammunition. UXO deemed unsafe to detonate in place are transported to Range 121 for treatment via open detonation (OD). The OD unit is currently operating in interim status while a Subpart X permit application is being prepared by CDPHE. A slight increase in OD operations is expected with increased training and expanded training area usage.

POLs and Storage Tanks

Storage tanks at Fort Carson are generally located within the cantonment area, primarily at vehicle maintenance facilities (motor pools), Butts Army Airfield, and other maintenance areas. ASTs with secondary containment are generally used to store petroleum products. Petroleum products are stored in numerous ASTs within the cantonment area and include newly constructed contractor-owned, contractor-operated bulk and retail fuel facilities that provide fuel to all military units on Fort Carson. Underground storage tanks have been used to store gasoline, diesel, aircraft fuel, and other fuels. Three commercial gas stations are operated on Fort Carson, and each station contains three USTs (DECAM 2004b).

Petroleum-based products are stored in several ASTs and at the hazardous cargo loading area located at the south end of the runway at Butts Army Airfield. Petroleum-based products are used in the repair of malfunctioning targetry systems and military vehicles and for replacement of obsolete or malfunctioning targetry systems such as lifters that contain hydraulic fluids (USAEC 2006b).

The painting, repair, and maintenance of 47 aircraft and their supporting wheeled ground vehicles require the use of POLs and other hazardous materials. Aircraft maintenance hangars, one hot-refuel point, and one outdoor wash rack are used to perform standard vehicle maintenance (DPW 2004). Additionally, painting operations are conducted at a paint booth in one of the old hangars. Lead acid batteries are used for all aircraft and their supporting wheeled vehicles.

Contaminated and IRP Sites

Fort Carson is not listed on USEPA's NPL, which designates high-priority cleanup sites under CERCLA, more commonly known as the Superfund Program. Investigation and cleanup of Fort Carson is conducted under the Corrective Action portion of a RCRA Part B Permit (#CO-06-09-29-01).

Investigation and cleanup of Fort Carson's contaminated sites is conducted in accordance with the RCRA Part B permit requirements under coordination with the CDPHE. Typical contaminants of concern include organics (solvents, petroleum hydrocarbons, etc.), explosives (TNT, RDX, etc.), and inorganics.

There are 170 Solid Waste Management Units (SWMUs) within various stages of cleanup status under Fort Carson's Corrective Action program at the cantonment, Butts Army Airfield, and Range. For the 170 SWMUs, site investigation and cleanup are being performed in accordance with applicable Army, state, and federal requirements to achieve established cleanup goals and schedules. Fort Carson manages the SWMUs according to all federal, state, and local regulations, and Fort Carson's RCRA Part B permit. To the extent practical, all SWMUs are avoided during construction projects.

Lead

Lead-based paint may be found in older facilities at Butts Army Airfield (DECAM 2006a). Lead can potentially be found in chipped or cracking painted walls of the buildings or in surrounding soils. Paint in liquid form can also contain hazardous lead concentrations. Lead waste may also be found at the gun and artillery practice ranges where lead munitions are used (DECAM 2004c).

Asbestos

Asbestos-containing materials may be found in older facilities at Butts Army Airfield (DECAM 2006a). Asbestos-containing materials can potentially be found in floor tiles, pipe wrappings, ceilings, and insulation of the buildings.

Polychlorinated Biphenyls & Chlorofluorocarbons

Transformers manufactured prior to 1976 and light ballasts manufactured before 1979 are assumed to contain PCB dielectric fluid (DECAM 2004g). There are 16 transformers and existing ballast light fixtures within the cantonment that potentially contain PCB dielectric fluid (DECAM 2006a). In addition, Building T6225, located at the old main hospital site, may contain chlorofluorocarbons (DECAM 2006a).

Pesticides/Herbicides

Pesticides and herbicides are required for insect and rodent control in select structures at Butts Army Airfield and in the control of undesired vegetation including noxious weeds (DECAM 2004d; USACE 2006a). Building 3708 was newly renovated for pest control and is used to store and mix pesticides (DECAM 2004j). Minor amounts of pesticides are also stored and distributed at the commissary, post exchange, and the veterinary clinic (DECAM 2004d). Pesticides used on Fort Carson are described in the Installation Pest Management Plan (DECAM 2004h).

Radon

The cantonment is an area of high concern for radon potential (DECAM 2006a) and requires monitoring and engineering precautions to limit radon exposure. The Consolidated Maintenance Facility (Building 8000) is used for holding radioactive components of the M1 tank. Unserviceable components are sent off post for repair. Building 8000 is more than 1 mile from existing and proposed family housing sites (DECAM 2006a). The Radioactive Materials Management Plan (DECAM 2004h) for Fort Carson provides the requirements for handling these materials.

Hazardous Waste

All hazardous waste generated at Fort Carson (including the cantonment, Butts Army Airfield, and the range) is transported to the Hazardous Waste Storage Facility, Building 9248, for storage and eventual shipment offsite for disposal. Currently, there are five satellite accumulation points (SAPs) on Fort Carson for the collection and temporary controlled on-site storage of hazardous waste (DECAM 2006a). The installation has no active landfills, and all sanitary waste is disposed of at off-post, commercial landfills.

Spent hydraulic lifters from mobile targets are stored at the small arms, live-fire ranges. Some of these materials become wastes through certain processes, expiration, not meeting specifications, or they become contaminated and unusable. Minimal amounts, if any, of hazardous waste are generated at the PCMS, which may be considered a Conditionally Exempt Small Quantity Generator (CESQG) under RCRA, and as such, the PCMS is not required to have a hazardous waste management plan (HWMP). Fort Carson's current HWMP (DECAM 2004c) incorrectly states that the plan applies to both Fort Carson and the PCMS. The HWMP and Fort Carson's RCRA Part B Permit apply only to Fort Carson (Downs 2006).

Fort Carson primarily uses the battery storage facility in Building 8000 for the storage of lead-acid batteries. New lead batteries are stored there prior to transportation to individual units; spent lead-acid batteries are stored on pallets at the battery storage facility until their transportation to an off-site recycling facility. Small battery storage areas are located in other buildings (DECAM 2004j).

Biomedical Waste

A small amount of biomedical or infectious waste could be generated by treating injuries. All medical waste generated at Fort Carson and PCMS is disposed of through a U.S. Army Medical Department Ac-

tivity (MEDDAC) contractor permitted to dispose of that type of waste. Any medical waste generated at PCMS is transported by certified personnel in government vehicles to Evans Army Community Hospital (EACH) at Fort Carson to be disposed of in accordance with MEDDAC's plans (Reeves 2006); Evans Army Community Hospital Hazardous Materials/Hazardous Waste Program, MEDDAC Regulation Number 40-5-6 (U.S. Army 2005a); and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (U.S. Army 2005b).

3.3.8.2 Piñon Canyon Maneuver Site

This section describes the affected environment for hazardous materials and wastes within the cantonment and the training areas at PCMS. Hazardous materials used at the PCMS include gasoline, diesel fuel, oil, and lubricants used during routine maintenance; pesticides; chemical agents; and explosive and pyrotechnic devices used in military training operations. A limited variety of hazardous/toxic materials is used on the PCMS compared to Fort Carson.

Ammunition, Live-Fire, and UXO

Explosive and pyrotechnic devices are used at PCMS for military training operations. UXO is not expected to be present at the PCMS. Non-explosive practice grenades are used at an existing grenade-launcher range.

POLs and Storage Tanks

Petroleum-based products are used in the training areas for the repair and maintenance of vehicles and replacement of obsolete or malfunctioning target systems, such as lifters, that contain hydraulic fluids (USAEC 2006b). Small maintenance facilities would be expected to be used to store petroleum-based products. Larger gas, diesel, and heating fuel USTs are located in the cantonment. Smaller ASTs are located at Big Canyon, Biernachis, Sharps, and Red Rocks Ranches. The 11 USTs and 10 ASTs have a combined capacity of approximately 130,000 gallons.

Contaminated and IRP Sites

No IRP sites are currently under investigation on PCMS. No SWMUs have been identified within the PCMS.

Lead and Asbestos

The ranches at the PCMS were built during a time when asbestos and LBP were commonly used for construction. The cantonment facilities were constructed after 1985 and are unlikely to contain LBP or asbestos.

Pesticides/Herbicides

As required by Army policies, the PCMS emphasizes integrated pest management. Pesticides and herbicides could be required for insect and rodent control in structures and control of undesired vegetation including noxious weeds (USACE 2006a). Potential areas of pesticide application include the grounds surrounding support facilities and ranges.

Radon

The cantonment is an area of high concern for radon potential (DECAM 2006a) and requires monitoring and engineering precautions to limit radon exposure.

Hazardous Waste

No hazardous waste is stored at the PCMS. Hazardous wastes generated at PCMS are properly disposed of at an off-post, permitted hazardous waste facility.

3.3.9 BIOLOGICAL RESOURCES

3.3.9.1 Fort Carson

Vegetation Community Descriptions

The eastern side of Fort Carson is characterized by flat to rolling, open terrain dominated by grasslands and shrublands. Woodlands and a variety of shrub communities occupy higher ground on the western side of the installation, and large grassland areas are also present. The cantonment area on Fort Carson is highly disturbed and developed, and vegetation consists primarily of nonnative ornamental landscaping including bluegrass turf and landscape trees. Only small areas of native vegetation remain within the cantonment. Native grasslands occur primarily in the eastern and southwestern portions of Fort Carson. Several deciduous shrubland types are found on Fort Carson, and these are often restricted to special edaphic (soil-related) conditions (USACE 2005a; DECAM 2002a).

Coniferous woodlands dominated by one-seed juniper (*Sabina monosperma*) or a combination of one-seed juniper and pinyon pine (*Pinus edulis*) are the most common woodlands on Fort Carson, occupying the elevated landscapes on the western side of the installation. Pinyon-juniper woodlands are found primarily on mesas and hills with gravelly soils where they out-compete grasses (USACE 2005a, DECAM 2002a).

Wetlands

The USFWS National Wetland Inventory identified 543 wetland areas totaling approximately 1,050 acres on Fort Carson, of which 383 wetlands totaling approximately 507 acres are man-made (USFWS 1991). The majority (70 percent) of wetlands on Fort Carson are palustrine emergent wetlands (USFWS 1991). Most of these are less than 1 acre. In the downrange training area of Fort Carson, isolated wetlands can occur where a dam has been built for erosion control or water storage, and most are only 1 to 2 acres size. The largest downrange wetland area, totaling approximately 100 acres, is on the upper reaches of Teller Reservoir. About six very small springs occur on Fort Carson, and each has a small associated wetland area. Wetland areas are also distributed throughout the cantonment area, typically in natural or stormwater runoff drainages and in an area south of Butts Army Airfield (site of the old golf course and now a wildlife management area) (DECAM 2002a).

In 2002, USACE issued a Regional Permit under Section 404 of the Clean Water Act (33 USC 1344) for Fort Carson and the PCMS Erosion Control Activities (USACE 2002b). This regional permit authorizes Fort Carson to conduct erosion control activities on post that may result in minimal individual and cumulative impacts to wetlands from dredge and fill activities. Typical erosion control measures include erosion control and stock watering impoundments, banksloping of erosion courses, check dams, rock armor, hardened crossings, culverts and bridges, erosion control terraces and water diversions, water turnouts, and other erosion control activities approved by USACE.

Noxious Weeds

A number of Colorado State- and county-listed (El Paso, Pueblo, and Fremont Counties) noxious weeds have invaded both natural and developed landscapes on Fort Carson. Fort Carson has targeted noxious

weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives, or eliminating the weed species from the area (DECAM 2002a). Maintaining healthy native plant communities and revegetating disturbed areas, as necessary, are the most effective methods of preventing weed establishment and encroachment at Fort Carson (DECAM 2002a).

Wildlife

Typical wildlife habitat types on Fort Carson include short-grass prairie, pinyon-juniper woodland, and aquatic and riparian communities. The dominant terrestrial habitat types on Fort Carson are grasslands, shrublands, and woodlands. Aquatic habitats on Fort Carson are very limited and consist of wetlands, riparian corridors, and open water. Existing data on wildlife species and descriptions of wildlife habitats present on Fort Carson were obtained from the INRMP (DECAM 2002a).

Western rattlesnake (*Crotalus viridis*), triploid checkered whiptail (*Cnemidophorus neotesselatus*), and coachwhip (*Masticophis flagellum*) are typical reptiles found on Fort Carson. Wetlands support several amphibian species found on Fort Carson, including plains leopard frog (*Rana blairi*), northern leopard frog (*Rana pipiens*), and snapping painted turtle (*Chrysemys picta*). Fifty-seven species of carnivores, ungulates, and small mammals and numerous bird species are known to occur on Fort Carson (USACE 2007a).

Native and nonnative fish can be found at reservoirs at Fort Carson (USACE 2005a), eight of which are managed for sport fishing (DECAM 2002a). The closest surface waters to the cantonment area, including Haymes, Townsend, and Northside Reservoirs and Bird Farm Reservoirs, are man-made impoundments primarily used for recreational fishing. Warm-water catch-and-release fisheries are found at Northside, Small Bird, and Large Bird Reservoirs. Womak, Haymes, and Townsend Reservoirs are currently managed as cold-water fisheries (DECAM 2002a). Streams, especially spring-fed streams, also support native fish species on Fort Carson (USACE 2005).

Threatened and Endangered Species/Species of Concern

Threatened and endangered plant and animal species are protected under the ESA and/or Colorado state law. The Migratory Bird Treaty Act protects migratory birds and implements the U.S. commitment to international conventions for the protection of migratory birds. Bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively) are protected by the Bald and Golden Eagle Protection Act. Other sensitive wildlife species include those listed by the Colorado Division of Wildlife, Colorado Natural Heritage Program (CNHP), USFWS, Partners in Flight, and the Central Shortgrass Prairie Ecoregional Assessment and Partnership Initiative. Other sensitive plant species include those identified by the CNHP as Colorado Species of Concern.

Special Status Wildlife Species. Eleven animal species that are on the USFWS list of federally listed endangered, threatened, and candidate species occur in El Paso, Pueblo, and Fremont Counties, in which Fort Carson is located. No critical habitat for these species has been designated or proposed for designation in these counties (USFWS 2005a, Linner 2006).

The following federally listed wildlife species are known to use Fort Carson: bald eagle, black-tailed prairie dog (*Cynomys ludovicianus*), mountain plover (*Charadrius montanus*), Mexican spotted owl (*Strix occidentalis lucida*), burrowing owl (*Athene cunicularia*), greenback cutthroat trout (*Oncorhynchus clarki stomias)*, and Arkansas darter (*Etheostoma cragini*) (USACE 2007a).

Forty-two Colorado-listed special status wildlife species occur on Fort Carson. The species are tracked by CNHP, USFWS, Partners in Flight, and the Central Shortgrass Prairie Ecoregional Assessment and Partnership Initiative.

Special Status Plant Species. No federally listed threatened or endangered plant species or candidates for federal listing are known to occur on Fort Carson, and no portion of Fort Carson has been designated or proposed for designation as critical habitat for listed plant species identified (USACE 2005a; Linner 2006).In addition, no state-listed threatened or endangered plant species are known to occur on Fort Carson.

The Federally Threatened Ute ladies'-tresses orchid (*Spiranthes diluvialis*) has the potential to occur on Fort Carson. However, surveys in potentially suitable habitat have not found the species and there are no historic records of its occurrence on Fort Carson (DECAM 2002a). Sensitive plant species known to occur on Fort Carson include Roundleaf Four-O'Clock *(Oxybaphus rotundifolius)*, Pueblo Goldenweed *(Oonopsis puebloensis)*, Arkansas Valley Evening Primrose *(Oenothera harringtonii)* ,Arkansas River Feverfew (*Bolophyta tetraneuris)* and Gold Blazingstar *(Mentzelia chrysantha)* . While these species have no federal or state protection, they are considered as regional targets for conservation by the CNHP. These species are not known or suspected to occur with the ROI.

Seven Colorado Plant Species of Special Concern (as listed by CNHP) occur on Fort Carson. Surveys conducted in 1995 for other Colorado Species of Special Concern plants potentially occurring on Fort Carson did not find Brandegee wild buckwheat (*Eriogonum brandegei*) or Degener penstemon (*Penstemon degeneri*) (DECAM 2002a).

Chalk-shale barrens on Fort Carson host several of these sensitive plants, including Arkansas Valley feverfew and Colorado endemics golden blazing star, round-leaf four o'clock, and Pueblo goldenweed (Rifici 2006). Fort Carson barrens communities are characterized by exposed bedrock formations and generally low plant cover. They are generally restricted to the extreme southern third of the installation and are most commonly found in Indian ricegrass (*O. hymenoides*) grasslands and one-seed juniper/Indian ricegrass/New Mexico feathergrass (*Sabina monosperma/O. hymenoides/H. neomexicana*) woodlands (USACE 2005a). Dwarf milkweed (*Asclepias uncialis*) is known from a single location in the extreme southeastern corner of Fort Carson. The distribution of other sensitive plant species on Fort Carson is not currently known. In accordance with the Army's Species at Risk Program, DECAM has initiated surveys to determine population numbers and the distribution of sensitive plant species (DECAM 2002a). Target species for sensitive plant surveys on Fort Carson in 2006 and 2007 include dwarf milkweed, Arkansas River feverfew, Arkansas evening primrose, Pueblo goldenweed, and round-leaf four o'clock (CNHP 2006).

3.3.9.2 Piñon Canyon Maneuver Site

Vegetation Community Descriptions

The PCMS is characterized by flat to rolling, open terrain dominated by grasslands. Woodlands and a variety of shrub communities, most with a substantial grass understory, occupy higher ground and the steep canyons leading down to the Purgatoire River beyond the eastern boundary of the PCMS.

Wetlands

Natural water bodies and wetlands are generally small and infrequent on the PCMS but are important in contributing to wildlife habitat diversity. The total wetland area on the PCMS is estimated to be about 370 acres, of which approximately 290 acres are man-made (USFWS 1991). Most wetlands on the PCMS are

associated with side canyons of the Purgatoire River and water developments. Playas (flat-bottomed depressions that are periodically covered by water) are also present, and additional small wetlands are associated with springs and other water bodies such as erosion control impoundments, stock watering ponds, and the overflow from stock tanks associated with windmills.

In 2002, USACE issued a Regional Permit under Section 404 of the Clean Water Act (33 USC 1344) for Fort Carson and the PCMS Erosion Control Activities (USACE 2002b). This regional permit authorizes the PCMS to conduct erosion control activities that may result in minimal individual and cumulative impacts to wetlands from dredge and fill activities. Typical erosion control measures include erosion control impoundments, stock watering impoundments, banksloping of erosion courses, check dams, rock armor, hardened crossings, culverts, bridges, erosion control terraces, water diversions, water turnouts, and other erosion control activities approved by USACE.

Noxious Weeds

Several Colorado State-listed and county-listed (Las Animas County) noxious weeds have invaded both natural and developed landscapes on the PCMS. The PCMS has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives, or eliminating the weed species from the area. Maintaining healthy native plant communities and revegetating disturbed areas, as necessary, are the most effective methods of preventing weed establishment and encroachment on the PCMS (DECAM 2002a).

Wildlife

Typical wildlife habitat types on the PCMS include short-grass prairie, pinyon-juniper woodland, and aquatic and riparian communities. The dominant terrestrial habitat types on the PCMS are grasslands, shrublands, and woodlands. Aquatic habitats on the PCMS are very limited and consist of wetlands, riparian corridors, and open water (USFWS 1991). Existing data on wildlife species and descriptions of wildlife habitats present on the PCMS are documented in the *Fish and Wildlife Management Recommendations: Piñon Canyon Maneuver Site Las Animas County, Colorado* (USFWS 1991) and the INRMP (DECAM 2002a).

The Texas horned lizard (*Phrynosoma cornutum*) and western rattlesnake are typical grassland reptiles found at the PCMS. The Texas blind snake (*Leptotyphlops dulcis*) is found in canyons with pinyon-juniper slopes and grasslands on the canyon floor (Hammerson 1999). Wetlands support several amphibian species found at the PCMS including the plains leopard frog and snapping turtle. Nine species of carnivores, ungulates, and small mammals and fifteen bird species are known to occur on PCMS (USACE 2007b).

Threatened and Endangered Species/Species of Concern

Federally-Listed Species. Seven USFWS listed endangered, threatened, and candidate animal species occur in Las Animas and Otero Counties (USFWS 2005a and Linner 2006).

The only federally listed wildlife species known to use the PCMS is the bald eagle, which is a late fall-through-winter (late October through late February) resident and migrant. Bald eagles primarily use the southwestern grassland section of the installation (DECAM 2002a). No evidence of bald eagles nesting on the PCMS has been found (DECAM 2002a and USACE 2005a).

No plant species appear on the USFWS lists of federally listed endangered, threatened, and candidate species for Las Animas or Otero Counties (USFWS 2005a and Linner 2006). No federally listed threatened or endangered plant species or candidate for federal listing is known to occur at the PCMS.

State-Listed Species. Thirteen state-listed special status wildlife species occur at the PCMS. The triploid checkered whiptail is designated as a Species at Risk (SAR) by the Army. In the summer of 2006, DECAM coordinated with CNHP to survey for the species at the PCMS. CNHP is developing a habitat model for triploid checkered whiptails based on habitat characteristics at 12 species observation locations (Klavetter 2006).

No state-listed threatened or endangered plant species are known to occur at the PCMS. Eight Colorado Plant Species of Special Concern (as listed by CNHP) occur on the PCMS (DECAM 2002a).

Of these Colorado species of special concern, both round-leaf four o'clock and dwarf milkweed are well represented at the PCMS, both in terms of the number of known sites and numbers of individuals (Rifici 2006). In accordance with the Army's SAR Program, DECAM has initiated surveys to determine population numbers and the distribution of these and other sensitive plant species (DECAM 2002a). Target species for SAR-sensitive plant species surveys on the PCMS in 2006 and 2007 include dwarf milkweed, pueblo goldenweed, round-leaf four o'clock, and Arkansas valley evening primrose (CNHP 2006, Klavetter 2006, Rifici 2006).

3.3.10 AIR QUALITY

3.3.10.1 Air Quality Standards

Laws and regulations also exist to protect air quality in areas that are meeting the national standards. Any significant net increase of criteria pollutants for which the area is designated as "attainment" would subject the PCMS to the PSD review requirements (40 CFR 52.21). The Colorado Air Quality Control Commission (AQCC), which is within the CDPHE, administers the State of Colorado's USEPA-approved PSD program (59 Federal Register [FR] 42500) by implementing Regulation 3, Part D, which regulates criteria pollutants from new combustion sources.

The AQCC also regulates the emissions of PM, smoke, CO, and sulfur oxides (SO_X) by implementing opacity and emission limits in AQCC Regulation No. 1. Opacity limits are set to ensure that visibility is not impacted in the long term. Obscurants include smoke and other products used for military training.

3.3.10.2 Clean Air Act Conformity

Because Colorado Springs is a maintenance area for CO a conformity analysis is required. A conformity determination for Fort Carson was conducted under the Fort Carson Transformation EIS and it was determined that the proposed action under that EIS conformed with the applicable SIP.

3.3.10.3 Existing Air Quality Conditions

All Colorado communities are currently in attainment of all NAAQS (CDPHE 2007). Colorado Springs once violated the federal clean air standard for CO, but developed a Carbon Monoxide Maintenance Plan for the Colorado Springs Attainment/Maintenance Area that shows how they have attained and will maintain those standards. As a part of the redesignation, the Colorado Springs area is under a CO Maintenance Plan until 2015 to demonstrate compliance with the Colorado NAAQS. Las Animas County is in attainment for all the monitored criteria pollutants.

3.3.10.4 Fort Carson

Air pollutant emissions are generated at Fort Carson mainly through the combustion of fossil fuels in equipment such as boilers, generators, and motorized vehicles. Combustion products include CO, nitrogen oxide (NO_x), SO_2, PM_{10}, and PM_{25}. Vehicle travel on unpaved roads contributes to fugitive PM. Painting and coating activities, fuel storage, fuel operations, and chemical usage contribute to both VOCs and hazardous air pollutants (HAPs). To a lesser extent, landfill-related emissions, military training activities, and fire training activities emit VOCs and various HAPs.

Prescribed burning, which supports training, ground maintenance, and the health of surrounding forest areas, is a major contributor of CO emissions. Approximately 3,000 to 10,000 acres are affected annually by prescribed burns at Fort Carson (DECAM 2003b).

Facilities with the potential to emit (PTE) more than 100 tons per year (tpy) of a criteria pollutant are a part of the CDPHE's Air Pollution Control Division (APCD)-administered Title V Operating Permit Program. The Title V Operating Permits include listings of all air pollution regulatory requirements applicable to the source. The PTE represents the maximum emissions a facility could emit given physical, enforceable, and permitting constraints. Fort Carson is considered a Title V major source because of its PTE of more than 100 tpy of CO, NOx, PM, and VOCs.

As a major source under the Title V program, Fort Carson is subject to Operating Permit No. 95OPEP110. A renewal application was submitted to the APCD on September 1, 2002, and the renewal permit is anticipated sometime in late 2006 or early 2007. None of the current air pollutant sources has contributed to an exceedance of the NAAQS (refer to Appendix C, Air Quality Supporting Documentation in Draft FTC Transformation EIS; USACE 2007a).

Fort Carson is also subject to its Title V Operating Permit, which limits the use of smoke munitions and obscurant smoke for military training exercises.

Fort Carson also implements Fort Carson (FTC) Regulation 200-1, promulgated in December 1999, which prescribes policies and procedures and assigns responsibilities for the conservation, protection, and enhancement of the environment, including air quality, at Fort Carson and supported facilities. The Air Quality Management Chapter of FTC Regulation 200-1 was updated in February 2003 to provide enhanced guidance on program responsibilities and smoke and obscurants management. FTC Regulation 200-1 parallels AR 200-1 and is specific to Fort Carson.

The Fugitive Dust Control Plan (DECAM 2004a) was established as a part of the state-enforceable best mitigation practice at Fort Carson to minimize dust impacts to air quality. It was approved by the CDPHE in August 2005 and will continue to be followed. Additionally, land disturbance permits and dust suppression regulations and procedures are applicable and implemented at Fort Carson.

3.3.10.5 Piñon Canyon Maneuver Site

The PCMS is subject to Construction Permit No. 96LA1082, which limits the generation of DoD-approved obscurants for training exercises. The PCMS will not exceed the following permit-limited emission rates (APCD 2000):

- 1,540 gallons per day for fog oil; or
- 115,591 pounds per year of smoke munitions; of this, hexachloroethane is not to exceed 2,024 pounds per year.

Controlled burns are used to minimize the risk of large fires by reducing fuel loads and breaking up the continuity of fuels. Prescribed burning targets areas with heavy fuel buildups that are the most likely to ignite because of range operations.

To reduce the air quality impacts, the PCMS follows AR 200-1 to provide environmental protection and enhancement. Under AR 200-1, steps are identified that enable the Army to meet federal and state regulations and to minimize the use of ozone-depleting chemicals (U.S Army 1997).

Although not required, the Fugitive Dust Control Plan (DECAM 2004a) and Fort Carson Regulation 2001 (Fort Carson 1999b) established for Fort Carson are followed as part of the BMPs at the PCMS to minimize dust impacts to air quality. Additionally, state land disturbance permits and dust suppression regulations and procedures are applicable and implemented at the PCMS. Disturbed areas larger than 25 acres or areas that have been disturbed 6 months or longer are subject to site-specific state permits, which implement BMPs.

3.3.11 NOISE

Noise levels in unincorporated areas in El Paso County are regulated under Ordinance No. 02-1, Ordinance Concerning Noise Levels in Unincorporated El Paso County. Section 5 of this ordinance specifies acceptable ambient noise levels that are presented in **Table 3-4.**

Table 3-4 Maximum Permissible Noise Levels in Unincorporated El Paso County

Land Uses	Maximum Noise (dbA) 7:00 a.m. to 7:00 p.m.	Maximum Noise (dbA) 7:00 p.m. to 7:00 a.m.
Residential property or Commercial area	55	50
Industrial area or Construction Activities	80	75
Non-specified areas	55	50

Notes:
Sound levels shall be measured in dbA as provided for in Section 6 of Ordinance 02-1.
In the hours between 7:00 a.m. and 7:00 p.m., the noise levels permitted by this section may be exceeded by 10 db(A) for a period not to exceed 15 minutes in any 1-hour period.

3.3.11.1 Fort Carson

Noise-sensitive areas adjacent to Fort Carson consist of numerous communities and residential developments. To the north, these areas include Cheyenne Mountain State Park and the communities of Colorado Springs, Security, Widefield, and Fountain. Other noise-sensitive areas include Turkey Canyon Ranch and Red Rock Valley Estates along the western boundary, and El Rancho and Midway Ranch along the eastern boundary. Noise-sensitive locations adjacent to the southern boundary of Fort Carson include the communities of Penrose and Pueblo West, which are located to the southwest and southeast, respectively. Noise-sensitive areas within Fort Carson are limited to the cantonment area.

Sources of noise associated with Fort Carson include aircraft and traffic as well as large- and small-caliber weapons. The primary sources of noise are the firing of weapons, specifically large-caliber weapons, such as artillery and tank main guns, as well as the operation of military aircraft at Butts Army Airfield. Secondary sources of noise include motor vehicle traffic consisting of cars, trucks, and tracked vehicles.

3.3.11.2 Piñon Canyon Maneuver Site

Noise-sensitive locations adjacent to the PCMS consist of a limited number of residences around the periphery of the installation. No other noise-sensitive areas are located adjacent to the PCMS.

The primary sources of noise at the PCMS originate from short-term military training exercises at the small-caliber weapons ranges and from military aircraft operations at the combat assault landing strip (CAL) by C-130 aircraft. Large-caliber weapons are currently not used at the PCMS (Renn 2006).

3.3.12 AIRSPACE RESOURCES

The airspace over Fort Carson is controlled and designated at special use airspace. Butts Army Airfield in the northern portion of Fort Carson is covered by Class D airspace. This airspace is controlled by the Butts Army Airfield tower.

The rest of Fort Carson is covered by Restricted Area R-2601. This restricted area is subdivided into training areas and corridors (U.S. Army 2006). Restricted Area R-2601 is divided into seven aviation training areas. Corridors have been identified for various purposes. The Range Corridor is designed to aid the flow of air traffic about R-2601. The Airburst Corridor is an extension of the Range Corridor that permits aircraft to transit the southern part of Fort Carson when certain range complexes are in a COLD or HOT status (the range is occupied and live ordnance is or is not being employed). Range 123 is an U.S. Air Force bombing and strafing range at the southwestern corner of Restricted Area R-2601.

The airspace associated with PCMS is designated as an MOA special use airspace. PCMS airspace is activated by the Commander, Butts Army Airfield. Approval for all aviation operations within PCMS must be coordinated through G-3 Range Division to the G-3 Aviation Office.

Two commercial airports of importance are located nearby Fort Carson. Colorado Springs Airport, 8 nautical miles northeast of Fort Carson, is the nearest commercial airport. Although Denver International Airport is 65 nautical miles northeast of Fort Carson, the western edge of Denver Class B airspace occurs within the local flying area designated for Fort Carson.

3.3.13 ENERGY

Fort Carson purchases natural gas and electricity from Colorado Springs Utilities. Electrical services are provided through two aerial 34.5-kilovolt, 3-phase, supply lines, which terminate at two power substations in the Cantonment. The peak historical electrical demand at Fort Carson is 24,000 kW, whereas the total capacity of transmission lines available to the installation is 48,800 kW and the total capacity of transformers is 32,200 kW (Guthrie 2005). The training facilities within the Range and Butts Army Airfield are also supplied power from Colorado Springs Utilities. Electrical supply lines to the airfield were upgraded in 1986. During maneuvers, targets are locally powered by battery or generator.

Fort Carson receives natural gas from Colorado Springs Utilities via two feeds at the north end of the installation, near Gate 4. The natural gas is metered and piped through a series of gas mains and distribution lines to Fort Carson's four central heating plants, Butts Army Airfield, and the Family Housing Area. The existing gas line servicing Butts Army Airfield does not have the capacity to accommodate additional gas service to the Range or Training Support Complex, located at the far west end of Wilderness Road. Colorado Springs Utilities is in the planning stages for a gas feed to Gate 1 area, in support of the new Cheyenne Mountain State Park west of this gate (DECAM 2005d). The peak historical daily consumption of natural gas at Fort Carson is 8,600 million cubic feet (mcf)/day, and the peak historical monthly con-

sumption is 186,000 mcf. Colorado Springs Utilities' maximum delivery capacity to the installation is 10,650 mcf/day (Guthrie 2005).

Fort Carson also is trying to reduce its consumption of energy and use more renewable sources of energy. For example, Fort Carson generates 1 to 2 percent of its energy from renewable sources, such as solar heat (indoor pool), photovoltaics, and a solar wall at a hanger. Fort Carson has established a 30-kW photovoltaic power system project at for water pumping, off-grid lighting, and telecommunications. Fort Carson also is purchasing electrical power generated from renewable sources from a Colorado Springs utility.

The PCMS purchases electricity from San Isabel Electric Association (DECAM 2002a). High-voltage overhead power lines enter the installation on the west side of the Cantonment, where the power lines connect to an electrical substation. The capacity of the existing transformer is 2,000 kilovolt ampere (KvA), and the existing demand is 164 KvA. Therefore, electricity demand at the site is below the design capacity of the existing transformer.

The substation supplies electricity to the existing buildings in the Cantonment through underground distribution lines located adjacent to the roads. Electric service is not available outside the Cantonment (Fort Carson 2005). Batteries and portable generators are used to supply power to the training areas.

Trucked-in heating oil and propane provide adequate fuel for heating at the PCMS. Most buildings in the Cantonment are heated by oil-fueled furnaces. Heating oil is trucked to the Cantonment and stored in building-specific underground storage tanks. Heating oil is not used outside the Cantonment. Propane is used to heat some buildings at the PCMS. Distribution lines are not required because storage of these fuels occurs at the point of use. Natural gas is not currently used at the PCMS (Fort Carson 2005).

3.3.14 FACILITIES

This section identifies the existing facilities at Fort Carson and PCMS, including utilities associated with potable water, wastewater, stormwater, communications, and solid waste. Thus, the ROI includes Fort Carson and PCMS. The environmental consequences for utilities include assessing the need for upgrades and any secondary impacts associated with those upgrades.

3.3.14.1 Fort Carson

This section describes the Army real property and facilities at Fort Carson. The topics addressed include real estate, facilities, public services, and infrastructure for utilities.

Real Estate

Fort Carson is an active military training facility for both weapons qualification and field training. Land use at Fort Carson falls generally into one of three categories: Cantonment, range, and non-military uses, which are accessible by the public for recreational uses.

Facilities

Facilities at Fort Carson include the Cantonment and training areas. The Cantonment area comprises approximately 6,000 acres and contains most of the facilities on Fort Carson, such as troop and family housing, administrative, maintenance, community support, recreation, and supply and storage facilities, utilities, and classroom and simulation training facilities. Principal industrial operations have been the repair and maintenance of vehicles and aircraft. For the most part, industrial operations take place at the "banana belt" (so called because it is a banana-shaped arc of brick buildings) on the east side of the Cantonment

area, the north end of the Cantonment area, and at Butts Army Airfield (part of the downrange area) (DECAM 2005a).

The downrange area consists of approximately 96,000 acres of unimproved or open lands that are used for live-fire artillery practice, small arms practice, tank and Bradley Fighting Vehicle maneuver operations, and bivouac training. Air operation ranges on Fort Carson consist of the Air Burst Range and Butts Army Airfield. Remaining land is used for recreation and other purposes (DECAM 2005a). The primary training activities that occur within the downrange area include maneuver training and live-fire training. Other areas within the downrange area are restricted from training.

Public Services

The Army coordinates with the county sheriff and fire departments for these services. The Army has cooperative agreements with the Colorado Springs Fire Department and El Paso County to provide mutual aid for the suppression of wildland fires on Fort Carson and surrounding areas (DECAM 2002a).

Fort Carson has on-post medical facilities. In addition, emergency medical facilities are available in Colorado Springs.

Infrastructure and Utilities

This section describes the infrastructure and utilities serving Fort Carson, including potable water, wastewater, stormwater, communications, and solid waste. Infrastructure and utilities at Fort Carson are currently sufficient to meet the needs of the Army.

Potable water is purchased by Fort Carson from Colorado Springs Utilities for domestic, industrial, and irrigation use in the Cantonment. A portion of the water purchased by Fort Carson is also supplied to the Cheyenne Mountain Air Force Station. Potable water is delivered through 50-year-old water lines within the Cantonment, which are deteriorated and in need of replacement. The potable water storage system at Fort Carson consists of four reservoirs that provide capacity during emergency conditions. Potable water for consumption during training activities on the downrange area is trucked from the Cantonment, while at the gunnery range, potable water is piped from the Cantonment (Benford 2006).

Fort Carson operates and maintains a sewage treatment plant that services the Cantonment, the family housing area, and Butts Army Airfield. The sanitary sewage treatment plant, which was newly constructed in 1998, has a 4.02-mgd design capacity with a maximum peak historical flow to the sanitary sewage treatment plant of 2.6 mgd (Guthrie 2005). The original sanitary system, constructed in 1942, comprises numerous areas of old, deteriorated lines that have been identified and programmed for replacement.

The Training Support Complex, at the far west end of Wilderness Road, is not currently supported by a sanitary sewer system and must use “open soaking pits” for discharge of shower, laundry, and mess hall wastewater. Portable toilets, dry vault, and self-composting latrines, are used on the downrange area when septic tanks/leach fields are not available (e.g., during training activities on the downrange area) (Benford 2006).

An industrial wastewater treatment plant (IWTP) is located directly north of the sanitary sewage plant, near Gate 20. The IWTP was designed and constructed to treat petroleum-contaminated water from the motor pools in the Cantonment. The IWTP collection sewer extends down Minick Avenue behind the motor pools and delivers industrial wastewater to the IWTP. Butts Army Airfield, the Colorado Army National Guard Centennial Training Site, and the 10th SFG Complex (all south of the Cantonment) are not

connected to the IWTP. Industrial wastewater from these facilities is containerized and treated at the IWTP. The industrial line at Butts Army Airfield, which is not connected to the IWTP, is combined with the sanitary line and both are pumped back to the sanitary sewage treatment plant at Gate 20.

Fort Carson, as an operator of a small municipal storm sewer system, falls under a general permit for "Stormwater Discharges from Federal Facility Small Municipal Separate Storm Sewer Systems in Colorado." In December 2005, the Army completed an evaluation of Fort Carson's storm sewer capacity (USACE 2005). The study concluded that the existing Fort Carson storm sewer system is at or near capacity.

The primary communication infrastructure at Fort Carson is the telephone lines that run throughout the Cantonment, seven ranges, and Butts Army Airfield. Currently, administrative analog telephone and low-speed data are available in a few downrange area locations using copper and leased fiber.

The Integrated *Solid Waste Management Plan* (DECAM 2004) contains details of the Solid Waste Management Program at Fort Carson. DPW manages refuse and construction-related solid waste, and DECAM manages recyclable materials (DECAM 2004).

Fort Carson's current waste disposal contractor for both refuse and construction and demolition waste is Waste Management, Inc. Waste Management is the refuse contractor for the entire installation, although waste from the housing units is handled under a separate contract (DECAM 2004). Currently, all solid waste from Fort Carson, including waste from the housing units, is shipped 15 mi to the Midway Landfill in Fountain, Colorado, for disposal. Midway Landfill is a permitted Subtitle D landfill.

3.3.14.2 Piñon Canyon Maneuver Site

This section describes the Army real property and facilities at PCMS. The topics addressed include real estate, facilities, public services, and infrastructure for utilities.

Real Estate

No land acquisition would be required for the proposed project activities on PCMS. The PCMS is an approximately 235,000-acre Army site dedicated to training units stationed at, or otherwise under the responsibility, of Fort Carson. The PCMS is located in southeastern Colorado in Las Animas County, approximately 150 miles southeast of Fort Carson. The PCMS is bounded by U.S. 350 to the west, Purgatoire River Canyon to the east, Las Animas County Road 54 to the south, and Otero County to the north.

Facilities

Existing facilities at PCMS include the Cantonment area and training areas. The Cantonment consists of developed land and the training areas consist of open land. The Cantonment area comprises approximately 1,660 acres of the PCMS. The Cantonment provides limited, austere Soldier and support facilities. Military training is restricted in this area.

The training areas consist of unimproved or open lands that are used for military training maneuvers and small arms, live-fire activities. The terrain at the PCMS varies widely from open, rolling prairies to semi-arid, basaltic hills. To a large degree, the terrain defines the suitability of training activities that occur within the training areas. The four main training land use types within the training areas include Maneuver Training, Dismounted Training, Small arms, Live-fire Ranges, and Restricted Areas.

Maneuver Training Areas comprise the majority of training land available at the PCMS. Maneuver Training Areas are appropriate (based on topography and other environmental conditions) for equipment and personnel tactically maneuvering against an opposing force throughout the area. Equipment and personnel move through the area according to the requirements of training exercises, resulting in disturbance to soils and vegetation. Land rest and rehabilitation are required in Maneuver Training Areas, so these areas are not available at all times to support training activities. Use of Maneuver Training Areas can also be limited in the area of Small arms, Live-fire Ranges if the ranges are actively being used for training activities.

Small arms, Live-fire Ranges include SDZs identified to protect personnel during weapons training. The SDZs are available for maneuver training when no live-fire activities are occurring. The acreage of the SDZs, therefore, is not additive to the Maneuver Training Areas.

Dismounted Training Areas have no vehicular traffic, except for emergency vehicles. These areas of the PCMS primarily include canyons that are unsuitable for mechanized training. Soldiers can move in these areas on foot only. Activities occurring in Dismounted Training Areas include surveying, placing communication equipment, bivouacking, and rappelling. Land impacts are generally similar to recreational camping (Trame 1997).

Restricted Areas protect lands that support wildlife, ecosystems, soils, facilities, and cultural resources. Varying degrees of training use are allowed in Restricted Areas. For example, in areas with known occurrences of buried cultural resources, digging is not permitted.

Public Services

The Army coordinates with the county sheriff and fire departments for these services. The 500,000-gallon-capacity water system is adequate to support emergency fire suppression (Fort Carson 2005). The water tank and potable water distribution system in the Cantonment is currently operating within capacity. The water supply pipeline along U.S. 350 has deteriorated in some areas and is leaking (Fort Carson 2005).

There are approximately 95 wells on the PCMS, and approximately 30 wells are functional. Some of the major wells are connected to distribution lines that fill stock tanks for which may be used for fire suppression (DECAM 2002a).

Emergency medical facilities are available in Trinidad and Pueblo.

Infrastructure and Utilities

This section describes the infrastructure and utilities serving PCMS. Infrastructure and utilities at PCMS are currently sufficient to meet the needs of the Army, including potable water, wastewater and stormwater, communications, and solid waste. The PCMS is a training installation with an austere cantonment area and minimal utility services.

Potable water for the PCMS and the surrounding area is supplied by the City of Trinidad. Existing wells are present on previously occupied ranches at the PCMS, but the ranch buildings are no longer used (except for training), and the water is not used for potable purposes (DECAM 2002d). Potable water for consumption in the training areas is trucked from the Cantonment. Water from the wells is used for emergency fire suppression and made available to wildlife (DECAM 2002d).

For treatment of sanitary wastewater and stormwater, the Cantonment primarily uses evaporative, nondischarging treatment/oxidation ponds, which were constructed in 1985 (DECAM 2005d). The treatment/oxidation ponds are currently operating at levels below their capacity (Fort Carson 2005). In addition, some of the facilities at Fort Carson have septic tanks (Fort Carson 2005). Portable toilets are used in the training areas when septic tanks are not available (such as during training activities in the training areas).

The existing communication infrastructure at the PCMS Cantonment consists of telephone lines that enter from U.S. 350. There is no communication infrastructure within the training areas at the PCMS (Fort Carson 2005).

Solid waste pickup at the PCMS is managed via contracts with local waste haulers, and wastes are transported to appropriately permitted disposal facilities. Solid waste generated in the training areas is collected and returned to the Cantonment for disposal. From the Cantonment, solid wastes are transported to appropriately permitted facilities.

Chapter 4
Impact Methodology

CHAPTER 4
IMPACT METHODOLOGY

4.1 OVERVIEW

This chapter of the EIS describes the methodology used to analyze the potential impacts (environmental consequences) on the affected environment that would result from implementation of the alternatives for permanently stationing the 2/25th SBCT. An environmental impact or consequence is defined as a modification or change in the existing environment brought about by the action taken. Effects can be direct, indirect, or cumulative and can be temporary (short term) or permanent (long term). Effects can also vary in degree, ranging from only a slight discernable change to a drastic change in the environment. The terms "effect" and "impact" are synonymous as used in this EIS.

4.1.1 INTRODUCTION TO IMPACT METHODOLOGY

A systematic approach to analysis of impacts has been developed for this assessment. This approach consists of a description of the components of each alternative, identification of each Valued Environmental Component (VEC), development of methods to analyze impacts, identification of significance criteria to determine the intensity of impacts, and development of mitigation measures that may be applied to reduce or eliminate impacts. Each of these components is described in the sections that follow.

4.1.2 IMPACTS COMMON TO MORE THAN ONE ALTERNATIVE

All three action alternatives involve replacing a modular IBCT with an SBCT at the specific installation. In addition, the IBCT that would be replaced at Fort Richardson (Alternative B) or Fort Carson (Alternative C) would transfer to Hawaii. Because all action alternatives involve the replacement of a modular IBCT with an SBCT, the effects analysis focuses on the differences that would result from the replacement. Also, the evaluation of Alternatives B and C include the analysis of the relocation of an IBCT to Hawaii if either of these alternatives are selected.

4.1.3 STANDARDIZED IMPACT ANALYSIS AND SIGNIFICANCE CRITERIA

To compare adequately the alternatives, standardized impact analysis methods and significance criteria will be established and used throughout the assessment process. The following sections of this chapter provide these methods and criteria for each environmental resource.

4.1.4 PRESENTATION OF IMPACTS

4.1.4.1 Summary of Impacts

Three levels of summary tables are included to provide an overview of impacts by alternative and by resource. These tables show the highest level of impact for each resource by valued environmental component (see Section 4.2.7 below).

Text supporting these conclusions is presented and mitigations are listed for all adverse impacts, where mitigation is available. There may be both adverse and beneficial impacts within a single resource category; for instance, a project could interfere with a pre-existing land use such as recreation (an adverse impact) while expanding public access to different recreational resources (a beneficial impact). Where there are both adverse and beneficial impacts, both are listed on the tables and in the text.

4.1.4.2 Detailed Analysis

At the resource level, potential effects on the resource from four groups of activities associated with the permanent stationing of the 2/25th SBCT are described. The four groups of activities are cantonment construction, range construction, live-fire training, and maneuver training. The four activity groups are described for each alternative in Chapter 2.

4.2 DEFINITION OF KEY CONCEPTS

4.2.1 DIRECT AND INDIRECT IMPACTS

CEQ's regulations define three types of impacts. They are direct, indirect, and cumulative. Direct impacts are those that are caused by an action and occur at the same time and place as the action. Indirect impacts are those caused by an action and that occurs later in time or is farther removed in distance from the action.

4.2.2 SHORT-TERM VERSUS LONG-TERM IMPACTS

Impacts also may be expressed in terms of duration. The duration of short-term impacts is considered to be one year or less, and long-term impacts are described as lasting beyond one year. Long-term impacts can potentially continue in perpetuity.

4.2.3 MEASURE OF IMPACTS

To the extent possible, potential impacts are measured and quantified using appropriate metrics for each environmental resource. For example, erosion from disturbed areas may occur and can be calculated in tons per acre per year, depending on a variety of influences such as soil type, slope, and cover. These impacts are than compared to available standards to determine significance. Mitigation measures or other best management practices are then applied to reduce the intensity of the affects.

4.2.4 CUMULATIVE IMPACTS

Cumulative impact is the "cumulative effect on the environment that results from the incremental impact of the action when added to "other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions". Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). Army regulation 200-2 (32 CFR 651.51) also requires that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, be discussed in the same impact statement. Direct, indirect, and cumulative impacts should be viewed together to determine the full impacts from each alternative identified in this EIS. Cumulative impacts are discussed separately at the end of Chapter 5 of this EIS. In addition, this EIS may identify significant direct impacts for certain resources while finding that there are no significant cumulative impacts for the same resource. This difference is normally due to the different geographical context needed for measuring direct and cumulative impacts. The ROI for cumulative impact analysis is generally larger than the ROI for project-related impacts. This is because impacts to resources can affect resources at a larger scale, such as regional air quality or the population levels of a certain species.

This EIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. Methods for gathering and assessing data regarding cumulative impacts include interviews, use of checklists, trends analysis, and forecasting. In general, past, present,

and reasonably foreseeable future actions are assessed by resource area. These actions, which are listed in Section 5.6, are sponsored by the Army, other federal and state agencies, and private entities and include a variety of projects in Hawaii (on the islands of Oahu and Hawaii), Alaska, and Colorado.

Cumulative impacts from the four alternatives would occur in all resource areas as described in Chapter 5 of this EIS. Significant cumulative impacts would occur in soil erosion, biological resources, cultural resources, noise, and wildfire management.

4.2.5 MAGNITUDE OF IMPACTS (CONTEXT AND INTENSITY)

To determine whether an impact is significant, CEQ regulations also require the consideration of context and intensity of potential impacts (40 CFR 1508.27). Context normally refers to the setting, whether local or regional, and intensity in regards to the severity of the impact. Also, an EIS should include a discussion of the possible conflicts between the action and the objectives of federal, regional, state and local land use plans and policies for the area concerned (40 CFR 1502.16 C).

4.2.6 SIGNIFICANCE CRITERIA (ELEMENTS LEADING TO A SIGNIFICANCE THRESHOLD)

Each resource section in this chapter includes the methodology used for impact analysis and a discussion of factors used to determine the significance of cumulative, direct, and indirect impacts (40 CFR 1508.7 through 1508.8) and proposed mitigation, as appropriate for that resource. Direct impacts are those that are caused by the action taken and occur at the same time and place. Indirect impacts are those caused by the action taken and occur later in time or are farther removed in distance from the action. Impacts are defined in the following categories:

- Significant
- Significant but mitigable to less than significant
- Less than significant
- No impact
- Beneficial impact

Impacts identified for each resource in the top two categories (significant or significant but mitigable to less than significant) are assigned an impact number in the text (e.g. Impact 1) with a corresponding numbered mitigation (e.g. Mitigation 1). Impacts in the next two categories (less than significant or no impact) are not assigned an impact number; however, SOPs, BMPs, or other standard practices would be implemented to ensure impacts are minimized. Beneficial impacts are also described when applicable.

4.2.7 VALUED ENVIRONMENTAL COMPONENTS (VECS)

In 1997, CEQ published specific guidelines for Cumulative Effects Analysis (CEA), establishing a new impact assessment approach (or paradigm) that focuses on important regional resources, as opposed to the traditional action-impact approach used for direct and indirect effects. The new assessment approach focuses on valued environmental components (VECs) or resources that are important in a specific region. In 2006, the Army released its Draft Cumulative Effects Guidance Manual. This manual provides a specific, detailed Army methodology to implement requirements outlined in the CEQ's CEA guidelines. The Army used the VEC methodology put forward in the CEQ guidance manual in the preparation of this EIS.

4.2.8 INSTITUTIONAL PROGRAMS

Permanent stationing of the 2/25th SBCT may affect installation management. Installation programs that directly affect the environment include range management, environmental management, and real property management. Implementation of the following institutional programs at all training areas include: ITAM, an INRMP, an ICRMP, a range development plan, institutional controls, IWFMP, and a real property management plan. The Army would continue to fund these programs under any action alternative, as funding is available, with the complexity and scope of the program proportional to the proposed land use.

4.2.9 MITIGATION

In instances where adverse impacts are identified, measures that could be used to mitigate those impacts are discussed. Mitigation is divided into two categories:

- Regulatory and administrative mitigation which is required in compliance with federal environmental laws and regulations that are SOPs or BMPs, or that are part of an on-going program to minimize impacts through careful project design
- Additional mitigation, which is proposed by the Army, other agencies, or the public and which may be implemented, depending on funding availability.

The Army has listed these additional mitigations to provide the public and regulatory agencies with information on all possible mitigations, and to request input on which mitigations the public would like to see implemented. The Army will identify in the Final EIS which of these mitigations are likely or unlikely to be implemented. The final determination on mitigation commitments will be outlined in the record of decision.

Where no significant adverse impacts are identified, mitigation measures are not proposed.

4.3 GEOLOGY, SOILS, AND SEISMICITY

4.3.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Geologic impacts include all of the effects that result from the interaction between the project and the geologic environment. For example, project impacts could include changes in soil erosion rates or changes in the level of exposure of people and structures to earthquakes or unstable slopes.

Identifying project impacts relied heavily on the use of available geologic studies, reports, observations, and engineering judgment to make reasonable inferences about the potential effects of the project, given the interpretation of the geologic setting described in the Affected Environment section. Additionally, some geologic impacts were evaluated in the context relative to regulatory requirements or guidelines. Regulatory requirements include state and local building codes, grading ordinances, and restrictions on development in protected areas or in areas subject to specific geologic hazards.

In order to provide additional information about existing concentrations of chemical constituents in soils, the Army investigated soils at training ranges at SBMR and PTA in 2002, which were evaluated and compared to USEPA Region IX industrial soil PRGs to identify potential chemicals of concern and to determine if exposure to these chemicals in soils might impact human health. Similar investigations were performed at various specific locations on FRA, DTA, Fort Carson, and PCMS. The results of these investigations were summarized in the Affected Environment section and used in Chapter 5 to assess potential impacts related to human exposure to contaminated soils during training activities.

Both the Alaska and Colorado alternative installations and associated training areas currently accommodate permanent modular IBCT units that would be replaced by an SBCT unit and permanently transfer to Hawaii if chosen. This impact analysis focuses on the net differences between the existing impacts resulting from the IBCT training components and impacts that would be caused by SBCT training components on each of the three alternative installations and associated training areas.

4.3.1.1 Assessment of Mounted Maneuver Training on Land Condition

Hawaii

The Army developed the ATTACC model for the 2004 FEIS for the Transformation of the 2nd Brigade 25th Infantry Division (Light) to an SBCT in Hawaii to assess the impacts of mounted maneuver training on land. The first step in the model was to estimate the training load placed on the land by the vehicles that would be used to transport and accompany troops on maneuvers at the ranges. This training load was measured in terms of a standard based on the impact of an Abrams tank per mile of travel during maneuver training. The standard unit is referred to as a MIM. Other vehicles have different impacts on land condition due to their weight, wheel or track configuration, and how they are operated. The effect of mounted maneuver training on a particular plot of land can be generally described by a curve that relates the land condition to the training load. As the training load increases, the condition of the land would generally decrease because the training load damages vegetation cover and disturbs soils, and these effects can persist over time. Once initiated, damage to vegetation cover and soils can accelerate, as eroded areas widen, for example, and soil loss prevents vegetation from becoming established. Mounted maneuver training is generally not restricted to roads but is restricted by terrain factors (slope and vegetation) and can be further restricted by the need to avoid sensitive habitat or cultural sites. Curves that relate land conditions to training load can be developed for small areas based on detailed information about the susceptibility of the land to the effects of maneuver training, or they can be developed for larger areas, where the effects are not known in as much detailed, but are averaged. The ATTACC modeling was performed at this broader level of analysis for the 2004 FEIS to estimate the overall effects of the proposed actions relative to existing conditions for the entire ranges.

In modeling the effects on the SBMR, the current land condition was classified as “moderate”, and the existing annual training load at SBMR was estimated at 16,740 MIMs, and the existing training load in SBER was estimated at 11,680 MIMs. The current land condition at DMR was classified as “acceptable” and the existing annual training load at DMR was estimated at 1,710 MIMs. The current land condition at KTA was classified as “severe” (currently used for high intensity training activities) and the existing annual training load at KTA/KLOA was estimated at 7,210 MIMs. The current land condition at PTA was classified as “mild” and the existing annual training load at PTA was estimated at 13,660 MIMs. Changes in the land condition and annual training loads estimated for transition to SBCT maneuver training in these areas under implementation of Alternative A are discussed in Chapter 5.

Alaska

The 2004 USARAK Transformation FEIS (USARAK 2004) evaluated the ability of soils to physically support military vehicle maneuvers, referred to as trafficability, using a study by the Cold Regions Research and Engineering Laboratory (CRREL), which used soil maps compiled via the Unified Soil Classification System (USCS) and ecological land surveys (geomorphologic and vegetation surveys for each unit). Resulting soil property maps were generated in GIS by superimposing the vegetation and USCS soil maps (USARAK 2004). The model results were used to determine limitations based on potential impacts to soil resources resulting from operation of military combat vehicles, including Stryker vehicles. The 2006 BAX and CACTF FEIS supplemented the trafficability model results from the 2004 USARAK Transformation FEIS by incorporating additional information on soil properties in the DTA,

using information from the NRCS Soil Survey of the DTA, which was initiated in 1999 and completed in 2004 (USDA 2005). Soil trafficability is the primary factor used in Chapter 5 of this EIS to evaluate the potential damage to soils caused by off-road military Stryker vehicle maneuvers on DTA. The results of the studies are summarized below as they relate to the trafficability of specific areas within the DTA.

Slopes in the DTA East rarely exceed 30 percent in the areas studied for trafficability of soils for military vehicle maneuvers; therefore, the presence of wetlands was the primary factor used for determining trafficability in the 2006 BAX and CACTF FEIS. Wetlands, which are characterized by saturated soils, and slopes steeper than 30 percent are considered not trafficable. Trafficability also varies by season on DTA. During the summer season, soils are often saturated, and the ability of wet soils to support off-road vehicle maneuvers is very low. During the winter (November to April), soils that may not be trafficable during summer do not limit off-road vehicle maneuvers, because frozen soils can support more than the required maneuver capacity regardless of soil type. Maneuver capacity was evaluated by estimating the number of vehicle passes each alternative site could sustain over the summer season without becoming impassible. An area containing a higher percentage of trafficable soils was considered to have increased maneuver capacity and lower expected erosion rates (USAGAK 2006a). Military vehicle MIMs were also calculated for each area studied. The study also described how certain wet soils in areas could be manipulated to provide increased maneuver capacity by filling and hardening an area. The trafficability, maneuver capacity of soils, and the military vehicle MIMs in the DTA that were calculated for the proposed action of the 2006 BAX and CACTF FEIS are summarized below as the baseline conditions to assess the net difference in vehicle maneuver impact that would result from transformation of the existing IBCT unit on DTA to an SBCT unit.

The portion of DTA west of the Delta River is considered by USARAK to be “NO GO” year round because of lack of access across the Delta River. The area east of the river is more maneuverable and the “NO GO” areas are characterized by thick forest and wet areas along the floodplains of Jarvis Creek and the Delta River. 86,000 MIMs annually are estimated for current vehicle maneuvers on DTA East as a whole, which is 69 percent of capacity in the summer and 1.2 percent of capacity in the winter.

The DTA East was distinguished by several sub-areas, including the North Texas Range, the Donnelly Drop Zone, and the Eddy Drop Zone, with BAX and CACTF areas within each sub-area. Most of the soils on the Eddy Drop Zone were considered trafficable and able to support military vehicle training maneuvers year-round. The proposed BAX maneuver area could support 10,001 Stryker vehicle passes in the summer season without becoming impassible. Winter season training was not considered affected by trafficability.

The Donnelly Drop Zone did not contain enough trafficable soils to support year-round military vehicle training maneuvers without site modification (filling and hardening activities). The proposed BAX maneuver area could only support 988 Stryker vehicle passes in the summer season without becoming impassible. Winter season training was not considered affected by trafficability.

Soils on the North Texas Range were not considered trafficable enough to sustain year-round military vehicle training maneuvers without site modification. The proposed BAX maneuver area could only support 517 Stryker vehicle passes in the summer season without becoming impassible. Winter season training was not considered affected by trafficability.

Colorado

The DECAM has conducted and consulted several studies as part of their rangeland management plan to quantify the effects of military training, including remote sensing from the USGS National Mapping Division in conjunction with military accounting procedures used to define training characteristics,

erosion and sediment transport surveys, evaluations of the effectiveness of erosion control structures, rangeland health assessments performed by NRCS, as well as ongoing soils and vegetation monitoring. Results from these studies, as they relate to impacts identified in the 2007 Fort Carson and PCMS Master Draft Transformation DEISs, were considered in evaluating the impacts to soils and vegetation caused by the transformation of existing IBCT maneuver training to SBCT maneuver training components at the Fort Carson and PCMS with implementation of Alternative C for this EIS. The assessment of military vehicle use for the 2006 Fort Carson and PCMS Master Draft Transformation DEISs did not involve analysis using units of MIMs, but was rather determined on a more qualitative level with regard to the intensity of the effects in relation to the difference in number of training rotations, personnel, and equipment for the various types of vehicles. For the purpose of analyzing the impacts of SBCT Training on Fort Carson and PCMS for Alternative C of this EIS, the intensity of current IBCT Training was compared to the expected intensity of the proposed SBCT Training on a qualitative level.

4.3.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether an alternative would have a significant impact on geologic and soil resources were evaluated and distinguished by the degree to which the impact would:

- Increase the exposure of people or structures to geologic hazards (such as ground shaking, volcanism, liquefaction, slope failure, expansive soils, and hazardous constituents in soils) that could result in injury, acute chronic health problems, loss of life, or major economic loss;
- Result in substantial loss of soil (through increased erosion), or loss of access to economically significant mineral deposits;
- Adversely affect human health or environmental receptors, such as through exposure to toxic chemicals or irritants present in geologic materials;
- Adversely alter existing geologic conditions or processes such that the existing or potential benefits of the geologic resource are reduced (such as construction of a jetty that would interfere with sand transport processes and beach formation or increase shore erosion);
- Conflict with existing federal, state, or local statutes or regulations;
- Permanently alter a unique or recognized geologic feature or landscape;
- Substantially alter the existing function of the landscape (such as altering drainage patterns through large scale excavation, filling, or grading); or
- Disturb or alter unique, rare, or otherwise important paleontological resources, such that the potential to derive benefits from those resources is reduced. (Note that paleontological resources are addressed with archaeological resources under the general heading of cultural resources.)

4.4 WATER RESOURCES

4.4.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Potential impacts to water resources were identified based on regulatory standards, scientific judgment, and public concerns expressed during the scoping process. Regulatory standards considered during the impact analysis included, but were not limited to, the following:

- Federal and state primary and secondary drinking water standards under the Safe Drinking Water Act;
- State and local plans and policies protecting surface water and groundwater resources;

- Limits on development of available surface and groundwater resources;
- Compliance with the Clean Water Act;
- Source water protection program requirements;
- Floodplain Management regulations;
- Coastal Zone Management Act regulations; and
- State water code regulations.

Analysis of impacts was based on multiple factors related to activity groups associated with transformation. Impacts from cantonment and range construction, and live-fire and maneuver training, as well as impacts from construction of facilities were evaluated for their potential to affect adversely water resources.

Impacts on water resources were analyzed by evaluating four groups of impact issues. These include impacts on surface water quality, impacts on groundwater quality, impacts as an increased flood potential, and impacts on groundwater supply.

Both direct and indirect impacts were evaluated for each alternative. Examples of direct impacts to water resources include increased water use due to increased troop numbers and impacts to water quality from introduction of chemical constituents. Impacts to water resources may also result from impacts to other affected resources, such as soils and vegetation, which also have the potential to alter flow dynamics and water quality.

A quantitative analysis utilizing the computer model ATTACC was performed to estimate erosion impacts associated with vehicle use in the training ranges. Historic and scientific data was used to predict positive or negative change to water resources for impact evaluation in Alaska and Colorado.

4.4.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether an alternative would have a significant impact on water resources include the extent or degree to which its implementation would:

- Degrade surface or groundwater quality in a manner that would reduce the existing or potential beneficial uses of the water;
- Reduce the availability of, or accessibility to, one or more of the beneficial uses of a water resource;
- Alter the existing pattern of surface or groundwater flow or drainage in a manner that would adversely affect the uses of the water within or outside the project region;
- Be out of compliance with existing or proposed water quality standards or with other regulatory requirements related to protecting or managing water resources;
- Conflict with Coastal Zone Management Program policies (Hawaii only);
- Compliance with the Clean Water Act;
- Substantially increase risks associated with human health or environmental hazards; or
- Increase the hazard of flooding or the amount of damage that could result from flooding, including from runoff or from tsunami or seiche runup (where applicable).

In addition to these factors, public concerns expressed during the scoping process were considered in the impact analysis. These concerns included the effects of residual contaminants from munitions use on water quality, overall watershed health, depletion of water resources, and the Army's commitment to preserving water resources for the future.

4.5 WILDFIRE MANAGEMENT

4.5.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Many ecosystems require fire for function and productivity, and fire is not always considered a negative impact. However, wildfires are a concern because of the potential impact on human activities and structures, sensitive biological and cultural resources, and military operations. Alteration of the natural fire regime by increasing the rate of ignitions is a potential adverse impact. This is especially important in ecosystems like Hawaii where there is no natural fire regime. Ecosystems that have not developed with the influence of fire are at a greater risk from wildfire because they lack fire adaptations. Likewise, wildlife species in these previously fire-free ecosystems are disproportionately affected by the introduction of fire. Wildfires resulting from military training in Hawaii are the largest threat to listed species.

Each alternative was evaluated for its potential to impact wildfire risk adversely and its affect on wildfire management. Impacts from cantonment and range construction, and live-fire and maneuver training were evaluated for their potential to affect wildfire risk adversely. Construction of facilities and the facilities themselves are not considered to impact wildfire risk adversely. Live-fire and maneuver training were identified as the primary activities capable of increasing the rate of fire to above natural frequencies. An increase in the overall population at the selected alternative location is not considered to increase the risk of wildfire ignitions significantly. Fire-related practices and policies applicable to each Alternative are presented in Chapter 3, and were evaluated on their ability to address appropriately changes to wildfire risk or management associated with permanent home stationing of the 2/25th SBCT.

4.5.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Impact determination was based on the assumption that the existing wildfire condition is acceptable. Any adverse departure from that condition is considered significant and requires mitigation. The following criteria were used to assess impacts on wildfire management and risk.

- Increased frequency of accidental ignitions from SBCT training
- Suitability of fire management practices, policies, and firefighting resources

4.6 CULTURAL RESOURCES

4.6.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

The methods for assessing potential impacts on cultural resources include identifying significant cultural resources in the areas of potential effect (APEs) to determine potential direct and indirect impacts on these resources. To identify cultural resources in the project areas, cultural resource reports and other records were reviewed. In addition, federal, state, and local inventories of historic places, including the NRHP, were reviewed for information related to prehistoric and historic resources within the project areas.

The first step in identifying impacts to cultural resources is the identification of the eligible cultural resources. Cultural resources may include historic structures, prehistoric and historic archaeological sites,

and properties of traditional, religious, Native American human remains, associated and unassociated funerary objects and objects of cultural patrimony, or cultural significance (PTRCSs). Cultural resources were identified in available reports and documents. The next step is identifying any potential for direct or indirect impacts. Impacts on cultural resources could include intrusion of new buildings or structures that are not sympathetic to the historic characteristics of the site or district, renovation or demolition of historic buildings, ground disturbance at archaeological sites, removal of objects or artifacts from eligible sites, increased access to archaeologically sensitive areas, or restriction of access to sacred sites. Any impact to cultural resources is potentially irreversible and irretrievable.

Activities that could impact cultural resources include stationing, construction, training, systems acquisition, management activities, and program implementation. Stationing entails the addition of personnel resulting in increased overall use and traffic. This could result in accelerated disturbance and degradation. Construction of operations facilities, maintenance and training support facilities, additional barracks, and a deployment staging area, could disturb or damage cultural resources. Increased frequency and intensity of training would result in more extensive and more frequent damage to cultural resources.

Impacts on cultural resources eligible for listing on the NRHP (historic properties) consist primarily of adverse effects as defined in federal regulations implementing Section 106 of the NHPA. An undertaking has an effect on a historic property when that undertaking may alter those characteristics of the property that qualify it for inclusion on the NRHP. An undertaking is considered to have an adverse effect on a historic property when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property or alteration of the character of the property's setting when that character contributes to the property's qualifications for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property, or changes that may alter its setting;
- Neglect of a property, resulting in its deterioration or destruction; or
- Transfer, lease, or sale of a property without adequate provisions to protect its historic integrity.

Depending on the intensity of an impact and the importance of a site to a native population, even a minor impact could be significant. These impacts can be mitigated to a greater or lesser extent. The severity of impacts to historic buildings or structures is more variable, depending on the characteristics that make them eligible. However, these impacts can also be mitigated by adherence to the Secretary's Standards for Rehabilitation, or by data recovery standards such as HABS. Impacts to PTRCSs are perceived as significant and invariably involve consultation. To the extent possible cultural resources are identified and evaluated in the planning stages of an undertaking, and measures are implemented to avoid or mitigate adverse effects. Native Hawaiian and Native American sites, including sacred sites, burials, and cultural items, whether or not they are considered eligible for the NRHP, may also be protected under Executive Order 13007 "Indian Sacred Sites",, ARPA, or NAGPRA. Factors considered in determining whether an alternative would impact cultural resources include the extent or degree to which its implementation would result in:

- An adverse effect on a historic property or TCP; or
- A violation of the provisions of Executive Order 13007, ARPA, or NAGPRA.

4.6.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Potential significant impacts to cultural resources are:

- Impacts on historic buildings;
- Impacts on archaeological resources from range and facility construction;
- Impacts on archaeological resources from training activities;
- Impacts on properties of traditional, religious or cultural significance (areas of traditional interest); and
- Impacts on archaeological sites from road or trail construction.
- Disturbance of and/or inhibited access to Sacred Sites, TCPs and PTRCs

4.7 LAND USE AND RECREATION

4.7.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Impacts to land uses and recreation resources were assessed based on whether the proposed project activities would be compatible with existing or planned land uses in the ROI for each project alternative. Impacts on natural resources management and recreation resources were assessed by determining the types of land and recreational uses in and around the project activities and then evaluating their sensitivity to the short- and long-term project effects. Localized and temporary impacts on land use during construction are also evaluated, as well as training changes to land that is currently used for training. Also considered was the consistency of the proposed project activities with the objectives and policies of the pertinent federal, state, and local land use and recreation plans.

4.7.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

The evaluation of potential impacts on land use and recreation resources was based on the potential for the proposed activities associated with each alternative to conflict with existing or planned land uses in and around the project activities. Factors considered in determining the significance of impacts on land use or recreation resources included the following:

- The preclusion of existing or planned land uses and recreation on or surrounding the proposed project activities;
- Non-compliance with the objectives, policies, or guidance of federal, state, and local land use, recreation, and natural resource management plans;
- Conversion of important farmland to nonagricultural uses;
- Impacts to the public's right of access to recreation areas both during project construction and long-term.

4.8 TRAFFIC AND TRANSPORT

4.8.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

The traffic impact analysis describes the potential impacts from transporting troops and equipment on public roads to training ranges, from increased traffic associated with the increased activity and number of military personnel and their families stationed at the Army installations, and from construction traffic.

The analysis includes impacts on local intersections, long-term traffic volumes, and construction traffic on the local circulation network. Impacts on local roads and circulation, parking, public access for recreation, and traffic safety also were evaluated. The objectives of the impact analysis are to quantify the impacts of the project alternatives on traffic and transportation resources, and to identify and evaluate potential strategies to mitigate traffic impacts.

4.8.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether each project alternative would have a significant impact to traffic / transport include the extent or degree to which its implementation would result in:

- Intersection operations - increase congestion at intersections currently operating at (or anticipated to operate at) capacity;
- Roadway segment operations – increased traffic on public roads that would disrupt or alter local circulation patterns;
- Construction traffic effects - lane closures or impediments that would disrupt or alter local circulation patterns; or
- Increase parking demand exceeding the supply.

4.9 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PROTECTION OF CHILDREN

4.9.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

The ROI was defined for each project alternative to include the counties or regional areas in which the majority of people potentially affected by changes at the installations reside. Each of the project alternatives were reviewed and evaluated to identify potential impacts (positive or negative) on socioeconomic conditions in the ROI. Potential disproportionate effects to low-income or minority populations and the potential for increased adverse health effects to children were assessed to evaluate environmental justice effects.

Impacts on population, business sales volume, employment, and income were evaluated both qualitatively and quantitatively using the Economic Impact Forecast System (EIFS), a computer-based economic tool that calculates multipliers to estimate the direct and indirect effects resulting from a given action. For each economic indicator, the model produces a standard range of values, or rational threshold value (RTV) that is calculated on the basis of yearly historical fluctuations in population, business sales volume, employment, and income within the ROI. The historical extremes for the ROI (the calculated RTVs) become the thresholds of significance for social and economic change. If the estimated effect of each project alternative falls above the positive RTV or below the negative RTV, the impact could be considered to be substantive.

In addition, potential impacts on schools based on the number of schools, existing student population, potential increase in student population, and capacity of the schools that could be affected were also assessed. This analysis also includes an assessment of anticipated changes to housing, environmental justice, and the protection of children.

To determine whether low-income or minority populations could be disproportionately affected by a project alternative, the proportion of low-income or minority populations in the areas surrounding the proposed project activities were identified. If unusually high percentages of low-income and minority

populations were identified, the potential for these populations to be displaced, for their income or employment to be lost, or for adverse effects to their health or environmental condition from the proposed construction or operational activities were assessed. To evaluate whether children could encounter disproportionate health or safety effects, the population under the age of 18 surrounding the proposed project activities was computed. The identified potential environmental or health and public safety risks were then evaluated based on proximity to populations of children.

4.9.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether an alternative would have a significant impact on socioeconomic conditions or environmental justice included the extent or degree to which its implementation would result in any of the following:

- Change the local housing market or vacancy rates, particularly when compared to the availability of affordable housing;
- Increase student enrollment beyond the capacity of the local schools;
- Change any social, economic, physical, environmental, or health conditions so as to disproportionately affect low-income or minority populations; or
- Disproportionately endanger children in areas on or near the proposed project activities or installations.

4.10 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

4.10.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Numerous federal, state, and local laws regulate the storage, use, recycling, disposal, and transportation of hazardous materials and waste. The methods for assessing potential hazards associated with hazardous materials and wastes for each project alternative generally include the following:

- Reviewing and evaluating each of the Alternatives to identify the action's potential to use hazardous materials or to generate hazardous waste based on the activities proposed;
- Comparing the location of each proposed project activity with baseline data on known or potentially contaminated areas (such as potentially UXO-contaminated land);
- Assessing the compliance of each proposed project activity with applicable site-specific hazardous materials and waste management plans;
- Assessing the compliance of each proposed project activity with applicable site-specific Army standard operating procedures (SOPs) and health and safety plans in order to avoid potential hazards; and
- Determination of known or suspected contamination potentially affected by each proposed project activity, including ongoing Army IRP remediation activities.

The overall methodology, including data sources and assumptions, used to conduct the human health and safety hazard impact evaluation is consistent with the Army NEPA Manual for Installation Operations and Training. This manual describes the various types of materials and waste that should be considered to identify potential impacts of the proposed project activities.

4.10.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether hazardous material and waste associated with each project alternative would result in a significant include the extent or degree to which the alternative's implementation would result in:

- Endanger the public or environment during the storage, transport, or use of ammunition;
- Expose military personnel or the public to areas potentially containing UXO;
- Cause a spill or release of a hazardous substance (as defined by Title 40, CFR Part 302 [CERCLA], or Parts 110, 112, 116 and 117 [CWA]);
- Expose the environment or public to any hazardous condition through release or disposal (for example, open burn/open detonation disposal of unused ordnance);
- Require the removal or upgrade of an underground storage tank;
- Adversely affect contaminated sites or the progress of IRP remediation activities;
- Cause the accidental release of friable (easily crumbled by hand pressure) asbestos or LBP during the demolition or renovation of a structure; or
- Generate either hazardous or acutely hazardous waste, resulting in increased regulatory requirements over the long term.

4.11 BIOLOGICAL RESOURCES

4.11.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Potential direct and indirect impacts on biological resources were analyzed for local terrestrial and aquatic ecosystems, including general vegetation and wildlife resources, along with sensitive species, biologically sensitive areas, designated critical habitat. The methods for assessing potential direct and indirect impacts on biological resources generally include the following:

- Comparing the location of such resources in relation to the physical locations of the proposed actions to determine potential direct and indirect impacts on these resources; and
- Examining the types and intensity of activities proposed in each location to determine the potential for impacts on these resources.

For this analysis, specific potential impacts on biological resources are based on the following:

- Relative importance or value of the resource affected, for example its legal, commercial, recreational, ecological, or scientific value;
- The resource's relevant occurrence in the region;
- Sensitivity of the resource to the proposed action;
- Anticipated physical extent of the potential impact; and
- Anticipated duration of the ecological ramifications of the potential impact.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis.

Direct effects of significant wetland degradation include:

- Increased peak flow and decrease lag time of water flow during runoff events
- Decreased volume of water flowing during low flow
- Loss of erosion control
- Loss of streambank stability
- Loss of riparian habitats
- Loss of highly productive fish and wildlife habitat
- Increased water temperatures during summer
- Loss of organic matter in water, resulting in lower productivity
- Loss of filtering capacity so sediments and pollutants flow through the system more readily
- Loss of permafrost or creation of thermokarst conditions

Each alternative was evaluated for its potential to adversely impact biological resources. Impacts from cantonment and range construction, and live-fire and maneuver training, as well as impacts from construction of facilities and the facilities themselves were evaluated for their potential to affect biological resources adversely. Each activity is assessed based on its location and associated activities in relation to the known presence and extent of biological resources on the installation. The sensitivity of biological resources is evaluated based on the following criteria, listed in order of importance:

- Designation of the resource by federal and state resource agencies (for example, USACE, NOAA, and the USFWS) as a high value or sensitive resource;
- Any known or presumed regional sensitivity of the resource; and
- Any known or presumed local significance of the resource.

Direct impacts may be short-term or long-term, depending on how the biological resources are altered or lost during the course of the project implementation and operation. Examples of direct impacts from project-related construction include grading or brushing vegetation (using a chain to tear out shrubs and brush to leave behind herbaceous plants), filling drainage areas, and losing or interrupting wildlife foraging or nesting areas.

Indirect impacts occur when project-related activities affect biological resources in a manner other than a direct loss of the resource. For example, indirect impacts from a construction project might last only during construction or for the long-term operation of the facility. Noise, lighting, erosion and siltation, substantial reduction in water quality, dust, and increased human activity within or directly adjacent to sensitive habitat areas are examples of potential indirect impacts.

4.11.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Impacts on biological resources were evaluated by determining the sensitivity, significance, or rarity of each resource that would be adversely affected, as described in the previous section. The significance may be different for each habitat or species and is based on the resource's rarity or sensitivity and the level of impact that would result from the proposed project.

Most impacts on high sensitivity resources are considered significant, while the determination of significance for impacts on the moderate and low sensitivity resources depends more on site-specific factors, such as the habitat quality and population size, as well as the nature and extent of the anticipated impact. For example, impacts on moderate resources could be considered significant if the anticipated impact were to reduce the population or geographic distribution of a species of special concern greatly.

Factors considered in determining whether an alternative would have a significant impact on biological resources include the extent or degree to which its implementation would do any of the following:

- Cause the "take" of a highly sensitive resource, such as a threatened and endangered or special status species (USFWS, NOAA);
- Result in a jeopardy biological opinion by the USFWS or NOAA;
- Reduce the population of a sensitive species, as designated by federal and state agencies, or a species with regional and local significance. This can happen with a reduction in numbers, by alteration in behavior, reproduction, or survival, or by loss or disturbance of habitat;
- Have an adverse effect on a wetland or riparian habitat regulated by the local, state, or federal government or on another sensitive habitat (such as designated critical habitat) identified in local or regional plans, policies, or regulations.
- Interfere with the movement of any native resident or migratory wildlife species (including aquatic species) or with established native resident or migratory wildlife corridors;
- Alter or destroy high to moderate habitat that would prevent biological communities in the area prior to the project from reestablishing;
- Conflict with Hawaii Coastal Zone Management Program policies;
- Introduce or increase the prevalence of undesirable nonnative species; or
- Cause long-term loss or impairment of a substantial portion of local habitat (species dependent).

4.12 AIR QUALITY

4.12.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Air quality impacts have been evaluated in terms of the emissions associated with the alternatives. Emission sources associated with the alternatives include emissions from construction activities, ordnance use, engine emissions from military vehicle use, fugitive dust from vehicle travel on unpaved roads, wind erosion from areas disturbed by off-road vehicle maneuvers, and engine emissions from personal vehicle use associated with added personnel.

Factors that determine the level of air quality effects include the increase of air pollutant emissions generated from SBCT activity relative to the baselines established in the Hawaii, Alaska and Colorado and the status of local air quality and nearby sensitive areas.

In general, the methodology used to assess air quality impacts includes use of USEPA emissions data, methodologies, emission rate models, and air dispersion models to predict emission rates and to calculate ambient air quality impacts. Results of emission rate calculations and model predictions were compared to the national and state regulations and standards.

In Hawaii, emissions of windblown fugitive dust from areas disturbed by off-road vehicle maneuvers were estimated using a proprietary wind erosion rate model and wind speed data from on-post

meteorological stations. A modeling analysis of fugitive dust issues was also conducted to determine the potential degree of impact and the geographic extent of the impact. In Alaska, USEPA emissions data were used to calculate emissions from stationary sources, such as heating systems and generators. Impacts on visibility were also assessed targeting the Denali National Park Class I Area. In Colorado, emissions from stationary sources and impacts on visibility were also evaluated.

4.12.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Major factors considered in determining whether a project alternative would have a significant impact on air quality include the following:

- Whether or not the analyses indicated a potential for violation of federal and state standards for criteria pollutants at off-post locations;
- Whether or not relatively high emissions would occur on a continuing basis for periods longer than the time frame of relevant ambient air quality standards (e.g., 8- hour periods for ozone precursors, 3-hour and 24-hour periods for sulfur oxides, 24-hour periods for PM_{10});
- Whether or not emissions of precursors to ozone or other secondary pollutants would occur in such quantities and at such locations as to have a reasonable potential to cause or contribute to a violation of federal or state ambient air quality standards; or
- Whether or not emissions of hazardous air pollutants could exceed state standards or other hazardous air pollutant exposure guidelines at locations accessible to the general public.

4.13 NOISE

4.13.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Under the Army's ENMP (formerly known as the Installation Compatible Use Zone Program) the Army evaluates the impact of noise that may be produced by ongoing and proposed Army actions and activities. The ENMP characterizes noise into three primary zones (Noise Zones 1-3). Noise Zone (NZ) 1 is typically suitable for all types of land uses and is located the furthest from the noise source. NZ II and NZ III are generally considered incompatible for noise-sensitive land uses.

- Zone I—areas with L_{dn} levels below 65 dBA or 62 dBC;
- Zone II—areas with L_{dn} levels of 65 to 75 dB or 62 to 70 dBC; and
- Zone III—areas with L_{dn} levels above 75 dB or 70 dBC.

The major noise sources associated with project alternatives include construction activity, ordnance firing and detonations, military vehicle use, aircraft and helicopter operations, and personal vehicle use. Factors that determine the level of noise effects include the increase of noise generated from SBCT activity relative to the baselines established in the Hawaii, Alaska and Colorado and potential effects on local noise regulations and sensitive receptors.

In general, the methodology used to assess noise impacts associated with project alternatives have been evaluated using available noise data for various weapons types, available monitoring data for actual live fire training exercises, and modeling analyses for various types of noise sources. Noise from large-caliber weapons was modeled using the BNOISE2 program; and SARNAM was used to model noise from small-caliber weapons. Computer modeling was used to develop noise contours to identify noise impacted areas.

The noise evaluations have considered both longer-term average noise level conditions and short-term noise levels associated with discrete noise events. Other relevant noise exposure conditions (time-of-day, background noise levels, the repetition pattern of brief noise events, and the duration of individual noise events, etc.) also have been considered in the evaluation of noise impacts. Results from noise monitoring and noise source modeling have been compared to various standards and guidelines in order to evaluate the significance of predicted noise levels.

For Hawaii, noise modeling for small arms firing employed data and equations published by the Army Environmental Hygiene Agency (now CHPPM) plus information from various other sources. Noise modeling for aircraft operations employed a proprietary flyover event simulation model using aircraft noise data from the US Air Force OMEGA108R program. In Alaska and Colorado, CHPPM conducted noise studies to evaluate the noise that would occur with the stationing of an SBCT at either installation.

4.13.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Specific considerations used in evaluating noise impact significance include the following:

- Whether noise levels would exceed community noise standards at the boundaries of Army installations;
- Whether land use compatibility problems would be created in terms of DOD guidelines (AR 200-1 and DA PAM 200-1); or
- Whether impulse or other short-term event noise levels would be likely to cause significant annoyance to more than 15% of exposed individuals at locations accessible to the general public (the underlying context for DOD noise guidelines and CHPPM evaluations of blast noise complaints).

4.14 AIRSPACE

4.14.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

Impacts on airspace were assessed by evaluating the potential effects of both project construction and operations activities on the principal attributes of airspace, namely controlled and uncontrolled or navigable airspace, special use airspace, military training routes, en-route airways and jet routes, and airports/airfields. Impacts on controlled and uncontrolled airspace were assessed by determining if the project would reduce the amount of navigable airspace by creating new or expanding existing special use airspace by introducing temporary flight restrictions or by constituting an obstruction to air navigation. Impacts on special use airspace were assessed by determining the project's requirement for modifications to existing special use airspace. Impacts on military training routes were assessed by determining if the project would require a change to an existing or planned military training route. Impacts on en route airways were assessed by determining if the project would lead to a change in a regular flight course or altitude or instrument procedures. Impacts on airports and airfields were assessed by determining if the project restricts access to or affects the use of airports or airfields available for public use, or if it affects airfield or airport arrival and departure traffic flows.

4.14.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether an alternative would have a significant impact on airspace, based in part on FAA Order 7400.2E, Procedures for Handling Airspace Matters (FAA 2001), include the extent or degree to which its implementation would result in the following:

- Reduce the amount of navigable airspace;
- Lead to the assignment of new special use airspace (including prohibited areas, restricted areas, warning areas, and military operations areas) or require the modification of special use airspace;
- Change an existing or planned military training route or slow route;
- Change an existing or planned IFR minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure, or require a visual flight rules operation change from a regular flight course or altitude;
- Restrict access to or affect the use of airports or airfields available for public use, or if it would affect commercial or private airfield or airport arrival and departure traffic flows; or
- Create an obstruction to air navigation.

4.15 ENERGY

4.15.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

The evaluation of potential impacts to energy demand or generation, delivery systems, or costs is based on the project's potential to affect energy demand and costs. Population changes projected for the ROI for each alternative were used for forecasting energy demands. These energy demand forecasts were compared to existing levels of energy use and generation to determine if regional energy prices are expected to increase significantly.

4.15.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether an alternative would have a significant impact on energy demand, generation, delivery systems, or costs would include the extent or degree to which its implementation would result in the following:

- Increase demand for energy beyond the current capacity of generation or delivery systems to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary;
- Increase demand for energy resulting in a significant increase in energy costs.

4.16 FACILITIES

4.16.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

The evaluation of potential impacts to real estate, installation facilities, public services, infrastructure, and utilities is based on the project's potential to affect these facilities. This analysis includes potential impacts on police, fire, and emergency medical services and infrastructure for water, wastewater, energy sources (electricity, and natural gas), solid waste management, and communications. Potential infrastructure shortfalls, inconsistencies, inadequacies, or deficiencies identified between the existing infrastructure and the requirements of a project alternative are identified.

Population changes projected for the proposed project were used for forecasting utility and public services demands, based on average per capita values whenever available. These utility forecasts were compared to existing levels of use and infrastructure capacities to determine if capacities would be exceeded.

This analysis identifies the potential environmental consequences to the Army real property, including lands, facilities, and infrastructure, within the ROIs for each project alternative. The environmental consequences to facilities, such as buildings, structures, and other improvements; public services; and infrastructure, including roadways and utilities are assessed for each alternative. This analysis included identification and evaluation of the mission requirements for facilities and infrastructure and the extent to which each installation already meets these requirements. The analysis also evaluates the need for upgrades to existing facilities or infrastructure and any secondary impacts associated with those upgrades.

Where the existing facilities and infrastructure do not meet the mission requirements, the additional facilities and infrastructure would be acquired through construction by the Army or through community or private sector mechanisms. The effects of acquiring the additional facilities and infrastructure are also assessed.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included the impact of the action on increased demand for water, collection and treatment of wastewater, communications, and the disposal of solid waste. Potential impacts to existing real estate, recreation facilities, schools and educational systems, traffic and circulation on both regional and installation roadways, parking facilities, and energy are analyzed in other sections of this document.

4.16.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Factors considered in determining whether an alternative would have a significant impact on real estate, facilities, public services, or infrastructure would include the extent or degree to which its implementation would result in the following:

- Impact real estate prices as a result of land acquisition or from land development that is incompatible with existing land uses;
- Result in an increase in demand for facilities, such as housing, parking, or other facilities, beyond the current capacity to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary;
- Interrupt or disrupt public services or utilities, as a result of physical displacement and subsequent relocation of public utility infrastructure, to the extent that the result would be a direct, long-term service interruption or permanent disruption of essential public utilities; or
- Result in an increase in demand for public services or utilities beyond the capacity of the utility provider to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary.

4.17 SUBSISTENCE

4.17.1 RESOURCE-SPECIFIC IMPACT ANALYSIS METHODOLOGY

The analysis of subsistence impacts applies only to Alaska and is based on a number of variables which could be affected by the proposed activities. Subsistence is prevalent in many parts of rural Alaska and involves harvesting resources, such as fish, animals, plants, and wood for direct consumption rather than obtaining those goods through commercial markets. Subsistence is often integrated with traditional, cultural, and spiritual values. Impacts to subsistence could result from a number of sources. Subsistence relies on the user's ability to locate and harvest local resources.

The primary variables include proximity of training lands to traditional subsistence locations, the amount of subsistence harvest known to occur on USARAK managed lands, the availability of resources, the accessibility of USARAK lands for subsistence purposes, and resources outside existing installation boundaries potentially affected by USARAK training activities and management programs.

4.17.2 RESOURCE-SPECIFIC SIGNIFICANCE CRITERIA

Subsistence impacts could be significant if implementation of the alternatives would:

- Restrict or limit access to locations of harvestable resources, particularly wildlife, fish, and plant resources necessary for subsistence lifestyles. (including both spatial and temporal access).
- Impact the availability of subsistence resources such as plant resources for the purposes of plant gathering and berry picking.
- Impact the migratory patterns of animals that would in turn impact resource availability.

Chapter 5
Environmental Consequences

CHAPTER 5
ENVIRONMENTAL CONSEQUENCES

This chapter describes both direct and indirect impacts, as well as cumulative impacts, that would result from the permanent stationing of the 2/25th SBCT at the various alternative locations described in Chapter 2. This chapter is organized by alternative to describe the impacts that would occur in Hawaii (Alternative A), Alaska (Alternative B), and Colorado (Alternative C). In addition, impacts that would result from the No Action alternative (Alternative D) are also identified to provide a comparative basis for the three action alternatives. The cumulative impacts of each alternative are presented at the end of the chapter.

5.1 SUMMARY OF ENVIRONMENTAL IMPACTS BY ALTERNATIVE

Table 5-1 below provides a comparative summary of the potential direct and indirect impacts of implementing each alternative for the permanent stationing of the 2/25th SBCT. The table exhibits the composite impact for each VEC resulting from implementation of each alternative.

Table 5-1 Summary of Impacts by Alternative

VEC	Alternative			
	A - Hawaii	B - Alaska	C - Colorado	D - No Action
Soil Erosion	⊗	⊘	⊗	⊘
Water Resources	⊘	⊙	⊙	⊘
Wildfire Management	⊗	⊗	⊗	⊘
Cultural Resources	⊗	⊗	⊗	⊘
Land Use and Recreation	⊘	⊙	⊘	⊙
Traffic and Transport	⊙	⊘	⊘	⊘
Socioeconomics	⊙	⊙	⊙	⊙
Hazardous Materials/ Hazardous Waste	⊘	⊘	⊘	⊙
Wetlands	○	⊘	○	⊙
Vegetation	⊙	⊘	⊘	⊙
Noxious Weeds	⊘	○	⊙	⊘
Threatened and Endangered Species	⊗	⊙	⊗	⊙
Wildlife and Habitats	⊙	⊙	⊙	⊙
Air Quality	⊘	⊙	⊙	⊙
Noise	⊗	⊙	⊙	⊙
Airspace	⊙	⊙	⊙	⊙
Energy Demand and Generation	⊙	⊙	⊙	⊙
Facilities	⊙	⊙	⊙	⊙
Subsistence	N/A	⊙	N/A	N/A

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

The composite impact incorporates the direct and indirect impacts from four activity groups that were analyzed (Cantonment Construction, Range Construction, Live-Fire Training, and Maneuver Training) occurring in all specific areas that would be affected in Hawaii, Alaska, and Colorado. To summarize these impacts comparatively, the highest impact level to each VEC that would be realized from any of the four activity groups in any of the impacted areas is used as the single impact rating for each alternative.

Likewise, for the No Action alternative (Alternative D), the composite impact rating incorporates the impacts that would occur in all three locations (Hawaii, Alaska, Colorado) under the No Action alternative. Details of each alternative's impacts resulting from the four activity groups and the various impacted areas are presented in the sections below.

Table 5-1 displays the summary of impacts for each alternative. Many of the direct and indirect impacts to the VECs are less than significant; however, significant impacts would occur with each action alternative. For all action alternatives, potential effects from wildfires and impacts to cultural resources would be significant despite implementation of mitigation measures. The presence of threatened and endangered species in Hawaii and Colorado create the possibility for significant impacts to those listed species. Alternative A would exacerbate existing problematic noise levels at Schofield Barracks, prolonging a significant noise impact. Soil erosion impacts from maneuver training in Hawaii and Colorado are expected to be significant. All other impacts to the VECs are expected to be either significant but mitigable to less than significant, less than significant, or would result in no impacts.

Generally, the broad comparison of alternatives as exhibited in **Table 5-1** shows that, while there are variations in the level of impact that would be expected to each VEC by implementing each alternative, the overall level of impact that would result from each alternative would be similar. Alternative B has the fewest VECs with significant impacts while Alternative A has the most. Each alternative has a similar number of VECs with impacts in the significant but mitigable to less than significant, less than significant, and no impact categories. However, this does not take into account the relative differences among VECs or the areas where the impacts would occur.

5.2 ALTERNATIVE A – PERMANENTLY STATION THE 2/25TH SBCT AT SCHOFILED BARRACKS MILITARY RESERVATION (SBMR) WHILE CONDUCTING REQUIRED TRAINING AT MILITARY TRAINING SITES IN HAWAII

5.2.1 SUMMARY OF CONSEQUENCES

Table 5-2 presents the potential impacts of implementing Alternative A as it is described in Chapter 2. For each VEC, impacts from four activity groups were analyzed: Cantonment Construction, Range Construction, Live-Fire Training, and Maneuver Training. Impacts from the four activity groups are summarized by a single impact rating for each area affected by the alternative. Details of each activity group's impacts are presented below in the resource sections.

The EIS for the Transformation of the 2nd Brigade, 25th Infantry Division (Light) (USAG-HI 2004) analyzed the projects and associated impacts as presented in the alternatives section of this EIS. The same approach to impact analysis used in the 2004 EIS was applied to this EIS.

Impacts from soil erosion are not mitigable to less than significant. The primary activity group responsible for immitigable soil erosion is maneuver training. Expansion of maneuver areas into those not currently used for maneuver would expose stable, vegetated soils to vehicle and foot traffic. This would cause loss of vegetation, soil compaction, and alterations to drainage patterns that would increase soil

erosion from both wind and water. BMPs and mitigation measures would minimize soil loss, but not to a less than significant level.

Impacts to threatened and endangered species would occur from continued use of Army lands but formal consultation with the USFWS has resulted in non-jeopardy BOs for the SBCT training. Construction and training activities would increase the potential to introduce or spread noxious weeds and increase the possibility of accidental ignition of a wildfire. Implementation of the IWFMP will greatly reduce the potential effects of a wildfire; however, the loss a sensitive species or its habitat would be a significant impact. Mitigation measures would reduce these impacts to less than significant. General wildlife, habitats, and vegetation would sustain only less than significant impacts. No impacts to wetlands would be expected.

Table 5-2 Summary of Potential Impacts from Alternative A

VEC	Location			
	SBMR	DMR	KTA/KLOA	PTA
Soil Erosion	⊗	⊗	⊗	⊗
Water Resources	⊘	⊙	⊘	⊙
Wildfire Management	⊗	⊗	⊗/ N/A	⊗
Cultural Resources	⊗	⊗	⊗/N/A	⊗
Land Use and Recreation	⊘	⊙	⊘/N/A	⊘
Traffic and Transport	⊙	⊙	⊙/ N/A	⊙
Socioeconomics	⊘	⊙	⊙/ N/A	⊙
Hazardous Materials and Hazardous Waste	⊘	⊙	⊘/N/A	⊙
Wetlands	○	○	○	○
Vegetation	⊙	⊙	⊙	⊙
Noxious Weeds	⊘	⊘	⊘	⊘
Threatened and Endangered Species	⊗	⊗	⊗/ N/A	⊗
Wildlife and Habitats	⊙	⊙	⊙	⊙
Air Quality	⊘	⊘	⊘/ N/A	⊙
Noise	⊗	⊙	⊙/ N/A	⊙
Airspace	⊙	⊙	⊙/ N/A	⊙
Energy Demand and Generation	⊙	⊙	⊙/ N/A	⊙
Facilities	⊙	⊙	⊙/ N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

A minor increase in noise levels would occur at SBMR. Existing noise levels are already at significant thresholds, and though the increased noise from the proposed action would be minor, noise levels from ordnance use at SBMR would continue to be a significant impact.

Surveys and monitoring of cultural resources are ongoing and have been incorporated into project and training design. A programmatic agreement is in place, as well as an inadvertent discovery plan, to address unknown cultural resources. However, the proposed action could result in inadvertent impacts to unknown cultural resources, or restrict access to existing resources. Mitigation measures are in place to minimize impacts to cultural and historical resources, but not to a less than significant level.

Air quality and water resource impacts, primarily from training activities, would be significant. The implementation of several administrative mitigation measures would reduce those impacts to less than significant.

Impacts to land use, socioeconomics, and hazardous materials would be largely mitigable to less than significant. Traffic, airspace, energy, and facilities would all experience less than significant impacts at all affected areas.

5.2.2 GEOLOGY, SOILS, AND SEISMICITY

Table 5-3 lists the significance of soil erosion and other geologic, soils, and seismic-related impacts that would occur under Alternative A for each type of project activity. Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

Table 5-3 Summary of Potential Soil Erosion Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊘	⊘	N/A	⊘
Impacts from Live-Fire Training	⊘	N/A	⊘	⊘
Impacts from Maneuver Training	⊗	⊗	⊗	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Construction of the BAX ranges at SBMP and PTA, and the range maintenance facility adjacent to PTA are expected to cause direct, short-term, localized soil erosion impacts when ground surfaces are disturbed to construct live-fire villages, trench lines, stationary armor targets, machine gun bunkers, and other typical BAX features. Because construction would occur in previously disturbed areas, this impact is considered significant but mitigable to less than significant with implementation of standard construction BMPs and standard construction erosion and sediment control measures specified in the USAG-HI ITAM annual work plan.

Construction of Dillingham Trail is expected to lead to potentially significant short-term increased surface disturbance, soil erosion and compaction, and potential for slope failure in steep areas, but the impacts could be reduced to less than significant with implementation of standard road construction BMPs and erosion and sediment control measures specified in the USAG-HI ITAM annual work plan. After construction, however, the roads could affect surface drainage in the long-term, both by focusing drainage collected from impermeable surfaces onto adjacent lands and by interfering with natural drainage patterns. These impacts could be reduced with mitigation, but not to less than significant levels.

New and existing ranges would be operated under Alternative A, some of which would support live-fire training. Munitions impact and wildfire sparked by fired weapons can remove vegetative cover and disturb soils, resulting in larger areas of bare ground than observed under current conditions, leading to increased rates of erosion in weapons training ranges. This impact is considered significant but mitigable to less than significant with implementation of revegetation projects implemented under the ITAM annual work plan (described below) and wildfire management practices implemented by USAG-HI.

SBCT maneuver training activities are expected to cause significant disturbance to soils and vegetation due to intensified on and off-road maneuver training on the new BAX ranges at SBMP and PTA, the new training area at the Keamuku Parcel, and existing maneuver areas on DMR, and KTA, and SBMR. The surface disturbance caused by maneuver training would lead to increased soil erosion, compaction, and rutting in the training areas. Soil erosion impacts resulting from SBCT maneuver training would be reduced with implementation of standard erosion control BMPs, and the land management practices mandated in the TRI, Sustainable Range Awareness Program (SRA), and LRAM programs of the USAG-HI ITAM annual work plan (described below), but not to less than significant levels.

5.2.2.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.2.2 Impacts from Range Construction

Significant Impacts Mitigable to Less than Significant

Impact 1: Soil Erosion. Construction of PTA Trail would remove existing vegetation and disturb soils, increasing the erosion potential. As proposed, much of the trail would be on steep slopes and would be nearly straight up the fall line of the slope. The road would be a 24-foot-wide gravel bed with 3-foot-wide shoulders, for a total width of 30 feet. The road may use existing road alignments and would be paved with asphalt on slopes greater than 10 percent. In effect, nearly all uphill segments would be paved with asphalt, and traverses along elevation contours would be paved with gravel. During construction, erosion by both wind and water could occur. The largest impacts are likely to be in steep slope areas containing fine loam soils, such as Waikoloa and Puu Pa sandy silt loams. This impact is considered potentially significant, but mitigable to less than significant during construction with implementation of standard road construction BMPs and standard road construction mitigation measures, described previously, specified in the USAG-HI ITAM annual work plan. After construction of the PTA Trail, however, the road could affect surface drainage in the long-term, both by focusing drainage collected from impermeable surfaces onto adjacent lands and by interfering with natural drainage patterns. Large runoff events could result in soil accumulation in culverts at gulch crossings, resulting in flooding and possible washouts of the roadway. Each of these situations could result in substantial soil erosion and subsequent sedimentation on lands adjacent to the road. This is considered a significant impact; however, implementation of mitigation measures makes this an unlikely possibility.

Construction of the BAX ranges at SBMP and PTA proposed for Alternative A is expected to cause direct, short-term, localized soil erosion impacts when ground surfaces are disturbed to construct live-fire villages, trench lines, stationary armor targets, machine gun bunkers, and other typical BAX features. Each BAX range would cover approximately 24 acres of land, although the BAX at PTA would be within the footprint of the existing Range 11T, which has already been disturbed. Potential increases in soil erosion caused by range construction would be temporary because construction of the structures and other features associated with BAX ranges would create bare land only periodically. Additionally, the Army would construct stormwater runoff control structures as part of standard BMPs, which would divert water from the construction sites. Other standard range maintenance BMPs that would be implemented under

Alternative A, such as road grading, target repair, and berm recontouring, would also reduce erosion. Compared to existing conditions, increased soil erosion resulting from range construction activities is expected to be short-term, local, and less than significant with implementation of standard construction BMPs and the land management practices, previously described, specified in the USAG-HI ITAM annual work plan.

Regulatory and Administrative Mitigation 1: The Army continually funds and implements USAG-HI-wide land management practices and procedures described in the ITAM annual work plan to reduce erosion and other soil and geologic impacts (USARHAW 2001a and USARHAW 2001b). Currently, these measures include implementing a TRI program, implementing an ITAM program, implementing an SRA program, developing and enforcing range regulations, implementing an Erosion and Sediment Control Management Plan, coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP), and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of erosion and sediment control measures identified in the ITAM annual work plan include stormwater runoff control structures (silt fences, hay bales, etc.) as part of standard BMPs, which would divert water from the construction sites. Standard range maintenance BMPs implemented by USAG-HI include road grading, target repair, and berm recontouring. Examples of current LRAM activities at USAG-HI include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, tree planting, irrigation, and mulching; combat trail maintenance program (CTP), coordination through the TCCC on road maintenance projects; and development mapping and geographic information system (GIS) tools for identifying and tracking progress of mitigation measures. These land practices and mitigation measures would be implemented regardless of permanent stationing of an SBCT under Alternative A. Mitigation measures implemented under the ITAM annual work plan for USAG-HI would reduce soil erosion but not to less than significant levels.

Less Than Significant Impact

Volcanic and Seismic Hazards. As described previously, portions of the areas that would be impacted under Alternative A are subject to volcanic eruptions, lava flows, occasional explosive eruptions, volcanic gas venting, and earthquakes. Construction of the BAX ranges and the range maintenance facility adjacent to PTA are not expected to have any effect on the frequency of volcanic eruptions or earthquakes; therefore, the impact would be the hazards associated with the ranges being constructed in areas in which volcanic and seismic hazards exist.

Alternative A may increase the hazard associated with volcanic and seismic hazards relative to No Action because it would involve construction of temporary and permanent structures on the two new BAX ranges at SBMP and PTA and the new range maintenance facility adjacent to the PTA BAX, which could affect the stability of those structures and increase the potential for construction personnel to be injured by structure features or heavy machinery during damaging events. On Oahu, the expected intensity of ground shaking in a reasonably strong earthquake would be moderate to minor because of its distance from the source of the earthquakes. There is very little risk of renewed volcanic activity on Oahu, so the impacts on facilities constructed on the ranges at SBMP and KTA are considered less than significant.

While the hazard associated with an eruption of lava or volcanic gases is high if directed toward an area occupied by people or structures during construction, and the probability of a lava flow occurring within the PTA during the next 50 to 100 years is moderately high (based on the relatively high risk USGS Lava Hazard Zone classifications described in Chapter 3 for the majority of PTA), existing warning systems are expected to generally provide sufficient warning of an eruption such that personnel and equipment would likely have time to evacuate from the path of a lava flow. The hazards associated with lava flows or earthquakes at PTA, therefore, are considered less than significant.

5.2.2.3 Impacts from Live-Fire Training

Significant Impacts Mitigable to Less than Significant

Impact 2: Soil Erosion and Compaction: Weapons training would increase under implementation of Alternative A, in the form of a greater number of various types of munitions fired by the additional SBCT troops, including munitions for mobile gun systems, which are not currently used. Live-fire training would occur at the BAX ranges at SBMP and PTA. SRTA training would also occur at the MOUT in KTA where the fire ignition potential is low. While weapons firing would typically occur in existing impact areas and the frequency of the training events would not change, surface disturbance caused by munitions impact would result in larger areas of bare ground than observed under current conditions. Munitions impact can directly create craters and remove patches of vegetation, which normally protects soil from erosion by slowing runoff, intercepting raindrops before they reach the soil surface, and anchoring the soil. Compaction in the craters caused by larger ordnance explosions can alter the permeability and water-holding capacity of the soils and harden silty clays affecting the ability of vegetation to recover in those areas. These direct impacts indirectly create large areas of bare ground that is susceptible to wind and water erosion, which can indirectly cause large-scale removal and redeposition of soils, gullying, or unstable slopes in areas of steep slopes and rapid runoff. Although weapons training events would be periodic, long-term impacts are expected because soil disturbance typically requires time and effort to amend. Implementation of the soil erosion control measures Implementation of standard BMPs, and revegetation and other land restoration projects implemented by the LRAM program under the ITAM annual work plan (described previously) would reduce these impacts to less than significant.

Detonation of munitions, smoking, use of welding torches, vehicle engines, and other training-related activities can initiate wildland fires. The addition of a BAX range at both SBMR and PTA would increase the use of larger caliber munitions. The BAX at PTA would be located in a previously disturbed site and oriented towards existing ordnance impact areas. Wildland fire caused by SBCT live-fire training activities at the SBMP BAX, PTA BAX, and KTA could remove large areas of vegetation that normally protects soil from erosion by slowing runoff, intercepting raindrops before they reach the soil surface, and anchoring the soil. Vegetation removal resulting from wildland fires could result in increased soil erosion by water and wind, indirectly causing large-scale removal and redeposition of soils, gullying, or unstable slopes in areas of steep slopes and rapid runoff. The impact would be directly proportional to the size of the fire. Under natural conditions, wildland fires occur infrequently in Hawaii, partly due to lack of lightning. Thus, native plant species are not well adapted to fire. Fire and loss of soil could reduce native plant species and encourage fast-growing nonnative species that recover quickly after fires. Some of these species may be more susceptible or even dependent on fire so that the occurrence of wildland fires may help to increase the chance of future wildland fires.

The potential for erosion resulting from wildland fire started by weapons firing is expected to be highest at the SBMP BAX. Although wildland fires, particularly grass fires, could occur at PTA, the effects on soil loss would be localized because much of the land contains shallow soil or exposed rock outcrops. Removing grassland vegetation by fire would temporarily expose soils to increased water erosion, but perhaps even more so to wind erosion. Due to a lack of continually flowing streams, soils would probably not migrate far from their upslope origins, but wind erosion could transport soil further from its original location. Many areas with soils on PTA are somewhat protected from water erosion because they are surrounded by rock outcrops. The potential for erosion resulting from wildland fire is expected to be lowest at KTA because of the wetter climate than the other Hawaii installations.

The Army often conducts prescribed burns, which are meant to reduce fuel loading (build up of easily ignitable vegetation) that can lead to large-scale wildfires, but which can also create bare areas susceptible to erosion. Those potential erosion impacts were discussed and approved for the NEPA process

undergone for the IWFMPs for Pohakuloa and Oahu Training areas, described below. Soil erosion resulting from fires ignited by weapons training related activities is considered to be a potentially significant impact at all applicable Hawaii installations. Implementation of the mitigation measures mandated by the IWFMPs, described below, would reduce these impacts to less than significant.

Regulatory and Administrative Mitigation 2: The IWFMP for Pohakuloa and Oahu Training Areas was finalized in June 2006. The Army would fully implement the IWFMP for all existing and new training areas to reduce the impacts associated with wildland fires. The plan considers the potential need for firebreaks and/or fuel breaks at each installation along with other safety concerns.

The IWFMP would be updated to address proposed activities along the Kawaihae Harbor-PTA trail. These updates would be completed before activities commence. Additionally, ITAM geographic information systems would be used to monitor the effectiveness of wildfire management activities. Army personnel would practice BMPs in operations, and trained personnel and equipment would be on hand during training activities to respond to wildfires. IWFMP wildfire management infrastructure, such as the three dip tanks proposed for PTA, would be constructed before SBCT training commenced. During training, appropriate personnel and equipment would be assigned to water resources for responding to a wildfire.

Less than Significant Impacts

Exposure to Soil Contaminants during Live-Fire Training Activities. Low levels of explosive residues are associated with munitions use. Studies have shown that TNT residues readily biotransform in the environment and the byproducts bind to organic matter. Areas with higher organic matter content appear to bind residues more rapidly. The explosive residues RDX and HMX do not degrade rapidly and are not very soluble. However, once dissolved in water, both can be highly mobile in soil.

Munitions are fired from firing points downrange and into the range impact areas. The Army restricts access to these areas by Soldiers or members of the public because of the explosive risk to safety they represent. It is unlikely; therefore, that military personnel or off-post residents would come into contact with the constituents of these munitions in the downrange impact area soils. The risk to military personnel who use the ranges would be low because contact with downrange impacted soils is unlikely and there are relatively few areas with high chemical constituent concentrations. There would be no risk to the general public from munitions constituents related to range use because there would be no public access to these areas. Exposure to soil contaminants during live-fire training activities is considered a less than significant impact.

Volcanic and Seismic Hazards: As described previously, portions of the areas that would be used for live-fire training under Alternative A are subject to volcanic eruptions, lava flows, occasional explosive eruptions, volcanic gas venting, and earthquakes. Weapons firing at the SBMP and PTA BAX ranges and the MOUT range on KTA is not expected to have any effect on the frequency of volcanic eruptions or earthquakes; therefore, the impact would be the hazards to personnel associated with weapons training in areas in which volcanic and seismic hazards exist. Alternative A may increase the hazard to personnel associated with volcanic and seismic hazards because it would involve personnel training on the two new BAX ranges at SBMP and PTA and additional personnel training on the MOUT range at KTA, which could increase the potential for soldiers to be injured by damaged structure features, heavy military vehicles, falling rock, or lava. On Oahu, the expected intensity of ground shaking in a reasonably strong earthquake would be moderate to minor because of its distance from the source of the earthquakes. There is very little risk of renewed volcanic activity on Oahu, so the hazard to personnel on the ranges at SBMP and KTA are considered less than significant.

As described previously, existing warning systems are generally expected to provide sufficient warning of a volcanic eruption in the vicinity of PTA, such that personnel and equipment would likely have time to evacuate from the path of a lava flow. The hazards associated with lava flows or earthquakes at PTA, therefore, are considered less than significant.

5.2.2.4 Impacts from Maneuver Training

Significant Impacts

Impact 3: Soil Erosion: Mounted and unmounted maneuver training using Stryker vehicles is expected to damage or remove vegetation and disturb soils to an extent that would substantially increase soil erosion rates and alter drainage patterns in the training areas, which could lead to gullying, and indirectly to downstream sedimentation, particularly when the vehicles travel off-road. While some of the off-road maneuvering would occur on existing maneuver areas, there would be several areas used for maneuvering that have not been previously used. Stryker vehicles tend to use trails much more than off-road travel, unlike current maneuver training at USAG-HI, because of their high speed and ability to cover greater distances. Because of their weight and wheel size of the Stryker vehicles, however, the off-road maneuvering that they would conduct could cause significant disturbance to soils and vegetation, increasing the potential for soil erosion. As discussed in Chapter 4, ATTACC model used calculated MIMs to predict effects to land condition as a result of Stryker vehicle maneuver training under Alternative A. Calculated MIMs were compared to predicted carrying capacity (also measured in MIMs) of each training area to come up with a predicted land condition, which was defined as the threshold of significance for training in each area and was classified as “mild”, “moderate”, and “severe”.

Off-road maneuvering by Stryker vehicles is expected to occur on 1,917 acres of existing maneuver area on SBER and 1,300 new acres on SRAA. Off-road maneuvering is not anticipated at SBMR and the existing acreage at SRAA due to UXO and environmental concerns. ATTACC model results suggested that land conditions from maneuver training activities would decline in both the SRAA and SBER from “moderate” and “minor”, respectively, to “severe”. Land in the SRAA is currently used for pineapple cultivation. The modeling assumed that the pineapple crops would be removed and maneuver training would be unrestricted over the entire accessible areas where slopes are less than 30 percent, which was determined would severely degrade the land condition. Under Alternative A, the crops would actually be left in place and the Stryker vehicles would be restricted to the existing farm roads. Relative to the assumption in the model, land disturbance would be limited to the existing roads instead of the entire range area; however, damage to the road areas would increase because vehicle use would be concentrated onto a smaller area and effects to soils from the Stryker vehicle are relatively greater than those from vehicles used for existing USAG-HI maneuver training. While this disturbance would not destroy as much vegetative cover as disturbance to off-road areas would, it could disturb the soils underlying the roads, causing ruts and gullies to form, which in turn could lead to the indirect effect of increased surface water runoff and soil erosion off of the road surface. The annual training load at SBMR would increase from 23,728 MIMs to 50,213MIMs (about a 111 percent increase). The land condition in SBER was similarly projected to decline from “moderate” to “severe” without mitigation under Alternative A because maneuver training with the Stryker vehicles would be focused in the relatively small portion where slopes are less than 30 percent.

Off-road maneuvering by Stryker vehicles on DMR is expected to occur on 364 acres that are already currently used for other types of military vehicle maneuver training. The ATTACC model results indicate that land condition on DMR would substantially decline to a severely degraded condition under the assumption that maneuver training would be unrestricted over the entire accessible area where slopes are less than 30 percent. ATTACC modeling assumptions considered current land condition on DMR as mildly impacted. However, under the Alternative A, it is expected that annual training load would

increase from 2,286 MIMs to 4,837 MIMs (about a 111 percent increase). Moderate impacts on land condition (for example, reduction in vegetation and exposure of soils) are expected to occur for a range of about 3,000 to 4,000 MIMs, and land condition is expected to decline more rapidly when MIMs exceed 4,000. However, similar to the discussion on SBMR, if the Stryker is restricted to existing training roads, the land damage would be limited to the existing roads instead of distributed over the entire DMR, but the restriction to the roads would mean that damage to the road areas and the indirect impacts of increased surface runoff and erosion of the areas adjacent to the roads would be increased because the vehicle use would be concentrated onto a smaller area.

Drum Road would be used by to transport vehicles and Soldiers to KTA. Off-road maneuver training is limited on KTA but proposed on 3,384 new acres at KTA under Alternative A. ATTACC modeling results suggest that a proportion of the land area in the maneuver areas could be affected. However, because KTA is currently used for military training activities, and the impact assessment is based on the level of predicted use by the Alternative A, the modeling results predict a less than significant impact. Steep slopes occur on the margins of the CACTF. ATTACC modeling of the maneuver training areas at the CACTF suggests that the effects on land condition would be severe after the Alternative A is implemented. These impacts would occur in addition to the ongoing erosion stresses due to known levels of public access and unauthorized use of portions of KTA.

Increased soil erosion may result from mounted and unmounted SBCT maneuver training from use of the PTA Trail, the new BAX at PTA, and the Keamuku Parcel. The intensity of off-road vehicle use within the current boundaries of PTA would increase with implementation of the Alternative A. Off-road maneuvering is expected to occur on 1,800 acres currently used for other types of maneuver training on PTA, but on 23,000 acres not previously used for maneuvers on the Keamuku Parcel.

ATTACC modeling for PTA assumed an increase in the number of MIMs from 16,293 under existing conditions to 34,480 (about a 111 percent increase). ATTACC modeling assumed that about 56,661 acres, or about 50 percent of the total land area within PTA, is maneuverable, but that only about 12,000 acres (11 percent of the total area) are currently being used. Much of this area is located adjacent to Saddle Road. The ATTACC model distributed the total MIMs over the available land area, resulting in an average of 1.36 MIMs per maneuverable acre under existing conditions, and about 2.87 MIMs per acre as proposed. Under existing conditions, it was assumed that the MIMs result in “mild” impacts on land condition in the PTA boundaries, meaning that relatively little restoration is needed to sustain the land. This may be reasonably accurate on average, but it is not accurate when applied to specific locations. For example, the INRMP for PTA identifies denudation of vegetation, major soil erosion, and severe windblown dust problems associated with maneuver training in Range 10. ATTACC modeling found that the Alternative A would result in degradation of land condition to a “severe” condition on average, meaning that it would be much more difficult to restore and sustain the land over the long term than under existing conditions. The threshold for “severe” was assumed to occur at about 29,000 MIMs.

For the Keamuku Parcel, the ATTACC modeling estimated that new SBCT maneuver training would result in a total of 34,480 MIMs and degradation to a “moderate” land condition (lower than the threshold for “severe”, estimated for the Keamuku Parcel at 50,000 MIMs). Based on a total maneuverable land area of 22,675 acres, Alternative A would result in about 1.52 MIMs per acre on the Keamuku Parcel. There is currently no mounted maneuver training there. Uses that could affect soil erosion include cattle grazing, civilian vehicle traffic, cinder cone quarrying operations, and periodic burning by wildfires. In addition, the parcel has been used for military maneuver training in the past (it is part of the Waikoloa Military Maneuver Area), and those past uses may have already had long-term effects on land condition, which is considered part of the baseline for this evaluation. Therefore, current conditions should not be assumed to reflect “natural” or undeveloped conditions.

In the ATTACC modeling, it was assumed that nearly all of the land in the Keamuku Parcel is maneuverable by Strykers. Therefore, the MIMs were distributed over the entire area of the parcel. In practice, however, it is likely that Strykers would follow routes that are neither over rock outcrops (which would be more difficult to traverse) nor over thick soft deposits, but would follow routes that skirt the margins of outcrops where the soils are relatively thin and firm, with exception to the Keamuku Parcel. Thus, the effective maneuverable area may be smaller than that modeled, and the effects on land condition may be more focused than assumed in the modeling. Although the average MIMs per acre would be similar to those within the current PTA boundary, the Keamuku Parcel is steeper, contains highly erodible and compressible volcanic ash, and the erosion hazard is greater than within the current PTA boundary. Stryker vehicle use of roads in this area could create conduits that would concentrate surface water flow and erode ash next to the roads. Vehicle maneuvering in this area could create tracks that act as potential preferential surface water pathways and severe erosion would result.

With the uncertainties of the model, the impact of soil loss from erosion caused by maneuver training activities on SBMR, KTA, DMR, and PTA is expected to be significant over time because it could result in additional major soil erosion, such as that described for Range 10. Standard BMPs, the land management practices mandated in the TRI, SRA, and LRAM programs of the USAG-HI ITAM annual work plan (described previously), and the additional mitigation measures described below would reduce the impacts, but not to less than significant levels in the event that all units are training at home station and not in deployment status.

Regulatory and Administrative Mitigation 3: The Army would develop and implement a DuSMMoP for the new training areas. The plan would address measures such as, but not limited to, restrictions on the timing or type of training during high-risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan would determine how training would occur in order to keep fugitive dust emissions below CAA standards for PM10 and soil erosion and compaction to a minimum. The Army would monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan would also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

Additional Mitigation 3: The Army would design portions of range in the Keamuku Parcel to address creation of potential preferential water pathways during maneuver training. Training would be confined to the road and the surrounding areas in the parcel because of the presence of highly erodible and compactable volcanic ash.

Impact 4: Soil Compaction and Rutting: Soils in the training areas, particularly soils that have not previously been used for military vehicle maneuver training, are likely to become compacted by use of the SBCT vehicles, which could alter the permeability and water-holding capacity of the soils and harden silty clays. Reduced water-holding capacity and permeability adversely impacts the ability of the soils to support recovered vegetation. Because vegetation cover is a primary means of preventing soil erosion, widespread compaction could indirectly lead to increased erosion and downstream sedimentation. The compacted linear track ruts left by off-road vehicles could create preferential pathways for surface runoff, which could also indirectly result in increased erosion along the tracks and subsequent downstream sedimentation.

Compaction is likely to occur in moist soils containing clays, which comprise most of KTA. Drum Road would be used under Alternative A to transport vehicles and Soldiers to KTA. 3,384 acres are proposed as new off-road maneuver areas under the Alternative A. ATTACC modeling results suggest that a proportion of the land area in the maneuver areas could be affected by compaction from maneuver training. Together, the impacts of soil compaction from maneuver training activities on KTA are expected

to be significant. These impacts would occur in addition to the ongoing erosion and compaction stresses due to documented public access and unauthorized use of portions of KTA.

Regulatory and Administrative Mitigation 4: Standard mitigation funded and implemented under the annual ITAM and SRA program work plans, with particular attention to areas where soil characteristics, depth, soil moisture, or other existing conditions preclude susceptibility to compaction and rutting, would reduce the soil compaction impacts on KTA, but not to less than significant levels. AEC should provide guidance in implementing the SRA program and oversee SRA program implementation and documentation. COE should review design plans to check that mitigation identified in the annual ITAM and SRA program work plans is accounted for.

Significant Impacts Mitigable to Less than Significant

Impact 5: Soil Compaction and Rutting: As described above, soils in the training areas, particularly soils that have not previously been used for military vehicle maneuver training, are likely to become compacted by use of the Stryker vehicles, which could alter the permeability and water-holding capacity of the soils and harden silty clays. Soil compaction may also affect vegetation recovery and create preferred drainage pathways along which erosion and subsequent downslope sedimentation may be enhanced.

Soils on existing road surfaces in the SRAA may be susceptible to compaction and rutting. Over the long term, use of Dillingham Trail by heavy vehicles may lead to compaction of the road surface and formation of ruts that interfere with proper drainage.

The Waikoloa and Waimea soils in the Keamuku Parcel are vulnerable to compaction because they contain a high percentage of fine materials. However, soils throughout PTA tend to have low moisture content. Therefore, the Waikoloa and Waimea soils are likely to be moderately vulnerable to compaction except shortly after storm events. Once compacted, the soils may remain compacted for a long time. Significant soil compaction is expected to occur in the Keamuku Parcel because this area has not been previously subjected to a high degree of vehicle use.

The impacts of compaction and rutting are considered to be potentially significant on PTA, SBMP, and DMR under the Alternative A depending on the soil characteristics and amount of the land affected because ATTACC modeling suggested that a large portion of the land in the maneuver areas could be affected by maneuver training.

Regulatory and Administrative Mitigation 5: Standard mitigation funded and implemented under annual ITAM and SRA program work plans, with particular attention to areas where soil characteristics, depth, soil moisture, or other existing conditions preclude susceptibility to compaction and rutting, would reduce impacts to less than significant levels on all ranges except portions of KTA, as described above.

Impact 6: Increased Potential for Slope Failure Resulting from Road Use: Slope failure is the collapse of soils on a steep slope when the internal friction of the materials supporting the slope is exceeded by the weight of the materials. Slope failure can be initiated by increasing the loading at the top of the slope, by deeper weathering of the materials in the slope, and by vibration. The combination of steep slopes, easily erodible soils, and the damage or modification to land cover or surface drainage that would occur due to use of the roads by SBCT vehicles during maneuver training could increase the potential for slope failure. Concentrated use of the roads by the Stryker vehicles could load weakly supported slopes and accelerate potential for slope failure in these areas.

Stryker vehicles using the Helemano Trail to transport soldiers during training activities at the SBMP BAX range would increase the potential for slope failure adjacent to the road. As described in Chapter 3, this road has segments that traverse highly erosive soils or steep slopes.

Use of the Dillingham Trail during maneuver training activities under in DMR would also increase the potential for slope failure adjacent to the road. As described in Chapter 3, this road has segments that traverse highly erosive soils or steep slopes. Most of Dillingham Trail would follow existing roads and would be on relatively gentle stable slopes. Parts of the proposed route would approach the rim of the gulches of Poamoho Stream and Kaukonahua Stream. The route could cross areas of unstable slopes, or construction of new roadways or modification of the existing roads could reduce slope stability through creation of new cuts and fills or drainage problems.

Over the long term, use of Dillingham Trail by heavy vehicles may destabilize slopes in areas underlain by soft saturated soils. In addition, vibrations caused by heavy vehicle use may induce failure of unstable slopes, or loading on unstable steep slopes may induce failure of the roadway. Repair of failed slopes could require additional cutting, filling, or shoring, with the potential to alter natural land contours and drainage patterns further. Landslides themselves may become the locus of future slides because the failed soil may be poorly drained. Some of the clay soils on the coastal plain near DMR are not considered highly suitable for road fills and are subject to shrinking and swelling or soil creep (slow downslope movement in soils with low strength).

Use of Drum Road during maneuver training activities in KTA could result in slope failures due to vibration or loading, but the proposed improvements to the road are expected to reduce these impacts compared to current conditions. Although there are many steep slopes within PTA and the Keamuku Parcel, most slopes are underlain by shallow bedrock or exposed rock outcrops, so there is little potential for slope failure.

Regulatory and Administrative Mitigation 6: Overall, the increased potential for slope failure resulting from use of roads and trails for SBCT maneuver training is considered potentially significant because slope failure could alter the landscape, obstruct stream channels, interrupt use of the road, and create safety problems for personnel. Regular monitoring and early maintenance of the roadways and adjacent slopes, as mandated in the USAG-HI ITAM annual work plan, as well as proposed improvements to existing roads, however, would reduce the impact to less than significant.

Less Than Significant Impacts

Exposure to Soil Contaminants: Exposure to chemical contaminants in soils at maneuver training areas could occur through several pathways, including direct contact with contaminated soils, ingestion of soils, or through inhalation of windblown dust. Exposure estimates are based on assumptions about the amount of soil that might be ingested by a person who works in an area with contaminated soils. It is a generally accepted principle of risk assessment that not all exposures result in unacceptable health risks and that there are certain thresholds of exposure below which the health risks are so low that they cannot be distinguished from background risks. Results from soils investigations conducted by the USAG-HI at SBMR and PTA in 2002 were discussed in Chapter 3 and are summarized below as they relate to the potential for exposure during maneuver training activities at the proposed BAX ranges and other maneuver areas.

Although a relatively small number of samples were collected to represent SBMR, the samples were collected specifically from locations that were considered highly probable to represent the most contaminated sites. The sample results, therefore, represented above average concentrations on SBMR overall. RDX was detected in the highest relative concentrations among the chemicals detected,

exceeding the PRG in two of 39 composite samples taken, which represented the highest concentrations on the range. The actual exposures would be lower than assumed in the analysis. Arsenic was detected at levels slightly above the cancer industrial PRG, although the levels were well below the non-cancer industrial PRG. Alternative A on SBMR is not expected to result in increased exposure to these chemicals, because military personnel would not experience contact with contaminated soils that is additional to existing contact levels or for durations (25 years) that trigger risk under industrial soil PRGs. Moving SBCT maneuver training to SRAA would actually reduce some of the potential for exposure because it does not contain any of the most contaminated sites. With regard to pesticide use within the SRAA, USEPA did not find concentrations of farm chemicals that would raise concern for human exposure.

The area of the proposed BAX presents a potential opportunity for contact with contaminated soils. The construction of the BAX would require the conversion of a portion of Training Area 12 to a training area where Soldiers could be exposed to the soils. However, their exposure would be limited to training for a period of days or weeks. The level of chemical compounds present at Range 12 are all below their respective PRGs. Considered together, the potential duration of exposure to the chemical concentrations on the training ranges at PTA, including Range 12, represent a low risk to personnel who use them.

Composite soil sampling at selected ranges within PTA revealed the presence of metals, explosives, and semi-volatile organic compounds. The observed concentrations were generally lower than industrial PRGs. One explosive compound, RDX, was detected in samples from Ranges 5 and 9 at concentrations above the industrial PRG, while Training Area 12 was below that. The risks from multiple chemical exposures are additive, and similar calculations can be done for each of the contaminants to which people may be exposed at PTA. The risks from HMX, nitroglycerin, and TNT are very small compared to the risk from RDX, and the sum of their risks is lower than 0.74 x 10-6. The risks associated with each of the metals can be calculated similarly, and the results would be similar. The highest risks are associated with the iron and aluminum in the soil, both of which occur naturally at high concentrations.

Overall, the sum of the carcinogenic and non-carcinogenic risks, based on the available soil sampling data and using the PRGs to estimate risk, is lower than the USEPA threshold for worker exposure. It is unlikely that troop exposures to RDX or other chemicals on the ranges would be similar to worker exposures in an industrial setting. For example, workers are assumed to ingest 100 mg of soil per day, 250 days per year, for 25 years. This assumption over-estimates troop exposures because troops are likely to be exposed only temporarily, and only for short durations. No public contact with these soils would occur. Based on the conservative analysis described above, this represents a less than significant impact.

Volcanic and Seismic Hazards: Portions of the areas that would be impacted by maneuver training are subject to volcanic eruptions, lava flows, occasional explosive eruptions, volcanic gas venting, and earthquakes. Alternative A would increase the hazard associated with these conditions because it would involve increasing personnel and SBCT equipment in the maneuver training areas, which could increase the risk of injury caused by earthquakes or volcanic eruptions. On Oahu, the expected intensity of ground shaking in a reasonably probable earthquake would be moderate to minor because of its distance from the source of the earthquakes. There is very little risk of renewed volcanic activity on Oahu, so the impacts on SBMR, DMR, and KTA are considered less than significant.

Liquefaction potential at DMR has not been characterized, and the potential for injury or property loss in the event that liquefaction occurs is probably less than significant, due to the low potential for significant ground shaking. However, in a strong earthquake, DMR may be impacted by liquefaction because of the high water table and sandy sediments underlying the facility. Liquefaction could cause damage to the Dillingham Trail, which could impact the ability to use it during SBCT maneuver training and could present a safety risk to the personnel in the SBCT vehicles. Alternative A is not expected to result in any

significant new hazards associated with earthquakes or liquefaction relative to existing conditions, and no new structures would be constructed at DMR under Alternative A. Therefore, the impact is considered less than significant.

The discussion of impacts related to volcanic and seismic hazards can be divided into two broad types of impacts: those that may be caused by the Alternative A and those that are the result of the project being constructed in an area in which hazards exist. The impacts summarized below are mainly of the latter type, as the use of explosives at PTA is not expected to have any effect on the frequency of volcanic eruptions or earthquakes.

While the hazard associated with an eruption of lava or volcanic gases is high if directed toward an area occupied by people or structures, and the probability of a lava flow occurring within the PTA during the next 50 to 100 years is moderately high (based on the relatively high risk USGS Lava Hazard Zone classifications described in Chapter 3 for the majority of PTA), existing warning systems are expected to generally provide sufficient warning of an eruption such that personnel and equipment would likely have time to evacuate from the path of a lava flow. The hazards associated with future earthquakes at PTA are considered less than significant because new BAX range structures would be designed to withstand the expected range of seismic shaking and because the area is underlain by thin soils and hard rock, which, unlike thick alluvial deposits, transmits rather than amplifies seismic wave energy.

5.2.3 WATER RESOURCES

Range construction at SBMR could result in impacts to surface water quality from nonpoint source contamination of surface water. These impacts would be significant but mitigable to less than significant. Continually funded mitigation measures would minimize these affects to less than significant levels. Impacts to water quality from nonpoint source contamination at PTA would be less than significant. Other less than significant impacts include impacts to water quality from dust control and potential spills.

Live fire training could result in impacts to surface water quality from introduction of munitions chemical residues present in soils from training activities at SBMR and KTA, and impacts from wildland fires. These impacts would be significant but mitigable to less than significant. Continually funded mitigation measures would minimize these affects to less than significant levels. Impacts on surface water and groundwater quality from live fire training at PTA would be less than significant.

Maneuver training could result in impacts to surface water quality from nonpoint source sediment loading at SBMR and KTA. Impacts to surface and groundwater quality could result from contamination of surface water and shallow groundwater during operation of facilities at the training ranges. These impacts would be significant but mitigable to less than significant. Continually funded mitigation measures would minimize these affects to less than significant levels. Impacts to surface water or groundwater from maneuver training at PTA, as well as impacts to water quality from spills or nonpoint source discharges, and impacts on flood potential at DMR are considered less than significant (**Table 5-4**).

Table 5-4 Summary of Potential Water Resource Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊘	⊘	N/A	⊘
Impacts from Live-Fire Training	⊘	N/A	⊘	⊙
Impacts from Maneuver Training	⊘	⊙	⊘	⊘

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.2.3.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.3.2 Impacts from Range Construction

Significant Impacts But Mitigable To Less Than Significant

Impact 1: Nonpoint source contamination of surface water: During construction, surface water quality may be affected by stormwater runoff coming into contact with disturbed soil or with contaminants from accidental spills. The resulting stormwater runoff could carry sediments or contaminants to adjacent waterways. Drainage from proposed construction sites could have a high potential to affect water quality in either the Kaukonahua Stream, north of the SBMR boundary, or the Waikele Stream, south of the installation boundary. Majority of the proposed BAX area is located within the Mohiakea Gulch drainage, a tributary of Kaukonahua Stream. The Motor Pool Maintenance Shops is about 60 percent constructed and located within the watershed of Waikele Stream.

Regulatory and Administrative Mitigation 1: Implementing Phase II Stormwater Management Regulations of the Clean Water Act, the ITAM, and IWFMP as described below would reduce nonpoint source contamination of surface water to less than significant.

The ITAM program would continue to identify and inventory land condition, coordinating between training planners and natural resource managers, implementing land rehabilitation measures identified in the INRMP, monitoring the effectiveness of the land rehabilitation measures, evaluating erosion modeling data to identify areas in need of improved management, and implementing education and outreach programs to increase user awareness of the value of good land stewardship.

The Army would implement the existing spill prevention and response plan to all new lands and activities under the Alternative A. The IWFMP for Pohakuloa and Oahu Training Areas was finalized in June 2006. The Army would fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The Army would incorporate BMPs that would reduce runoff and sedimentation to aquatic environments in accordance with CWA regulations for stormwater runoff at construction sites.

Less Than Significant Impacts

Impacts from nonpoint chemical loadings: Chemicals, such as petroleum hydrocarbons that may spill or leak onto soils as a result of vehicle use or refueling, could be bound to soil particles and then transported to surface water by erosion. These impacts are expected to be less than significant because spills would be addressed effectively through standard procedures.

Impacts from range construction sites. During ground preparation for new construction sites, grading, excavating, and trenching may expose erodible soils to stormwater runoff and increase the potential for sediments to contaminate surface waters. Similarly, broken hydraulic lines on heavy equipment could spill chemicals during equipment refueling, and chemical solvents, paints, and other chemicals used in construction could also be spilled. These potential impacts would be reduced to acceptable levels by implementing standard construction BMPs.

Use of dust control palliatives. Applying calcium, magnesium chloride, calcium lignosulfonates, or other environmentally friendly materials or measures to control dust could affect surface water quality, either by increasing the biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals would be applied according to industry standards (Parametrix 2001) and because the amount of runoff is expected to be low in most of the areas where dust suppression would be needed.

Regulatory and administrative mitigation 1 and 2 and additional mitigation measures described in the above section would be implemented to protect water resources from potential impacts resulting from range construction.

5.2.3.3 Impacts from Live-Fire Training

Significant Impacts But Mitigable To Less Than Significant

Impact 2: Impacts on water quality from wildland fires. The risk of wildland fires is expected to remain at about the same level as under existing conditions or slightly higher due to the increase in munitions use. The potential for wildland fires is expected to be low but could increase when the land is fallowed due to growth of grasses and other vegetation. Wildland fires can generate chemical contaminants, and loss of vegetation can increase the potential for soil erosion and sediment loading to streams. Either of these effects could result in adverse impacts on surface water quality.

Regulatory and Administrative Mitigation 2: Implementing the ITAM and IWFMP as described above would reduce water quality impacts from wildfires to less than significant.

Impact 3: Nonpoint source chemical residues in soil: Drainage and runoff from training ranges could transport contaminants to streams, reducing water quality in the stream and ultimately discharging contaminants in the ocean. Contaminants associated with military activities include residues of explosives or other constituents of munitions such as metals, constituents of plastics, or combustion products. Other chemical pollutants, such as petroleum hydrocarbon fuels or lubricants, may be inadvertently spilled or released as an indirect result of military activities.

The Alternative A may result in an increase in sediment transported to streams draining the ranges, and ultimately to surface waters beyond the installation boundary. In the absence of mitigation, an increase in sediment erosion could result in greater impacts, possibly in exceedance of health-based standards or antidegradation policy goals.

No systematic sampling investigations of the major streams or tributaries that drain the watersheds have been performed to determine whether or not explosives residues or other chemical pollutants from military training have affected surface water quality. Samples of surface soils from selected areas on the training ranges were collected and analyzed, and these data provide an indication of the concentrations of metals, semi-volatile organic compounds, and explosives in surface soils that could be transported to surface water (USACE 2002a).

The principal explosive chemicals of concern identified in soil samples, listed in order of their water solubilities, were nitroglycerin, 2,4,6-TNT, RDX, and HMX. These are also the most prevalent organic constituents of the explosive munitions used on the ranges. The rate of migration of these four chemicals through soil and their fate and transport are further described in Transformation FEIS (USAG-HI 2004). The ultimate degradation products of these compounds are inorganic nitrogen compounds, carbon dioxide, and water.

It is possible, though unlikely, that the contaminant concentrations observed in soils from ranges at SBMR could adversely affect stream water quality. The chemicals of concern are likely to bind to soil particles and to migrate in this bound state. The amount of water needed to mobilize the contaminated sediments would likely result in very low concentrations in water. Without direct surface water sample data, it is necessary to make some assumptions in order to estimate the concentration of contaminants that might enter stream waters beyond the boundary of SBMR.

Assuming a suspended sediment concentration of 1 g/L in water, which is typical for turbid runoff water, and assuming that the sediment carried by the streams that drain SBMR contains the average RDX concentration (estimated at 5.9 micrograms per gram [µg/g] [USACE 2002a]), the resulting concentration of RDX in the water containing the sediment would be 5.9 micrograms per liter (5.9 µg/L). Using the same logic, the average concentrations of TNT, HMX, and nitroglycerin in the surface water would be 0.21, 0.72, and 16.6 µg/L, respectively, based on their average concentrations in the surface soils (USACE 2002a).

Given these assumptions, the projected concentration of RDX in the stream water discharged at the installation boundary would be just slightly above the USEPA lifetime health advisory level (3.7 µg/L versus 2 µg/L), the concentration of nitroglycerin would be about three times the lifetime health advisory level (15.5 µg/L versus 5 µg/L), and the concentrations of the TNT and HMX would be much lower than the lifetime health advisory levels.

The concentrations of contaminants that would actually be transported by runoff to the installation boundary are very difficult to predict, and the predicted concentration is highly dependent on the assumptions on which the prediction is based. Therefore, the estimate described above is intended only to illustrate a simple approach to the problem and to provide an idea of the approximate order of magnitude of the concentrations under these assumptions. Note that the average concentration used in this estimate likely greatly overestimates the average concentration in soils over the larger area of the ranges because it is based on sampling that was purposely selected for areas expected to contain higher than average concentrations of contaminants. Also, the sample results indicate that the contaminants occur in some areas but not others, so the distribution is not even. Many contaminants are not highly mobile in water, and sediments may require many months or years to migrate downslope to streams. Meanwhile, some contaminants, such as explosives, would be undergoing chemical degradation.

The assumption of the lifetime health advisories is that the water is consumed at a rate of 2 liters per day for a year. The stream water would not be consumed without filtration, and filtration would remove the contaminants because they are bound to the suspended sediment. Therefore, after dilution in the main

stems of Kaukonahua or Waikele Streams, the concentrations of contaminants would be below detection levels and would not reduce the beneficial uses of the streams.

A similar analysis can be conducted for metals using the concentrations observed in the soil samples on the ranges. The results would show that metals could be transported to streams at concentrations that might exceed drinking water standards. The loading rates would increase with increased soil erosion. Implementing the mitigation measures discussed in the mitigation section would reduce the impacts on surface water quality to acceptable levels.

Regulatory and Administrative Mitigation 3: Implementing the ITAM and IWFMP as described above would reduce water quality impacts from wildfires to less than significant.

Less Than Significant Impacts

Impacts on surface water and groundwater quality: Alternative A may increase the amount of explosives residues in soils. It also may result in dispersion of these residues by wind and water erosion. However, due to lack of any permanent streams or water bodies, impacts on surface water would be of short duration, if they occurred, and are expected to be less than significant. Due to the depth of groundwater beneath the PTA and the relatively low concentrations of explosives residues in soils, groundwater beneath the PTA is not expected to be affected.

The following mitigation measures would be implemented to protect water resources from potential impacts resulting from live-fire training. The Army would develop and implement a DuSMMoP for the training area. The plan would address measures such as, but not limited to, restrictions on the timing or type of training during high-risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan would determine how training would occur in order to keep fugitive dust emissions below CAA standards for PM10 and soil erosion and compaction to a minimum. The Army would monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan would also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

5.2.3.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 4: Impacts on surface water quality from nonpoint source sediment loading: Training activities are expected to include an increase in mounted maneuver training area in the SRAA, KTA, and in SBER compared to existing conditions. The resultant increase in soil erosion is likely to result in an appreciable increase in suspended sediment in adjacent streams. Of most concern are the major perennial streams that receive runoff from SBMR, including Kaukonahua Stream to the north and Waikele Stream to the south.

Regulatory and Administrative Mitigation 4: Implementing the ITAM and IWFMP as described above would reduce water quality impacts from sediment loading to less than significant.

Impact 5: Nonpoint source contamination of surface water. Each of the proposed construction projects includes engineering components to control site drainage and to minimize erosion. For example, the proposed motor pool maintenance shops would be provided with a storm drainage system incorporating modern oil-water separators; repair activities would be performed indoors to avoid stormwater exposure; and petroleum, oil, and lubricants and hazardous waste storage facilities would be designed according to modern standards. The proposed motor pool would primarily address the increased maintenance

requirements of the Alternative A, which involves approximately an additional 400 wheeled vehicles. The Alternative A would involve retaining the existing motor pool, so this alternative would not reduce surface water impacts from this motor pool. Accidental spills are not entirely unavoidable, and increased industrial activity under the Alternative A could result in a greater probability of accidental spills.

Regulatory and Administrative Mitigation 5: Implementing the ITAM and IWFMP as described above would reduce water quality impacts from nonpoint source contamination to less than significant.

Impact 6: Impacts on groundwater quality. Operating several proposed facilities, particularly the motor pool maintenance shops, the tactical vehicle wash, and the Multiple Deployment Facility (MDF), would involve handling hazardous liquids or other chemicals or processing wastewater or other waste liquids. The MDF is in the Wheeler Gulch area, which reportedly has shallow groundwater conditions. Implementing mitigation measures described in the mitigation section is expected to reduce the potential for impacts on groundwater to acceptable levels.

Regulatory and Administrative Mitigation 6: Implementing the ITAM and IWFMP as described above would reduce impacts to groundwater quality to less than significant.

Impact 7: Erosion impacts on surface water quality. Based on ATTACC modeling results, the Alternative A would severely degrade land condition. MIMs are expected to increase under the Alternative A. Under existing conditions, the effects of maneuver training on land condition are considered significant but mitigable to less than significant.

There are relatively few large contiguous areas available for maneuver training at KTA. Therefore, the effects of training would be concentrated on the limited available land, and there would be little opportunity to rotate training to other areas to allow damaged lands to recover. The implication of this in the relatively steep terrain, with high annual rainfall, is that it would also increase soil erosion. Erosion would not occur all at once but would be progressive. If not mitigated, the rate of erosion would steadily increase as more land area was disturbed and vegetation cover decreased. Consequently, steady land erosion would contribute to sediment loading in streams. However, with mitigation, impacts to stream water quality from sediment loading are expected to be controlled within acceptable levels.

Regulatory and Administrative Mitigation 7: Implementing the ITAM and IWFMP as described above would reduce water quality impacts from erosion to less than significant.

Less Than Significant Impacts

Chemical spills or nonpoint source discharges. Maneuver training could involve the possibility of accidental spills of petroleum products (from fuel or hydraulic lines) or other chemicals. Any spills would be reported, contained, and cleaned up as soon as possible according to procedures described in the SPCC Plan.

Impacts on groundwater quality. Perched groundwater occurs at a shallow depth beneath DMR. Accidental spills or releases could occur during routine operations and, instead of affecting surface water quality, could infiltrate the subsurface and affect groundwater quality. The impacts are expected to be less than significant because, as described for surface water, spills would be quickly contained and then cleaned up using standard procedures described in the SPCC Plan. Furthermore, although there would be more mounted maneuver training at DMR under the Alternative A, the increase would not result in an appreciably higher risk of spills.

Impacts on flood potential. A portion of DMR lies within a designated 100-year flood zone, and it is likely that a portion of the unmapped part of DMR is also subject to a 100-year flood. The Alternative A would not increase the potential for flooding, but it may increase the exposure of personnel or property to flooding. Also, storage of hazardous chemicals within a flood-prone area can lead to the potential for chemical releases in the event of a flood. However, BMP would be used to prevent this from occurring as well as SPCC would be implemented in case of inadvertent chemical release into the environment.

The primary hazard from flooding at DMR is likely to be loss of property and the potential for chemical releases. The extent of the risk of flooding is not well established because flood zone determination has not been made for DMR. After determination of flood-prone areas, it may be possible to reduce the hazards of flooding to acceptable levels through a combination of engineering controls, training, and planning.

Potential spills on Drum Road. A spill response plan and SOPs would be implemented to control any accidental spills that may occur. Some of the hazards of spills and accidents would be reduced compared to No Action because public roads, with their inherent risks of accidents involving civilian vehicles, would be avoided.

Impacts on surface water or groundwater. Maneuver training would continue to disturb the soils however, due to lack of permanent surface water resources and the depth to groundwater, water quality impacts, if any, are expected to be less than significant.

5.2.4 WILDFIRE MANAGEMENT

Table 5-5 lists the types of impacts associated with wildfire management that would occur under Alternative A. Live-fire and maneuver training would create a significant but mitigable wildfire impact at the installations and along the trails and roads. Hawaii's climate, vegetation, range operations, and rugged terrain limiting accessibility for fire suppression efforts have always created high risk of wildfire within Army installations. New ranges would be operated, some of which would support live-fire training. Increased live-fire activities, increased nonlive-fire activities that can still ignite wildfires, and increased transportation of personnel and ordnance in areas not currently used all contribute to the potential to start wildfires. A wildfire could damage animal and plant communities, damage cultural resources and places of traditional importance, and exacerbate soil erosion by removing vegetation. In addition, although the USFWS considers the risk of wildfire from military training the greatest threat to listed species on and adjacent to training area in Hawaii, the non-jeopardy BOs were based in large part on the quality of the IWFMP. By implementing the IWFMP, the USFWS feels that the Army greatly reduces the chance that a listed species will be harmed by military training related fires. However, since there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species or known or unknown cultural resources, the Army has made a conservative determination that although the mitigation will considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level. The mitigation measures below will substantially reduce the impact, but not to less than significant.

5.2.4.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

Table 5-5 Summary of Potential Impacts to Wildlife Management from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	○	○	N/A	○
Impacts from Live-Fire Training	⊗	N/A	⊗/ N/A	⊗
Impacts from Maneuver Training	⊗	⊗	⊗/ N/A	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.2.4.2 Impacts from Range Construction

No Impacts

Construction of a BAX at SBMR and PTA and the Dillingham Trail at DMR would temporarily increase human presence and activity at construction sites. This increase is not expected to impact the risk of accidental wildfire ignition. No SBCT-specific range construction would be necessary at KTA or KLOA; therefore, impact analysis is not applicable. No mitigation is necessary for impacts from range construction.

5.2.4.3 Impacts from Live-Fire Training

Significant Impacts

Impact 1: Increased Wildfire Risk. The addition of a BAX range at both SBMR and PTA would increase the use of larger caliber munitions. The BAX at PTA would be located in a previously disturbed site and oriented towards pre-existing ordnance impact areas. As a result, both live- and nonlive-fire training would increase, resulting in the potential to increase the frequency of wildfires. At KTA, nonlive-fire and live-fire training using SRTA, which still has the potential to ignite wildfires, would increase but would not likely produce a significant wildfire risk because the ammunition has a plastic tip and does not include tracer rounds. Overall, SBCT training would increase the number of soldiers training at all ranges, thus increasing the total number of rounds fired. Although mitigation will considerably reduce wildfire risk, the impacts from a wildfire may not be reduced to a less than significant level. The mitigation measures below will substantially reduce the impact but not to less than significant.

Regulatory and Administrative Mitigation 1: The IWFMP for Pohakuloa and Oahu Training Areas was finalized in June 2006. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation along with other safety concerns. Several projects are planned as part of implementing the IWFMP are presented here as examples of mitigation measures. Projects are designed to increase accessibility for firefighting activities through road construction and maintenance, limit the spread of wildfire through the establishment of firebreaks and fuel reduction areas, and construction of dip ponds to increase the availability of water for helicopter fire suppression.

SBMR: Two fire access roads at SBMP, one surrounding the McCarthy Flats (MF) ranges and a second encompassing the south range, would be constructed. Dip ponds are proposed for construction at SBMP and SRAA. A new fire access road would be constructed roughly following the western edge of the existing pineapple fields, connecting with existing plantation roads on the south and with Trimble Road on the north. This fire access road would be 2.4 miles long and 20 feet wide. Grass on the Multipurpose Qualification Training Range, South Range Acquisition Area (QTR2), would be kept at stubble height by regular mowing and/or weed whacking. Biodegradable herbicide and mechanical removal would be used to control fuels bounding the fire access road. A dip pond is proposed for construction at SRAA. It would be a plastic-lined, earthen pond with a 300,000-gallon capacity.

DMR: Two fire access roads are planned for DMR. One or both would be established depending on feasibility. Both routes would follow existing roads that have gone unused over the years and are overgrown with vegetation. The primary route would be roughly 2,953 feet long, running from the cantonment area to the east side of training area P3. The secondary route would lie to the south of the eastern portion of the primary route. Fuel modification projects under consideration at DMR are maintenance of fuels along the Dillingham Military Vehicle Trail and may include prescribed burns. Areas that are overgrown would be managed through the application either of herbicide or by cutting the grass or shrubs. Prescribed burning would be used within the finished fire access road. Mechanical preparation of the fuels (e.g. cutting) may be necessary in order to provide better containment. No burns would take place outside of the completed fire access roads.

KTA/KLOA: A dip pond would be constructed just east of the installation boundary at KTA. It would be a plastic-lined, earthen pond with a 300,000-gallon capacity. There are no plans to construct any fire access roads at KLOA. Fuels management actions at KLOA would be limited to the Kawailoa to Schofield Barracks Military Vehicle trail and Drum Road. Fuels would only be managed if they are of a growth form that presents a fire hazard (e.g. grasses and flammable shrubs).

PTA: Fire access roads and breaks would continue to be established using existing roads and through new construction. The roads would be constructed to be approximately 20 feet wide with a buffer area of reduced vegetation extending 10 feet to the outside of the road and 30 feet inside. Improvements to existing roads not meeting this standard would be necessary and would include widening, smoothing of the road surface, and/or the application of surface material. A network of fire access roads would be established along the western boundary of the installation and extend into Kipuka Kalawamauna. Fire access roads would be maintained twice a year, and fuels would be controlled by herbicide application or cutting along roadsides.

Four fuel management corridors would be constructed throughout the current extent of PTA. All of the proposed corridors are located in areas with little or no existing fuel. Initially, the corridors would be monitored once every 5 years to determine if fuels management needs to be initiated. Once management has begun, these corridors will be monitored biannually and treated whenever necessary to remain within specifications. Herbicide treatments would be applied manually to the greatest extent feasible; however, if the level of encroachment makes this approach cost-prohibitive and/or impractical, herbicides would be applied via an aerial source.

The Keamuku parcel is located just to the northwest of PTA proper and covers roughly 23,000 acres. Fuel breaks are planned around the perimeter of the Keamuku Parcel. In addition, a Memorandum of Agreement with Waikii Ranch requires fuels management in a 1 km buffer around the ranch. Grazing is currently used on the Keamuku Parcel as a fuel management tool; however, grazing alone is unlikely to manage grassland fuels completely.

Fires originating on state land west of the installation are a major cause of fire on PTA. To reduce this threat, prescribed burns are proposed for the area lying between the two fire access roads located on and to the west of the installation boundary near Kipuka Kalawamauna. Currently, prescribed burns would only be conducted as part of firefighting activities should a fire originate outside of the western boundary and pose a threat to the installation. Prescribed burns may be considered as an annual fuel management treatment to maintain a low fuel load within this area at a future time depending on fuel growth and available funding. If prescribed burns are to be used as an annual fuel treatment, the Directorate of Public Works, Environmental Division will consult with the USFWS and perform Section 106 consultation prior to its implementation. Any burning between the two roads on the West side of PTA would require consultation and coordination with the State because the western most road is on State lands.

The IWFMP would be updated to address proposed activities along the Kawaihae Harbor-PTA trail. These updates will be completed before activities commence. Additionally, ITAM geographic information systems will be used to monitor the effectiveness of wildfire management activities. Army personnel will practice BMPs in operations, and trained personnel and equipment will be on hand during training activities to respond to wildfires. To the extent possible, IWFMP wildfire management infrastructure would be constructed before SBCT training commenced. During training, appropriate personnel and equipment will be assigned to water resources for responding to a wildfire.

5.2.4.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 2: Increased Wildfire Risk. Following the establishment of Helemano Trail, Dillingham Trail, and Drum Road, units would transport materials and equipment on these improved routes. Additionally, the military vehicle trail between Kawaihae Harbor and PTA would be improved and extended to provide off-highway transport of vehicles, personnel, and equipment. Transportation of personnel and use of flammable or combustible materials, such as fuel or ordnance (i.e., weaponry or equipment), could increase the potential for starting a wildfire, especially in areas not previously used frequently. However, the IWFMP does not address fire management actions for these routes. The use of the trails would increase potential sources of wildfire ignition from Army training in areas that do not have established fire management actions, such as fire prevention and fire suppression. Unlike training activities conducted, the trail would not always be near an installation where access to Army fire suppression resources would be readily available. A wildfire could damage animal and plant communities, damage cultural resources, and contribute to soil erosion by removing vegetation.

Maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, and the frequency of maneuver training at PTA is not expected to increase above existing levels. The Keamuku Parcel would be used for maneuver training as well, and would remain a nonlive-fire area. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency. Munitions use is not part of maneuver training, so the risk of wildfire ignition is from vehicle use and human activity. SBCT maneuver training typically covers a larger area than IBCT maneuver training, potentially extending training into areas that have not been used as frequently. These areas may not have been managed to reduce wildfire risk or have been incorporated into fire management strategies, such as new maneuver training areas on SMBR, KTA, and PTA. Training at DMR would occur in areas currently used for off-road maneuvers, so impacts are expected to be less than significant. The inherent minor risk of accidental ignition attributed to SBCT maneuver training is expected to be similar to the existing maneuver training. Nonetheless, maneuver training would increase the potential for wildfire, and as described previously under Live-Fire Training, the impacts from the resulting wildfire are potentially significant.

Regulatory and Administrative Mitigation 2: Implementation of Mitigation Measures described above under Impacts from Live-fire Training would reduce increased risk of wildfire from maneuver training, but not to less than significant.

5.2.5 CULTURAL RESOURCES

The SBCT has been temporarily stationed at SBMR and no construction would be needed at the cantonment to accommodate permanent stationing at this installation. However, range construction and expansion of training areas has not yet been completed. Some of the projects that would be used by the SBCT if they are permanently stationed at SBMR are general improvements that would also be used for combat training by other Army units. That is, they are not SBCT-specific projects. Permanent stationing of the 2/25th SBCT would entail range construction for BAX at SBMR and PTA, use of new, larger weapons, and expansion of maneuver training areas at SBMR, KTA, and PTA. These changes would increase the likelihood of significant impacts to cultural resources. **Table 5-6** summarizes the types of impacts to cultural resources that would occur under Alternative A.

Table 5-6 Summary of Potential Cultural Resources Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊗	N/A	N/A	⊗
Impacts from Live-Fire Training	⊗	N/A	⊘/N/A	⊗
Impacts from Maneuver Training	⊗	⊗	⊘/N/A	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.2.5.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.5.2 Impacts from Range Construction

Significant Impacts

Impact 1: Impacts to cultural resources: Completion of the SBCT transformation would include construction of a BAX at the SBMP and a second BAX west of the existing 11T training range. Cultural resource surveys for these areas of proposed range construction have identified archaeological sites. No historic buildings or structures or PRTCSs have been reported.

Cultural resource surveys for the majority of the areas of proposed surface disturbance for the BAX at SBMR identified 79 cultural resources within or near the areas of proposed disturbance (USAG-HI 2006). Additional sites were also recorded as part of ongoing cultural monitoring of UXO clearance. Avoidance or relocation was recommended for all but three of the reported resources. Five of the sites, including two of the three for which no further work is recommended, are identified as historic military, ranching, or industrial features.

The proposed BAX on PTA would be west of the existing 11T Range. Cultural resource surveys of the proposed project area reported 12 cultural resources. These resources include one historic fence. Additional documentation was recommended for all but one of the sites. Significant impact to these cultural resources is mitigable by avoidance and protection measures.

Range construction involves grubbing vegetation, grading site surfaces, excavating subsurface, and moving heavy construction equipment. All of these activities, particularly excavation, could result in direct damage to or destruction of archaeological resources. Destruction, damage, or restricted access to previously unknown properties of traditional importance could occur. Mitigation measures would minimize impacts to cultural resources; however, the loss of cultural resources is considered a significant impact.

Regulatory and Administrative Mitigation 1: The Army has been working to mitigate adverse effects to cultural resources by redesigning projects when possible, developing and implementing site protection plans for construction and UXO clearance, monitoring earth disturbing activities, and developing long-term site protection measures. Under the stipulations of the current PA, the locations of eligible cultural resources or areas considered likely to contain eligible cultural resources would be designated as sensitive areas, and access to or use of these areas would be restricted and monitored. There would be regular monitoring of known sites by cultural resource personnel after training activities to identify any impacts and adjust protection if needed. Impacts to archaeological sites can be avoided or mitigated through compliance with the PA. In accordance with the PA, if sites cannot be avoided, appropriate mitigation measures that may include data recovery would be implemented. Any construction or maintenance that entails ground disturbance would also be monitored, and any discovery of undocumented cultural resources or human remains would be treated in accordance with the inadvertent discovery plan in the PA and NAGPRA.

5.2.5.3 Impacts from Live-Fire Training

Significant Impacts

Impact 2: Impacts to cultural resources. Permanent stationing of the 2/25th SBCT in Hawaii would include training at the two new BAX ranges using new weapons and equipment and additional use of SRTA on KTA. The BAX areas are the same areas discussed for range construction. The same cultural resource surveys cover these areas of live-fire training. Significant impacts to archaeological sites are mitigable. Permanent stationing of the SBCT in Hawaii would entail an incremental increase in the live-fire rounds at existing training and qualifying ranges.

Regulatory and Administrative Mitigation 2: The protection, monitoring, and mitigation measures described for range construction would be implemented for cultural resources sites.

5.2.5.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 3: Impacts to cultural resources. Potential significant impacts from maneuver training would be the most widespread impacts associated with the SBCT. The permanent stationing of the SBCT in Hawaii would entail qualitatively different maneuver training over larger areas than earlier IBCT maneuver training. Current maneuver training areas would be used and additional training areas would be added on SRAA, KTA, and the Keamuku Parcel. The SBCT would use existing trails more than the IBCT, but maneuvers would extend over larger training areas. The SBCT has more and heavier vehicles, but is less likely to go cross-country. The SBCT is also more mobile and creates less ground disturbance for

bivouacs and fighting positions. The potential for significant impacts to cultural resources from maneuver training is greater with the SBCT because of the more extensive training exercises. The nature of the impacts is somewhat different.

Cultural resource surveys of SBMR (excluding SRAA) have identified 170 archaeological sites. There are also 47 archaeological sites on affected portions of SRAA. Most of these sites have not been evaluated for eligibility. Only 24 archaeological sites have been reported on DMR and the Dillingham Trail, but all of these sites are evaluated as eligible or not yet evaluated for eligibility. Most of the known archaeological sites at DMR are on densely vegetated steep slopes, and impact to them from Stryker training would be limited. To date, 182 archaeological sites have been reported on KTA (103) and KLOA (79). Thirty-eight of those sites are evaluated as eligible or not yet evaluated for eligibility. Many of these archaeological sites may be impacted by road construction and use of training areas. Surveys of PTA have reported at least 383 archaeological sites, including 96 at the Keamuku Parcel. Surveys along proposed trails have identified nine sites along the PTA trail, five along the DMR trail, and none along the HMR trail. Most of these sites have not been evaluated for eligibility and are considered potentially eligible. Portions of KTA and PTA have not been systematically surveyed for cultural resources. However, these are not areas that will potentially be affected by SBCT projects.

Increased and more extensive training activities in these areas could also result in significant impacts to ATIs. Expansion of training exercises to SRAA and the Keamuku Parcel could limit Native Hawaiian access to and use of sites on these parcels for traditional or religious purposes.

To the extent feasible, sites evaluated as eligible would be avoided. Areas around known sites have been designated as no-use areas, and training activities are not likely to increase impacts to archaeological resources. Monitoring of training areas and mitigation measures would reduce the severity of impacts to archaeological sites. Under the current PA, there would be regular monitoring of known sites by cultural resource personnel to identify any impacts and adjust protection if needed. Impacts to archaeological sites can be avoided or mitigated through compliance with the PA. In accordance with the PA, if sites cannot be avoided, appropriate mitigation measures that may include data recovery would be implemented.

Regulatory and Administrative Mitigation 3: The protection, monitoring, and mitigation measures described for range construction would be implemented for cultural resources sites.

5.2.6 LAND USE AND RECREATION

Table 5-7 summarizes the potential impacts to land uses and recreation resources under implementation of Alternative A. The proposed project activities would primarily be located on land owned by the federal government and within existing Army installations. There would be no significant or immitigable impacts to land use or recreation under implementation of Alternative A. Mitigation would be implemented to minimize impacts as summarized in the following subsections.

5.2.6.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

Table 5-7 Summary of Potential Land Use and Recreation Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	⊘	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊘/ N/A	⊙
Impacts from Maneuver Training	⊙	⊙	⊘/ N/A	⊙+

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.2.6.2 Impacts from Range Construction

Significant But Mitigable To Less Than Significant

Construction of the Dillingham Trail would change the land uses of approximately 55 acres of land for the 15-mile long gravel road. This would be a perpetual easement for the road and would be a long-term change in existing land use. While this would be a significant change in land use, long-term impacts of the trail are expected to be less than significant on surrounding land uses as discussed in other sections of this document.

Less Than Significant Impacts

Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. Two new BAX ranges would be constructed, one each at SBMR and PTA, primarily within lands previously used as ranges or for other Army activities. The BAX on PTA would be located partially within the footprint of an existing range (previously disturbed site) and oriented towards pre-existing ordnance impact areas. Construction of the ranges at SBMR and PTA would indirectly affect nearby land uses as a result of increased noise, dust, odors, adverse effects on public views, and human presence and activity in the construction sites. These impacts would be localized, temporary, and less than significant. No mitigation is necessary for impacts from range construction.

Impacts on land use during construction. During range construction, UXO could be encountered. Although the Keamuku Parcel is part of the former Waikoloa Maneuver Area, which is a Formerly Used Defense Site (FUDS) and supported live-fire training in the past, a risk-based analysis assessed this area as having a low probability of UXO exposure. The PTA Trail is also part of this former maneuver area and was considered to present a medium to high risk of UXO exposure. Construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from this project. Although UXO presents a significant impact, USAG-HI would follow proper abatement techniques, which would reduce this impact to acceptable. In addition to these mitigation measures, the Army would continue to educate soldiers on how to identify UXO and the proper safety procedures for handling UXO. With continued implementation of standard Army regulatory and administrative requirements, this impact

is expected to be less than significant. The proposed mitigation measures would reduce the significant impacts to moderate.

During construction of the ranges, potential impacts associated with the presence of UXO would be mitigated by continued implementation of Army SOPs. Prior to construction, UXO cleanup would involve identifying the most probable munitions (MPM) and clearing a safety radius associated with UXO. Owners and occupants of the areas within the MPM would be notified, and, as needed, road closures and coordination with local law enforcement agencies, fire departments, and transportation agencies would occur. In addition, structures within the MPM may be temporarily evacuated as appropriate UXO cleanup activities are conducted (Streck 2003).

No SBCT-specific range construction would be necessary at KTA, or KLOA; therefore, impact analysis is not applicable.

5.2.6.3 Impacts from Live-Fire Training

Significant But Mitigable To Less Than Significant

Impact 1: Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. Both nonlive-fire and live-fire training using SRTA would increase at KTA. Unauthorized access at KTA may be adversely affected by additional fencing and signs restricting access, which are necessary due to the proposed live-fire use of the area. SRTA has a maximum range of approximately 2,300 feet and an effective range of approximately 246 feet. When the range is in use, any traffic (on foot or in unprotected vehicles) within the SDZ would be prohibited. Presently, traffic (such as unauthorized public access) is not strictly controlled at KTA. Access to training lands would be restricted during fires and to when SDZs are active. Land use compatibility impacts would be associated short- or long-term changes in ambient conditions, such as increased noise, dust or odors, or adverse effects on public views and may result in indirect effects to land uses or quality of recreation in the vicinity of the training area. Impacts associated with noise, dust, odors, and human health and safety are evaluated in the respective sections of this document.

Regulatory and Administrative Mitigation 1: Strict adherence to applicable safety regulations and procedures would continue to protect human health and safety.

Additional Mitigation 1: Access controls would be developed and implemented to ensure the safety of all personnel; and warning signs would be posted on the boundary to prevent unauthorized use/trespass.

Less Than Significant Impacts

Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. Under implementation of this alternative, additional live-fire training would occur as a result of an increased number of Soldiers training at both the existing and new ranges. In addition, new weapons would be used at the BAX ranges at SBMR and PTA and the use of large caliber munitions would increase. SBCT training would result in an increased number of Soldiers training at all ranges, thus increasing the number of rounds fired as well as increased vehicular traffic. Increased noise, dust, or other indirect effects associated with this alternative are not expected to affect off-post land uses. The surrounding areas are uninhabited lands within the SBMR and PTA installations. No residential areas, schools, hospitals, or businesses are expected to be affected. These impacts would be localized to the vicinity around the ranges. UXO would only be used within the impact areas, which are posted as restricted to public access. With continued implementation of current Army SOPs to minimize potential

noise and safety impacts, impacts are expected to be less than significant. No additional mitigation would be required. No live-fire would occur at DMR or KLOA; therefore, impact analysis is not applicable.

5.2.6.4 Impacts from Maneuver Training

Significant But Mitigable To Less Than Significant

Impact 2: Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. Under this alternative, maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, and the frequency of maneuver training at PTA is not expected to increase above existing levels. The Keamuku Parcel would be used for maneuver training as well, and would remain a nonlive-fire area. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency. Munitions use is not part of maneuver training; however, SBCT maneuver training typically requires a larger area compared to current training, potentially extending training into areas that have not been used as frequently. Training at DMR would occur in areas currently used for off-road maneuvers, so impacts are expected to be less than significant.

One new 3,384-acre maneuver training area would be constructed at KTA. Short- or long-term changes in ambient conditions, such as increased noise, dust or odors, or adverse effects on public views, may result in indirect effects to land uses or quality of recreation in the vicinity of the maneuver training area. Impacts associated with noise, dust or odors are evaluated in the respective sections of this document.

Regulatory and Administrative Mitigation 2: Mitigation measures for noise, biological resources, and dust and odors are presented in the respective sections of this document.

Impact 3: Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. One new 1,300-acre maneuver training are would be used at SRAA. With implementation of the proposed mitigation, as described below, training activities at SRAA are expected to result in significant but mitigable to less than significant to land uses.

Regulatory and Administrative Mitigation 3: Strict adherence to applicable safety regulations and procedures would continue to protect human health and safety within the new maneuver area.

Additional Mitigation 3: Access controls would be developed and implemented to ensure the safety of all personnel; and warning signs would be posted on the boundary to prevent unauthorized use/trespass.

Less Than Significant Impacts

Conversion of agricultural land to training land. The use of two new maneuver training areas would result in the conversion of agricultural land at SRAA and the Keamuku Parcel to training land. Approximately 535 acres of actively cultivated pineapple land within SRAA would be converted to training land and approximately 23,000 acres of grazing land at the Keamuku Parcel would be converted to maneuver training land. The Keamuku Parcel is part of the former Waikoloa Maneuver Area.

Under Alternative A, military activities, training, and restriction areas would be confined within the SRAA boundaries and would not affect land uses outside the SRAA. In addition, this land is adjacent to existing urban areas and support services, would not result in the indirect conversion of any existing farmland or farm support services (i.e., irrigation systems) off-site, and would not jeopardize the farm support services on remaining areas. The acquisition area would serve as an additional buffer to the existing training lands, including the ordnance impact area. Disturbed areas (agricultural fields and roads)

would continue to be used for walking and driving between locations. The ITAM program would be used to identify and mitigate potential impacts on the land.

The use of the Keamuku Parcel is likely to be used for military training 40 to 60 times per year. General military training within these areas is not expected to affect off-post land uses because the proposed activities would be confined to within the training area boundaries. The Army is considering establishing cooperative relationships to allow continued agricultural use at the SRAA and continued grazing activities at the Keamuku Parcel, in conjunction with training on the land, subject to constraints posed by training activities. With implementation of these mitigation measures, impacts to agricultural land uses are expected to be less than significant.

SBCT training on lands currently used for training. Much of the land area within the Army installations that would be used for SBCT training under Alternative A is currently being used for training. Three currently used off-road maneuver areas would be used by the 2/25th SBCT:

- 1,917-acre maneuver area at SBER;
- 364-acre maneuver area at DMR; and
- 1,800-acre maneuver area at PTA.

Land uses would not change under implementation of Alternative A because these areas currently being used for maneuver training would continue to be used in the same manner. Vehicles used during maneuver exercises would be replaced by the Stryker vehicle. The land is expected to be used more frequently and intensively; however, maneuver areas would remain the same. Therefore, introducing the Stryker is not considered a significant land use change. No mitigation would be required.

5.2.6.5 Beneficial Impacts

Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. Hunting activities associated with PTA would not change because the Army would continue its cooperative efforts with the state to provide access to hunting areas. There would be a beneficial impact on recreation land use at the Keamuku Parcel. The Keamuku Parcel consists of Parker Ranch-managed land, which is a private hunting area. Acquisition of this land by the Army would have a beneficial impact because this land would become accessible to the public for hunting when not in use for training.

No Impacts

There would be no maneuver training area on KLOA; therefore, impact analysis is not applicable.

5.2.7 TRAFFIC AND TRANSPORT

Table 5-8 summarizes the potential impacts to traffic and transportation resources under implementation of Alternative A. Impacts would include increased traffic on public roads as a result of transporting soldiers and equipment to training ranges and from construction traffic. Traffic impacts associated with military vehicle convoys and during construction activities would be less than significant. Mitigation would be implemented to minimize impacts as summarized in the following subsections. Overall, the traffic impacts on public roadways outside the Army installations would be less than significant.

Table 5-8 Summary of Potential Traffic and Transport Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	N/A	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊙ / N/A	⊙
Impacts from Maneuver Training	⊙	⊙	⊙ / N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.2.7.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.7.2 Impacts from Range Construction

Less Than Significant Impacts

Construction traffic. Range construction activities associated with Alternative A would generate additional traffic from worker vehicles and trucks, but construction traffic would be temporary and would result in less than significant impacts. The project-related construction traffic would not significantly affect operations at the intersections and street segments in the project vicinity, and traffic would generally be free flowing. Implementation of Alternative A is expected to result in less than significant traffic-related impacts associated with the construction of the individual projects at SBMR. No mitigation would be required.

Under implementation of Alternative A, no mitigation is required for traffic congestion off post. However, the Army currently operates a public web site (http://www.25idl.army.mil) that lists a schedule of upcoming USAG-HI activities including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USAG-HI training and convoy schedules, community projects in which the USAG-HI is involved, public USAG-HI activities and functions, general USAG-HI news that might be of interest to the public, and USAG-HI services available to the public.

To minimize traffic impacts on the surrounding community during construction, a construction traffic management program would be implemented. The program would stagger work hours to reduce impacts from construction workers during peak hours, would identify truck routes to limit truck traffic to major streets, and would designate parking for construction workers.

Intersection and Roadway Segment Operations. Traffic volumes adjacent to the new ranges at SBMR and PTA would increase slightly during and could result in modified traffic patterns. These traffic changes would generally be due to redistribution of existing traffic within the SBMR or PTA properties. No significant changes in traffic patterns or flows outside the SBMR or PTA properties are expected. Therefore, the traffic impacts on public roadways outside the Army installations property would be less than significant, and no mitigation is necessary.

No Impacts

Parking. No parking impacts are identified at the range construction sites.

5.2.7.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Under implementation of Alternative A, SBCT training would result in an increased number of Soldiers training at all ranges. Traffic would increase slightly because a larger number of Soldiers would use the existing and newly constructed live-fire ranges at SBMR and PTA; however, traffic impacts associated with intersection operations and roadway segments, and parking are expected to be less than significant. No mitigation is necessary.

5.2.7.4 Impacts from Maneuver Training

Less Than Significant Impacts

Under this alternative, maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, and the frequency of maneuver training at PTA is not expected to increase above existing levels. The Keamuku Parcel would be used for maneuver training as well, and would remain a nonlive-fire area. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency.

Vehicle convoys would move personnel and equipment between the Army installations for maneuver training. Approximately 1,005 vehicles would be used for convoys, an increase of 346 vehicles compared to current conditions. Stryker armored vehicles would be used for training. Soldiers would be transported to ranges for training by convoys of Stryker armored vehicles and trucks.

A convoy is normally defined as six or more military vehicles moving simultaneously from one point to another under a single commander, ten or more vehicles per hour going to the same destination over the same route, or any one vehicle requiring a special haul permit. Per command guidance, USAG-HI convoys normally maintain a gap of 15 to 30 minutes between serials (a group of military vehicles moving together), 330 feet between vehicles on highways, and 7.5 to 15 feet while in town traffic. Per state regulation, military convoys are not authorized movement on state highways during peak-hour conditions (between 6:00 AM and 8:30 AM and 3:00 PM and 6:00 PM, Monday through Friday). Movements on Saturday, Sunday, and holidays are by special request only.

Under implementation of Alternative A, the military vehicles would use existing Army protocols and BMPs to minimize impacts to public transportation conditions as follows:

- The maximum number of vehicle per convoy would be 24.
- Convoys would be sequenced at 15- to 30-minute intervals, so the maximum hourly volume would be 96 vehicles per hour.
- Convoys would be scheduled during non-peak traffic hours, thus reducing potential impacts on peak-hour traffic conditions.
- Convoy traffic would yield to public traffic at road crossings.

Traffic impacts were assessed based on volume increases and LOS, which is a measure of traffic conditions on a given lane or roadway. Six LOSs (LOS A through LOS F) are used to designate driving

conditions from best to worst, respectively. In general, LOS A represents free-flow conditions with no congestion, while LOS F represents severe congestion with stop-and-go conditions. The analysis assessed whether the traffic associated with Alternative A would exceed the capacity of on- and off-ramps, cause LOS at intersections and freeway mainline segments to deteriorate from LOS A through D to LOS E or F, cause LOS to deteriorate from LOS E to LOS F, or increase congestion at intersections currently operating at (or anticipated to operate at) LOS F. A worst-case LOS analysis was performed for the highways and crossings using the following assumptions:

- The maximum number of vehicles was used for calculations (four convoys of 24 vehicles each, sequenced at 15-minute intervals);
- The convoys would stop for traffic along the state highways, so an intersection would be controlled by two-way stop signs; and
- Although convoys would be scheduled for non-peak hours; to develop a worst-case LOS analysis, convoys were assumed to be scheduled during peak-hour conditions as described above.

Intersection Operations. Military vehicle convoys would cross public roadways. Convoys would yield to public traffic at road crossings to minimize impacts on traffic operations. Therefore, impacts to intersection operations associated with convoys would be less than significant.

Roadway Segment Operations. Under this alternative, military vehicle convoys would generate additional traffic on public roadways. Assuming worst-case conditions, the LOS for convoy traffic would be C or better (light congestion; occasional backups on critical approaches). Public roadway segment operations would continue to operate at acceptable levels (LOS C).

Roadway segment operations at SBMR and WAAF would continue to operate at acceptable levels under Alternative A including convoy activity between SBMR and Hickam Air Force Base. The Stryker vehicle is well within the design standards for these highways.

To serve as military vehicle trails, perpetual easements would be acquired for the Dillingham Trail and Helemano Trails, as well as an easement for Drum Road, also know as Kukuha Trail. These trails would typically be used for convoy transport. Dillingham Trail would connect SBMR and DMR. Helemano Trail would be used to access DMR and KTA. Military traffic that currently uses public roadways may be rerouted to the trails. Thus, current military traffic volumes along public roadways would not increase and could be lower during certain periods. All military vehicle trails would be signed and gated to prohibit public access, to prevent conflicts between military traffic and public traffic, and to avoid safety problems. However, trails would be made available for public use during state and national emergencies.

Until the trails are constructed, all military vehicles would continue to use public roads. Because the increase of military traffic on public roadways would be minimal, the LOS would not change. The identified impacts to roadway segment operations would be less than significant, and no mitigation would be necessary.

No impacts

Parking. No parking impacts are identified at DMR, KTA, KLOA, or PTA.

5.2.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Table 5-9 summarizes the potential impacts to socioeconomic resources, environmental justice, and the protection of children under implementation of Alternative A. Implementation of Alternative A would

have beneficial effects on population, employment, and income, resulting from new construction and the resultant increased expenditures that would stimulate the economy. These beneficial impacts would be less than significant because the changes would be within the capacity of the ROI to absorb. Permanent stationing of the 2/25th SBCT at SBMR would not increase the overall population of Soldiers, their families, or support personnel. Mitigation would be implemented to minimize impacts as summarized in the following subsections.

Table 5-9 Summary of Potential Impacts to Socioeconomics from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	N/A	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊙/ N/A	⊙
Impacts from Maneuver Training	○	○	○/ N/A	○

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Table 5-10 and **Table 5-11** contain the EIFS model results for Hawaii and Honolulu Counties. The RTV, as shown in the fourth column of the tables, indicates the thresholds used to assess significance of the magnitude of the economic values derived from the model. The RTV values are based on the largest historic changes (both increases and decreases) over a 25-year (or more) period. Changes in economic values (sales volume, income, employment, or population) which fall within the RTVs are not considered to be significant because these values are within the baseline range of historic fluctuations.

Table 5-10 EIFS Construction Model Output for Honolulu County

Indicator Variable	Project Change	Percent Change	RTV
Direct sales volume Induced sales volume Total sales volume	$96,496,660 $164,044,300 $260,541,000	1.87%	-3.17% to 5.33%
Direct income Induced income Total income	$39,197,690 $26,286,210 $65,483,900	0.29%	-2.73% to 5.37%
Direct employment Induced employment Total employment	1,506 1,183 2,690	0.47%	-2.02% to 3.28%
Local population Local off-base population	2,017	0.23%	-0.42% to 3.25%

Note:
These analyses indicate that the changes in sales volume (1.87 percent), income (0.29 percent), employment (0.47 percent), and population (0.23 percent) are well within the respective RTVs of 5.33 percent, 5.37 percent, 3.28 percent, and 3.25 percent.
Source: EIFS Model 2002

Table 5-11 EIFS Construction Model output for Hawaii County

Indicator Variable	Project Change	Percent Change	RTV
Direct sales volume Induced sales volume Total sales volume	$42,905,770 $66,074,890 $108,980,700	7.38%	-5.21% to 7.18%
Direct income Induced income Total income	$6,989,448 $10,763,750 $17,753,200	0.73%	-10.91% to 16.43%
Direct employment Induced employment Total employment	364 561 924	1.31%	-3.14% to 5.82%
Local population Local off-base population	0	0.00%	-4.57% to 9.72%

Note:
These analyses indicate that the changes in sales volume (7.38 percent), income (0.73 percent), employment (1.31 percent), and population (0.2 percent) are well within the respective RTVs of 7.18 percent, 16.43 percent, 5.82 percent, and 9.72 percent.
Source: EIFS Model 2002

5.2.8.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.8.2 Impacts from Range Construction

Less Than Significant Impacts

Environmental Justice. Under Alternative A, no minority or low-income residences would be displaced by range construction; however, noise and fugitive dust generated from project-related construction or training areas could have minor adverse indirect impacts on nearby schools or private residences. Increased noise and fugitive dust from construction would last only for the duration of the individual project and would be limited to daytime hours. Fugitive dust emissions at SBMR could affect low-income and minority populations in Wahiawa and Mililani Town; however, these impacts would be mitigated as described in the Air Quality Section of this document. Indirect impacts would be less than significant and would not disproportionately affect low-income or minority populations. Indirect impacts would be less than significant and would not disproportionately affect low-income or minority populations. No mitigation is required.

Protection of Children. Implementation of Alternative A would not result in any disproportionate endangerment of children on or near the ranges. Minor adverse indirect impacts on nearby schools or private residences would be similar to those described above. Construction would take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Strict adherence to applicable safety regulations and procedures would continue to protect the health and safety of children. No adverse impacts to the health and safety of children are expected.

No Impacts

Range construction would have no impacts on population, economy, employment, income, housing, or schools. No range construction would occur on DMR or KLOA; therefore, impact analysis is not applicable.

5.2.8.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Environmental Justice. No minority or low-income residences would be displaced by training modifications. However, noise and fugitive dust generated from project-related construction or training areas could have less than significant adverse indirect impacts on nearby schools or private residences. Increased noise and fugitive dust would be limited to daytime hours. Long-term noise impacts would result from increased training, but training is currently occurring at the installations. Fugitive dust emissions at SBMR could affect low-income and minority populations in Wahiawa and Mililani Town; however, these impacts would be mitigated, if necessary, as described in the Air Quality section of this document. Indirect impacts would be less than significant and would not disproportionately affect low-income or minority populations.

Protection of Children. No disproportionate endangerment of children would occur on or near the installations. Alternative A would result in some less than significant short-term adverse indirect effects on nearby schools or residences. Increased noise and fugitive dust associated with live-fire training activities would be temporary, and no adverse impacts to the health and safety of children are expected.

No Impacts

Live-fire training would have no impacts on population, economy, employment, income, housing, or schools.

No live-fire training would occur on DNR; therefore, impact analysis is not applicable.

5.2.8.4 Impacts from Maneuver Training

No Impacts

Maneuver training would have no impacts on population, economy, employment, income, housing, or schools. Long-term noise impacts would result from increased training, but training is currently occurring at the installations.

5.2.9 HUMAN HEALTH AND SAFETY HAZARDS

Table 5-12 summarizes the potential human health and safety impacts under implementation of Alternative A. Under implementation of this alternative, there would be no significant and immitigable impacts associated to human health and safety. Significant but mitigable impacts would be associated with the use of additional ammunition and UXO generation during live-fire training, and potential construction disturbances to ongoing remediation at IRP sites, the use of hazardous materials or generation of hazardous wastes during construction, and increased fuel usage during SBCT maneuver training. The Army follows strict SOPs for storing and using hazardous materials; therefore, no new procedures would need to be implemented to store or use the construction-related or operation-related hazardous materials. The regulatory and administrative requirements that would be implemented to minimize impacts to human health and safety are summarized in the following subsections.

Table 5-12 Summary of Potential Hazardous Material and Hazardous Waste Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊘	N/A	N/A	⊘
Impacts from Live-Fire Training	⊘	N/A	⊘/ N/A	⊘
Impacts from Maneuver Training	⊙	⊙	⊙/ N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.2.9.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.9.2 Impacts from Range Construction

Significant But Mitigable To Less Than Significant

Impact 1: Unexploded Ordnance. UXO could affect the construction of the proposed ranges on SBMR and PTA. Construction would involve moving soils that could be contaminated with UXO from prior activities in the range ordnance impact area. Construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from this project. Although UXO presents a significant impact, USAG-HI would follow proper abatement techniques, which would reduce this impact to acceptable. In addition to these mitigation measures, the Army would continue to educate Soldiers on how to identify UXO and the proper safety procedures for handling UXO. With continued implementation of standard Army regulatory and administrative requirements, impacts associated with UXO are expected to be less than significant.

Regulatory and Administrative Mitigation 1: Before the start of any construction activities, the Army would employ qualified personnel to conduct a UXO survey of the proposed construction area. If the risk of encountering UXO is low, then UXO construction support would be used. If the risk of encountering UXO is high, then UXO clearance would be performed to ensure the safety of the site. The Army would document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. The Army would perform UXO clearance activities if rounds are fired outside of designated impact areas or present an immediate threat to human health or safety. Continued implementation of standard Army regulatory and administrative requirements, would reduce this impact to less than significant.

Impact 2: Lead. Range construction could potentially expose workers to lead.

Regulatory and Administrative Mitigation 2: At the training ranges, berms would be used to stop projectiles fired at the ranges that are expected to contain significant quantities of lead and potentially UXO. The Army would retain lead-contaminated soils from existing berms on-site and use the soils in the

construction of new berms associated with the new ranges. If lead-contaminated soils were not reused at the site for new berm construction, contaminated soils would be remediated for lead in accordance with applicable federal and state standards.

Less Than Significant Impacts

Hazardous Materials and Wastes Use and Management. Hazardous materials and wastes associated with range construction would be similar to those previously described for cantonment construction. With continued implementation of regulatory and administrative mitigation, impacts to human health and safety are expected to be less than significant. No range construction would occur on DMR or KLOA; therefore, impact analysis is not applicable.

5.2.9.3 Impacts from Live-Fire Training

Significant But Mitigable To Less Than Significant

Impact 3: Ammunition use, storage, and wastes. Under implementation of this alternative, additional live-fire training would occur as a result of an increased number of Soldiers training at both the existing and new ranges. In addition, new weapons would be used at the BAX ranges at SBMR and PTA and the use of large caliper munitions would increase. SBCT training would result in an increased number of Soldier training at all ranges, thus increasing the number of rounds fired.

Ammunition use would increase compared to existing conditions. The quantity of ammunition rounds fired during Army training on all Army training ranges would increase from 16 million to 20 million rounds per year, primarily consisting of small arms munitions. The 105mm cannon on the Stryker MGS and the 120mm mortar are the only new weapons that would be introduced to training. These weapons would be used at ranges on SBMR and PTA.

The ammunition would be maintained and managed by the administration in accordance with federal and USAG-HI protocol, therefore creating no additional significant impact. Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations; therefore, the increase in ammunition and ordnance is expected to result in less than significant impacts.

When Soldiers train at the ranges, safety protocol must be followed in order to protect the public from injury or accidents. SDZs are set up in accordance with Army Pamphlet 385-64, Ammunition and Explosive Safety Standards. In addition, in order to prevent conflict with recreational activities in areas near the training ranges, land use restrictions are set up to limit access to the areas during range training times. SDZs are included in the design configuration for the proposed ranges at SBMR, KTA, and PTA.

Additionally, similar safety protocol must be implemented to protect Army personnel during range training. Soldiers and officers are given safety manuals with a complete discussion of safety procedures while training. In addition, before training, soldiers are briefed on range-specific safety measures that may be necessary during the special exercise. Finally, Soldiers and officers are provided with field manuals for each specific operation and exercise that give more detailed procedures and protocol to be followed in order to prevent accidents.

Regulatory and Administrative Mitigation 3: All government personnel or government contractors accessing impact areas would continue to follow OSHA and Army standards and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The general public would be allowed in or near impact areas only at times and in group sizes approved by USAG-HI Command.

Army-trained and -certified personnel would escort the general public at all times. Access is limited to only those areas deemed safe by USAG-HI Range Control. No live-fire training would occur on DMR; therefore, impact analysis is not applicable.

5.2.9.4 Impacts from Maneuver Training

Significant But Mitigable To Less Than Significant Impacts

Impact 4: Unexploded Ordnance. Training as projected under this alternative would lead to a proportionate increase in UXO and could also result in an increase in the spread of lead wastes on the range within live-fire impact zones. Maneuver training would be conducted at PTA in the same training area locations as are presently used, excluding the 1,500-acre MPRC area, at the company level. Although no live-fire training would be conducted in this area to introduce new UXO, the existing presence of UXO is suspected. In addition, the Keamuku Parcel is part of the former Waikoloa Maneuver Area, which is a FUDS and supported live-fire training in the past; however, a risk-based analysis assessed this area as having a low probability of UXO exposure.

Although UXO presents a significant impact, USAG-HI would follow proper abatement techniques, which would reduce this impact to acceptable. In addition to these mitigation measures, the Army would continue to educate Soldiers on how to identify UXO and the proper safety procedures for handling UXO.

Regulatory and Administrative Mitigation 4: As previously described for range construction, the Army would employ qualified personnel to conduct a UXO survey of the proposed maneuver areas. With continued implementation of standard Army SOPs, impacts associated with UXO are expected to be less than significant. The proposed mitigation measures would reduce the significant impacts to moderate. No additional mitigation is proposed.

Less Than Significant Impacts

General Training. There would be less than significant impacts associated with maneuver training at SBMR, DMR, KTA, and PTA. SBCT actions relevant to this type of activity include military training on training lands outside of developed areas, e.g., the cantonment area. Such training would include non live-fire, mounted maneuver training (using vehicles such as the Stryker and high-mobility multiple wheeled vehicle [HMMWV]), and other non live-fire dismounted (foot traffic) military training. Most of the non live-fire training by SBCT forces would be similar to that currently being conducted by light infantry brigades.

Petroleum, Oils, and Lubricants. As a result of an elevated level of training, increased fuel storage and use would be encountered at SBMR and PTA. Following the establishment of Helemano Trail, Dillingham Trail, and Drum Road, units would transport materials and equipment on these improved routes. Additionally, the military vehicle trail between Kawaihae Harbor and PTA would be improved and extended to provide off-highway transport of vehicles, personnel, and equipment. Transportation of personnel and use of flammable or combustible materials, such as fuel or ordnance (i.e., weaponry or equipment), could increase the potential for spills or releases of hazardous materials, especially in areas not previously used frequently. Best management practices would be practiced at each of these proposed facilities, and project area personnel would follow USEPA and USAG-HI protocol for using and handling hazardous materials, such as POLs. Each facility maintains strict SOPs and spill contingency plans for hazardous materials and waste, identifying specific operating responsibilities and procedures.

Pesticides/Herbicides. Pesticides would be used at SRAA and PTA/Keamuku Parcel. Although Alternative A would generate a slight increase in the amount of pesticides used on these installations in

order to maintain the proposed ranges, pest management would continue to be managed by DPW in accordance with the USAG-HI IPMP, and pesticides would continue to be stored at the Pest Control Shop on SBMR and the Environmental Shop on PTA. This impact is considered less than significant.

5.2.10 BIOLOGICAL RESOURCES

Table 5-13 lists the types of impacts on biological resources that would occur, including impacts to wetlands, vegetation, noxious weeds, threatened and endangered species, habitats, and general wildlife. No wetlands have been identified at KTA or PTA. A wetland delineation of DMR identified one jurisdictional wetland (USACE 2002c). This wetland is within DMR but outside of the area that would be used for range construction and live-fire and maneuver training. There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID[L] 2001a), but they are not expected to be impacted by 2/25th SBCT activities.

Table 5-13 Summary of Potential Biological Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Wetlands				
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	○	N/A	N/A	○
Impacts from Live-Fire Training	○	N/A	○	○
Impacts from Maneuver Training	○	○	○	○
Vegetation				
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	N/A	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊙	⊙
Impacts from Maneuver Training	⊙	⊙	⊙	⊙
Noxious Weeds				
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊘	N/A	N/A	⊘
Impacts from Live-Fire Training	⊘	N/A	⊘	⊘
Impacts from Maneuver Training	⊘	⊘	⊘	⊘
Threatened and Endangered Species				
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊘	N/A	N/A	⊗
Impacts from Live-Fire Training	⊘	N/A	⊘/ N/A	⊗
Impacts from Maneuver Training	⊘	⊘	⊘/ N/A	⊗
General Wildlife and Habitats				
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	N/A	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊙	⊙
Impacts from Maneuver Training	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Impacts from range construction, live-fire training, and maneuver training would occur primarily in areas that have been previously disturbed. The majority of the impacted areas are nonnative vegetation and common native plants, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. Impacts to general vegetation and habitats would be less than significant.

Impacts from all activity groups would be expected to affect the introduction and spread of invasive species through movement of troops and equipment, construction, and fires. Impacts from noxious weeds would be significant, but mitigable to less than significant.

Construction and training would impact threatened and endangered species and their habitats. Given training levels would not dramatically increase and the majority of impacts would be in disturbed or existing training areas, impacts are mitigable to less than significant.

General wildlife and habitats would be affected by range construction and training activities. Impacts would primarily be in previously disturbed areas, and limited intact, native habitats would be affected. Overall, impacts to general wildlife and habitats would be less than significant.

Mitigation measures, planning considerations, and BMPs contained in the INRMP, IWFMP, Biological Opinions, Draft Oahu and PTA Implementation Plans, and other guidance documents would avoid impacts to biological resources of concern. Where impacts cannot be avoided, they would be reduced to a less than significant level.

5.2.10.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.10.2 Impacts from Range Construction

Significant Impacts

Impact 1: Impacts to Threatened and Endangered Species: The Proposed Action would result in short- and long-term impacts on listed species and their designated critical habitat within the PTA ROI as a result of construction and increases and changes to training. Within the ROI one wildlife species, the palila, has critical habitat. Proposed activities border on the palila designated critical habitat in the ROI. There are 2,569 acres of palila critical habitat within the ROI. The Army is responsible for maintaining this habitat in a condition suitable for the palila and, by doing so, contribute to the recovery of the species.

Construction activity and increased training would have adverse impacts on the habitat, deterring the recovery of the species. BAX construction will affect the easternmost population of honohono (*Haplostachys haplostachya*), significantly reducing the distribution of this species. Populations of *Silene hawaiiensis* (No Common Name) are known from the footprints of the BAX, and up to 20 percent of the total number of existing plants of this species could be adversely affected by construction. One individual representing less than one percent of the total population of ae (*Zanthoxylum hawaiiense*) occurs in the BAX project area and would likely be affected by construction. Mitigation measures would minimize impacts to threatened and endangered species and their habitats, but not to a less than significant level.

Regulatory and Administrative Mitigation 1: In 2003, the Army initiated a formal consultation with the USFWS by issuing a Biological Assessment (BA) for SBMR, KTA, KLOA, SBER, SRAA, and DMR. The USFWS responded with no jeopardy BO for current force activities on the islands of Oahu and Hawaii under the condition that the listed species, that have less than three stable populations and/or more than 50 percent of known individuals occur within the action area, be stabilized. The consultation used an

action area that encompasses all land potentially affected by military training and thus includes land outside the installation boundaries.

The Draft OIP (USAG-HI 2005a) was developed to monitor and protect listed species identified in the BO. The OIP guides the Army in the ongoing conservation and stabilization efforts for 23 endangered plant taxa, 4 endangered snail species, and one avian species potentially affected by military training at any of the Army training installations on Oahu (except Makua). This effort will result in 69 plant, 24 snail and multiple elepaio populations. The OIP identifies additional management actions, beyond those already used by the Army, needed to stabilize these target taxa. If at any time there is a change in the training areas or action areas, if there is a change in the species status, or the discovery of additional taxa the Army would be required to reinitiate consultation with the USFWS in order to avoid a jeopardy opinion under Section 7 of the Endangered Species Act. An Implementation Plan for PTA and the Keamuku Parcel is currently in development and will be structured with the same approach to species protection as is taken in the OIP.

All species management in regards to impacts would be followed as described the Oahu and Hawaii Biological Opinions (USFWS 2003a, USFWS 2003b). Example mitigation measures that would be implemented by the Army at potential impact sites include:

- Enclosure fencing of sensitive plant species to eliminate impacts from human disturbance and ungulates.
- Development and implementation of a fire fuel reduction plan.
- Development and implementation of an alien rat control plan to protect sensitive species.
- Expand monitoring programs in potential areas of impact for sensitive species.
- Establish signage to identify areas that are off limits due to the presence of federally listed species.
- Provide education for each set of new Soldiers regarding the importance of avoiding listed species and disturbance to their habitats.

Significant Impacts Mitigable To Less Than Significant

Impact 2: Introduction and spread of invasive plants and noxious weeds. In general, invasive plant species pose a threat to Native Hawaiian ecosystems. Movement of equipment into Hawaii from continental U.S. or foreign ports, as well as from other islands or subinstallations within Hawaii, would increase the likelihood of nonnative plant and animal introductions. Construction can also introduce invasive species and other weeds through the use of sand and gravel that contains nonnative plant seeds. Impacts from noxious weeds from range and trail construction would be significant, but mitigable to less than significant.

The use of roads and trails would also affect the introduction and spread of invasive species. The use of Helemano Trail would introduce more invasive species to the area. This would have a minor indirect impact on sensitive species because the area where the trail is proposed is largely made up of agricultural lands and dirt roads. A long-term increase in the use of Helemano Trail is associated with Alternative A. This includes increasing Stryker and conventional truck traffic on the proposed road. There would be an increase in the number of conventional Army trucks (trucks and HMMWVs) and Strykers used on roads to and from SBMR, WAAF, and the Helemano Trail. Strykers would travel on the roads and trail, 12 times per year, with most traffic concentrated on the new trail.

The use of Dillingham Trail would likely introduce more invasive species to the area, which would have both short-term and long-term impacts on sensitive plants and wildlife. Activities associated with Dillingham Trail and activities along this trail could facilitate the spread of invasive species into the native wiliwili forest and the adjacent rare Lonomea forest. The Lonomea forest supports sensitive species *Schiedea kealiae* (a federally listed plant), ahakea, and kokio. Long-term elevated use of Dillingham Trail could lead to long-term increases in the spread of invasive species at DMR and habitats along Dillingham Trail. There would be an increase of conventional trucks and Strykers on the roads to DMR and Dillingham trail. This would increase the likelihood of a fire in the ROI. Invasive species often benefit from fires, due to their ability to colonize areas following a burn. Also, the presence of invasive species often provides fuel for wildfires, makes fires larger, and facilitates the spread of fire.

The use of Drum Road would introduce more invasive species to the area, which would have both a short-term and long-term impact on sensitive plants. A long-term increase in the use of Drum Road is associated with this alternative. This includes increasing Stryker and conventional truck traffic (trucks and HMMWVs) on the proposed road. Strykers would travel on either trails or roads, from SBMR to KTA 12 times per year. Most of the travel would be on trails, but Drum Road would carry 10 percent of all Stryker travel and 40 percent of all trucks between these two bases. There would be a net increase of 195 vehicles traveling on roads and trails between SBMR and KTA, four times per year, and 235 vehicles eight times per year. Increases in the number of vehicles that would traverse Drum Road increase the likelihood that invasive plants would be introduced or spread.

Although most of the plant species in and around the proposed Drum Road are nonnative, the area could be further disturbed than it already is and would adversely affect the recovery of sensitive species. Sensitive plant species and sensitive wildlife species are likely to occur on KTA/KLOA. Manuka and heirba del solado are nonnative plants that have recently been discovered in the ROI. Satinleaf (*Chrysophyllum oliviforme*) has not yet established on KTA/KLOA. The habitat degradation associated with the construction projects could lead to these very aggressive species becoming established throughout the project area.

Discrete quantities of sensitive native plant species that are especially threatened by nonnative species' invasion include the following:

- Ninety-five percent of the remaining nioi plants exist on KTA/KLOA ROI. There is a high threat to these plants from invasive species invasions associated with the proposed activities.
- Twelve individuals of the native gardenia nanu exist on KTA/KLOA ROI. There is a moderate threat to these plants from invasive species associated with the proposed activities.
- Two to five percent of the remaining oheohe plants exist on KTA/KLOA ROI. There is a low to moderate threat to these plants from invasive species associated with the proposed activities.
- There are several sensitive wildlife species that could be affected by the spread of invasive species: *Achatinella curta, A. livida, A. pulcherrima, A. sowerbyana, Aurculella pulchra,* Oahu elepaio, and the iiwi. These species would be adversely affected by the introduction or increase in the spread of invasive species on KTA/KLOA.

Regulatory and Administrative Mitigation 2: The impact of SBCT actions on the spread of invasive species would be lessened by instituting the Army's ongoing environmental programs. Measures identified in the Ecosystem Management Plan Report, Oahu Training Areas (R. M. Towill Corp. 1998), the Oahu Training Areas INRMP (USARHAW and 25th ID[L] 2001a), the Biological Opinions for the Island of Oahu and PTA, and the Transformation EIS (USFWS 2003c, USFWS 1981, and USFWS 2003d, respectively), and the DRAFT Implementation Plan for Oahu Training Areas (USARHAW

2005b) for protection of biological resources would continue as part of the proposed SBCT project actions.

USAG-HI will follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines federal agency duties with regard to preventing and compensating for invasive species impacts. USAG-HI will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. The implementation of an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities. Mitigation for Impacts from noxious weeds related to Construction and Training, as required in the terms and conditions of the BO (USFWS 2003c), include:

- Educating soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment, and field gear.
- Educating contractors and their employees about the need to wear weed-free clothes and maintaining weed-free vehicles when coming onto the construction site and avoiding introducing nonnative species to the project site.
- Preparing a one-page insert to construction contract bids informing potential bidders of the requirement.
- Inspecting and washing all military vehicles at wash rack facilities prior to leaving SBMR, KTA/KLOA, or PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations.

Additional Mitigation 2: The Army would prevent any weeds brought in from becoming established by rigorously monitoring using transects and roadside surveys and eradicating new weeds using most effective means known specific to each of the invasive species.

- The Army would provide education regarding cleaning vehicles and field gear (these education materials will be Service approved).
- The Army would wash vehicles in wash rack facilities prior to returning from the training areas, to minimize weeds (e.g., fountain grass).
- Persons and equipment coming from foreign countries must go through U. S. Department of Agriculture and U.S. Customs inspections before coming into the United States.
- The Army would train and require soldiers to clean their gear and vehicles when first arriving in Hawaii and prior to moving from installation to installation, as well as when moving from island to island.

Impact 3: Impacts to Threatened and Endangered Species: Construction of a BAX at SBMR would temporarily increase human presence and activity at construction sites. The new ranges are proposed in areas that are currently disturbed lands or active ranges, so the potential to impact a listed species is low. No SBCT-specific range construction would be necessary at DMR, KTA, or KLOA; therefore, impact analysis is not applicable. Mitigation would decrease the potential for impacts to sensitive species and their habitats during construction activities to a less than significant level.

Regulatory and Administrative Mitigation 3: All species management in regards to impacts would be followed as described the Oahu and Hawaii Biological Opinions (USFWS 2003a, USFWS 2003b). Additional mitigation measures that would be implemented by the Army are discussed in Range Construction above.

Less Than Significant Impacts

Impacts to vegetation: Range construction at SBMR and PTA would occur. Habitats within the SBMR are, for the most part, disturbed natural and introduced landscapes. Activities in this area would mostly affect nonnative species adapted to stressed or nonnative environments. Construction of the proposed ranges collectively would directly affect approximately 48 acres; however, the majority of the area planned for the new ranges is existing disturbed ranges, so impacts to native vegetation are expected to be negligible. Vegetation within the proposed footprints of these projects, which primarily includes nonnative grasses, shrubs, and pineapple fields, would be removed. Following construction of the proposed ranges, the Army would seed disturbed areas with native or noninvasive vegetation.

Nonnative vegetation communities and barren lava prevail in the areas of proposed construction at PTA. As mentioned in the affected environment section, these communities are all affected by fountain grass, which can rapidly invade a disturbed community. Impacts in these areas would include trampling and disturbance from vehicles and military personnel.

Impacts to vegetation from range construction would be less than significant. Measures to reduce impacts to vegetation further from range construction are the same as those described previously under Impacts from Cantonment Construction.

Impacts to general wildlife and habitats. Range construction projects at SBMR and PTA are proposed for areas that are currently disturbed lands or active ranges. Impacts to native vegetation and habitats are expected to be negligible. Human presence and elevated noise levels would displace various wildlife species during construction. However, impacts from range construction to wildlife would not be different than the impacts from normal operations and activities occurring in the anticipated construction footprints. Increased noise as a result of construction is not expected to affect terrestrial wildlife because field surveys have shown that it is not a significant factor in behavior and does not affect reproductive success (U.S. Army Engineering District Honolulu 2000). Impacts to general wildlife and habitats from range construction would be less than significant, and no mitigation is necessary. Measures to reduce impacts from range construction further are the same as those described previously under Impacts from Cantonment Construction.

No Impact

Impacts to wetlands: No wetlands have been identified at PTA. There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID [L] 2001a), but they are not expected to be impacted by range construction. No impacts to wetlands are expected from range construction. No SBCT-specific range construction would be necessary at DMR, KTA, or KLOA; therefore, impact analysis is Not Applicable. SOPs and BMPs designed to minimize impacts to wetlands through stormwater and erosion control would be followed (see Section 5.2.2 Soil Erosion and 5.2.3 Water Resources).

5.2.10.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 4: Introduction and spread of invasive plants and noxious weeds. In general, invasive plant species pose a threat to Native Hawaiian ecosystems. The proposed impacts from live-fire training at SBMR, PTA, and KTA would be expected to affect the introduction and spread of invasive species by potential fires that would put native plant species at competitive disadvantage. The potential introduction of fire resulting from the operation of the proposed ranges is discussed under Section 5.2.4 Wildfire Management.

Regulatory and Administrative Mitigation 4: Impacts from noxious weeds resulting from live-fire training under Alternative A would be significant, but mitigable to less than significant. Mitigation measures for effects to noxious weeds from range construction are the same as those described previously under Impacts from Cantonment Construction. Additional mitigation measures to reduce the risk of and impact from wildfires are presented in Section 5.2.4 Wildfire Management.

Impact 5: Impacts to Threatened and Endangered Species: The addition of a BAX range at both SBMR and PTA would increase the use of larger caliber munitions. The BAX at PTA would be located in a previously disturbed site and oriented towards pre-existing ordnance impact areas. As a result, both live- and non live-fire training would increase, resulting in the potential to increase the frequency of wildfires, which could impact special status species. Impacts from construction of ranges are presented above. Once constructed, operation of the new ranges is not expected to create immitigable impacts. Impacts from increased wildfire risk from live-fire training are presented in Section 5.2.4. At KTA, non live-fire and live-fire training using SRTA, which has the potential to ignite wildfires, but fire risk and impacts to special status species would be mitigated to less than significant. An increased in noise, car fumes, and activity form live-fire training could impact special status species.

Regulatory and Administrative Mitigation 5: All species management in regards to impacts would be followed as described the Oahu and Hawaii Biological Opinions (USFWS 2003c and USFWS 2003d). Additional mitigation measures that would be implemented by the Army are discussed in Range Construction above.

Less Than Significant Impacts

Impacts to vegetation: Vegetation communities within the proposed range areas on SBMR, PTA and KTA would be disturbed by live-fire training. The BAX at PTA would be located in a previously disturbed site and oriented towards pre-existing ordnance impact areas. SBCT training would increase the number of soldiers training at all ranges. The majority of the training areas are nonnative vegetation and common native plants, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. The use of certain types of ammunition increases the chances of starting fires in the impact area and within the surface danger zones. The potential introduction of fire resulting from the operation of the proposed ranges is discussed under Wildfire Management. Impacts to vegetation from live-fire training would be less than significant.

Measures to reduce impacts to vegetation further from range construction are the same as those described previously under Impacts from Cantonment Construction.

Impacts to general wildlife and habitats. Operation of ranges has the potential to displace various wildlife species. Displacement would be caused by increased human presence in the area, as well as by elevated noise levels. Wildlife within the impact area and associated surface danger zones could be directly affected by ordnance or other munitions. SBCT use of new ranges at SBMR and PTA would not significantly impact wildlife or their habitats because the new ranges would be constructed in disturbed areas or in the footprints of existing ranges. Wildlife species in or around these ranges are more tolerant of human activity, and it is assumed that more sensitive species have previously left the area. Higher training levels at existing ranges would increase incidental mortality to wildlife could occur. However, such mortality would not cause measurable impacts to wildlife populations. SBCT training on the new and existing ranges would have a less than significant impact to wildlife and habitats. Measures to reduce impacts from range construction further are the same as those described previously under Impacts from Cantonment Construction.

No Impact

Impacts to wetlands: No wetlands have been identified at KTA or PTA. There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID [L] 2001a), but they are not expected to be impacted by live-fire training. No impacts to wetlands are expected from live-fire training. No mitigation is necessary for wetland impacts from live-fire training. SOPs and BMPs designed to minimize impacts to wetlands through stormwater and erosion control would be followed (see Section 5.2.2 Soil Erosion and 5.2.3 Water Resources).

5.2.10.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 6: Introduction and spread of invasive plants and noxious weeds. Military activities increase the threat of spreading noxious weeds through training and increased use of roads and trails. Maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, and the frequency of maneuver training at PTA is not expected to increase above existing levels. The Keamuku Parcel would be used for maneuver training as well, and would remain a nonlive-fire area. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency. However, SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently. Additionally, roads and trails, including Helemano Trail, Dillingham Trail, and Drum Road, would be improved and use would increase. Maneuver training under Alternative A would be expected to affect the introduction and spread of invasive species at SBMR, DMR, KTA, and PTA in the following ways:

- Movement of troops and equipment across the landscape would increase the likelihood of nonnative plant introductions;
- Disturbance of native vegetation creates an open ecological niche that nonnative plants can invade;
- Fires would put native plant species at competitive disadvantage.

Regulatory and Administrative Mitigation 6: Impacts from noxious weeds from maneuver training would be significant, but mitigable to less than significant. Mitigation measures for effects to noxious weeds from range construction are the same as those described previously under Impacts from Cantonment Construction.

Impact 7: Impacts to Threatened and Endangered Species: Following the establishment of Helemano Trail, Dillingham Trail, and Drum Road, units would transport materials and equipment on these improved routes. Additionally, the military vehicle trail between Kawaihae Harbor and PTA would be improved and extended to provide off-highway transport of vehicles, personnel, and equipment. This would result in direct and indirect effects on listed species and their critical habitat by potentially causing the take of federally listed species and the degradation of critical habitat. A wildfire could damage special status plant and wildlife communities. The presence of large, loud vehicles would limit wildlife migration and would interrupt corridors for natural dispersal of species among these areas. Dust, soil erosion, and runoff would continue to affect the areas that surround the road adversely, including valuable freshwater resources. The loss in habitat value occurs primarily in those areas surrounding the trails that are exposed to increased noise, car fumes, general activity, and invasive species, and areas downstream that are subject to runoff and erosion problems.

Regulatory and Administrative Mitigation 7: All species management in regards to impacts would be followed as described the Oahu and Hawaii Biological Opinions (USFWS 2003c and USFWS 2003d). Additional mitigation measures that would be implemented by the Army are discussed in Mitigation 2 above.

Less Than Significant Impacts

Impacts to vegetation: Maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, but the frequency of maneuver training at PTA is not expected to increase above existing levels. The Keamuku Parcel would be used for maneuver training as well. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency.

General SBCT training would occur on established roads or trails, as well as areas designated for maneuver training throughout the installations. Vegetation resources would not be expected to be affected by maneuvers on existing roads and trails. Off-road mounted maneuvers would occur where they are already existing and on 1,300 new acres on SRAA, 3,384 new acres on KTA, and 23,000 new acres on Keamuku Parcel. Due to the weight of the Stryker vehicle, vegetation in areas where the Stryker performs off-road maneuvers likely would be crushed or flattened along tire paths.

Stryker maneuvers would generally occur in non-forested areas at PTA and Keamuku Parcel that contain nonnative vegetation communities. Vegetation that would be impacted on SBER and KTA is also primarily nonnative. The net conversion of the highly disturbed pineapple fields to fallow land with mounted maneuvers on the roadways would not amount to a significant loss of vegetation. Nonnative plants generally have a negative influence on the success of native plants and wildlife. For this reason, a loss to nonnative species is not considered significant. There are areas with high concentrations of native species that will be avoided. Off-road vehicle maneuvers would only be allowed in areas of less than 30 percent slope on KTA.

Maneuver training is expected to have a less than significant impact on vegetation under Alternative A. The majority of the training areas are nonnative vegetation and common native plants, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. Measures to reduce impacts to vegetation from maneuver training are the same as those described previously under Impacts from Cantonment Construction.

Impacts to general wildlife and habitats. Due to the weight of the Stryker vehicle, vegetation in areas where the Stryker performs off-road maneuvers likely would be crushed or flattened along tire paths. Off-road mounted maneuvers would occur throughout the western portion of SBER. Wildlife and vegetation found in this highly disturbed area is primarily nonnative. Ground-dwelling wildlife and vegetation would be adversely impacted as a result of the maneuvers. Road-restricted mounted maneuvers would occur at the SRAA. Conversion of the highly disturbed pineapple fields to fallow land with mounted maneuvers on the roadways would not significantly impact general wildlife or vegetation.

At DMR, maneuver training would occur on established roads or trails, as well as areas currently designated for maneuver training throughout the installation, and would not affect native habitats. The natural communities within the boundary of DMR are two types of lowland dry communities that are on the cliff slopes at the southern end of the training area. These areas would not be used for maneuver training and therefore would not be affected by the use of the Stryker vehicle. The construction of Dillingham Trail would not fragment any natural vegetation communities. The trail is located in areas of agricultural use, and the vegetation that surrounds these areas is primarily nonnative species with some common natives. Wildlife species in or around these areas are more tolerant of human activity, and it is

assumed that more sensitive species have previously left the area. No effects from potential runoff are expected for marine wildlife resources or coral. No increase in runoff as a result of SBCT activities is expected. DMR is on the leeward side of the island, so storm runoff is minimal.

The slopes at KTA are steep, and training activities are generally limited by the topography to dismounted maneuvers and vehicle travel on established roads. Vegetative regrowth is fairly rapid. The majority of the training area is nonnative vegetation and common native plants, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. Off-road vehicle maneuvers would be allowed in areas of less than 30 percent slope and would be expected to result in adverse impacts on wildlife and habitats. No SBCT maneuver training would occur at KLOA.

At SBMR, KTA, and PTA, training would also occur in areas that have not been previously used for off-road maneuver training. Impacts from trampling and an associated reduction in vegetative groundcover would result in loss and degradation of habitat for general vegetation, wildlife, and habitat, primarily in areas of nonnative vegetation. Habitats and wildlife would be impacts by removing vegetation, deterring wildlife from foraging, and promulgating other general degradation effects that would result from elevated human activity, but not to a significant degree. Habitats that would be impacted on SBMR and KTA are dominated primarily by nonnative vegetation. Nonnative vegetation communities and barren lava prevail at PTA.

On all maneuver areas, new or existing, wildlife that does not vacate areas being used for maneuver could sustain injuries. The most likely species to be affected by off-road maneuvers would be ground-nesting birds or small mammals.

UAVs would be flown over portions of KTA, KLOA, and PTA already allowing aircraft and would follow AR 95-1, Aviation Flight Regulations, which restrict elevation of UAVs about Noise Sensitive Areas to a minimum of 2,000 feet unless mission essential. This would limit the effect of UAVs on sensitive biological resources during normal operation.

The increase from 60 to 66 LSV trips a year is minor. It has been shown that marine wildlife can react adversely to the introduction of loud low-frequency sounds in their habitat (Richardson et al. 1995). Assuming that low frequency or mid-range sonars are not used from LSVs, impacts from vessel transit is expected to be minor and not significant. These emissions typically occur off of vessels engaged in defense training maneuvers, not transport. Theater Support Vessels (TSVs) are not in use at this time; however, they may be used in the future. When and if that occurs, separate NEPA documentation will be done to address impacts from TSV use to marine wildlife. There is a minimal chance of ship strikes (direct hits on marine mammals) with LSVs or barges, but these are considered to be minimal due to the slow speed of the vessels. Less than significant impacts on marine wildlife are expected from vessel transport between Oahu and the island of Hawaii.

Measures to reduce impacts from maneuver training further are the same as those described previously under Impacts from Range Construction.

No Impact

Impacts to wetlands: Maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, but the frequency of maneuver training at PTA is not expected to increase above existing levels. The Keamuku Parcel would be used for maneuver training as well. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency.

A wetland delineation of DMR identified one jurisdictional wetland (USACE 2002c). This perched wetland is within DMR but outside of the area that will be used for maneuver training. An additional wetland area was also investigated at DMR. Based on an evaluation by the U.S. Army Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, the wetland area was determined to be non-jurisdictional and not regulated under Section 404 of the Clean Water Act. Therefore, no impacts to wetlands are expected at DMR from maneuver training under Alternative A.

No wetlands have been identified at KTA or PTA. There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID [L] 2001a), but they are not expected to be impacted by maneuver training. No impacts to wetlands under Alternative A would occur at KTA, PTA, or SBMR from maneuver training. No mitigation is necessary for wetland impacts from maneuver training. SOPs and BMPs designed to minimize impacts to wetlands through stormwater and erosion control would be followed (see Section 5.2.2 Soil Erosion and 5.2.3 Water Resources).

5.2.11 AIR QUALITY

Table 5-14 lists the types of impacts associated with air quality that would occur under Alternative A. The impact from range construction would be mitigable to less than significant. Live-fire training would be significant but mitigable to less than significant. The level of impact from maneuver training would be less than significant with mitigation with the exception of PM10 emissions generated from wind erosion at Keamuku Parcel, which the Army considers to be a significant impact under Alternative A.

Table 5-14 Summary of Potential Impacts to Air Quality from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊘	⊘	N/A	⊘
Impacts from Live-Fire Training	⊙	N/A	⊙	⊙
Impacts from Maneuver Training	⊘	⊘	⊘ / N/A	⊘

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.2.11.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.11.2 Impacts from Range Construction

Significant Impacts Mitigable To Less Than Significant

Impact 1: Fugitive dust from construction activities. Construction of a BAX at SBMR and PTA and trail construction at DMR would temporarily increase fugitive emissions from activities at construction sites. Construction contractors would comply with the provisions of Hawaii Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of construction contracts. Consequently, impact from range construction at SBMR and PTA would be significant but mitigable to less than significant.

Regulatory and Administrative Mitigation 1: The Army would develop and implement a Dust and Soils Mitigation Monitoring Plan (DuSMMoP) for the training affected areas. The plan would address measures such as, but not limited to, restrictions on the timing or type of training during high-risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan would determine how training would occur in order to minimize fugitive dust emissions below CAA standards for PM_{10} and soil erosion and compaction. The Army would monitor the effects of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan would also define contingency measures to mitigate the effects of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

Less Than Significant Impacts

Impacts from vehicles and construction. Nitrogen oxide emissions are of concern primarily as an ozone precursor. Even though construction emissions would increase, annual emissions of ozone precursors from construction activities associated with Alternative A would be too small to have a measurable effect on ozone levels. No SBCT-specific range construction would be necessary at KTA or KLOA; therefore, impact analysis is not applicable.

Airfield improvements at BAAF would accommodate increased use of fixed-wing cargo aircraft (C-17 aircraft) for transporting troops and equipment to PTA. The Shadow 200 UAV would be used during many training exercises at PTA. However, current patterns of helicopter flight activity would continue to be the primary flight activity at PTA. Because the net increase in emissions resulting from added cargo aircraft and UAV flight activity would be too small to have much effect on ambient pollutant concentrations, emissions from increased aircraft operations would be less than significant under Alternative A.

5.2.11.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Emissions from ordnance. Ordnance use at SBMR under Alternative A would occur at new training range facilities (BAX and upgrade airfield for C-130 Aircraft) as well as at other range facilities. The total estimated ordnance use by the 2/25th at all USAG-HI installations would increase by about 25 percent. Approximately 96 percent of the annual ordnance use would consist of small arms ammunition, each item of which emits only a very small propellant charge. Ordnance items with explosive or pyrotechnic components (such as mortars, artillery, mines, demolition charges, smoke devices, flares, or blast simulators) would represent about 4 percent of the annual ordnance use.

Live ordnance is not used at DMR, but blank ammunition and ground-based smoke devices are used for some training exercises. The total estimated ordnance use at all USAG-HI installations would decrease by about 25 percent under Alternative A. Smoke, flare, and simulator items would remain the predominant munitions used at DMR. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use at DMR pose very little risk of creating adverse air quality effects. Consequently, air quality effects expected from munitions use under Alternative A are considered less than significant.

Use of the CACTF at KTA would involve SRTA in addition to blank ammunition. Some pyrotechnic devices also would be used at KTA. Only blank ammunition would be used at KLOA. Due to changes in the nature of training activities, the annual quantity of ammunition used at PTA, KTA and KLOA would decrease. Based on the general nature of detonation processes and the very low emission rates that have

been published in studies of munitions firing and open detonations, emissions associated with ordnance use at KTA and KLOA pose very little risk of creating adverse air quality effects. Consequently, air quality effects from munitions use under are considered less than significant.

Wildfire emissions. The addition of a BAX range at both SBMR and PTA would increase the use of larger caliber munitions. The BAX at PTA would be located in a previously disturbed site and oriented towards pre-existing ordnance impact areas. As a result, both live- and nonlive-fire training would increase, resulting in the potential to increase the frequency of wildfires. At KTA, nonlive-fire and live-fire training using SRTA, which still has the potential to ignite wildfires, would increase but would not likely produce a significant wildfire risk because the ammunition has a plastic tip and does not include tracer rounds. Overall, SBCT training would increase the number of Soldiers training at all ranges, thus increasing the total number of rounds fired and potential increased frequency of wildfires With implementation of the mitigation measures detailed in the Wildfire Management section, fire risk and impacts would be mitigated to less than significant.

Emissions from controlled burns. Controlled burns are sometimes used to manage vegetation on range areas or to prepare areas for UXO clearance. Controlled burns are not frequent events, and so the resulting emissions have not been estimated. These emissions would be considered in the prescribed burn plans prior to the actual burns.

5.2.11.4 Impacts from Maneuver Training

Significant Impacts Mitigable to Less than Significant

Impact 2: Military vehicle use and emissions. Vehicle use would be distributed among different areas, but all vehicles would be based at SBMR. Estimated annual MIMs for training use of military vehicles at under Alternative A would increase by 111 percent in MIMs traveled.

Maneuver training would occur at SBMR, DMR, KTA, and PTA. Training at SBMR would occur on existing off-road areas on SBER and on 1,300 new acres at SRAA. Training at DMR would occur in areas currently used for off-road maneuvers. Training would occur on 3,384 new acres at KTA. Training at PTA would occur on 1,800 acres of existing off-road areas. The training area would be expanded on the Keamuku Parcel to include 23,000 new acres. SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently.

The net increase in military vehicle engine emissions would be 3 tons per year for reactive organic compounds, 28.5 tons per year for nitrogen oxides, 8.8 tons per year for carbon monoxide, 0.3 ton per year for sulfur oxides, and 2.6 tons per year for PM_{10}. Because the increase in emissions for any pollutant would result in too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels, they would not affect the attainment status of the area. Therefore, emissions from increased military vehicle use at SBMR would be less than significant.

Off-road vehicle activity would reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to emissions from vehicle travel and wind erosion. PM_{10} would be generated by these actions from the affected areas. The amount of off-road vehicle activity would increase due to proposed training activities. In addition, the area available for off-road vehicle maneuvers would increase. Most of the additional land that would become available for off-road vehicle maneuvers has a very high potential for wind erosion if vegetation cover is reduced.

The dispersion modeling results obtained for evaluating vehicle maneuver exercise on a 10,000-acre (4,047 hectare) portion of the Keamuku Parcel were used to extrapolate potential PM_{10} concentrations

from wind erosion conditions. PM_{10} emissions would be approximately 537 tons per year, an increase of about 211 tons per year. Approximately 32 percent of the net increase in fugitive PM_{10} emissions would be associated with vehicle travel on unpaved roads while the remaining 68 percent represents potential emissions from off-road vehicle maneuver activity. These emissions could be significant if not mitigated. The Army's DuSMMoP and ITAM program would substantially mitigate potential wind erosion problems by providing management tools that would help limit damage to vegetation from off-road vehicle maneuver activity.

Regulatory and Administrative Mitigation 2: Although violation of air quality standards is not likely, the overall level of PM_{10} generated by wind erosion would increase. Given the resulting increase in overall PM_{10} levels, the uncertainties associated with any estimate of potential wind erosion conditions and public perceptions of the potential magnitude of this impact, the Army considers wind erosion from the Keamuku Parcel to be a significant air quality impact, but with implementation of the DuSMMoP, impacts would be less than significant.

Less Than Significant Impacts

Impacts from aircraft operation. Under Alternative A, WAAF would be upgraded to better accommodate C-130 use of the airfield, but no substantial change to helicopter flight operations at WAAF would occur. Flight operations at WAAF are dominated by helicopter activity; fixed-wing aircraft use (C-130 and C-17 aircraft) represents a very small fraction of flight operations. Modest increases in fixed-wing flight activity at WAAF would not have a significant effect on total annual aircraft emissions. The increase in aircraft emissions at WAAF would be less than significant.

There would be no major change to existing Army helicopter flight operations in Hawaii. Some UAV flight activity could be based at DMR, but the total flight time would be relatively low. The net increase in emissions resulting from UAV flight activity would be too small to have a meaningful effect on ambient air quality conditions. The increase in aircraft emissions at DMR would be less than significant.

5.2.12 NOISE

Table 5-15 lists the noise impacts associated with Alternative A. Impacts from range construction and maneuver training would be less than significant. The determination of significance for live-fire training at SBMR is based on noise from ordnance use at existing noise levels.

5.2.12.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.12.2 Impacts from Range Construction

Less Than Significant Impacts

Noise from construction activities. Construction projects at SBMR, PTA, and DMR would temporarily increase human presence and activity at construction sites. Individual items of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. With multiple items of equipment operating concurrently, noise levels can be relatively high during the day at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet from the site of major equipment operations. Locations more than 1,000 feet from construction sites seldom experience significant levels of construction noise.

Table 5-15 Summary of Potential Noise Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	⊙	N/A	⊙
Impacts from Live-Fire Training	⊗[1]	⊙	⊙ / N/A	⊙
Impacts from Maneuver Training	⊙	⊙	⊙ / N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

[1] The proposed action would have a minor increase in noise impacts. The determination of significance is based on existing noise levels.

Construction activities would generate average daytime noise levels of about 55 dBA at the closest noise-sensitive area. Because incremental Ldn contributions from construction activities would be lower than 65 dBA at the nearest noise-sensitive areas (1,950 feet distant), impacts from construction noise would be less than significant. Most other construction projects would be further removed from noise-sensitive locations than the projects discussed above. Noise effects from these projects would be less significant than the noise effects discussed above.

No SBCT-specific range construction would be necessary at KTA or KLOA; therefore, impact analysis is not applicable. No mitigation is necessary for impacts from range construction. Impacts from range construction would be less than significant.

5.2.12.3 Impacts from Live-Fire Training

Significant Impacts

Impact 1: Noise from ordnance use. Noise levels from weapons firing and ordnance detonations are quite variable, with noise levels at long distances influenced in part by weather conditions. Small arms firing can produce relatively high peak noise levels at localized areas around the range. Equations for estimating noise from small arms firing typically predict the peak unweighted dB value (Lpk). Because human hearing does not respond as rapidly to impulse noise events as do noise monitoring instruments, the 1/8 second Lmax noise level measurement is a better indicator of how people perceive impulse noise than the unweighted peak dB measurement. The 1/8 second Lmax value typically would be about 15 to 20 dB lower than the Lpk measure. Limited studies of annoyance from noise near civilian shooting ranges have found that the A-weighted 1/8 second Lmax value is the most useful predictor of annoyance. For most small arms types, the A-weighted decibel value would be about 3.5 dB lower than the unweighted decibel value. Thus, the A-weighted Lmax for small arms firing is about 20 dB lower than the peak unweighted dB value.

As indicated by past estimates of noise contours around WAAF and by the noise contours for large caliber weapons, firing noise levels associated with SBMR do not cause noise levels in off-post residential areas to exceed generally accepted land use compatibility criteria. Based on modeling results for SBMR, there would be a modest expansion of Zone II conditions and some small changes in the

location of Zone III conditions within the SBMR ROI. Zone II conditions would expand eastward by about 985 to 1,300 feet to encompass additional troop and family housing areas on the eastern side of the Main Post.

Zone II conditions would affect some undeveloped areas north and south of SBMR, but would not expand into existing off-post residential areas. Solomon Elementary School and Hale Kula Elementary School would remain under the Zone II noise contour. In the absence of the nighttime noise sensitivity factor, Hale Kula Elementary is within Zone I conditions versus Zone II.

Zone III conditions would remain unchanged or actually contract slightly in the northern portion of the Main Post, but would expand eastward by about 325 to 490 feet in the southwest corner of the cantonment area. Some additional family housing units would be encompassed by the Zone III contour in this area. The Zone II and Zone III noise contours would affect a larger portion of the developed cantonment area than occurs under existing conditions.

Noise from increased ordnance use would not significantly increase noise levels experienced on people residing on or working at SBMR. The primary factor resulting in the slight expansion of Zone II and Zone III noise exposure areas would be an increase in the number of 155mm artillery rounds fired and an increase in nighttime artillery and mortar firing.

As with the existing condition, only about 10 percent of the total artillery and mortar firing would occur during nighttime hours (10:00 PM to 7:00 AM), although the number of individual ordnance items fired or detonated at night would increase by about 35 percent. The 10 percent nighttime training factor at SBMR is lower than the more typical 15 percent factor that occurs at most Army installations. The increase in nighttime noise generation may result in an increase in noise complaints from surrounding communities.

Although the numerical increase in noise levels within the cantonment area at SBMR would be small, existing noise levels already represent a significant impact. Therefore, noise from increased ordnance use under the Proposed Action would remain a significant impact on people residing on or working at SBMR.

Additional Mitigation 1: Although there are likely no mitigation measures that are available to reduce the identified significant impacts to a level below significance thresholds, certain mitigation measures may be available to reduce these identified impacts. Potential mitigation measures for identified impacts to the local noise environment include the following:

- The Army proposes to evaluate training techniques, scheduling and location to reduce overall noise impacts at SBMR. In this evaluation, the Army would consider, as feasible, the benefit of timing restrictions on training and moving certain training activities to PTA, and
- The Army proposes to provide noise-insulating measures whenever new buildings are constructed or existing buildings are renovated, such as modifications to window materials and cooling systems to noise-sensitive land uses that are or that may become exposed to Zone II and Zone III noise conditions.

Less Than Significant Impacts

Noise from ordnance use. Unlike SBMR, the other USAG-HI training areas do not have significant existing noise concerns. Therefore, the minor increase in noise attributable to the proposed action is expected to cause a less than significant impact at DMR, KTA, KLOA, and PTA.

Zone III conditions (with an L_{dn} above 70 dBC) would expand slightly but would remain within the boundaries of PTA. Zone II conditions (with an L_{dn} of 62 to 70 dBC) would expand slightly within the ordnance effect area at PTA but would contract slightly in the area north of Saddle Road. There would be a slight expansion of Zone II conditions in the cantonment area, but this change would not include most of the on-post housing units. The Zone II noise contour would not expand toward the Kilohana Girl Scout Camp or Waikii Ranch and would actually contract slightly in the eastern portion of the Keamuku Parcel.

The Zone II noise at Mauna Kea State Park would expand slightly to include a small amount of land on the west side of Saddle Road, but there would be very little change in the location of the Zone II noise contour near the picnic area and rental cabins east of Saddle Road. Changes in the SBCT equipment package, firing point locations, and range configurations collectively quantify the overall increase in munitions use and at the same time account for the limited changes in noise contours when compared to existing conditions.

Use of blank ammunition and simulator devices in the Keamuku Parcel area may potentially create noise effects within the Waikii Ranch development and the Kilohana Girl Scout Camp, both of which share fence line boundaries with the Keamuku Parcel. Noise from blank ammunition firing would fall below the Zone II threshold at approximately 3,500 feet for common types of small arms blank ammunition. Thus, noise from small arms firing with blank ammunition could have substantive noise effects at Waikii Ranch and the Kilohana Girl Scout Camp when training occurs within a few thousand feet of these locations.

Substantial portions of the Keamuku Parcel are more than 1 mile from the Waikii Ranch development. An even greater portion of the Keamuku Parcel is more than 1 mile from the Kilohana Girl Scout Camp. Given the large size of the Keamuku Parcel, it is reasonable to expect that management actions could be taken to reduce the frequency of noise disturbance at Waikii Ranch and Kilohana Girl Scout Camp to acceptable levels. Because appropriate management actions could be implemented to reduce small arms noise effects at Waikii Ranch and Kilohana Girl Scout Camp, noise from ordnance use at PTA would constitute a less than significant impact.

Blank ammunition and ground-based smoke generating items are the only types of ordnance that would be used at DMR. Small arms firing with blank ammunition can produce relatively high peak noise levels at distances of up to 3,000 feet and might remain audible at distances of up to 1.5 miles. The 1/8 second Lmax noise level from blank ammunition is typically about 71 to 78 dBA at 2,000 feet and 50 to 57 dBA at 1 mile. Noise levels from firing blank small arms ammunition typically drop below levels that cause substantive annoyance at distances of 2,500 to 3,000 feet. The closest residential areas are more than 2 miles from the areas where blank ammunition would be used at DMR. Noise effects from ordnance use at DMR would be less than significant.

Blank ammunition, SRTA, and various pyrotechnic devices are the only types of ordnance items that would be used at KTA. Only blank ammunition is used at KLOA. The closest residential areas are about 1 mile from the areas where training ammunition would be used at KTA. Noise effects from ordnance use at KTA would be less than significant.

Noise from military vehicles. Tactical and support vehicles would travel within SBMR during military training exercises. Vehicles would also travel from SBMR to other installations in support of training exercises at those installations. Vehicle convoys using public roads on Oahu are limited to no more than 24 vehicles in a group. Vehicles within a convoy group (also called convoy serials) typically are spaced about 165 to 330 feet apart and are timed at least 15 to 30 minutes apart. These convoy procedures prevent situations where convoy vehicles dominate local traffic flow for substantial periods of time. Instead of creating conditions where military vehicle traffic dominates traffic noise conditions for a

noticeable amount of time, convoy procedures result in noise from convoy traffic occurring as a sequence of multiple individual vehicle pass-by events within a background of normal traffic noise conditions.

Noise data are not readily available for most military vehicles, and noise data specific to the Stryker vehicle are not yet available. Noise data for heavy construction equipment provide some general guidance regarding expected noise levels from military vehicles. Vehicle noise generation equations used in highway traffic noise models provide additional useful noise estimates for various types of trucks and passenger vehicles. The Bradley Fighting Vehicle is a tracked vehicle that has a larger engine (500 horsepower) and is heavier (25 to 33 tons) than the Stryker (which has a 350 horsepower engine and weighs 19 to 20 tons). Drive-by noise data for the Bradley Fighting Vehicle can be used as an upper limit for the expected noise levels from wheeled military vehicles.

Noise levels generated by the Stryker are expected to fall between those of multi-axle heavy trucks and those of the Bradley Fighting Vehicle. This indicates that noise from a Stryker vehicle would be expected to be within noise levels of existing Army vehicles. The number of military vehicles assigned to the transformed 2nd Brigade at SBMR would increase by slightly more than 52 percent. Most of the added vehicles would be Strykers, but 50 military vehicles of other types also would be added. Each of the 12 subordinate commands based at SBMR has its own vehicle fleet.

The total government-owned vehicle fleet based at SBMR has not been inventoried, but it exceeds 2,000 vehicles. Stryker vehicles would account for no more than 12 to 15 percent of the total military vehicle fleet based at SBMR. Military vehicle traffic, dominated by HMMWVs, light trucks, and medium trucks, would be expected to produce noise levels comparable to normal highway traffic that has a high fraction of medium and heavy trucks. Noise levels from individual vehicle pass-bys would be comparable to noise levels generated by typical highway truck traffic. The Stryker vehicle is expected to generate peak drive-by noise levels a few decibels higher than levels produced by typical multi-axle heavy trucks.

In general, it takes a doubling of noise source activity to create a 3-dBA increase in noise levels. This means that it takes a doubling of traffic volume to produce a 3-dBA change in resulting traffic noise levels. A 3-dBA noise level increase represents a 23 percent increase in perceived loudness. A 10-dBA noise level increase represents a doubling of perceived loudness. The procedures used for military convoy travel would prevent convoy traffic from substantially increasing traffic volumes on public roadways. Therefore, there would be no significant change in traffic noise levels along public roads.

Noise levels along on-post roadways and along military vehicle trails would increase. However, overall traffic volumes and vehicle speeds generally are low for these types of roadways. As a result, noise increments attributable to vehicle traffic would remain within the Army's land use compatibility guidelines.

Traffic on military vehicle trails between SBMR and other installations would increase noise levels along the trail corridors during the periods of vehicle travel. Up to 56 vehicles might travel at one time between SBMR and DMR, and up to 173 vehicles might travel at one time between SBMR and KTA. If the maximum number of vehicles departed within a single hour, the resulting hourly average noise level along a one-lane military vehicle trail such as Helemano Trail would be about 72 dBA at a distance of 50 feet from the trail, and less than 60 dBA at a distance of 400 feet. Because there are no noise-sensitive land uses immediately adjacent to Helemano Trail, these noise levels would constitute a less than significant impact. The smaller size of vehicle convoys to DMR would result in lower noise levels along the Dillingham Trail than along the Helemano Trail.

Military vehicle maneuvers would occur along unpaved roads and in various off-road areas at SBMR and SBER. Peak pass-by noise levels would drop by 15 dBA at a distance of 500 feet from the travel path.

Vehicle maneuvers would occur during both daytime and nighttime hours, making vehicle maneuver activity noise an issue of concern where residential land uses and school sites are close to SBER boundaries.

Because vehicle speeds are low during most maneuver activities and vehicles tend to be relatively dispersed during off-road maneuvers, maneuver activities would be expected to produce hourly average noise levels of less than 55 dBA at a distance of about 500 feet, with brief peaks of 65 to 70 dBA. Such noise levels would not cause significant noise effects at off-post noise-sensitive land uses during daytime hours. These noise levels would be more disturbing during nighttime hours. The Army has established a 1,000-foot noise buffer along those portions of SBER that border residential areas of Wahiawa. As long as nighttime vehicle maneuver activity is minimized in this buffer area, vehicle noise from training and maneuver activities would be less than significant.

Most military vehicle travel to and from DMR would occur on Dillingham Trail. In addition, vehicle maneuver training would occur at DMR. During an individual training activity at DMR, fewer than 75 vehicles are operating at any one time. Generally, fewer than 60 vehicles would travel in a convoy to DMR on the Dillingham Trail per hour. Resulting hourly average traffic noise levels along Dillingham Trail would be about 65 dBA at a distance of 100 feet from the vehicle trail. Vehicle activity within DMR would produce comparably low noise levels. Consequently, noise from military vehicle use at DMR would constitute a less than significant impact.

Most military vehicle travel to and from KTA and KLOA would occur on the Helemano Trail and Drum Road. In addition, vehicle maneuver activity would occur at KTA. During an individual training activity at KTA and KLOA, up to 241 vehicles are expected to be operating at any one time, with up to 216 vehicles using Helemano Trail and Drum Road to reach KTA. For the maximum number of vehicles, resulting hourly average traffic noise levels along Helemano Trail and Drum Road would be about 72 dBA at a distance of 50 feet from the vehicle trail and about 64 dBA at 200 feet from the vehicle trail. Vehicle activity within KTA and KLOA would produce comparably low noise levels, so noise from military vehicle use at KTA and KLOA would constitute a less than significant impact.

. Additionally, the Army proposes to establish a minimum 1,000-foot noise buffer around the Waikii Ranch property and the Kilohana Girl Scout Camp. In addition, the Army would consider training guidelines that minimize nighttime training activities involving weapons fire or aviation activity within a minimum of 2,000 feet of those properties. The Army would continue to work with affected communities on noise buffers and may adjust the buffer size depending on these discussions.

5.2.12.4 Impacts from Maneuver Training

Less Than Significant Impacts

Noise from military vehicles. The types of impacts from maneuver training would be similar to the types of impacts described for vehicle use in live-fire training. However, because maneuver training involves the movement of vehicles and, in this case, the movement of vehicles over large areas of which a significant portion of which are new acres, the level of impact would likely be more significant.

Maneuver training would occur at SBMR, DMR, KTA, and PTA. Brigade- and battalion-level training would primarily occur at PTA, and the frequency of maneuver training at PTA is not expected to increase above existing levels. Training would occur on 1,800 acres of existing off-road areas. However, the training area would be expanded on the Keamuku Parcel to include 23,000 new acres, and would remain a non-live-fire area. Platoon- and company-level training would primarily occur at the other areas, and would increase in frequency. Training at SBMR would occur on existing off-road areas on SBER and on

1,300 new acres at SRAA. Training at DMR would occur in areas currently used for off-road maneuvers, so impacts are expected to be less than significant. Training would occur on 3,384 new acres at KTA.

The impacts from military vehicle noise during maneuver training would be similar to those impacts described under live-fire training. Impacts are likely to be less because maneuver training would occur within the boundaries of training areas where sensitive noise receptors are fewer. Noise impacts from maneuver training would be a less than significant impact.

Noise from aircraft operations. Alternative A would not result in any meaningful changes in flight operations at WAAF. Improvements to WAAF would improve facilities for C-130 aircraft operations. Increased use of WAAF by C-130 aircraft would increase airfield vicinity noise levels somewhat. However, noise conditions in the vicinity of WAAF would continue to be dominated by helicopter flight operations. The 65-dBA Ldn contour around WAAF extends into Leilehua Golf Course but not into any residential area (USAEHA 1993; U.S. Army CHPPM 1999). Overall changes in airfield vicinity noise levels would be less than significant.

Current levels of helicopter and fixed-wing aircraft flight operations would continue over SBMR and SBER, and UAV flight operations also would be conducted. Noise level data for the Shadow 200 UAV are limited to ground test measurements with the engine either at an idle setting or at a high power setting. The Shadow 200 UAV produces a noise level of 85 dBA at a distance of about 70 feet (21 meters) when the engine is at an idle power setting, and a noise level of 85 dBA at a distance of about 342 feet when the engine is at a high power setting (Army 2001a) and this is probably a slight overestimate for typical flight conditions.

The addition of UAV flight activity to current patterns of aircraft and helicopter flight operations would not result in any noticeable change in noise levels from aircraft flight operations. Alternative A would not result in any meaningful changes in helicopter or fixed-wing aircraft flight operations at DMR. The only added military flight activity would involve UAV flight operations in nearby restricted airspace. UAV flights would not be launched from or recovered at DMR, but some UAV flight activity may occur in the R-3110B and R-3110C restricted airspace areas south of DMR or in the offshore W-189 Warning Area north of DMR.

Alternative A would not result in any meaningful changes in helicopter or fixed-wing aircraft flight operations at KTA or KLOA. The only added military flight activity would involve UAV flight operations. Three types of changes to current aircraft and helicopter flight operations at PTA would occur: 1) accommodation of a limited number of C-17 cargo aircraft flights to and from BAAF, 2) addition of UAV flight operations over the main portion of PTA and Keamuku Parcel, and 3) changes in the geographic distribution of helicopter flight activity at PTA.

Cargo aircraft flight operations and UAV flight operations are not expected to have substantive noise consequences. While overall USAG-HI helicopter flight activity would not change, there would be changes in the geographic distribution of flight operations due to changes in the locations and types of training conducted. A portion of helicopter flight operations at PTA would be shifted into the Keamuku Parcel to support maneuver training exercises.

Data summarized in U.S. Army CHPPM (2001) indicate that annoyance with individual aircraft and helicopter flyover and flyby events can be correlated with maximum noise levels during the event. Even though actual noise levels at off-post locations may not be very loud, the tonal characteristics would make helicopter noise increments readily distinguishable from normal background noise conditions. Thus, the overall increase in helicopter flight activity over the Keamuku Parcel would be noticeable to residents of Waikii Ranch and probably would lead to an increase in the frequency of noise complaints. Overall noise

levels at Waikii Ranch would remain within the Army's guidelines for noise levels compatible with residential land uses. Though the change in noise conditions would be readily noticeable, this effect is considered less than significant.

Helicopters normally operate at low flight altitudes, often within 300 feet of ground level. C-130 and C-17 cargo aircraft would be at low flight altitudes during the final landing approach to and the early stages of departures from BAAF. In most cases, the UAV would be expected to operate at relatively high altitudes to avoid conflict with other helicopter and aircraft flight activity. UAV takeoffs and landings normally would occur within the R-3103 area at PTA rather than at BAAF. Overall aircraft activity at PTA would continue to be dominated by helicopter operations. The number of added cargo aircraft and UAV flight operations would be relatively small in comparison to continuing helicopter flight operations. In addition, the noise buffers proposed as mitigation would apply to helicopter training activities. The Army would continue to work with affected communities on noise buffers and may adjust the buffer size depending on these discussions. Noise from aircraft operations at PTA and BAAF would constitute a less than significant impact.

5.2.13 AIRSPACE RESOURCES

Table 5-16 summarizes the impacts associated with airspace resources that would occur under Alternative A. No impacts are expected from range construction or live-fire training. Less than significant effects are expected from flights of UAVs during maneuver training that would restrict use of airspace during the training.

5.2.13.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.13.2 Impacts from Range Construction

No Impacts

Construction of a BAX at SBMR and PTA would temporarily increase human presence and activity at construction sites. This construction would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed. No SBCT-specific range construction would be necessary at DMR, KTA, or KLOA; therefore, impact analysis is not applicable. No mitigation is necessary for impacts from range construction.

Table 5-16 Summary of Potential Impacts to Airspace Resources from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	○	N/A	N/A	○
Impacts from Live-Fire Training	○	N/A	N/A	○
Impacts from Maneuver Training	⊙	⊙	⊙/ N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.2.13.3 Impacts from Live-Fire Training

No Impacts

This alternative would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed. A controlled firing area (CFA) would be established above QTR2. However, CFAs pose no problems for VFR or IFR flights because activities within a CFA must be suspended immediately when radar, spotter aircraft, or ground lookouts detect an approaching aircraft.

5.2.13.4 Impacts from Maneuver Training

Less Than Significant

Maneuver training, which would occur at SBMR, DMR, KTA, and PTA, would include flights by UAVs. The proposed UAV flights primarily would be conducted within previously designated restricted areas (e.g., R-3109 and R-3103). For UAV flights that could not be conducted entirely within restricted areas, operations would occur in accordance with well-defined FAA procedures for remotely operated aircraft. These procedures include approval of the UAV flights by the FAA regional office in Honolulu at least 60 days in advance. This approval would be contingent on the Army demonstrating that the flights would be as safe as those for manned aircraft. In addition, coordination, communications, route and altitude procedures, and lost link/mission abort procedures would all have to be identified (FAA 2001).

As noted above, the Army proposes to reorient the runway at PTA. Reorientation of the runway would change the current instrument approach procedures by changing the compass directions for approaches and departures from the runway, shifting the initial approach fix (IAF) location, and changing the missed approach point and track. Although this reorientation of the runway would result in a significant improvement to the safety of the PTA Cantonment by allowing air traffic to clear the PTA Cantonment, it would have a less than significant effect on the airspace above the PTA. Once the runway is reoriented and its approaches have been adjusted, operations within the airspace would continue as they occurred before the reorientation.

5.2.14 ENERGY

This section identifies the potential environmental consequences to energy demand, generation, delivery systems, or energy costs. This analysis included identification and evaluation of the mission requirements for energy and the extent to which each installation already meets these requirements. The analysis also evaluated whether the proposed project activities for each alternative would expand the specific installations' demand for regional energy, if energy prices in the region have been rising, and if any additional demand for energy and increases in prices would adversely affect the proposed project. **Table 5-17** summarizes the potential energy impacts under implementation of Alternative A. Energy impacts are expected to be less than significant; therefore, no mitigation is required.

5.2.14.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

Table 5-17 Summary of Potential Energy Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	N/A	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊙ / N/A	⊙
Impacts from Maneuver Training	⊙	⊙	⊙ / N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.2.14.2 Impacts from Range Construction

Less Than Significant Impacts

Energy demand and costs. Alternative A would result in less than significant adverse long-term effects on energy usage as a result of increased electrical demands at SBMR and PTA, but would also result in less than significant beneficial impacts on electrical service. Construction at SBMR and PTA could result in service interruptions in order to connect new lines and extend service. This impact would be temporary, and the length of disruptions would be minimized to the greatest extent possible during this period. Service would be returned to normal after construction. No mitigation would be required.

5.2.14.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Energy demand and costs. Live-fire training would increase under this alternative; however, impacts to energy use and costs are expected to be less than significant. No mitigation would be required.

5.2.14.4 Impacts from Maneuver Training

Less Than Significant Impacts

Energy demand and costs. Maneuver training would increase under this alternative; however, impacts to energy use and costs are expected to be less than significant. No mitigation would be required.

5.2.15 FACILITIES

Table 5-18 summarizes the potential impacts to facilities under implementation of Alternative A. Potential impacts to facilities at the Army installations, including public services and utilities would occur as a result of increased training, and construction and operation of new facilities. Potential impacts to land uses, recreational resources, and transportation facilities are analyzed in other sections of this document. Impacts to facilities, public services, infrastructure, and utilities are expected to be less than significant. No mitigation is required.

Table 5-18 Summary of Potential Facilities Impacts from Alternative A

Activity Group	Location			
	SBMR	DMR	KTA/KLOA	PTA
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A
Impacts from Range Construction	⊙	N/A	N/A	⊙
Impacts from Live-Fire Training	⊙	N/A	⊙/ N/A	⊙
Impacts from Maneuver Training	⊙	⊙	⊙/ N/A	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.2.15.1 Impacts from Cantonment Construction

Because the SBCT is currently located at SBMR, no new cantonment construction would be necessary.

5.2.15.2 Impacts from Range Construction

Less Than Significant Impacts

Facilities. Under this alternative, new training ranges would be constructed at SBMR and KTA. The Dillingham Trail would also be constructed at DMR. Impacts to facilities would be beneficial and less than significant. No mitigation would be required.

Utilities. A slight increase in demand on utilities would occur under this alternative as a result of range construction; however, impacts to utilities are expected to be less than significant. No mitigation would be required.

No Impacts

Public Services. No impacts to public services are expected as a result of range construction. No range construction is planned at DMR, KTA, or KLOA under this alternative; therefore, impact analysis is not applicable.

5.2.15.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Facilities. Range use would increase on each range type and increased amounts of ammunition would be used, resulting in a proportionate increase in the generation of UXO and lead contamination on training ranges. With implementation of Army SOPs, impacts are expected to be less than significant. No additional mitigation is required.

Utilities. A slight increase in demand on utilities would occur under this alternative as a result of increased live-fire training; however, impacts to utilities are expected to be less than significant. No mitigation would be required.

No Impacts

Public Services. Under this alternative, there would be a slight increase in usage of the live-fire training ranges; however, no impacts to public services are expected. No live-fire training is planned at DMR under this alternative; therefore, impact analysis is not applicable.

5.2.15.4 Impacts from Maneuver Training

Less Than Significant Impacts

Public Services. Alternative A would have less than significant long-term impacts on police, fire, and medical services at SBMR, DMR and PTA because of training on the Army installations. Moving military traffic to Dillingham Trail and PTA Trail would improve safety on public roads, which would be a beneficial effect.

Utilities. A slight increase in demand for public utilities would occur as a result of increased training; however, impacts to utilities are expected to be less than significant. No mitigation would be required.

Minimal long-term adverse effects are expected because of increased demand for potable water at the maneuver training areas. Additional potable water needed at KTA would continue to be trucked in, as there is no water distribution system in operation. Construction at SBMR, DMR, and PTA could result in service interruptions in order to connect new lines and extend service. This impact would be temporary, and the length of disruptions would be minimized to the greatest extent possible during this period. Service would be returned to normal after construction.

No impacts would occur to wastewater and stormwater at DMR. No new staff would be added and no additional training facilities would be constructed at DMR, and the road from SBMR to DMR would include drainage improvements, culverts at stream crossings, grass and concrete swales, and drainage structures and lines to manage stormwater runoff. Less than significant long-term adverse impacts would occur at SBMR and PTA because of new construction and facilities, and increased training volume and intensity. The wastewater and stormwater collection and treatment systems at SBMR and PTA are expected to have adequate capacity to handle increases in volume that could result. Impacts to facilities, public services, infrastructure, and utilities are expected to be less than significant. No mitigation is required.

5.3 ALTERNATIVE B – PERMANENTLY STATION THE 2/25TH SBCT AT FORT RICHARDSON WHILE CONDUCTING REQUIRED TRAINING AT MILITARY TRAINING SITES IN ALASKA

5.3.1 SUMMARY OF THE ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE B

Table 5-19 presents the potential impacts of implementing Alternative B as it is described in Chapter 2. For each VEC, impacts from four activity groups were analyzed: Cantonment Construction, Range Construction, Live-Fire Training, and Maneuver Training. Impacts from the four activity groups are summarized by a single impact rating for each area affected by the alternative. Details of each activity group's impacts are presented below in the resource sections.

Impacts on soils erosion would be significant but mitigable to less than significant across all activity groups. Construction and maneuver training would expose stable, vegetated soils to vehicle and foot traffic. This would cause loss of vegetation, soil compaction, and alterations to drainage patterns that

would increase soil erosion from both wind and water. BMPs and mitigation measures would minimize soil loss.

Table 5-19 Summary of Environmental Consequences of Alternative B

VEC	Location	
	Fort Richardson	Donnelly Training Area
Soil Erosion	⊘	⊘
Water Resources	⊙	⊙
Wildfire Management	⊗	⊗
Cultural Resources	⊗	⊗
Land Use and Recreation	⊙	⊙
Traffic and Transport	⊘	⊘
Socioeconomics	⊙	⊙
Hazardous Materials and Hazardous Waste	⊘	⊘
Wetlands	⊘	⊘
Vegetation	⊘	⊘
Noxious Weeds	○	○
Threatened and Endangered Species	⊙	⊙
Wildlife and Habitats	⊙	⊙
Air Quality	⊙	⊙
Noise	⊙	⊙
Airspace	⊙	⊙
Energy Demand and Generation	⊙	⊙
Facilities	⊙	⊙
Subsistence	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Significant impacts to wetlands could occur from the use of Army lands. Construction and training activities would increase the potential to introduce or spread noxious weeds and increase the possibility of accidental ignition of a wildfire. Mitigation measures would reduce these impacts to less than significant. General wildlife, habitats, vegetation, and threatened and endangered species would sustain only less than significant impacts.

Air quality and water resource impacts, primarily from training activities, would be significant but mitigable to less than significant, or less than significant. The implementation of several administrative mitigation measures would reduce all significant but mitigable impacts to less than significant.

Impacts to land use, socioeconomics, and hazardous materials would be mitigable to less than significant. Traffic, noise, airspace, energy, facilities, and subsistence would all experience less than significant impacts at all affected areas.

5.3.2 GEOLOGY, SOILS, AND SEISMICITY

Table 5-20 summarizes the potential soil erosion and other geologic, soils, and seismic-related impacts that would occur for each group of project activities. The current baseline of existing conditions at FRA and DTA would continue, and soil erosion-related impacts would continue at their current levels. Additional impacts resulting from Alternative B would be measured by the difference in magnitude between the impacts caused by the current IBCT unit and the SBCT unit that would replace it. The differences were introduced in Chapter 2 and are discussed in this impact analysis as they pertain to proportionately increased or decreased impacts to soil resources on the installation relative to activities under Alternative B.

Table 5-20 Summary of Potential Soil Erosion Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊘	N/A
Impacts from Range Construction	⊘	N/A
Impacts from Live-Fire Training	⊘	⊘
Impacts from Maneuver Training	⊘	⊘

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Impacts resulting from construction and training activities in Alaska would be similar to those discussed for Alternative A with some exceptions. They include the presence of permafrost and the seasonal differences of training area carrying capacity. Portions of FRA and DTA contain permafrost, which is soil, silt, and rock that remains frozen year-round. Disturbance of the insulating peat and vegetation above permafrost can cause it to melt, which in turn can lead to irregular subsidence (thermokarst) and areas that are continually wet or flooded during the summer. Impacts to permafrost are often long-term and irreversible once initiated.

The following mitigation measures specified in the USARAK INRMP and ITAM annual work plan would reduce the potentially significant impacts of soil erosion, compaction, rutting, and damage to permafrost caused by increased cantonment and range construction, live-fire training, and maneuver training activities at FRA and DTA. These measures are currently in place and are continually revised and reviewed to respond to new or increasing impacts.

- Comply with training exercise regulations as stipulated by USARAK Range Regulation 350-2.
- Use environmental limitations maps to determine when and where USARAK units can train effectively while limiting environmental disturbance.
- Apply the ITAM program to inventory and monitor, repair, maintain, and enhance training lands.

- Use RTLA program and the Land Rehabilitation and Maintenance program to inventory land conditions, monitor vegetation trends, repair damaged areas, and minimize future damage.
- Obtain wetlands permits to conduct military training in wetland areas
- Implement programs to track munitions use.
- Use the Range and Facility Maintenance Support System (RFMSS) and input range use data.
- Implement a soil and water monitoring program for DTA.
- Implement recreational vehicle use policy on installation lands

Additional mitigation measures that would be implemented specifically to address impacts resulting from activities proposed under Alternative B are discussed in the appropriate activity group impact discussions below.

5.3.2.1 Impacts from Cantonment Construction

Significant Impacts Mitigable to Less than Significant

Impact 1: Soil Erosion Resulting from Cantonment Construction Activities. Cantonment construction to expand the motorpool parking area would be required. The motorpool would be expanded to a disturbed area adjacent to the existing parking area.

Construction of the parking area would cause direct, short-term, localized impacts to soils. Construction activities, such as excavation, grading, trenching, and other earth-disturbing activities, could remove vegetation and disturb soils in the immediate construction footprint, increasing the potential for soil erosion. Temporary soil disturbance caused by construction may also result in indirect, short-term soil erosion and delivery of sediment to streams and wetlands, as well as fugitive dust from heavy construction machinery. The impacts of surface water sedimentation and fugitive dust are discussed in Sections 5.3.3 and 5.3.11, respectively.

Potential increases in soil erosion caused by construction in cantonment areas would be temporary, only periodically exposing bare land susceptible to soil erosion. Additionally, the Army would construct stormwater runoff control structures as part of standard construction BMPs, which would divert water from the construction sites. Near the completion of construction, the Army would implement standard restoration BMPs, such as revegetation and landscaping to address any remaining exposed soils. Compared to existing conditions, increased soil erosion resulting from cantonment construction activities is expected to be short-term, local, and less than significant.

Regulatory and Administrative Mitigation 2: Implementation of standard construction BMPs and the land management practices specified in the USARAK INRMP and ITAM annual work plan would reduce these impacts to less than significant.

Less than Significant Impacts

Volcanic and Seismic Hazards. Cantonment construction on FRA is not expected to have any effect on the frequency of volcanic eruptions or earthquakes, nor are cantonment improvements expected to be susceptible to seismic hazards. The Anchorage area is seismically active and has experienced earthquakes and ash fall from volcanic eruptions in the area. While the hazard associated with volcanic eruptions and earthquakes is high if directed toward an area occupied by people or structures during construction, and the probability of seismic activity in the Anchorage area is moderately high, existing warning systems are expected to generally provide sufficient warning of an earthquake or eruption such that personnel and

equipment would likely have time to evacuate. The impacts associated with seismic and volcanic hazards during cantonment construction are considered less than significant.

Exposure to Soil Contaminants. Impacts associated with potential exposure to soil contaminants during construction activities on FRA would be less than significant. While most of the contamination at FRA is identified in the main post area, there are relatively few areas with high levels of contamination.

5.3.2.2 Impacts from Range Construction

Significant Impacts Mitigable to Less than Significant

Impact 2: Soil Erosion Resulting from Range Construction Activities. Construction of new weapons training ranges at FRA is expected to cause direct, short-term, localized soil erosion impacts when ground surfaces are disturbed to construct weapons training range features. Upgrading an existing range to the required MPMG range would involve only existing disturbed ground, and upgrading the UAC would not require any new ground disturbance. Potential increases in soil erosion caused by range construction would be temporary because construction of the structures and other features associated with weapons training ranges would create bare land only periodically. Additionally, the Army would construct stormwater runoff control structures as necessary as part of standard BMPs, which would divert water from the construction sites. Other standard range-maintenance measures such as road grading, target repair, and berm recontouring, would reduce erosion. Compared to existing conditions, increased soil erosion resulting from range construction activities is expected to be short-term, local, and less than significant. With implementation of standard construction, BMPs and the land management practices specified in the USARAK INRMP and ITAM annual work plan.

Regulatory and Administrative Mitigation 2: Implementation of standard construction BMPs and the land management practices specified in the USARAK INRMP and ITAM annual work plan would reduce these impacts to less than significant.

Less than Significant Impacts

Volcanic and Seismic Hazards. Similar to cantonment construction, construction of new ranges on FRA are not expected to have any effect on the frequency of volcanic eruptions or earthquakes; therefore, the impact would be the hazards associated with the ranges being constructed in areas in which volcanic and seismic hazards exist. The impacts associated with seismic and volcanic hazards during range construction are considered less than significant because existing warning systems are generally expected to provide sufficient warning of an earthquake or eruption such that personnel and equipment would likely have time to evacuate.

Exposure to Soil Contaminants. Impacts associated with potential exposure to soil contaminants during range construction activities would be less than significant. While most of the contamination at FRA is identified in the main post area, there are relatively few areas with high levels of widespread contamination identified and the new construction required would be in relatively small areas when compared to the total size of the installation.

5.3.2.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 3: Soil Erosion and Compaction from Munitions Impact. A larger number of Soldiers would use existing and new ranges for live-fire training on FRA and DTA. There would be a corresponding increase

in the total number of rounds fired, as well as increased vehicular traffic. While some live-fire training would occur in existing impact areas and the frequency of weapons training is not expected to increase, other training would occur on the new ranges and the intensity of the training events at existing ranges would increase. The 2/25 SBCT would train at the DTA BAX, and though use of the BAX would increase, the range would be operated within design parameters and annual use days would not be exceed. Surface disturbance caused by munitions impact would result in larger areas of bare ground than observed under current conditions. Munitions impact can directly create craters and remove patches of vegetation, which normally protects soil from erosion by slowing runoff, intercepting raindrops before they reach the soil surface, and anchoring the soil. Compaction in the craters caused by larger ordnance explosions can alter the permeability and water-holding capacity of the soils and harden silty clays affecting the ability of vegetation to recover in those areas. These direct impacts indirectly create large areas of bare ground and exposed soils that are susceptible to wind and water erosion, which can indirectly cause large-scale removal and redeposition of soils, gullying, or unstable slopes in areas of steep slopes and rapid runoff. Although weapons training events would be periodic, long-term impacts are expected because soil disturbance typically requires time and effort to amend.

Regulatory and Administrative Mitigation 3: Implementation of standard BMPs, as well as revegetation and other land restoration projects implemented by the LRAM, TRI, and SRA programs of the USARAK INRMP and ITAM annual work plan would reduce these impacts to less than significant.

Impact 4: Soil Erosion Resulting from Wildland Fires Ignited by Live-Fire Training Activities: There would be an increase in the total number of rounds fired at new and existing ranges, as well as increased vehicular traffic. An increased risk of accidental wildfire ignition would come from ordnance, vehicles, flammable materials, or cigarettes, which could lead to subsequent large areas of bare soils susceptible to erosion. Wildfire plays an important role in Alaskan ecosystems and is considered a beneficial impact on the natural environment. Negative impacts are seen as those that threaten human life and property. However, fires generated by military training activities often occur in extremely elevated numbers and intervals, thereby causing unacceptable damage to critical vegetative cover that aids in stabilizing soils from wind and water erosion. A wildland fire assessment was completed for areas of concern for the 2004 USARAK Transformation FEIS. Fuel maps were created indicating concentrations of fire-prone vegetation and areas recommended for hazard fuel reduction projects. The fire assessment results were also used in assessing wildfire risk for the 2006 BAX and CACTF FEIS. Impacts associated with soil erosion resulting from wildland fires ignited by live-fire training activities are expected to be less than significant with implementation of the following mitigation measures.

Regulatory and Administrative Mitigation 4: Areas most likely to be affected by wildland fire are adjacent to those areas that are used for live-fire training. Mitigation measures are designed to prepare the landscape for impending wildfires. Patches of thinned trees and controlled burns in high-risk areas may slow wildfire intensity and speed.

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Use the fire index in cooperation with BLM.
- Coordinate live-fire training exercises when fire weather and indices are low to help prevent the ignition and spread of wildfire.
- Avoid ordnance use during periods when weather and fuels conditions are conducive to quick fire starts and spreading.

- Continue to update and implement fire management plans written by USARAK and the BLM Alaska Fire Service for each installation. The plans assess current fire hazards and list recommendations to reduce them.
- Maintain existing firebreaks on USARAK lands, including on the southern end of Main Post.
- Comply with existing range regulations and restrictions (USARAK Regulation 350-2).
- Follow existing range guidelines to prevent wildfires.

Additional Mitigation 4: Some USARAK projects and programs already propose measures that would mitigate many impacts to fire management. These programs are only partially implemented and funded. The proposed mitigation is, therefore, to fully implement plans and projects that have already been identified by USARAK's INRMPs. Additional possible mitigation measures are listed below.

- Review access to firing ranges to enable quick and effective response by initial attack forces in the event of a wildfire.
- Conduct prescribed burning. This would be considered as an option where grass is the primary fuel type. Burning may be done every 1 to 3 years depending on fuel load and conditions. This would increase user days for the Army with a lower risk of wildfire.
- Locate operational areas within hardwood forests (i.e., not in black spruce) to minimize the risk of wildfire.
- Create defensible space around existing and new structures. This would be done by clearing fuels around new structures and facilities to reduce the threat to structures.

Less Than Significant Impacts

Exposure to Soil Contaminants. Low levels of explosive residues are associated with munitions use. Studies have shown that TNT residues readily biotransform in the environment and the byproducts bind to organic matter. Areas with higher organic matter content appear to bind residues more rapidly. The explosive residues RDX and HMX do not degrade rapidly and are not very soluble. However, once dissolved in water, both can be highly mobile in soil. RDX and HMX are not expected to be easily mobilized because of low precipitation and frozen conditions most of the year. Additionally, strong reducing conditions found in the soils of some wetland impact areas in Alaska readily degrade RDX and HMX (Collins 2003).

Munitions are fired from firing points downrange and into the range impact areas. The Army restricts access to these areas by Soldiers or members of the public because of the explosive risk to safety they represent. It is unlikely; therefore, that military personnel or off-post residents would come into contact with the constituents of these munitions in the downrange impact area soils. The risk to military personnel who use the ranges would be low because contact with downrange impacted soils is unlikely and there are relatively few areas with high chemical constituent concentrations. There would be no risk to the general public from munitions constituents related to range use because there would be no public access to these areas. Exposure to soil contaminants during live-fire training activities is considered a less than significant impact.

Volcanic and Seismic Hazards. Similar to cantonment and range construction, live-fire training is not expected to have any effect on the frequency of volcanic eruptions or earthquakes; therefore, the impact would be the hazards associated with the training occurring on ranges in areas in which volcanic and seismic hazards exist. The impacts associated with seismic and volcanic hazards during live-fire training are considered less than significant because existing warning systems are generally expected to provide

sufficient warning of an earthquake or eruption such that personnel and equipment would likely have time to evacuate.

5.3.2.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 5: Soil Erosion Resulting from Maneuver Training Activities: Maneuver training would occur at both FRA and DTA in existing maneuver areas. Alternative B would add SBCT maneuver training to the new ranges at FRA. Additionally, the frequency and intensity of small unit (squad and platoon) maneuver training at FRA would increase compared to the existing IBCT training. Currently, an SBCT is stationed at Fort Wainwright and trains at DTA, so Alternative B would just add additional SBCT troops and vehicle maneuver training there.

Mounted and unmounted maneuver training using Stryker vehicles is expected to damage or remove vegetation and disturb soils to an extent that would substantially increase soil erosion rates and alter drainage patterns in the training areas. This could lead to gullying, and indirectly to downstream sedimentation, particularly when the vehicles travel off-road. The Stryker vehicles are much heavier than IBCT vehicles, and there would be increased numbers of vehicles with conversion from IBCT training to SBCT training, which would likely cause greater surface disturbance for the off-road maneuvering. Unlike the existing IBCT maneuver training, however, SBCT vehicles typically travel more on roads than cross-country. IBCT maneuver training tends to cause additional surface disturbance during rotations than simply the vehicle traffic, because IBCT training has units bivouac and dig individual and unit fighting positions. SBCT training, because of the speed of the vehicles and ability to cover longer distances does not do much digging with regard to fighting positions. Overall, given the qualitative differences between the two units, surface disturbance between IBCT training and SBCT training is relatively comparable and both can lead to long-term significant soil erosion.

Stryker maneuverability on DTA was evaluated for the 2004 USARAK Transformation FEIS and the 2006 USAGAK BAX and CACTF FEIS and was summarized in Chapter 3. Current MIMs calculated for DTA were estimated at 86,000 annually. A SBCT would generate approximately 55,000 more MIMs than the IBCT it would replace, and increase of 111 percent. Approximately 14,000 of the MIMs would occur at FRA, and the remaining 41,000 would occur at DTA.

During summer months, the portion west of the Delta River is considered NO GO because of the lack of access across the Delta River. The areas east of the Delta River are more trafficable and the NO GO areas are the thick forests and wet areas along the floodplains of Jarvis Creek and the Delta River. There would be no SBCT maneuver impacts to these areas during summer months, as these areas would be either inaccessible or not used because of their NO GO classification.

There would be measurable and long-term impacts to unfrozen soils from Stryker vehicle use in low-lying areas along Jarvis Creek and other areas with poorly drained soils; however, the majority of DTA East is characterized by well-drained soils capable of supporting year-round Stryker vehicle use. Increased potential for wind and water soil erosion resulting from SBCT maneuver training would be a potentially significant impact caused by the ground disturbing activities.

Because training maneuvers in Alaska can be and often are conducted in the winter months in many areas that are normally not trafficable when unfrozen, increases in erosion resulting from training activities are likely to be less during winter months. Soil erosion impacts in the DTA and FRA maneuver areas are expected to be potentially significant during summer months, especially in localized lowland areas where soils tend to be fine-grained and wet, and less than significant during winter months where soils are

frozen (thus stronger) and protected by snow cover. Due to the large size of DTA and isolated distribution of permafrost and soils susceptible to erosion on DTA and FRA, overall, the impact is considered less than significant with implementation of mitigation.

Regulatory and Administrative Mitigation 5: Implementation of standard BMPs, as well as revegetation and other land restoration projects implemented by the LRAM, TRI, and SRA programs of the USARAK INRMP and ITAM annual work plan (described previously) would reduce these impacts to less than significant.

Additional Mitigation 5: The following additional mitigation measures would also help reduce the impact.

- Incorporate existing cleared areas into design of range facilities.
- Assess ground truth soil conditions for potential high-use maneuver locations.
- Conduct real-time analysis of ground conditions to support maneuver land use.

Impact 6: Soil Compaction, Rutting, and Impacts to Permafrost. Soils that are normally susceptible to compaction during summer months (silty, clayey, and/or wet soils) are usually frozen in winter months, and thus, are stronger and able to support the weight of Stryker vehicles. In areas of permafrost, however, winter training activities, regardless of frost depth, may damage vegetation in areas of low or inadequate snow cover, which could initiate melting of the permafrost and indirectly result in thermokarst in those sensitive areas. Impacts of compaction, rutting, and damage to permafrost from Stryker vehicle use would be significant on north-facing slopes in these areas. However, permafrost is found in isolated patches throughout DTA and FRA. Compared to existing IBCT Training, the impacts of compaction, rutting, and damage to permafrost from Stryker vehicle maneuver activities would not be substantially greater. Due to the large size of DTA and isolated distribution of permafrost and soils susceptible to compaction, rutting and damage to permafrost on FRA and DTA, overall the impacts are expected to be less than significant with implementation of mitigation.

Regulatory and Administrative Mitigation 6: Implementation of standard BMPs, as well as revegetation and other land restoration projects implemented by the LRAM, TRI, and SRA programs of the USARAK INRMP and ITAM annual work plan (described previously) would reduce these impacts to less than significant.

Additional Mitigation 6: The following additional mitigation measures would also help reduce the impact.

- Conduct permafrost mapping, sensitivity analysis, and model development.
- Study the effects of fire on active layer thickness and permafrost degradation on maneuver lands.
- Conduct real-time analysis of ground conditions to support maneuver land use.
- Prevent off-road vehicle traffic in high permafrost areas during summer months when the ground is thawed.
- Incorporate existing cleared areas into design of range facilities.

Impact 7: Increased Potential for Slope Failure. Impacts associated with increased potential for slope failure resulting from road use are expected to be similar to those discussed for the Alternative A. Areas of steep slopes and erosive soils on FRA and on DTA are located on steep slopes and erosive soils are located in the foothill areas of the Donnelly Drop Zone and North Texas Range.

Regulatory and Administrative Mitigation 7: Implementation of standard road maintenance BMPs mitigation measures described in the LRAM, TRI, and SRA programs of the USARAK INRMP and ITAM annual work plan would reduce these impacts to less than significant.

Less Than Significant Impacts

Volcanic and Seismic Hazards. Similar to cantonment and range construction, maneuver training is not expected to have any effect on the frequency of volcanic eruptions or earthquakes; therefore, the impact would be the hazards associated with the training occurring on ranges in areas in which volcanic and seismic hazards exist. The potential for strong ground motion at DTA is similar to FRA because the Denali Fault runs through the training area; however, the potential for damage resulting from earthquakes on DTA would be lower than at FRA, because of the significantly smaller number of structures and less human activity on DTA. The impacts associated with seismic and volcanic hazards during maneuver training would be less than significant because existing warning systems are generally expected to provide sufficient warning of an earthquake or eruption such that personnel and equipment would likely have time to evacuate.

5.3.3 WATER RESOURCES

Potential impacts to water resources resulting from Alternative B include impacts on stream channel morphology, surface water quality, and groundwater quality and supply. At FRA, impacts to surface water quality due to increased erosion and sedimentation related to training activities and construction of new facilities may result. Other impacts include impacts on water quality from spills and leaks, increased munitions use, and increased water use from added troops. At DTA, impacts to stream channel morphology and water quality due to increased erosion and sedimentation related to training activities, and impacts to water quality from accidental spills and leaks may occur. All of these potential impacts are considered less than significant (**Table 5-21**).

Table 5-21 Summary of Potential Water Resource Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.3.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Nonpoint source contamination of surface water: Implementation of this alternative would require construction of additional motorpool parking at FRA. Construction activities could result in short-term, localized increases in erosion and runoff. Use of heavy construction equipment would cause compaction

of near surface soils that could result in increased runoff and increased sedimentation. Clearing and grading during construction would expose the soils to erosion. However, impacts to surface water are expected to be less than significant. Construction activities at FRA would also include increased overland flow and runoff and consequently decreased percolation to groundwater. These impacts are also expected to be less than significant. Engineering controls and BMPs, including the SWPP Plan, would be used to minimize these potential impacts during construction.

Impacts on Water Use: Overall water use on FRA would increase under this alternative. The added personnel represent a 16 percent increase over the current population. Due to the quantity of water available, the increase on water use is not expected to have a significant effect on water availability in the area. The current water supply is expected to meet the increase in demand.

Flood Potential: There could also be adverse impacts to flood-prone areas if construction of permanent facilities occurs within flood-prone areas. To avoid adverse impacts, new facilities would be located to the extent practicable outside of known flood-prone areas.

Potential Impacts of Spills of Hazardous Materials: Construction of new facilities would temporarily increase the use of fuels, solvents, and other hazardous and toxic substances, which could result in indirect impacts to surface and/or groundwater if accidentally released into the environment. FRA has implemented BMPs, an SPCC, and an SWPPP to address leaks or spills of hazardous materials. With these established measures, impacts are expected to be less than significant.

5.3.3.2 Impacts from Range Construction

Less Than Significant Impacts

Nonpoint source contamination of surface water: Construction activities could affect surface water by localized increases in erosion and runoff. Potential impacts would include increased overland flow and runoff and decreased percolation to groundwater. These impacts are expected to be less than significant. Engineering controls and BMPs, including the SWPP Plan, would be used to minimize these potential impacts during construction.

Potential Impacts of Spills of Hazardous Materials: Construction and operation of new facilities would increase the use of fuels, solvents, and other hazardous and toxic substances, which could result in indirect impacts to surface and/or groundwater if accidentally released into the environment. The Army has implemented BMPs, an SPCC, and an SWPPP to address leaks or spills of hazardous materials. With these established measures, impacts are expected to be less than significant.

5.3.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Nonpoint source contamination of surface and groundwater: The projected increase in munitions use could lead to increased localized sediment loads and concentrations of ordnance constituents in impact area waterways. Introduction of chemical constituents used in live fire training could also impact groundwater through leaching and percolation, as the depth to groundwater ranges from near surface in some areas to 200 feet below ground surface at FRA. However, the munitions constituents would be identical to those currently in use. Studies have shown that these constituents degrade rapidly over time and distance from point of impact, so environmental effects on groundwater would be limited (Houston 2002; Ferrick et al. 2001). Consequently, impacts are expected to be less than significant.

Increased training levels would increase the use of fuels, solvents, and other hazardous and toxic substances, which might result in indirect impacts to surface and/or ground water if accidentally released into the environment. USARAK would implement BMPs and SPCC to address leaks or spills of hazardous materials. Impacts are expected to be less than significant.

The following measures already implemented, and would continue to protect water resources from potential nonpoint source impacts resulting from live fire training:

- Continue to implement the latest Integrated Natural Resources Management Plans, including institutional controls and training programs for troops, to reduce or eliminate the risk of inadvertent petrochemical releases that could affect groundwater (USARAK 2002d,e). These describe specific actions to preserve healthy surface and groundwater resources.
- Monitor USARAK water resources within the monitoring program. This would provide a baseline for surface water conditions and updated baseline for groundwater changes or impacts.
- Modify current practices to reduce firing high-explosive munitions into active river channels. Firing only into abandoned channels and banks would reduce the direct impact of munitions on waterways including munitions constituents and sedimentation.
- Place new targets farther away from open waterways. Providing distance between waterways and targets would reduce the direct impact of munitions on waterways including munitions constituents and sedimentation.
- Promote vegetated buffer zones between small arms range footprints and lakes and streams. Vegetated buffer zones intercept runoff from the ranges, trapping sediment that can contain dissolved and particulate metals.
- Impacts from spills would be addressed effectively through the Spill Prevention Control and Countermeasure Plan and standard procedures, including training personnel in spill prevention and control techniques and requirements.

Flood Potential: Personnel and equipment could be affected by floodwaters when training in flood-prone areas. The safety of troops and equipment is a priority during training, and training procedures direct that troops relocate away from flood-prone areas when conditions are favorable for flooding. Consequently, the impacts are expected to be less than significant.

The Jarvis Creek Flood Control Project as detailed in the 2006 Memorandum of Agreement between the City of Delta Junction and USARAK, would be implemented. This flood control project would construct a dike in DTA East that would direct floodwaters back into Jarvis Creek.

5.3.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Nonpoint source contamination of surface and groundwater: Maneuver training of an SBCT may lead to increased sedimentation due to the frequency and intensity of maneuver training. However, given the extensive existing trail system, and that no new off-road maneuver areas would be created, impacts are expected to be less than significant.

Increased maneuver training activities could have impacts on soil compaction and overland surface flow. Bank-side erosion is also expected to occur from both non-winter stream crossings as well as at ice bridge approaches. Sedimentation would increase over background levels, and localized changes to stream width

could occur, particularly at the crossing points. Sedimentation impacts would be less than significant due to the high base levels of sediment in area waterways.

Increased maneuver training with the Stryker is expected to lead to increased maneuver impacts. This would lead to soil compaction and overland surface flow, which in turn may reduce percolation and groundwater recharge. However, these impacts are expected to be less than significant.

Increased maneuver training at FRA and DTA would increase the use of fuels, solvents, and other hazardous and toxic substances, which might result in indirect impacts to surface and/or groundwater if accidentally released into the environment. However, implementing BMPs including SPCC would minimize potential impacts resulting from leaks or spills of hazardous materials. Impacts are expected to be less than significant.

The following measures already implemented would continue to protect water resources from potential nonpoint source impacts resulting from maneuver training:

- Maintain protective buffer zones along some waterways to reduce maneuver impacts. Buffer zones would reduce vegetation loss and sediment transport from areas directly adjacent to waterways, and would also reduce the deposition of fugitive dust, petrochemicals, and other chemicals resulting from maneuvers.
- Harden approaches to fords and ice bridges on anadromous creeks and rivers within training areas. Ensure that crossing would occur only at these approaches. Hardened approaches would reduce the amount of bank-side erosion and sedimentation occurring at crossing points.
- Rehabilitate maneuver trails and areas on a rotational basis to allow the freeze and thaw process to eliminate compaction and reduce the chance of channelized flow. Allowing an undisturbed freeze/thaw cycle would alleviate compaction on trails and reduce overland flow into nearby waterways.
- Impacts from spills would be addressed effectively through the Spill Prevention Control and Countermeasure Plan and standard procedures, including training personnel in spill prevention and control techniques and requirements.

Flood Potential: Personnel and equipment could be affected by floodwaters when training in flood-prone areas. The safety of troops and equipment is a priority during training, and training procedures direct that troops relocate away from flood-prone areas when conditions are favorable for flooding.

5.3.4 WILDFIRE MANAGEMENT

Table 5-22 lists the types of impacts associated with wildfire management that would occur under Alternative B. General descriptions of the impacts are also provided. Cantonment and range construction would not impact wildfire risk. Live-fire training would increase both the number of Soldiers and the number of rounds fired. This would create a significant wildfire risk. Maneuver training at FRA and DTA, particularly small unit training, would increase. Since there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species or known or unknown cultural resources, the Army has made a conservative determination that although the mitigation will considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level. Implementing fire management plans written by USARAK and the BLM Alaska Fire Service, and continued fuel management projects will substantially reduce the impact, but not to less than significant.

Table 5-22 Summary of Potential Impacts to Wildfire Management from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-Fire Training	⊗	⊗
Impacts from Maneuver Training	⊗	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.3.4.1 Impacts from Cantonment Construction

No Impacts

Permanent stationing of the 2/25th SBCT at FRA would slightly increase the overall population with the addition of Soldiers, their families, and support personnel. Minor cantonment construction of a larger motorpool would be required. Construction would temporarily increase human presence and activity at construction sites. This increase is not expected to impact the risk of accidental wildfire ignition because fires at FRA are quickly identified and extinguished. No cantonment construction would be necessary at DTA; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from cantonment construction.

5.3.4.2 Impacts from Range Construction

No Impacts

Constructing and upgrading ranges at FRA would temporarily increase human presence and activity at construction sites. This increase is not expected to impact the risk of accidental wildfire ignition because fires at FRA are quickly identified and extinguished. No range construction would be necessary at DTA; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from range construction.

5.3.4.3 Impacts from Live-Fire Training

Significant Impacts

Impact 1: Increased Wildfire Risk. A larger number of Soldiers would use existing and newly constructed ranges for live fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. An increased risk of accidental wildfire ignition would come from ordinance, vehicles, flammable materials, and cigarettes. Reclassification of fire management options may occur as needed to ensure fire management meets anticipated changes in wildfire risk. Prescribed burning resulting from any management prescriptions would create short-term adverse impacts to air quality and would require a permit. With implementation of the mitigation measures below, fire risk would be reduced, but the impacts of a wildfire would remain significant.

Regulatory and Administrative Mitigation 1: Areas most likely to be affected by wildland fire are adjacent to those areas that are used for live-fire training. Mitigation measures are designed to prepare the landscape for impending wildfires. Patches of thinned trees and controlled burns in high-risk areas may slow wildfire intensity and speed.

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Use the fire index in cooperation with BLM.
- Coordinate live-fire training exercises when fire weather and indices are low to help prevent the spread of wildfire.
- Avoid ordnance use during periods when weather and fuels conditions are conducive to quick fire starts and spreading.
- Continue to update and implement fire management plans written by USARAK and the BLM Alaska Fire Service for each installation. The plans assess current fire hazards and list recommendations to reduce them.
- Maintain existing firebreaks on USARAK lands, including on the southern end of Main Post, from the Richardson Highway to Jarvis Creek on DTA.
- Comply with existing range regulations and restrictions (USARAK Regulation 350-2).
- Follow existing range guidelines to prevent wildfires.

Additional Mitigation 1: Some USARAK projects and programs already propose measures that would mitigate many impacts to fire management. These programs are only partially implemented and funded. The proposed mitigation is, therefore, to fully implement plans and projects that have already been identified by USARAK's INRMPs. Additional possible mitigation measures are listed below.

- Review access to firing ranges to enable quick and effective response by initial attack forces in the event of a wildfire.
- Conduct prescribed burning. This would be considered as an option where grass is the primary fuel type. Burning may be done every 1 to 3 years depending on fuel load and conditions. This would increase user days for the Army with a lower risk of wildfire.
- Locate operational areas within hardwood forests (i.e., not in black spruce) to minimize the risk of wildfire.
- Create defensible space around existing and new structures. This would be done by clearing fuels around new structures and facilities to reduce the threat to structures.
- Station an additional USARAK wildland fire crew at Fort Wainwright. The crew would accompany troops that train DTA during high fire danger and would provide immediate wildfire suppression. During times of low fire risk, the fire crew would conduct needed hazard fuel reduction projects near military structures and on ranges.
- Fire mitigation measures detailed in the MOA between the City of Delta Junction and USARAK would be implemented. These include creation and/or maintenance of fuel breaks and clearings, restricting BAX/CACTF use during fire season unless additional fire crew are on hand, firefighting equipment upgrades, and restricted use of certain munitions under elevated fire risks.

5.3.4.4 Impacts from Maneuver Training

Significant Impacts

Impact 2: Increased Wildfire Risk. Maneuver training would occur at both FRA and DTA, and would have similar impacts at each location. Brigade-, battalion-, and company-level training would occur at DTA, and the frequency of maneuver training at DTA is not expected to increase above existing levels. Platoon-level and smaller training would occur at FRA, and would increase in frequency. Munitions use is not part of maneuver training, so the risk of wildfire ignition is from vehicle use and human activity. The inherent minor risk of accidental ignition of SBCT maneuver training is expected to be similar to the existing IBCT maneuver training. However, SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently. These areas may not have been managed to reduce wildfire risk or have been incorporated into fire management strategies.

Mitigation 2: Implementation of mitigation measures described above under Live-Fire Training would reduce the risk of wildfire from maneuver training, but the impacts of a wildfire would remain significant.

5.3.5 CULTURAL RESOURCES

Impacts to cultural resources would result from demolition or renovation of existing facilities, construction of new facilities, operation and maintenance of facilities, road and trail construction, road use, and training activities. The stationing of the SBCT in Alaska would result in an overall increase in the extent and intensity of these activities, and increased potential for impacts to archaeological sites, historic buildings and structures, and PRTCSs. There is a possibility the proposed action would impact known or unknown cultural resources, an impact that cannot be mitigated to less than significant. **Table 5-23** summarizes the types of impacts to cultural resources that would occur under Alternative B.

Table 5-23 Summary of Potential Cultural Resources Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊗	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊗	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Impacts on cultural resources including historic structures, prehistoric and historic archaeological sites, and PRTCSs could include intrusion of new buildings or structures that are not consistent with the historic characteristics of a historic site or district, renovation or demolition of historic buildings, ground disturbance at archaeological sites, removal of objects or artifacts from eligible sites, increased access to archaeologically sensitive areas, or restriction of access to sacred sites. The overall increase in traffic and use could result in accelerated disturbance and degradation. New training ranges would be required on FRA. Increased frequency and intensity of training would result in more extensive and more frequent damage to cultural resources. New systems and equipment, including eight-wheeled Stryker vehicles,

would entail the use of more extensive areas during maneuver training, resulting in more damage to cultural resource sites. However, Stryker vehicle exercises tend to focus more on rapid deployment and remain on existing roads than training with conventional vehicles. Management activities, land stewardship, policy and programs implementation are expected to improve data collection and management and improve the protection and enhancement of cultural resources.

5.3.5.1 Impacts from Cantonment Construction

Less Than Significant

There is a potential for less than significant impacts to known historic buildings or structures from cantonment construction on FRA. Past historic building surveys and ongoing studies of Cold War-era historic buildings on FRA have identified buildings that may contribute to a historic area. There are currently no plans for demolition, renovation, or construction on the cantonment that would impact Cold War-era buildings that may be eligible for the NRHP.

An ICRMP has been implemented for FRA. The goals of this ICRMP are to comply with federal laws and regulations for the treatment of cultural resources, inventory and evaluate cultural resources in USARAK administered areas, minimize impacts on eligible cultural resources, streamline consultation processes, and consider outside interests, including those of Alaskan Natives, local governments, and public groups. The ICRMP provides clear guidance on the best methods for compliance with cultural resources management responsibilities. The ICRMP establishes priorities and standards for historic surveys to identify and evaluate resources that may need to be protected. The ICRMP also specifies standards and guidelines for the preservation and mitigation of eligible cultural resources. Each ICRMP includes SOPs for Section 106 consultation, compliance with ARPA, accidental discoveries, demolition of historic buildings and structures, rehabilitation and maintenance of historic buildings, cultural resources contracting, coordination with the public and interested parties, and other key procedures. Each installation is responsible for appointing a CRM who is responsible for ensuring that cultural resources are taken into consideration in all projects and for interaction with the public. Preferred measures are the avoidance of sites and the mitigation of adverse effects to sites. If eligible sites cannot be avoided, they are to be treated and documented in accordance with appropriate standards.

5.3.5.2 Impacts from Range Construction

Significant Impacts

Impact 1: Impacts to cultural resources: There would be limited construction of new training ranges on FRA. Range construction would occur in existing ranges areas that been surveyed for cultural resources. SOPs and guidance in the ICRMP would be followed to identify, evaluate, and protect cultural resources. Should modification and upgrading of existing ranges require disturbance of areas not surveyed for cultural resources, the appropriate surveys would be conducted. Range construction involves grubbing vegetation, grading site surfaces, excavating subsurface, and moving heavy construction equipment. All of these activities, particularly excavation, could result in direct damage to or destruction of archaeological resources. Destruction, damage, or restricted access to previously unknown properties of traditional importance could occur. Mitigation measures would minimize impacts to cultural resources; however, the loss of cultural resources is considered a significant impact.

Regulatory and Administrative Mitigation 1: ICRMPs have been implemented for FRA and Fort Greely (DTA). The goals of these ICRMPs are to comply with federal laws and regulations for the treatment of cultural resources, inventory and evaluate cultural resources in USARAK administered areas, minimize impacts on eligible cultural resources, streamline consultation processes, and consider outside interests,

including those of Alaskan Natives, local governments, and public groups. The ICRMPs provide clear guidance on the best methods for compliance with cultural resources management responsibilities. The FRA ICRMP applies a cultural landscape planning approach recognizing the complexity of cultural interaction with the terrain. The ICRMPs have established priorities and standards for archaeological and historic surveys to identify and evaluate resources that may need to be protected. The ICRMPs also specify standards and guidelines for the preservation and mitigation of eligible cultural resources. Each ICRMP includes SOPs for Section 106 consultation, compliance with ARPA, accidental discoveries, demolition of historic buildings and structures, rehabilitation and maintenance of historic buildings, cultural resources contracting, coordination with the public and interested parties, and other key procedures. Each installation is responsible for appointing a CRM who is responsible for ensuring that cultural resources are taken into consideration in all projects and for interaction with the public. Preferred measures are the avoidance of sites and the mitigation of adverse effects to sites. If eligible sites cannot be avoided, they are to be treated and documented in accordance with appropriate standards.

The locations of eligible cultural resources or areas considered likely to contain eligible cultural resources are designated as sensitive areas, and access to or use of these areas is restricted and monitored. There would be regular monitoring of known sites by cultural resource personnel after training activities to identify any impacts and adjust protection if needed. Impacts to archaeological sites can be avoided or mitigated through an approved treatment plan in compliance with the ICRMP. In accordance with the ICRMP, if sites cannot be avoided, appropriate mitigation measures that may include data recovery would be implemented. Any construction or maintenance that entails ground disturbance would also be monitored, and any discovery of undocumented cultural resources or human remains would be treated in accordance with the inadvertent discovery plan in the ICRMP and with NAGPRA. USARAK would continue to engage with federally recognized tribes in Alaska to address their concerns with Army managed lands.

5.3.5.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Impacts to cultural resources: The stationing of the 2/25th SBCT at FRA would entail use of new training ranges, an increased intensity of use of existing ranges, and use of new weapons. There would be no appreciable change in live-fire training. Existing ranges have been surveyed for cultural resources and measures are in place to monitor impacts to these resources. An increase in live-fire training would occur, and the resulting impacts from increased risk of wildfire are presented in Section 5.3.4.

5.3.5.4 Impacts from Maneuver Training

Significant Impacts

Impact 2: Impacts to cultural resources: Potential significant impacts from maneuver training would be the most widespread impacts associated with the SBCT. The SBCT would perform qualitatively different maneuver training over larger areas than current IBCT maneuver training. However, the impacts would be similar to those of an exiting SBCT at Fort Wainwright. Current maneuver training areas would be used. The SBCT would use existing trails more than the IBCT, but maneuvers would extend over larger training areas. The SBCT has more and heavier vehicles, but is less likely to go cross-country. The SBCT is also more mobile and creates less ground disturbance for bivouacs and fighting positions. The potential for significant impacts to cultural resources from maneuver training is greater with the SBCT compared to an IBCT because of the more expansive training exercises.

To date, only six archaeological sites have been reported on FRA. None of these sites is recommended as eligible for the NRHP, and there is a low potential for minor impact to known sites. Most of the archaeological surveys that have been completed on DTA have been in DTA East. Archaeological surveys conducted in 2002 identified a large number of sites near the kettle lakes to the east and west of the Richardson Highway on DTA East. Collectively, these sites form archaeological districts that are potentially eligible for the NHRP. Including the results of surveys completed in 2004 and 2005, there are now 380 reported sites on DTA and near the Fort Greely cantonment. Most of these sites (274) are recommended eligible for the NRHP or need to be evaluated. The same kettle lake topography that is present on portions of DTA East is also present on DTA West, and initial surveys of this area indicate the potential for a large concentration of sites. Systematic cultural resource surveys of DTA are ongoing. The potential is high for undiscovered resources in areas that have not been surveyed. Increased traffic and increased training activities could impact many of these sites. Maneuver training could result in the destruction or damage to previously unknown properties of traditional importance, an impact that cannot be mitigated to less than significant.

Regulatory and Administrative Mitigation 2: Mitigation measures presented for impacts from range construction would reduce the potential to impact cultural resources. However, impacts to unknown resources could occur, resulting in a significant impact.

5.3.6 LAND USE AND RECREATION

Table 5-24 summarizes the potential impacts to land use, including recreation and subsistence activities, under implementation of Alternative B. No land acquisition would be required and the proposed project activities would be located on land within the existing Army installations. No agricultural land would be converted to training land under this alternative. Impacts to land use and recreation would be less than significant. Measures would be implemented to minimize impacts as summarized in the following sections.

Table 5-24 Summary of Potential Land Use and Recreational Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.3.6.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Impacts on land use. During construction, existing land uses (including recreation and hunting) in the vicinity of the cantonment area may be temporarily affected. Construction would indirectly affect nearby

land uses because of increased noise, dust, odors, adverse effects on public views, and human presence and activity near the construction sites. These impacts would be localized (within the FRA installation), temporary, and less than significant. No mitigation is necessary for impacts from cantonment construction.

Impacts to existing land uses and recreational resources or conflicts with land use or resource management plans or policies. The proposed construction project would be located within areas of the FRA installation that are not currently used for recreational or subsistence activities. Overall impacts to land uses, including recreational and subsistence activities, are expected to be less than significant. No mitigation is necessary.

No cantonment construction would be necessary at DTA; therefore, impact analysis is not applicable. No mitigation is necessary for impacts from cantonment construction.

5.3.6.2 Impacts from Range Construction

Less Than Significant Impacts

Impacts on land use during construction activities: New ranges would be constructed or upgraded at FRA, wholly within lands previously used for Army activities. During range construction, UXO and lead could be encountered. Construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from this project. Although UXO presents a potential for significant impact, the Army would follow proper abatement techniques, which would ensure this impact remains at less than significant. In addition to these mitigation measures, the Army would continue to educate Soldiers on how to identify UXO and the proper safety procedures for handling UXO. Continued implementation of standard Army regulatory and administrative requirements, would keep this impact to less than significant.

Conflicts with existing land uses and recreation resources or conflicts with land use or resource management plans or policies. During construction, nearby on-post land uses may be indirectly affected by noise, dust, and the sight of equipment and human activities. However, these impacts would be localized and temporary, and are expected to be less than significant. No mitigation is necessary for impacts from range construction.

No range construction would be necessary at DTA; therefore, impact analysis is not applicable.

5.3.6.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Impacts to existing land uses and recreational resources or conflicts with land use or resource management plans or policies. Under implementation of this alternative, additional live-fire training would occur as a result of an increased number of Soldiers training at both existing and new ranges at FRA and DTA. In addition, new weapons would be used and the use of large caliber munitions would increase. SBCT training would result in an increased number of rounds fired as well as increased vehicular traffic. Increased noise, dust, or other indirect effects associated with this alternative are not expected to affect off-post land uses. The surrounding areas are uninhabited federal lands and no residential areas, schools, hospitals, or businesses are expected to be affected. These impacts would be localized to the vicinity around the ranges and are expected to be less than significant. No mitigation is necessary.

5.3.6.4 Impacts from Maneuver Training

Less Than Significant Impacts

Impacts to existing land uses and recreational resources or conflicts with land use or resource management plans or policies. Maneuver training would occur at both FRA and DTA. Except for the differences described below, SBCT training would have similar impacts as current IBCT training at each location. Company-level and larger training would occur at DTA, and the frequency of maneuver training at DTA is not expected to increase above existing levels. Platoon-level and smaller training would occur at FRA, and would increase in frequency. Munitions use is not part of maneuver training; however, SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently. Implementation of this alternative would result in an increase in the frequency of training area closures at FRA, and a larger area would be used for maneuver training at DTA. Impacts associated with public access closures are expected to be less than significant because alternate areas on USARAK lands would still be available for recreational and subsistence activities.

SBCT training on lands currently used for training. The Army may use more land area for maneuver training. Increased training and the use of Stryker vehicles could degrade training lands and affect the long-term availability of training lands for military use. Because Stryker vehicle exercises tend to remain on existing roads, impacts to training lands are expected to be less than significant. The regulatory, administrative, and additional mitigation measures described below are currently in place and are continually revised and reviewed to respond to new or increasing impacts to land uses and recreation resources.

Training Impacts to Surrounding Land Use. Noise levels would increase from increased weapons training and the use of Stryker vehicles, but these effects would be localized and temporary during training. Increased noise, dust, or other indirect effects associated with this alternative are not expected to affect off-post land uses. The surrounding areas are uninhabited federal lands and no residential areas, schools, hospitals, or businesses are expected to be affected. These impacts would be localized and temporary during training activities and are expected to be less than significant. No mitigation is necessary.

The following measures are currently in place and are continually revised and reviewed to respond to new or increasing impacts to land uses and recreation resources.

- Continue to implement Range Development Plan, involving maintenance projects on all firing ranges such as target repair and replacement, target mechanism maintenance and repair, and maintenance of range buildings.
- Continue to implement ITAM Work Plan. The ITAM Work Plan includes projects to repair and revegetate maneuver land. Repair and revegetation improves the condition of the land and raises the land condition measurement. The ITAM work plan includes projects that help to match training requirements with capabilities of maneuver land, reducing impacts on sensitive habitats. Environmental awareness projects educate Soldiers to minimize unnecessary damage. The ITAM Work Plan also includes projects to assess the condition of the land through monitoring.
- Continue to implement INRMPs. The INRMPs contain projects designed to provide environmental stewardship and mitigate impacts from military training. Erosion control projects reduce the impacts from erosion. Soil and water quality monitoring protocols to detect the migration of contamination from impact areas are currently being developed at DTA.
- Continue environmental, conservation, and cultural resources management programs.

- Continue to implement recreational vehicle use policies, per the most recent INRMPs. The INRMPs lay out specific actions to maintain and improve public access and recreation opportunities on USARAK lands.
- Continue to implement USARTRAK automated check-in phone system. This would provide information regarding daily closures and should greatly simplify the public access process.
- Continue to streamline public access to USARAK lands through the Recreational Access Permit.
- Maintain the extended 2-year renewal duration on the DTA Recreational Access Permits. A two-year permit duration would simplify public access to USARAK lands.
- Continue or increase hunter safety education courses and work with ADFG to provide educational opportunities on USARAK lands. Hunter safety courses and educational opportunities would allow USARAK to better and more safely manage its lands for a wide range of public uses.
- Monitor recreational usage of each training area through the USARTRAK phone system. This would inform USARAK and ADFG about use patterns, which should help to improve management for public access and recreation.

Some programs already propose measures that would mitigate many impacts to USARAK land uses and recreation resources. These programs are only partially implemented and funded. The proposed mitigation for Alternative B is to implement fully plans and projects that have already been identified by USARAK's INRMPs and other plans.

- Implement a Training Area Recovery Plan. This would ensure sustainability of training areas.
- Implement the Range and Training Land Development Plan, ITAM Work Plan, Environmental Management Systems, the INRMP, Integrated Cultural Resources Management Plan, ecosystem management program, and sustainable range program.
- Conduct a detailed study to assess the impacts of recreational vehicles on USARAK lands. This would support USARAK's long-term recreational management plans.
- Build kiosks at all primary entrances to recreational areas on USARAK lands and provide visitors maps and information geared towards that area. Information kiosks can assist users to quickly identify areas designated for recreational use, as well as the times and locations of military activities.
- Monitor recreational impacts on stocked lakes and streams, and upgrade access and recreational opportunities when needed. Improved monitoring of and access to stocked lakes would allow USARAK and ADFG to better manage the stocked lakes program on Army lands.
- Fully fund conservation officers to enforce state and federal game laws and military rules and restrictions.

5.3.7 TRAFFIC AND TRANSPORT

Table 5-25 summarizes the potential impacts to traffic and transportation resources under implementation of Alternative B. The 2/25th SBCT would be stationed at FRA and would convoy to DTA for some training exercises. Traffic would increase from additional Soldiers and their families relocating to FRA, from convoys traveling from FRA to DTA for training exercises, and from construction activities. Mitigation would be implemented to minimize impacts as summarized in the following subsections.

Table 5-25 Summary of Potential Traffic and Transport Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.3.7.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Construction Traffic. The proposed cantonment construction at FRA would generate additional traffic from worker vehicles and trucks. Minor changes in traffic volumes adjacent to the individual projects at FRA may occur because of changed traffic patterns. However, these traffic changes would generally be redistributions of existing traffic within the FRA property. There would be minimal changes to traffic patterns or flows on public roads outside the FRA property. Construction traffic impacts to public roadways would be temporary and are expected to be less than significant.

Intersection and Roadway Segment Operations. Slightly increased traffic volumes on public roads would occur; however, this would represent an increase of less than 1 percent in the regional population. Impacts to traffic on FRA and public roadways are expected to be less than significant.

Parking. Implementation of Alternative B would result in a small increase in personal vehicle parking demand because of additional personnel stationed at FRA. Parking impacts are expected to be less than significant. There would be a shortfall in motorpool parking, necessitating the expansion of the existing motorpool parking area. Construction of additional motorpool parking prior to the permanent stationing of the 2/25th SBCT would avoid any parking conflicts within the cantonment area.

5.3.7.2 Impacts from Range Construction

Less Than Significant Impacts

Traffic would increase slightly during construction and upgrading of two new ranges at FRA. Traffic impacts associated with intersection operations and roadway segments, as well as parking impacts, are expected to be less than significant. No range construction would be necessary at DTA; therefore, the impact analysis is not applicable.

5.3.7.3 Impacts from Live-Fire Training

Less Than Significant Impacts

SBCT training would result in an increased number of Soldiers training at all ranges. Traffic would increase slightly because a greater number of Soldiers would use the existing and newly constructed ranges at FRA for live fire training; however, traffic impacts associated with intersection operations and roadway segments, and parking are expected to be less than significant. The BAX at DTA would be used more frequently, but not above operating parameters. No mitigation is required for traffic impacts from live-fire training.

5.3.7.4 Impacts from Maneuver Training

Less Than Significant Impacts

Impact 1: Intersection Operations. Maneuver training would occur on both FRA and DTA. The frequency of maneuver training would increase at FRA; however, any traffic impacts would be limited to travel routes within FRA, and are not expected to impact off-post traffic significantly. The frequency of maneuver training at DTA would not increase above current conditions. Convoys would travel approximately 225 miles from FRA to DTA two to three times per year.

The 2/25th SBCT would primarily use Glenn and Richardson Highways to deploy Soldiers from FRA to DTA. Convoys traveling from FRA to DTA for maneuver training would use and cross public roadways. Military vehicle convoys would include a maximum of 317 Stryker vehicles; however, fewer wheeled support vehicles and tracked vehicles would be used for SBCT training compared to the current IBCT training. Because the frequency of convoys between FRA and DTA is not expected to increase under this alternative, impacts to traffic at the crossings of public roadways are expected to be less than significant.

The following measures are currently in place, and are continually revised and reviewed to respond to new or increased impacts.

- Split convoys into smaller vehicle groups and stagger departure times, per AR 55-2. Splitting convoys into smaller, separated fragments eases traffic congestion problems.
- Continue to provide portable containment systems for use at in-field refueling points that would be capable of containing potential fuel releases from fuel tanker vehicles. This would minimize the risk of area contamination from inadvertent petrochemical release.
- Continue convoy permitting process with ADOT and Public Facilities.

Additional measures to reduce impacts include considering alternate travel routes and methods for military convoys, including line haul, airlift, and rail if available, and expanding public notification of imminent convoy activity, including specific days of convoy activity. This would allow the public to avoid highway travel concurrent with military convoys.

Roadway Segment Operations. The use of Army vehicles on public roads could increase the risk of accidents and lengthen vehicle drive times on local highways. The potential for vehicular accidents would increase as the number of vehicles using Alaskan roadways increases, especially during hazardous driving conditions.

Deployments from FRA to DTA for training purposes would not increase in frequency compared to current conditions; however, convoys are still likely to result in traffic delays on roads and highways,

particularly along the Glenn and Richardson Highways. Highway speed for a military convoy is not expected to exceed 40 to 45 mph (USARAK 2006). There would be a disparity between convoy speed and the current civilian highway traffic speed limit of 55 mph.

Winter and spring convoys are expected to have a greater impact due to hazardous driving conditions or possible roadway degradation. Summer convoys would exacerbate tourist season traffic loads. Congestion on Glenn and Richardson Highways could affect both recreational and commercial drivers as a result of increased time spent in traffic. Indirect impacts associated with convoys would include increased noise near Glenn and Richardson Highways and in the Delta Junction area. Traffic impacts are not expected to differ from existing conditions.

To minimize traffic impacts, large convoys would be segmented to reduce impacts to traffic on the public roads. Under USARAK BMPs, convoys would be broken into groups of no more than 20 vehicles (USARAK 2006). These groups are then separated by 30-minute gaps between departures to minimize traffic impacts on public highways. Traffic impacts could also be minimized by public announcement of scheduled deployments.

Roadway Segment Operations. Maneuver training at DTA property would not increase in frequency; however, Stryker vehicle exercises tend to remain on existing roads compared to training with conventional vehicles and would likely require the use of more extensive areas during maneuver training compared to current training activities at DTA. Therefore, the use of Stryker vehicles in the training areas could result in degradation of the roads within the DTA property as a result of additional traffic on the installation roads.

5.3.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Table 5-26 summarizes the potential impacts to socioeconomic resources, environmental justice, and the protection of children under implementation of Alternative B. Mitigation would be implemented to minimize impacts as detailed in the following subsections.

Table 5-26 Summary of Potential Impacts to Socioeconomic Resources, Environmental Justice, and Protection of Children from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

This section analyzes the potential impacts to socioeconomics, environmental justice, and protection of children. This alternative includes additional Soldiers, facilities, and equipment at FRA and maneuver training at both FRA and DTA. **Table 5-27** summarizes the EIFS Construction Model Output for FRA. The proposed activities at DTA would be limited to live-fire and maneuver training and training

modifications; therefore, there would be no impacts to population, employment, income, housing, or schools.

Table 5-27 EIFS Construction Model Output for Fort Richardson, Alaska

Indicator Variable	Project Change	Percent Change	RTV
Direct sales volume	$6,565,568		
Induced sales volume	$12,671,550		
Total sales volume	$19,237,110	0.07%	-4.05 % to 5.56%
Direct income	$20,597,860		
Induced income	$2,637,882		
Total income	$23,235,740	0.15%	-3.69 % to 5.55%
Direct employment	601		
Induced employment	84		
Total employment	685	0.17%	-3.98 % to 3.98%
Local population	1387		
Local off-base population	693	0.2%	-1.6 % to 3.13%

Note:
These analyses indicate that the changes in sales volume (0.07 percent), income (0.15 percent), employment (0.17 percent), and population (0.2 percent) are well within the respective RTVs of 5.56 percent, 5.55 percent, 3.98 percent, and 3.13 percent.
Source: EIFS Model 2007

5.3.8.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Population: Implementation of Alternative B would result in a slight increase in population because of additional Soldiers stationed at FRA, resulting in a less than 1 percent change to the total population. This change would be within the historic RTV range for the ROI and would be less than significant.

Economy. A number of construction projects would occur at FRA, resulting in a short-term increase in business sales volume. This change would be within the historic RTV range for the ROI and would be less than significant.

Employment. There would be a slight increase in employment as a result of both military employment and construction employment. The increase in employment would be within the historic RTV ranges for the RIO and would be less than significant.

Income. Implementing this alternative would result in a slight increase in income for the ROI. This change would be within the historic RTV range for the ROI and would be less than significant.

Housing. The increase in military population at FRA would cause a slight increase in the demand for housing. The existing housing areas on FRA include 1,435 units and on-post housing construction and renovation is planned to occur through 2021. If on-post cannot meet the demand for housing under this alternative, the Anchorage rental market is expected to absorb the additional housing demand easily. The available housing stock near FRA would accommodate the demand for housing associated with this alternative. Impacts to the availability and cost of housing would be less than significant.

Schools. A small increase in enrollment would occur for the schools servicing FRA as a result of the additional personnel stationed at FRA. Long-term adverse effects on schools serving FRA are expected.

The impacts associated with enrollment of additional students would vary with the school, but impacts are expected to be less than significant.

Environmental Justice. Additional construction would occur at FRA. As described in Section 3.3.7, the 2000 Census data indicated that the population near FRA (Matanuska-Susitna Borough) had a lower percentage of minorities and a slightly higher percentage of people living below the poverty level compared to Anchorage. No minority or low-income populations would be displaced by the proposed new construction, but indirect effects, such as increased noise, fugitive dust, or traffic from construction, could have indirect adverse effects on off-post properties. The areas that would be affected are primarily uninhabited federal lands. Under implementation of this alternative, there would be no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. No construction projects would take place near schools, day care facilities, or other areas with large populations of children; however, indirect effects, such as increased noise, fugitive dust, or traffic from construction, could have indirect adverse effects on nearby schools or residences. Increased noise and fugitive dust associated with proposed construction activities would be localized and temporary. No adverse effects to the protection of children are expected under this alternative. No cantonment construction would occur on DTA; therefore, impact analysis is not applicable.

Measures to minimize potential socioeconomic and environmental justice (minority, low-income and subsistence populations) impacts further are summarized below. The following mitigation measures are ongoing regulatory and administrative requirements.

- Continue publication and distribution of Environmental Resources Newsletter and Environmental Restoration Newsletter. Newsletters ensure that members of local communities who may not have access to the Internet are kept informed about USARAK policies and activities, allowing for identification and communication of pertinent concerns.
- Maintain USARAK website. This provides up-to-date information to members of local communities that may be affected by activities on USARAK lands
- Continue Restoration Advisory Boards as appropriate. Restoration Advisory Boards provide an established, effective strategy for communication between affected local communities and USARAK.
- Ensure existence of full-time Native Tribal coordination within USARAK. A Native Liaison serves as a reliable, consistent source of information on issues of concern for both tribes and USARAK staff.
- Publish and distribute a newsletter to 60 federally recognized tribes in Alaska and several Alaska Native organizations. A tribal newsletter would address the need to distribute information to many of the minority and low-income communities within USARAK's area of influence.

The Army has established government-to-government relationships with Alaska Native tribes whose interests may be significantly affected by USARAK activities as required by E0 13175, along with DoD policy, Alaska guidance, and DoD instruction. This facilitates efficient and effective communication between both leadership and staff members of tribal governments and USARAK. The Army continues engaging with federally recognized tribes in Alaska on a government-to-government basis to address their concerns with Army managed lands.

5.3.8.2 Impacts from Range Construction

Less Than Significant Impacts

There would be less than significant impacts to population, economy, employment, income, housing, or schools from range construction. Impacts would be the same as described for Cantonment Construction.

Environmental Justice. No minority or low-income populations would be displaced by the proposed range construction; however, minor adverse indirect impacts on nearby schools or private residences would be similar to those described for cantonment construction. Indirect impacts would be less than significant and would not disproportionately affect low-income or minority populations.

Protection of Children. No construction projects would take place near schools, day care facilities, or other areas with large populations of children. Minor adverse indirect impacts on nearby schools or private residences would be similar to those described for cantonment construction. Construction would take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Strict adherence to applicable safety regulations and procedures would continue to protect the health and safety of children. No adverse effects to the protection of children are expected under this alternative. No range construction would occur on DTA; therefore, impact analysis is not applicable.

5.3.8.3 Impacts from Live-Fire Training

Less Than Significant Impacts

There would be less than significant impacts to population, economy, employment, income, housing, or schools as a result of live-fire training. Impacts would be the same as described for Cantonment Construction.

Environmental Justice. Long-term noise impacts would result from increased training, but training is currently occurring at the installation and would be limited to daylight hours. Indirect effects, such as increased noise, fugitive dust, or traffic associated with live-fire training are unlikely to affect off-post populations because the surrounding areas would primarily be uninhabited federal lands. There would be no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. No live-fire training would take place near schools, day care facilities, or other areas with large populations of children. No adverse effects to the protection of children are expected under this alternative.

No Impacts

There would be no impacts to population, economy, employment, income, housing, or schools from live-fire training.

5.3.8.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would occur at both FRA and DTA and Soldiers would travel from FRA to DTA for training. No personnel would be permanently stationed at DTA. Impacts to DTA would result primarily from increased training and training modifications; therefore, there would be no impacts to population, employment, income, housing, or schools from maneuver training.

Economy. Soldiers traveling to DTA for training may purchase some supplies and result in a slight increase in business sales volume. This change would be within the historic RTV range for the ROI and would be less than significant.

Environmental Justice. Under implementation of this alternative, no minority or low-income residences would be displaced by the training modifications. Increased noise, fugitive dust, or traffic from training activities are not expected to impact off-post populations because the surrounding properties are uninhabited federal lands. This alternative would result in no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. No maneuver training exercises would take place near schools, daycares, or other areas with large populations of children. No adverse effects to the health and safety of children are expected under this alternative.

5.3.9 HUMAN HEALTH AND SAFETY

Table 5-28 summarizes the potential human health and safety impacts under implementation of Alternative B. There would be no significant and immitigable impacts to human health and safety. Significant but mitigable impacts would be associated with the use of additional ammunition and UXO generation during live-fire training, and potential construction disturbances to ongoing remediation at IRP sites, the use of hazardous materials or generation of hazardous wastes during construction, and increased fuel usage during SBCT maneuver training. Mitigation would be implemented to minimize impacts as summarized in the following subsections.

Table 5-28 Summary of Potential Human Health and Safety Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊘	⊘
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Each facility maintains strict SOPs and SPCC plans for hazardous materials and waste. Potential impacts to human health and safety would be mitigated by conformance with the existing Army protocols and SOPs as summarized in the mitigation described with the impact analysis. With implementation of existing Army SOPs, potential impacts associated hazardous materials and wastes are expected to be significant but mitigable to less than significant.

5.3.9.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Contaminated Sites. None of the facilities to be constructed as a part of this alternative would be located on land with known contamination. However, construction excavation can expose soils contaminated by historic uses of sites. An Excavation Clearance Request (dig permit) must be obtained prior to any excavation activities. Any discovered contaminated soil or groundwater would not be removed from construction sites without written approval from an authorized USAGAK representative. Should contamination be discovered during preconstruction or construction, appropriate soil remediation would be implemented. These methods would be agreed upon by the Army, USEPA, and ADEC. Standard spill prevention measures would be taken during construction. If contaminated soils are exposed during construction, impacts are expected to be significant; however, with implementation of standard Army administrative and regulatory requirements, impacts would be reduced to less than significant.

Lead and Asbestos. During renovation or demolition of older buildings to clear the way for construction of new facilities, LBP and asbestos may be encountered and removed, and could temporarily generate small amounts of hazardous waste. All operations involving hazardous waste would be accomplished in accordance with USAGAK Pamphlet 200-1, Environmental Quality: Hazardous Waste, Used Oil, and Hazardous Materials Management, and ADEC regulations and continued implementation of Army SOPs would result in less than significant impacts. No additional mitigation is required.

Petroleum, Oils, and Lubricants. The number of vehicles on-post would increase slightly as a result of additional personnel stationed at FRA and from increased training. As a result of the additional vehicles and the use of Stryker vehicles, it is expected that petrochemicals would be used at a greater rate on FRA, increasing the potential for petrochemical spills during refueling of training vehicles. However, the USARAK's existing capacity for storage and disposal of hazardous materials and wastes is expected to be sufficient to handle any potential increase in generation and continued implementation of Army SOPs would result in less than significant impacts.

Hazardous Materials and Wastes Use and Management. Additional Soldiers would be stationed at FRA and the use of hazardous materials at the on-post housing could increase. In addition, the proposed construction of new support facilities could require the use of hazardous materials and could generate hazardous wastes, such as LBP, asbestos, and PCBs. Continued implementation of standard Army regulatory and administrative requirements would result in less than significant impacts.

Biomedical Waste. A minor increase in biomedical waste could occur because of the additional Soldiers and their families stationed at FRA. However, the method of management and disposal of biomedical waste would not change and the temporary storage facilities are well managed and would be able to handle the increase in waste. Less than significant impacts are expected from the anticipated increase in biomedical waste.

Radon. Construction and operation of new facilities at the cantonment and range areas would result in a potential increased risk of exposure to naturally occurring radon. Continued implementation of standard Army regulatory and administrative requirements would result in less than significant impacts. No cantonment construction would occur on DTA; therefore, impact analysis is not applicable.

5.3.9.2 Impacts from Range Construction

Less Than Significant Impacts

Ammunition and UXO. Two new ranges would be constructed within areas currently used for Army activities at FRA. During range construction, UXO and lead could be encountered. Construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from this project. Although UXO presents a significant impact, the Army would follow proper abatement techniques, which would reduce this impact to acceptable. In addition to these mitigation measures, the Army would continue to educate Soldiers on how to identify UXO and the proper safety procedures for handling UXO. Continued implementation of standard Army regulatory and administrative requirements would result in less than significant impacts.

Hazardous Materials and Wastes Use and Management. Hazardous materials and wastes associated with range construction would be similar to those previously described for cantonment construction. With continued implementation of regulatory and administrative mitigation, impacts to human health and safety are expected to be less than significant. No range construction would occur on DTA; therefore, impact analysis is not applicable.

5.3.9.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Ammunition use, storage, and wastes. Additional live-fire training would occur because of an increased number of Soldiers training at both the existing and new ranges. SBCT training would result in an increased number of Soldiers training at all ranges, thus increasing the number of rounds fired. In addition, new weapons would be used, and the use of large caliber munitions would increase. The 105mm cannon on the Stryker MGS and the 120mm mortar are the only new weapons (compared to the IBCT that the SBCT would replace) that would be introduced to training. These weapons would be used at existing ranges on FRA and DTA. Although Alternative B would result in increased ammunition use from the elevated level of training and expansion in military force, the impact of this increase would not be significant because artillery and ammunition management would not change.

Regulatory and Administrative Mitigation 1: Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations; therefore, impacts are expected to be less than significant.

Impact 2: Unexploded Ordnance. Increased amounts of ammunition would be used, resulting in a proportionate increase in the generation of UXO and lead contamination on training ranges. However, with implementation of existing Army SOPs, impacts to human health and safety are expected to be significant but mitigable to less than significant.

Regulatory and Administrative Mitigation 2: UXO would only be within the impact areas, which are fenced and posted as restricted to public access. With implementation of Army SOPs, impacts are expected to be less than significant.

5.3.9.4 Impacts from Maneuver Training

Less Than Significant Impacts

Petroleum, Oils, and Lubricants. The frequency of maneuver training would increase at FRA and a larger maneuver training area would be used DTA compared to current conditions. Training increases would lead to increased use and storage of fuels and a slightly increased risk of accidental spills or releases. Portable containment systems would be used at in-field refueling points and would be capable of containing potential fuel releases from fuel tanker vehicles. This would minimize the risk of area contamination from inadvertent petrochemical release. With continued implementation of existing Army SOPs, impacts associated with the use of additional fuels and hazardous materials and an increase in the generation of hazardous wastes are expected to be less than significant.

Additional measures that the Army would implement would ensure safe handling of hazardous materials include:

- Maintain the current institutional control policy that limits access to contaminated sites and maintain an active restoration program to clean up contaminated sites on USARAK lands. These policies reduce health and safety risks from exposure to contaminated areas.
- Continue environmental management programs listed in the current INRMPs, and continue to provide environmental awareness training to Soldiers and civilians. The INRMPs list specific actions designed to alleviate human health and safety risks.

5.3.10 BIOLOGICAL RESOURCES

Table 5-29 lists the types of impacts on biological resources that would occur under Alternative B. Impacts to wetlands, vegetation, noxious weeds, threatened and endangered species, habitats, and general wildlife. Wetlands comprise 8 percent of FRA and approximately 68 percent of DTA. If SBCT cantonment construction projects were located in existing cantonment areas on FRA, there would be few or no direct impacts to wetlands. Wetlands could be lost on FRA during range construction. Impacts would be significant, but mitigable to less than significant.

Increased live-fire training associated with the SBCT could cause direct and long-term impacts to wetlands including moderate physical disturbances to wetland areas and an increase in pollutants and hazardous materials. Impacts would be less than significant. Impacts to wetlands from maneuver training from SBCT would increase with the need for larger training areas; however, the intensity of the impacts would decrease through their more frequent use of existing roads. These impacts would be significant, but mitigable to less than significant.

Construction projects occurring in existing cantonment areas would cause little or no direct impacts to natural vegetation. Construction of ranges would not result in alteration or loss of natural vegetation at FRA. Impacts to vegetation from range construction are expected to be less than significant.

Increased live-fire training associated with the SBCT would cause direct impacts to vegetation when munitions explode and create craters, resulting in areas of bare ground. However, the craters accumulate organic matter, and vegetation usually recovers. Impacts to vegetation from live-fire training would be less than significant. Impacts to vegetation from maneuver training would be significant but mitigable to less than significant. The amount of impacts to vegetation from SBCT would increase with the need for larger training areas; however, the intensity of the impacts would decrease through their more frequent use of existing roads.

Table 5-29 Summary of Potential Biological Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Wetlands		
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	⊘	N/A
Impacts from Live-fire Training	⊙	⊙
Impacts from Maneuver Training	⊘	⊘
Vegetation		
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-fire Training	⊙	⊙
Impacts from Maneuver Training	⊘	⊘
Noxious Weeds		
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-fire Training	○	○
Impacts from Maneuver Training	○	○
Threatened and Endangered Species		
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙
General Wildlife and Habitats		
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Increasing construction at FRA and DTA, increasing the number of people, and increasing the number of vehicles could increase the number and type of nonnative plants, including noxious weeds, potentially introduced to disturbed areas. However, because the invasive species problem is currently minimal, and USARAK is committed to proactive management, no impacts from noxious weeds would occur on FRA or DTA.

There would be little or no direct impacts to special status species because no federal or state threatened, endangered, proposed, or candidate plant or animal species are found within or near lands used by USARAK. However, several species of concern are found on USARAK lands. Construction of ranges and cantonment upgrades would not result in habitat loss. No impacts to special status species from range construction are expected. Increased live-fire and maneuver training associated with the SBCT would cause less than significant impacts to special status species.

General wildlife and habitats would be affected by construction and training activities. Impacts would primarily be in previously disturbed areas. Construction and use of new ranges at FRA would not cause additional permanent habitat loss; however, given the limited size of the ranges compared to the surrounding available habitat, impacts to general wildlife and habitats would be less than significant.

Mitigation measures, planning considerations, and BMPs contained in the INRMP, application of Land Condition Trend Analysis and Land Rehabilitation and Maintenance Program, and continued monitoring programs would avoid impacts to biological resources of concern. Where impacts cannot be avoided, they would be reduced to a less than significant level.

5.3.10.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Impacts to vegetation. Permanent stationing of the 2/25th SBCT at FRA would require cantonment construction to accommodate larger motorpool requirements. Impacts to vegetation from construction can include breaking and crushing of plants and direct mortality. This can directly or indirectly alter plant community composition and structure and vegetative cover. Fugitive dust from these construction projects could occur and result in short-term impacts to vegetation. Impacts to rare ecotypes or species of concern are not expected to occur. Construction projects would occur in existing, disturbed cantonment areas, and there would be little or no direct impacts to native or sensitive vegetation. Impacts to vegetation from cantonment construction would be less than significant. No cantonment construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

The following measures are currently in place to respond to new or increasing impacts to vegetation, and are continually reviewed and revised.

- Continue to conduct forest resource inventories to aid ecosystem management program.
- Continue use of environmental limitations overlays, indicating areas where maneuver training is and is not allowed.
- Continue implementation of INRMPs, with specific actions for management of vegetation.
- Continue Range and Training Land Assessment and Land Rehabilitation and Maintenance Program programs to minimize and rehabilitate vegetation damage.
- Continue to implement recreational vehicle use policy at USARAK.

Additionally, a detailed study is planned to assess impacts of recreational vehicles to vegetation. This would provide information for natural resources managers to help develop policies to ensure conservation and sustainability of vegetation resources.

Impacts to general wildlife and habitats. SBCT construction projects would be located in existing, disturbed cantonment areas thereby limiting impacts to vegetation. Habitats within the footprints of cantonment projects would likely be either developed, disturbed, or otherwise managed. Wildlife would

be temporarily disturbed during construction; however, species likely to be present in areas of cantonment construction are those habituated to human presence, and would not be adversely affected. An influx of personnel to FRA could result in increased recreational impacts to wildlife and fisheries. Impacts to general wildlife and habitats from cantonment construction would be less than significant. No cantonment construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

No Impacts

Impacts to wetlands Use and management of wetlands on USARAK lands are regulated by the Rivers and Harbors Act of 1899; Section 404 of the Clean Water Act; Executive Order 11990, Protection of Wetlands; the Sikes Act, which requires the development and implementation of INRMPs; and the Military Land Withdrawal Act PL 106-65. Wetlands comprise 8 percent of FRA.

SBCT construction projects would be located in cantonment areas where few or no direct impacts to wetlands would occur. However, erosion from construction could occur and result in short-term increases of sedimentation to wetlands. Wetland permitting, which is regulated by the U.S. Army Corps of Engineers, would be required if construction were to impact wetlands. No significant impacts to wetlands from cantonment construction are anticipated. No cantonment construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

Introduction and spread of invasive plants and noxious weeds. Management of invasive plant species is an issue of concern on USARAK lands. The Range and Training Land Assessment program monitors vegetation and documents invasive plant species. These species are managed using integrated pest management techniques, whereby chemical control is minimized.

Increasing construction at FRA, increasing the number of people, and increasing the number of vehicles could increase the number and type of nonnative plants, including noxious weeds. However, because the invasive species problem is currently minimal, and USARAK is committed to proactive management, no impacts from noxious weeds would occur.

Impacts to Threatened and Endangered Species: Construction would temporarily increase human presence and activity at construction sites. However, no federal or state threatened, endangered, proposed, or candidate plant or animal species are found within or near lands used by U.S. Army Alaska (USARAK). Several species of concern are found on USARAK lands. The types of effects to threatened or endangered species and species of concern would include increased habitat loss and disturbance; however, proposed projects would be in developed or disturbed areas. USARAK's policies for management of endangered species are outlined in the Integrated Natural Resources Management Plans for each post (USARAK 2002d,e,f). Endangered species management goals and objectives include protection and conservation of endangered or threatened species found on USARAK posts, identification and delineation of species and their habitats, and compliance with Section 7 of the Endangered Species Act. USARAK would conduct planning for the endangered species program; implement an inventory and monitoring program to identify the location and distribution of any rare, uncommon, or priority species; and protect habitats of these species. There is no endangered species management plan unless a federally listed endangered or threatened species is found on an installation. The USARAK ecosystem management program also monitors species of concern.

5.3.10.2 Impacts from Range Construction

Significant Impacts Mitigable To Less Than Significant

Impact 1: Impacts to wetlands. Wetlands are not expected to be lost during range construction at FRA. Modifications to the existing ranges could have indirect impacts on the surrounding environment resulting

in wetland disturbance and loss. Soils at disturbed sites such as construction sites tends to become more compacted, which can affect seedling establishment, water and nutrient uptake, and root penetration. Reestablishment of plant communities may be impeded by changes in soil properties. Soil erosion and transport may increase due to a loss in stability from the removal of vegetative cover and the underlying supportive root system.

Damage to wetlands in northern climates such as Alaska can affect the insulating layer that protects permafrost (Section 5.3.2). This could create thermokarst conditions, possibly leading to subsidence, and could increase sediment delivery to nearby waterways. As a result, the water quality and aquatic habitats could be degraded.

Wetland permitting, which is regulated by the U.S. Army Corps of Engineers, would be required if range construction were to impact wetlands. Impacts to wetlands from range construction could be significant, but mitigable to less than significant. No range construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

Regulatory and Administrative Mitigation 1: Some programs already propose measures that would mitigate many impacts to wetlands. These programs are only partially implemented and funded. The proposed mitigation is therefore to implement plans fully and projects that have already been identified by USARAK's INRMPs, the Training Area Recovery Plan, and other plans associated with wetlands. Additional mitigation measures are also listed below.

- Implement additional wetlands mitigation on a case-by-case basis. This would ensure compliance with wetland regulations and conservation of wetland resources.
- Develop and maintain a wetlands database for each USARAK post that includes the spatial distribution of wetland types and historical damage levels. This would provide natural resources managers with information to help monitor and conserve wetland resources.
- Complete a survey of USARAK wetlands, including wetland type and location, to aid military operation coordinators in planning field exercises away from these areas. This would ensure conservation of wetlands.
- Conduct a detailed study to assess impacts of recreational vehicles to wetlands. This study would provide managers with information to be used for future conservation efforts.

Additional Mitigation 1: The following measures currently in place to respond to new or increasing wetland impacts, and are continually reviewed and revised.

- Continue to use and update environmental limitations overlays.
- Conduct planning-level surveys, wetlands management, and revegetation plans.
- Continue implementation of INRMPs, with specific actions for management of wetlands.
- Continue to obtain wetland permits.
- Continue damage control measures.
- Continue implementation of recreational vehicle use policy, which places the same limitations on recreational access as those that already apply to military vehicles.

Less Than Significant Impacts

Impacts to vegetation. Construction of ranges would result in alteration or loss of disturbed, non-native vegetation at the ranges to be upgraded. No new areas would be disturbed. Impacts to rare ecotypes or

species of concern are not expected to occur. Impacts to vegetation from range construction would be less than significant.

Impacts to general wildlife and habitats. Construction of new ranges at FRA would not result in additional long-term or permanent loss of habitat. Construction noise and related human presence would disrupt the normal activities of animals. Mortality may occur to individual animals that are small or less mobile. Because range construction would occur in existing range footprints, there would be no increase in habitat fragmentation. Construction and development of ranges would provide habitat for species that prefer edge habitat, open areas, or early succession. Forest-dwelling species would not be affected. Construction activities could affect water quality, but any impacts are expected to be short-term and minor. Following construction of the proposed ranges, the Army would seed disturbed areas with native or noninvasive vegetation. Overall, the short-term impacts of range construction would be minor. Range construction would have the long-term impact of limiting the available habitat for some species; however, the relatively small size of the proposed range improvements compared to available habitat resources is less than significant.

To minimize impacts to general wildlife and habitats, USARAK would continue to implement the INRMP developed to address wildlife and habitat impacts from Army actions. The INRMP contains specific actions to inventory, maintain, and improve wildlife habitat. Effects of military training on select wildlife species (especially herd animals and waterfowl) during critical seasons such as breeding, rearing of young, and migration would be monitored. Management strategies to minimize disturbance to priority wildlife would also benefit general wildlife. Coordination between natural resources and range managers would design training schedules that minimize impacts to wildlife populations. USARAK would continue to conduct a detailed study to assess the effects of noise on wildlife.

Additionally, USARAK is considering development and implementation of an information and education program for personnel using USARAK lands. Emphasize conservation of wildlife and natural resources; develop protocol to reduce wildlife disturbance and negative wildlife-human interactions (e.g., bear or moose attacks). This would enhance the conservation of wildlife resources on USARAK lands. Develop and implement an information and education program for personnel using USARAK lands. This would enhance the conservation of fisheries resources on USARAK lands.

No Impacts

Introduction and spread of invasive plants and noxious weeds. Management of invasive plant species is an issue of concern on USARAK lands. The Land Condition Trend Analysis program monitors vegetation and documents invasive plant species. These species are managed using integrated pest management techniques, whereby chemical control is minimized.

Increasing construction at FRA, increasing the number of people, and increasing the number of vehicles could increase the number and type of nonnative plants, including noxious weeds. However, because the invasive species problem is currently minimal, and USARAK is committed to proactive management, no impacts from noxious weeds under Alternative B would occur.

Impacts to Threatened and Endangered Species: Construction new ranges at FRA to accommodate the SBCT would temporarily increase human presence and activity at construction sites. However, no federal or state threatened, endangered, proposed, or candidate plant or animal species are found within or near lands used by USARAK. Several species of concern are found on USARAK lands. USARAK's policies for management of endangered species are outlined in the INRMPs for each post (USARAK 2002d,e,f). Endangered species management goals and objectives include protection and conservation of endangered or threatened species found on USARAK posts, identification and delineation of species and their

habitats, and compliance with Section 7 of the Endangered Species Act. USARAK would conduct planning for the endangered species program; implement an inventory and monitoring program to identify the location and distribution of any rare, uncommon, or priority species; and protect habitats of these species. There is no endangered species management plan unless a federally listed endangered or threatened species is found on an installation. The USARAK ecosystem management program also monitors species of concern. No range construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

5.3.10.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Impacts to wetlands. Increased live-fire training associated with the SBCT could cause direct and long-term impacts to wetlands. An increase would result in moderate physical disturbances to wetland areas and an increase in pollutants and hazardous materials. Impacts, however, would be limited to existing impact areas. The frequency of training would increase, and the number of rounds and the numbers of Soldiers and weapons would also increase. Impacts to wetlands from live-fire training would be less than significant.

Impacts to vegetation. Increased live-fire training associated with the SBCT would cause direct impacts to vegetation. Munitions explode and create craters, resulting in areas of bare ground that are susceptible to erosion from wind and water (Houston 2002). However, the craters accumulate organic matter, and vegetation usually recovers. The frequency of live-fire training would increase at the DTA BAX. The number of rounds and the numbers of Soldiers and weapons would increase; however, the BAX would remain within operating parameters, including land maintenance and rehabilitation. Impacts to vegetation from live-fire training would be less than significant.

Impacts to Threatened and Endangered Species: A larger number of Soldiers would use existing and newly constructed ranges for live fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. However, no federal or state threatened, endangered, proposed, or candidate plant or animal species are found within or near lands used by USARAK. Several species of concern are found on USARAK lands. USARAK's policies for management of endangered species are outlined in the INRMPs for each post (USARAK 2002d,e,f). Endangered species management goals and objectives include protection and conservation of endangered or threatened species found on USARAK posts, identification and delineation of species and their habitats, and compliance with Section 7 of the Endangered Species Act. USARAK would conduct planning for the endangered species program; implement an inventory and monitoring program to identify the location and distribution of any rare, uncommon, or priority species; and protect habitats of these species. There is no endangered species management plan unless a federally listed endangered or threatened species is found on an installation. The USARAK ecosystem management program also monitors species of concern. Impacts from live-fire training would be less than significant.

Impacts to general wildlife and habitats. Operation of ranges has the potential to displace various wildlife species. Displacement would be caused by increased human presence in the area, as well as by elevated noise levels. Wildlife species that are more tolerant of human activity may remain in or around these ranges. Individuals that remain within the impact area and associated surface danger zones could be directly affected by munitions. Higher training levels at existing ranges would increase incidental mortality to wildlife. However, such mortality is not expected to cause measurable impacts to wildlife populations. Therefore, SBCT training on the new and existing ranges would have a less than significant impact to wildlife and habitats. Measures described previously under Impacts from Range Construction would further reduce the impacts of live-fire training.

No Impacts

Introduction and spread of invasive plants and noxious weeds. Management of invasive plant species is an issue of concern on USARAK lands. The Land Condition Trend Analysis program monitors vegetation and documents invasive plant species. These species are managed using integrated pest management techniques, whereby chemical control is minimized.

Increasing live-fire training at FRA and DTA, increasing the number of people, and increasing the number of vehicles could increase the number and type of nonnative plants, including noxious weeds. However, because the invasive species problem is currently minimal, and USARAK is committed to proactive management, no impacts from noxious weeds would occur.

5.3.10.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Impacts to wetlands. Damage to wetlands occurs from off-road maneuvers during summer when the wetlands are unfrozen (Radforth and Burwash 1977). Impacts of military operations to wetlands include breaking and crushing of plants and disturbance to soils or wetland substrate. Unintentional removal of vegetation from clearing with heavy equipment has also resulted in wetland degradation. These off-road impacts are less harmful during winter when wetlands are frozen and snowpack protects vegetation. Impacts could occur to the surrounding environment as a result of wetland disturbance and loss.

Maneuvers can directly or indirectly alter the composition of plant communities and vegetative structure. If wetlands are disturbed, small annual plants or invasive species often replace large perennial plants. Maneuver impacts could decrease plant cover and densities of woody vegetation, resulting in reduced wetland function and habitat quality. In severe cases, damaged plant communities could be replaced by lower quality plant communities.

Soils at disturbed sites also tend to become more compacted, which can affect seedling establishment, water and nutrient uptake, and root penetration. Reestablishment of plant communities may be impeded by changes in soil properties. Soil erosion and transport may increase due to a loss in stability from the removal of vegetative cover and the underlying supportive root system. Damage to wetlands in northern climates, such as Alaska, can affect the insulating layer that protects permafrost (Section 5.3.2). This could create thermokarst conditions, possibly leading to subsidence, and could increase sediment delivery to nearby waterways. As a result, the water quality and aquatic habitats could be degraded.

Severe adverse impacts would be expected if the Stryker vehicle were used in summer. Use of the Stryker vehicle in wetlands during summer, however, is not likely because the vehicles quickly become stuck. This would also result in wetland degradation (Bagley, unpublished data). Use of the Stryker on wetlands during winter would result in minor damage to wetland plants, but minimal damage to the root systems and soil substrate due to frozen conditions.

The number of large maneuver rotations would not be expected to differ greatly from current IBCT rotations, but there are qualitative differences between IBCT and SBCT maneuver training. The SBCT uses existing roads and trails more than the IBCT; however, it requires larger maneuver areas. The SBCT causes less surface disturbance during maneuver rotations and does less digging than the IBCT. There are more vehicles of heavier gross weight in the SBCT, and the quantity of small-unit collective maneuver rotations would be expected to increase by 50 percent.

Overall, impacts to wetlands from maneuver training would be significant but mitigable to less than significant. The amount of impacts from SBCT would increase with the need for larger training areas; however, the intensity of the impacts would decrease through their more frequent use of existing roads. Mitigation measures for impacts to wetlands from maneuver training would be the same as those described in Impacts from Range Construction.

Impact 2: Impacts to vegetation. Maneuver training could cause long-term adverse impacts to vegetation under Alternative B. Off-road maneuver training when vegetation is not dormant could result in vegetation damage. Vehicles can indirectly affect plant communities through soil compaction and by altering competitive relationships (Milchunas et al. 1998, 1999). Use of vehicles can result in decreased plant litter, ground cover and basal cover, and increased bare ground (Shaw and Diersing 1989, 1990). Large military vehicles can alter vertical and horizontal structure of plant communities (Severinghaus et al. 1981).

Increased soil compaction can alter plant communities by affecting seedling establishment, plant water and nutrient uptake, root penetration, and by causing invasions of more tolerant plant species. Reestablishment of plant communities and structure may be impeded by changes in soil properties (Shaw and Diersing 1990).

Jones (1993) reported that bivouac sites damage vegetation in forested areas by reducing overstory and understory stem density and species richness. Decreased ground cover resulted in increased bare ground and bulk soil density, with significant soil loss in some areas. Soil compaction occurred, resulting in crown dieback, although canopy cover was not significantly different between bivouac sites and non-bivouac sites.

The impacts from maneuver training could range from less than significant to significant depending on environmental conditions and spatial extent of damage. The impacts to forest resources would be negligible. Increases in foot training during summer could result in minor impacts to vegetation, but the impacts would not be widespread.

Overall, impacts to vegetation from maneuver training would be significant but mitigable to less than significant. The amount of impacts to vegetation from SBCT would increase with the need for larger training areas; however, the intensity of the impacts would decrease through their more frequent use of existing roads.

Mitigation measures for impacts to vegetation from maneuver training would be the same as those described under Impacts from Cantonment Construction.

Less Than Significant Impacts

Impacts to Threatened and Endangered Species: SBCT training would have similar impacts to special status species as current IBCT training. Ongoing Army environmental management and stewardship activities would continue to decrease effect intensity and to protect sensitive plants and habitats within the ROI. All determinations made through ESA Section 7 Consultation would apply under this alternative as well. Any effects would be limited and would be addressed by ongoing Army environmental management and stewardship activities. Impacts are expected to be less than significant.

Impacts to general wildlife and habitats. Maneuver training would affect wildlife by disrupting animals and altering habitat. Impacts from trampling and an associated reduction in vegetative groundcover would result in loss and degradation of habitat for general vegetation, wildlife, and habitat. Habitats and wildlife would be impacts by removing vegetation, deterring wildlife from foraging, and promulgating other

general degradation effects that would result from elevated human activity, but not to a significant degree. In all maneuver areas, new or existing, wildlife that does not vacate areas being used for maneuver could sustain injuries. The most likely species to be affected by off-road maneuvers would be ground-nesting birds or small mammals.

The increase in frequency of smaller deployments in FRA could affect some animals. However, any increase in direct mortality from training would not likely affect wildlife at population levels. Bivouac, foot use, and general vehicle traffic in maneuver areas would increase. Although these kinds of disturbances do not represent physical destruction of habitat, they can compromise habitat quality for some individual animals or localized populations. Certain species can habituate to disturbance from vehicle traffic. USARAK's ecosystem management program would continue to develop methodology to analyze the impacts of road construction and use on priority wildlife populations. Grizzly bear, caribou, bison, moose, and wolf might be more susceptible to disturbance from road development or training, and the effects to localized populations could be moderate.

Maneuver training may affect fisheries resources directly by affecting water quality or by altering habitat. The expected increase in maneuver training could result in higher rates of erosion and sedimentation. Frequent training with Strykers or other vehicles could increase the possibility of petrochemical spills during refueling. Higher training intensities could also result in increased frequency of fires, which could cause erosion into streams, ponds, and waterways.

Mitigation measures described previously under Impacts from Range Construction would further reduce the impacts of live-fire training.

No Impacts

Introduction and spread of invasive plants and noxious weeds. Management of invasive plant species is an issue of concern on USARAK lands. The Land Condition Trend Analysis program monitors vegetation and documents invasive plant species. These species are managed using integrated pest management techniques, whereby chemical control is minimized.

Increasing training at FRA and DTA could increase the number and type of nonnative plants, including noxious weeds. However, because the invasive species problem is currently minimal, and USARAK is committed to proactive management, no impacts from noxious weeds under Alternative B would occur.

5.3.11 AIR QUALITY

Table 5-30 summarizes the impacts associated with air quality that would occur under Alternative B. Impacts from cantonment construction, range construction, live-fire training and maneuver training are predicted to be less than significant.

Visibility was assessed for Alaska projects and would encompass all activity groups. The assessment targeted Denali Nation Park Class I Area because it receives the highest level of protection. Denali National Park is the closest Class I Area in proximity of FRA and DTA, so there is the potential for visibility effects related to the park. Visibility during days with the lowest visibility (days with fog and cloud cover) would not be degraded by dust emissions from DTA. For highest visibility days, visibility may not be impaired inside the Class I area itself, but visibility for observers outside the Class I area looking into the park may be impaired due to increased training and maneuver activities.

Table 5-30 Summary of Potential Impacts to Air Quality from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.3.11.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Impacts from vehicles and construction: Permanent stationing of the 2/25th SBCT at FRA would slightly increase the overall population with the addition of Soldiers, their families, and support personnel. Cantonment construction of SBCT-specific facilities would be required. Increased stationing of personnel could result in impacts to air quality through increased emissions from personal vehicles and general increased energy consumption. The impacts would be less than significant.

Air emission effects would include temporary, short-term emissions generated from the operation of heavy-duty construction equipment. Fugitive dust generated during construction of the new motorpool would be temporary. The size of this construction sites would not produce substantive emissions and there would be little to no ambient effects.

The following mitigation measures are proposed to be implemented as funding is available.

- Conduct air quality monitoring projects to assess impacts. If construction activities are found to impact air quality greater then is expected, then alternative mitigation measures would be implemented.
- Collect additional data to determine impacts of fugitive dust generation and investigate need for dust control plans to control fugitive dust generation. Further mitigation measures would be implemented if impacts are shown to be severe.

5.3.11.2 Impacts from Range Construction

Less Than Significant Impacts

Impacts from vehicles and construction: Training facilities would be constructed to support SBCT requirements. Construction of two new ranges at FRA would temporarily increase emissions associated with the construction of these projects. Measures to minimize air quality impacts would be the same as those identified under cantonment construction.

5.3.11.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Emissions from ordnance: A larger number of Soldiers would use existing and newly constructed ranges for live fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use pose very little risk of creating adverse air quality effects.

Emissions from wildfires: An increased risk of accidental wildfire ignition would come from ordinance, vehicles, flammable materials, or cigarettes. Prescribed burning resulting from any management prescriptions would create short-term adverse impacts to air quality and would require a permit. With the mitigation measures detailed in the Wildfire Management section, fire risk and impacts would be less than significant.

5.3.11.4 Impacts from Maneuver Training

Less Than Significant Impacts

Fugitive dust from military vehicles: Maneuver training would occur at both FRA and DTA and would have similar impacts at each location, but at different magnitudes. SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently. These areas may experience greater reduction in vegetative cover over time and a higher rate of PM_{10} emissions as wind-blown dust. Increased movement of Stryker vehicles, a heavy-duty class vehicle, on unpaved areas would result in particulate emissions. Fugitive particulate emission from deployment over paved roads were not evaluated as they would be relatively minor and produce no impact over the large number of road miles traveled during a deployment.

The effect of fugitive dust generated by maneuver activities at the FRA and DTA training areas were assessed under the current SBCT action for comparison with the 24-hour and annual PM_{10} NAAQS. The estimated effect from maneuver activities during the interim and end-state stages at FRA and DTA would not be significant in comparison with the NAAQS.

5.3.12 NOISE

Table 5-31 summarizes the impacts associated with noise that would occur under Alternative B. The impacts from all activity groups would be less than significant.

5.3.12.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Construction and operation noise: Permanent stationing of the 2/25th SBCT at FRA would slightly increase the overall population with the addition of Soldiers, their families, and support personnel. Construction would temporarily increase human presence and activity at construction sites. In general, construction would occur away from installation boundaries and would not result in long-term negative impacts on the surrounding communities. Construction would contribute to temporary, localized increases in noise levels. Overall, these increases in noise would be less than significant.

Table 5-31 Summary of Potential Impacts to Noise from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.3.12.2 Impacts from Range Construction

Less Than Significant Impacts

Noise from construction activities. Construction of the new ranges would occur away from installation boundaries, within existing range footprints, and would not result in long-term negative impacts on the surrounding communities. Construction of facilities would contribute to temporary, localized increases in noise levels. However, these increases in noise would be less than significant.

5.3.12.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise from ordnance use. A larger number of Soldiers would use existing and newly constructed ranges for live fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. During live-fire training the acreage of Zone II and III noise levels would increase at FRA. Thus, the total acreage under moderate or severe noise levels (Zones II and III) would increase. A large proportion of the increase would result from the use of the new range in the northeast portion of the post. This increase would be on training lands and would not affect the cantonment area or areas off-post. Zones II and III noise levels would nearly double off-post; however, the areas would not affect sensitive land use areas such as residential or commercial zones. The off-post contours are over the Knik Arm or Elmendorf Air Force Base. The increased noise levels in the cantonment would mostly be on lands adjoining the Otter Lake Recreation Area. The artillery firing points are more than 2 miles from any residential areas, which would reduce the probability of noise complaints. Overall, residential areas would not be affected by the expansion of Zone II and III noise levels.

While training at DTA, the 2/25th SBCT would use weapons similar to those currently used by the SBCT stationed at Fort Wainwright. However, stationing of the 2/25th SBCT would increase the use of some weapons. Training would continue with the 81mm and 60mm mortars, but use of the 120mm mortar and the 155mm howitzer would be increased. The 120mm mortar has a range of 23,622 feet, so there may occasionally be mortar firing farther from the Eagle River Effect Area, meaning closer to the boundary. The SBCT would also add 27 mobile gun systems.

The contours in the Eagle River Flats area do not change appreciably. Development of the multi-purpose training range would result in increased Zones II and III noise levels in the northeastern portion of FRA.

If the firing points are moved from near the edge northeast portion of the post (i.e., from Firing Points 23 and 33), then the noise contours would not extend beyond the boundaries of FRA.

The adverse effects of noise resulting from military training would increase. However, the overall effects of noise levels would be less than significant.

5.3.12.4 Impacts from Maneuver Training

Less Than Significant Impacts

Noise from military vehicles. Brigade-, battalion-, and company-level training would occur at DTA, and the frequency of large-maneuver training is not expected to increase above existing levels. Platoon-level and smaller training would occur at FRA, and would increase in frequency. Munitions use is not part of maneuver training, so noise impacts from ordnance are eliminated. The types of impacts of SBCT maneuver training is expected to be similar to the existing IBCT maneuver training. However, SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently.

Increased intensity of maneuver training would possibly result in increased noise levels from Stryker vehicles at FRA, but the level of noise would likely not rise above background levels from the Glenn Highway. Consequently, no impacts are expected. The adverse effects of noise resulting from military training would increase in the DTA area, but the overall effect would be minor.

5.3.13 AIRSPACE RESOURCES

Table 5-32 summarizes the impacts associated with airspace resources that would occur under Alternative B. No impacts are expected from cantonment construction, range construction, or live-fire training. Less than significant effects are expected from flights of UAVs during maneuver training that would restrict use of airspace during the training.

Table 5-32 Summary of Potential Impacts to Airspace Resources from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-Fire Training	○	○
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.3.13.1 Impacts from Cantonment Construction

No Impacts

Impacts to airspace use. When compared to the IBCT that it would be replacing, permanent stationing of the 2/25th SBCT at FRA would slightly increase the overall population with the addition of soldiers, their

families, and support personnel. Cantonment construction would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed. No cantonment construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

5.3.13.2 Impacts from Range Construction

No Impacts

Impacts to airspace use. Construction of new ranges at FRA to accommodate the SBCT would temporarily increase human presence and activity at construction sites. This construction would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed. No range construction would be necessary at DTA; therefore, impact analysis is Not Applicable.

5.3.13.3 Impacts from Live-Fire Training

No Impacts

Impacts to airspace use. Implementation of this alternative would have no major direct or indirect effects on airspace resources at FRA or DTA. The alternative would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed for live-fire training. No modifications to the airfield would occur. Consequently, current airspace and airfield restrictions would remain in effect on all USARAK lands. Procedures established for existing restricted airspace would continue to apply to all aircraft, including UAV operations. Although closures of currently restricted airspace are expected to increase in frequency because of increased training, the UAV is not designed to fly during high wind or extremely cold conditions, which would limit the periods during which operation is possible.

A CFA may have to be established above new firing ranges at FRA. However, CFAs pose no problems for VFR or IFR flights because activities within a CFA must be suspended immediately when radar, spotter aircraft, or ground lookouts detect an approaching aircraft.

5.3.13.4 Impacts from Maneuver Training

Less Than Significant

Impacts to airspace use. Maneuver training would occur at both FRA and DTA. The proposed UAV flights primarily would be conducted within previously designated restricted areas. Flight safety for airspace users would be accomplished by ensuring visual observation of the UAV. Flight observer(s) would be located at strategic locations to maintain visual observation throughout the flight corridor. Flight observer(s) would have direct communication with the UAV operator and ground control station through handheld radio equipment.

For UAV flights that could not be conducted entirely within restricted areas, operations would occur in accordance with well-defined FAA procedures for remotely operated aircraft. These procedures include approval of the UAV flights by the FAA regional office at least 60 days in advance. This approval would be contingent on the Army demonstrating that the flights would be as safe as those for manned aircraft. In addition, coordination, communications, route and altitude procedures, and lost link/mission abort procedures would all have to be identified.

5.3.14 ENERGY

Table 5-33 summarizes the potential energy impacts of implementing Alternative B. Energy impacts are expected to be less than significant; therefore, no mitigation is required.

Table 5-33 Summary of Potential Energy Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Increased live-fire training associated with the SBCT could cause direct and long-term impacts to wetlands including moderate physical disturbances to wetland areas and an increase in pollutants and hazardous materials. Impacts would be less than significant. Impacts to wetlands from maneuver training from SBCT would increase with the need for larger training areas; however, the intensity of the impacts would decrease through their more frequent use of existing roads. These impacts would be significant, but mitigable to less than significant.

5.3.14.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Energy demand and costs. Based on the increase in population associated with this alternative, a less than ten percent increase in energy use would occur at FRA. The number of additional personnel under this alternative would represent an increase of less than 8 percent compared to the existing on-post population. The current energy output is sufficient to meet the energy demands of the SBCT as well as other future and ongoing activities on or near FRA. Impacts to energy use and costs are expected to be less than significant.

5.3.14.2 Impacts from Range Construction

Energy demand and costs. Impacts to energy use and costs would be similar to those described for cantonment construction and are expected to be less than significant.

5.3.14.3 Impacts from Live-Fire Training

Energy demand and costs. Live-fire training would increase under this alternative; however, impacts to energy use and costs are expected to be less than significant.

5.3.14.4 Impacts from Maneuver Training

Under this alternative, maneuver training would be performed at both FRA and DTA. Increased maneuver training would be performed at FRA, resulting in a slight increase in energy use. The frequency of maneuver training at DTA is not expected to increase. Current energy output is sufficient to meet the energy demands of DTA without crimping public services. Impacts to energy use and costs are expected to be less than significant.

5.3.15 FACILITIES

Table 5-34 summarizes the potential impacts for facilities under Alternative B. No real estate or land acquisition would occur under this alternative. With the exception of convoy transport, the proposed activities for this alternative would occur within the existing Army installations. Existing land ownership, ROWs, easements and leases on FRA would continue with no changes or additions proposed. Facility changes would include construction support facilities and increased maneuver training. The frequency of maneuver training is not expected to increase at DTA; however, a larger area may be affected. This section analyzes the potential impacts of this alternative on USARAK facilities, public services, and utilities. With continued implementation of regulatory and administrative mitigation such as ITAM, INRMPs, ecosystem management, and the sustainable range management program, impacts to facilities are expected to be less than significant. No mitigation is required.

Table 5-34 Summary of Potential Facilities Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.3.15.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Facilities. Impacts to facilities may occur from the stationing of additional personnel at FRA and increased use of existing facilities. Proposed construction includes new motorpool facilities. No housing or community facilities construction is planned under this alternative. Impacts to facilities would be less than significant.

Public Services. No plans for construction or improvements of public services or community facilities would result from this alternative. A slight increase in demand on public services would occur under this alternative as a result of additional personnel stationed at FRA. Because the additional personnel would represent an increase of less than one percent compared to the existing population in the ROI, impacts to public services are expected to be less than significant.

Utilities. No plans for construction or improvements of utilities would result from this alternative. A slight increase in demand on utilities would occur under this alternative as a result of additional personnel stationed at FRA. Because the number of additional personnel under this alternative would represent an increase of less than 1 percent compared to the existing population in the ROI, impacts to utilities are expected to be less than significant.

5.3.15.2 Impacts from Range Construction

Less Than Significant Impacts

Facilities. Two new training ranges would be constructed at FRA. Impacts would be a beneficial and less than significant.

Utilities. No plans for construction or improvements of utilities would result from this alternative. A slight increase in demand on utilities would occur under this alternative as a result of range construction; however, impacts to utilities are expected to be less than significant.

No Impacts

Public Services. No impacts to public services are expected as a result of range construction at FRA. No range construction is planned at DTA under this alternative; therefore, impact analysis is not applicable.

5.3.15.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Facilities. Range use would increase on each range type and increased amounts of ammunition would be used, resulting in a proportionate increase in the generation of UXO and lead contamination on training ranges with 567 additional Soldiers. All ranges would be operated with design specifications. With implementation of Army SOPs, impacts are expected to be less than significant.

Utilities. A slight increase in demand on utilities would occur under this alternative as a result of increased live-fire training; however, impacts to utilities are expected to be less than significant. No mitigation would be required.

No Impacts

Public Services. There would be a slight increase in usage of the live-fire training ranges; however, no impacts to public services are expected.

5.3.15.4 Impacts from Maneuver Training

Less Than Significant Impacts

Facilities. Maneuver training land is sufficient to support training requirements proposed under this alternative. Institutional programs would provide mitigation measures to help minimize impacts to land condition and impacts resulting from maneuver training. Overall, proposed training requirements under this alternative would produce less than significant impacts to maneuver training land infrastructure.

Current institutional programs, such as the ITAM program, would mitigate impacts to training lands. Additionally, the proposed implementation of institutional programs, such as ITAM, INRMPs, ecosystem management, and the sustainable range management program would mitigate this impact.

Public Services. No plans for construction or improvements of public services or community facilities would result from this alternative. A slight increase in demand on public services would occur under this alternative; however, impacts to public services are expected to be less than significant.

Utilities. A slight increase in demand on utilities would occur at the maneuver training areas. Current utility infrastructure is sufficient to meet the energy demands of the SBCT as well as other future and ongoing activities on or near FRA and DTA. Impacts are expected to be less than significant and no mitigation would be required.

5.3.16 SUBSISTENCE

Table 5-35 summarizes the potential impacts to subsistence access and resources under implementation of Alternative B. Mitigation would be implemented to minimize impacts as summarized in the following subsections.

Table 5-35 Summary of Potential Subsistence Impacts from Alternative B

Activity Group	Location	
	Fort Richardson	Donnelly Training Area
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-Fire Training	⊙	⊙
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Alternative B is expected to result in less than significant impacts to subsistence. The proposed mitigation measures to minimize impacts to subsistence resources are described in the Mitigation Section following the impact analysis.

As described in Section 5.3.8, of this document, Alternative B would result in a slight increase in personnel stationed at FRA. Increased stationing could affect subsistence access and resource availability as an additional 567 Soldiers reside on FRA and train on DTA. Additional personnel may increase sport-hunting interest, which would increase competition with existing recreational hunters for fixed-quantity permits and for harvest take where unlimited open entry permits are available. The ADFG manages harvest through its permit system and affects harvest through early closures and/or regulation changes.

The frequency and intensity of maneuver and weapons training would increase under this alternative. Increased training could affect activity patterns or movements of some wildlife species. Increased training may also affect access because of increases in range closures for training purposes.

5.3.16.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The Subsistence Management Regulations for each Game Management Unit define which rural residents may participate in subsistence activities, as well as the season and harvest limits for each species. FRA is

located in federal subsistence management Unit 14C. Under the special provisions of the Subsistence Management Regulations, Unit 14 on FRA is "closed" to subsistence taking of wildlife (USFWS 2002). Hunting and fishing is permitted on FRA under the ADFG regulations, and it is recognized as an important area for the subsistence lifestyle of Native people. Therefore, impacts to subsistence from military activities and management on FRA were assessed even though federal subsistence limits and seasons do not apply.

Impacts to Access. The additional 567 personnel that would be stationed at FRA may result in a small increase in the number of local sport fisher and hunter populations. Personnel would be restricted to hunting during the seasons and permit requirements defined in the State of Alaska regulations. An increase in sport hunting interest would compete with existing recreational hunters for fixed-quantity permits and for harvest take where unlimited open entry permits are available. The change in numbers of sport fishers and hunters would have No Impacts on hunting and fishing. Overall impacts to access for subsistence activities are expected to be less than significant.

Increased military training would require an increase in access closures. However, alternate areas on FRA would still be available for access and subsistence activities. Therefore, this alternative is expected to have a less than significant impact on access for subsistence activities.

Impacts to the Availability of Subsistence Resources. The additional personnel stationed at FRA might participate in recreational hunting and fishing activities. However, the additional personnel would represent an increase of less than 1 percent compared to existing number of personnel at FRA and would thus result in a small change in the number of sport fishers and hunters. Alternative B would be expected to result in a less than significant increase in competition hunting and fishing; therefore the availability of subsistence resources is unlikely to be affected.

Impacts to subsistence as a result of cantonment construction are expected to have less than significant impacts on both access closures and on subsistence resources.

5.3.16.2 Impacts from Range Construction

No Impacts

Range projects would occur in existing range footprints. Construction of new ranges at FRA is not expected to result impacts to either access closures or subsistence resources.

5.3.16.3 Impacts from Live-Fire Training

Under this alternative, the 567 additional Soldiers stationed at FRA would result in a minor increase in the use of the existing and new live-fire ranges. The minor increase in live-fire training is expected to result in have less than significant impacts on both access closures and on subsistence resources.

5.3.16.4 Impacts from Maneuver Training

Less Than Significant Impacts

Impacts to Access. Maneuver training intensity at FRA would increase and a larger area would be required for training at DTA. Local subsistence resources could be affected by increased frequency and intensity of training, as well as more extensive land use. Implementation of this alternative would result in an increase in the frequency of training area closures at FRA. In addition, maneuver space requirements would increase slightly on DTA. Impacts associated with public access closures are expected to be less

than significant because alternate areas on FRA and USARAK lands outside of DTA would still be available for access and subsistence activities.

Increased training area access closures would affect primarily subsistence users' taking of furbearers, small game and upland birds. This impact is expected to be less than significant because alternate areas on DTA would still be available for access to subsistence resources including wildlife, fish, and plants.

Impacts to the Availability of Subsistence Resources. The Army would use more of DTA for maneuver training than is currently used by the IBCT. Wildlife populations would be able to tolerate some disturbance from vehicular traffic; however, information available currently is insufficient to determine the extent of population-wide effects. Wildlife would be closely monitored by USARAK's ecosystem management program to understand better the impacts and the extent of disturbance resulting from increased road use and development.

Alternative B could affect populations of wildlife. Increases in training frequency and intensity could temporarily affect the distribution of moose. Moose appear well adapted to multiple use management (forestry, hunting, and military activities), and military training seems no more detrimental to moose populations than other land uses (Andersen et al. 1996). Impacts to moose populations are potentially significant if winter habitats were degraded. However, moose are readily adaptable to the creation of new early succession habitat. Overall, the availability of moose to subsistence hunters would be less than significant.

Maneuver training would also result in less than significant impacts to fisheries. Expected increases in training levels could lead to higher rates of erosion and sedimentation, as well as an increased potential for petroleum spills during refueling. However, such impacts would be localized within waterways. Fires could also be a result of increased training frequency, contributing to potential erosion into streams, ponds and waterways, and thus potentially affecting waterfowl and fisheries resources. Increased levels of chemical components from unexploded or partially exploded ordnance are also a potential impact to subsistence resources under. Studies conducted on USARAK impact areas and adjacent waterways have shown that aquatic concentrations of residues are negligible (Ferrick et al. 2001).

Additional personnel stationed at FRA might participate in recreational hunting and fishing activities and could impact current availability of subsistence resources on or near DTA. An increase in sport hunting interest would compete with existing recreational hunters for fixed-quantity permits and for harvest take where unlimited open entry permits are available. The ADFG manages harvest through its permit system and impacts harvest through early closures and or regulation changes. However, the additional personnel would represent an increase of less than 1% compared to the existing population and would thus result in a small change in the number of fisher and hunter populations. Impacts to the availability of subsistence resources are expected to be less than significant.

A slight increase in frequency of closures is expected. Overall impacts on subsistence may occur because of the expected increase in access closures and the potential disruption or partial migration of wildlife. Overall effects on subsistence are expected to be less than significant.

5.3.17 IMPACTS OF RELOCATING IBCT FROM FORT RICHARDSON TO HAWAII

Selection of Alternative B – Alaska for the permanent stationing of the 2/25th SBCT, would require that the IBCT currently stationed at FRA be relocated to Hawaii. Relocating an IBCT from FRA would not significantly change the number of soldiers currently supported by cantonment and range facilities in Hawaii. Although an IBCT would be an increase of 430 soldiers from the current 2/25th ID, it is still less soldiers than the 2/25th SBCT currently training there temporarily. Therefore, no additional IBCT-

specific cantonment or range construction would be required that would contribute to increased short-term construction-related surface disturbance and soil erosion at the cantonments or ranges, as current facilities and ranges adequately support the larger temporary 2/25th SBCT unit.

The majority of the projects identified in the transformation EIS (USAG-HI 2004) would be completed, although some would be down-scoped to exclude elements exclusive to SBCT training. Conditions and impacts at SBMR would be similar to the No Action Alternative. Ongoing transformation projects would be completed, but the increase in live-fire training and training maneuvers in Hawaii would involve a modular IBCT rather than the existing SBCT.

Since no new construction would be required to accommodate the relocation of an IBCT to Hawaii, live-fire or maneuver training would the primary potential contributors to impacts to all resources. Since this training for the IBCT is not expected to differ greatly from existing training frequency or intensity, the impacts associated with IBCT training would be expected to be similar to current levels. Also, the degree of ground disturbance typically caused by munitions and military vehicles used for IBCT training is similar to that caused by the vehicles used for other types of training that already occur at the ranges in Hawaii.

Because the amount of ground disturbance resulting from IBCT training would be similar to the existing conditions, the potential impacts to soils, water, vegetation, wildlife, sensitive species, and cultural resources are expected to be approximately the same. Because the frequency and intensity of training would be similar to that occurring on the ranges now, wildfire, noise, air quality, and land use impacts would also be similar.

Relocating an IBCT from FRA would not significantly change the number of soldiers currently supported by cantonment and range facilities in Hawaii so impacts associated with the number of soldiers would not be expected to change appreciably. The presence of the IBCT would also not be expected to change significantly the population, economy (business sales, volume), employment, income, housing and schools, socioeconomic conditions, minority and low-income populations, environmental justice, the protection of children in Hawaii. Likewise, impacts to traffic and transportation, human health and safety, and energy would be expected to be approximately the same. Live-fire and maneuver training, the primary contributors to indirect impacts to surrounding populations, would not change appreciably from current condition.

Impacts to all resources in Hawaii from relocating an IBCT from FRA to Hawaii would be less than significant.

5.4 ALTERNATIVE C – PERMANENTLY STATION THE 2/25TH SBCT AT FORT CARSON WHILE CONDUCTING REQUIRED MILITARY TRAINING AT TRAINING SITES IN COLORADO

5.4.1 SUMMARY OF THE ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE C

Table 5-36 presents the potential impacts of implementing Alternative C as it is described in Chapter 2. For each VEC, impacts from four activity groups were analyzed: Cantonment Construction, Range Construction, Live-Fire Training, and Maneuver Training. Impacts from the four activity groups are summarized by a single impact rating for each area affected by the alternative. Details of each activity group's impacts are presented below in the resource sections.

The primary activity group responsible for immitigable soil erosion is maneuver training. Soils at FTC and PCMS are generally prone to erosion, a condition worsened by the dry, windy climate. More

extensive maneuver training into areas not currently used for maneuver would expose stable, vegetated soils to vehicle and foot traffic. This would cause loss of vegetation, soil compaction, and alterations to drainage patterns that would increase soil erosion from both wind and water. BMPs and mitigation measures would minimize soil loss, but not to a less than significant level.

Increases in live-fire and maneuver training would increase the potential a wildfire. This could result in an irretrievable loss of individuals of sensitive species or known or unknown cultural resources. The Army has made a conservative determination that, although the mitigation will considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level. Implementing fire management plans such as the Prescribed Burn Plan and other fuel management projects will substantially reduce the impact, but not to less than significant.

Table 5-36 Summary of Environmental Consequences of Alternative C

VEC	Location	
	Fort Carson	PCMS
Soil Erosion	⊗	⊗
Water Resources	⊙	⊙
Wildfire Management	⊗	⊗
Cultural Resources	⊗	⊗
Land Use and Recreation	⊘	⊙
Traffic and Transport	⊘	⊘
Socioeconomics	⊙	⊙
Hazardous Materials and Hazardous Waste	⊘	⊙
Wetlands	○	○
Vegetation	⊘	⊘
Noxious Weeds	⊙	⊙
Threatened and Endangered Species	⊗	⊗
Wildlife and Habitats	⊙	⊙
Air Quality	⊙	⊙
Noise	⊙	⊙
Airspace	⊙	○
Energy Demand and Generation	⊙	⊙
Facilities	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Construction and training activities have the potential to impact cultural resources. Even with implementation of ICRMP, destruction or damage to previously unknown properties of traditional

importance could occur. Mitigation measures would minimize impacts to cultural resources; however, the loss of cultural resources is considered a significant impact.

Impacts to threatened and endangered species would occur from continued use of Army lands. Conservation plans would reduce the impacts; however, impacts to or mortality of sensitive species could occur, an impact that cannot be reduced to less than significant.

The introduction or spread noxious weeds may occur, but FTC has targeted noxious weeds for priority control by preventing them from populating disturbed areas. Range construction would have limited but permanent impacts on vegetation in the construction footprints. General wildlife and habitats would sustain only less than significant impacts. No impacts to wetlands would be expected.

Land use impacts, primarily from training activities would be significant. The implementation of several administrative mitigation measures would reduce those impacts to less than significant.

Water resource and land use impacts, primarily from training activities would be significant. The implementation of several administrative mitigation measures would reduce those impacts to less than significant.

Impacts from hazardous materials would be largely mitigable to less than significant. Water resources, noise, socioeconomics, air quality, airspace, energy, and facilities would all experience less than significant impacts at all affected areas.

5.4.2 GEOLOGY, SOILS, AND SEISMICITY

Table 5-37 lists the significance of soil erosion and other geologic, soils, and seismic-related impacts that would occur under Alternative C for each type of project activity. The current baseline of existing conditions would continue under Alternative C, and soil erosion related impacts would continue at their current levels. Additional impacts resulting from implementation of this alternative would be the difference in magnitude between the impacts caused by the current existing IBCT unit and the SBCT unit that would replace it. The differences were introduced in Chapter 2 and are discussed in this impact analysis as they pertain to proportionately increased or decreased soil erosion related impacts on the installation relative to Alternative C actions.

Table 5-37 Summary of Potential Soil Erosion Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊘	N/A
Impacts from Range Construction	⊘	N/A
Impacts from Live-Fire Training	⊘	N/A
Impacts from Maneuver Training	⊗	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Impacts resulting from construction and training activities under Alternative C would be similar to those discussed for Alternative A. Soil and vegetation disturbance caused by range construction is expected to cause short-term and localized erosion and subsequent sedimentation that can be reduced to less than significant levels with implementation of standard construction BMPs, existing federal, state, and local laws, and existing Army requirements specified in the FTC and PCMS INRMPs (DECAM 2002a) and ITAM annual work plan. Potentially significant soil erosion impacts caused weapons firing and munitions impact from the increased frequency and numbers of soldiers conducting live-fire training activities. However, these impacts can also be reduced to less than significant levels by implementing such mitigation. Intensified on and off-road SBCT maneuver training activities and the increased MIMs associated with SBCT training are expected to cause unavoidable significant disturbance to soils and vegetation, leading to increased rates of soil erosion on the new ranges at FTC and existing ranges at PCMS.

The Army currently implements standard erosion and sedimentation control mitigation measures and wildfire management installation-wide that would reduce many of the potential impacts caused by implementation of Alternative C. These land management practices are specified in the FTC and PCMS INRMPs and ITAM annual work plan. Some of these measures include:

- All construction activities are subject to FTC's Fugitive Dust Control Plan. Site-specific dust control plans are required for all projects with a footprint larger than 25 acres or disturbed for 6 months or longer (state permit), and an El Paso County permit is required for disturbed land greater than 1 acre. Implementation of BMPs, including dust suppression and establishment of speed limits in construction areas, could minimize short-term construction impacts.
- Continued implementation of standard BMPs (e.g., silt fences, straw bales) to reduce potential for soils eroded during construction and demolition to travel off-site and be redeposited downslope or in surface waters.
- Continued implementation of environmental and land management programs (LRAM, TRI, and SRA) to balance training requirements and the need to maintain quality training lands for sustained military use. These programs include minimizing the potential for wind and water erosion of soils and indirect impacts to water quality.
- Continued education of troops and implementation of training guidelines (e.g., no vehicle maneuvers on wet soils) to minimize impacts of training activities on soils.
- Continued implementation of ITAM erosion control projects and maneuver damage repair or reclamation projects for areas damaged by training activities.

5.4.2.1 Impacts from Cantonment Construction

Significant But Mitigable To Less Than Significant Impacts

Impact 1: Soil Erosion. No cantonment construction would be required at FTC initially to accommodate the addition of 567 soldiers, their families, support personnel, and SBCT-specific facilities associated with the permanent stationing of the 2/25th SBCT at FTC. The initial needs would be met by the facilities being vacated by the 4/4th IBCT that the SBCT would be replacing. In comparison to the existing population of FTC, this increase in personnel and associated facilities needs would not be significantly different than the current needs at FTC that are on-going as part of the transformation at FTC and any future construction is likely to occur in previously disturbed areas of the cantonment. Temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed to make up the identified shortfall of approximately 20,000 square yards. Construction of future facilities and the temporary parking can cause direct, short-term,

localized impacts to soils. Construction activities, such as excavation, grading, trenching, and other earth-disturbing activities, could remove vegetation and disturb soils in the immediate construction footprint, increasing the potential for soil erosion. Temporary soil disturbance caused by construction and parking may also result in indirect, short-term soil erosion and delivery of sediment to streams and wetlands, as well as fugitive dust from the movement of machinery. The impacts of surface water sedimentation and fugitive dust are discussed in Sections 5.4.2 and 5.4.11, respectively. Potential increases in soil erosion caused by future construction or parking in cantonment areas would be temporary because buildings and other cantonment improvement features, such as pavement, lawn, and landscaping would create only periodically bare land susceptible to soil erosion. With the implementation of mitigation measures, soil erosion from cantonment construction would be less than significant.

Regulatory and Administrative Mitigation 1: The Army would construct stormwater runoff control structures as part of standard construction BMPs, which would divert water from the construction sites. Near the completion of construction, the Army would implement standard restoration BMPs, such as revegetation and landscaping to address any remaining exposed soils. Compared to existing conditions, increased soil erosion resulting from cantonment construction activities is expected to be short-term, local, and less than significant with implementation of standard construction erosion control BMPs and erosion and sediment control measures specified in the FTC INRMP and ITAM annual work plan.

Less than Significant Impacts

Exposure to Soil Contaminants. FTC has some of the highest naturally occurring documented levels of Se in the United States. Naturally occurring selenium can acutely and chronically affect both aquatic and terrestrial wildlife when land disturbances, such as excavation and trenching occur. Selenium that has leached into lower soil profiles over millions of years is exposed by land disturbance and is taken up by non-native selenium-receiving plants, which then invade and overtake disturbed sites. When selenium-loaded soils are exposed to water, selenium can directly enter surface water systems and biologically accumulate in the systems of aquatic and terrestrial animals. Deep-rooted, selenium receptor plants can also redistribute selenium onto the ground surface and into the soil. Other heavy metals naturally occurring at high levels on FTC, such as mercury, follow the same geological and biological pathways as selenium. The impact associated with exposure to naturally occurring metals contamination during cantonment construction is considered less than significant because selenium study results, described in Chapter 3, provide FTC managers with site-specific selenium knowledge. Resulting management decisions ensure that land user activities do not create a selenium environmental reception hazard.

Seismic Hazards. FTC is located within the low-risk Seismic Zone 1 (DECAM 2002b) and there is low potential for significant seismic activity near the cantonment. Any new structures developed in the future would likely be designed to withstand the expected range of seismic shaking; therefore, the impact is considered less than significant.

5.4.2.2 Impacts from Range Construction

Significant Impacts Mitigable to Less than Significant

Impact 2: Soil Erosion. Construction of the two new weapons training ranges at FTC is expected to cause direct, short-term, localized soil erosion impacts when ground surfaces are disturbed to construct live-fire villages, trench lines, stationary armor targets, machine gun bunkers, and other typical weapons training range features. However, the MPMG range would be developed by upgrading or renovating an existing range and the UAC would only involve 3 acres of new construction that would occur on a previously undisturbed site. Potential increases in soil erosion caused by range construction would be temporary because construction of the structures and other features associated with weapons training ranges would

create bare land only periodically. Compared to existing conditions, increased soil erosion resulting from range construction activities is expected to be short-term, local, and less than significant with mitigation.

Regulatory and Administrative Mitigation 2: The Army would construct stormwater runoff control structures as part of standard BMPs, which would divert water from the construction sites. Other standard range maintenance measures such as road grading, target repair, and berm recontouring would also reduce erosion. Implementation of standard construction BMPs and the land management practices specified in the FTC INRMP and ITAM annual work plan would reduce soil erosion from range construction to less than significant levels.

Less than Significant Impacts

Exposure to Soil Contaminants. Impacts associated with potential exposure to soil contaminants during range construction activities on FTC would be less than significant. As described for cantonment construction, FTC managers operate with site-specific selenium knowledge. Resulting management decisions ensure that land user activities do not create a selenium environmental reception hazard.

Seismic Hazards. Similar to cantonment construction, construction of the new ranges on FTC are not expected to have any effect on the frequency of earthquakes; therefore, the impact would be the hazards associated with the ranges being constructed in areas in which volcanic and seismic hazards exist. As described for cantonment construction, there is low potential for significant seismic activity in the vicinity of the ranges. New structures would likely be designed to withstand the expected range of seismic shaking; therefore, the impact is considered less than significant.

5.4.2.3 Impacts from Live-Fire Training

Significant Impacts Mitigable to Less than Significant

Impact 3: Soil Erosion and Compaction from Munitions Impact. A larger number of soldiers would use existing and new ranges for live-fire training on FTC. There would be a corresponding increase in the total number of rounds fired (estimated to be 88 percent), as well as increased vehicular traffic. While some live-fire training would occur in existing impact areas, the frequency of weapons training is expected to increase. Also, other training would occur on the new ranges and the intensity of the training events at existing ranges, such as the DMPRC, would increase. Surface disturbance caused by munitions impact would result in larger areas of bare ground than observed under current conditions. Munitions impact can directly create craters and remove patches of vegetation, which normally protects soil from erosion by slowing runoff, intercepting raindrops before they reach the soil surface, and anchoring the soil. Compaction in the craters caused by larger ordnance explosions can alter the permeability and water-holding capacity of the soils and harden silty clays affecting the ability of vegetation to recover in those areas. These direct impacts create large areas of bare ground and exposed soils that are susceptible to wind and water erosion, which can indirectly cause removal and deposition of soils, gullying, or instability of soils in areas of steep slopes and rapid runoff. Although weapons training events would be periodic, long-term impacts are expected because soil disturbance typically requires time and effort to amend.

Regulatory and Administrative Mitigation 3: Implementation of standard BMPs, as well as revegetation and other land restoration projects implemented by the LRAM, TRI, and SRA programs of the FTC INRMP and ITAM annual work plan (described previously) would reduce these impacts to less than significant.

Impact 4: Soil Erosion Resulting from Wildland Fires: There would be an increase in the total number of rounds fired at new and existing ranges on FTC, as well as increased vehicular traffic. An increased risk of accidental wildfire ignition would come from ordnance, vehicles, flammable materials, or cigarettes, which could lead to subsequent large areas of bare soils susceptible to erosion. While wildfire is considered a necessary component of a healthy ecosystem, fires generated by military training activities often occur in extremely elevated numbers and intervals, thereby causing unacceptable damage to critical vegetative cover that aids in stabilizing soils from wind and water erosion. FTC's fire management program considers these effects in decisions regarding wildfire suppression and prescribed burning as they relate to mandates to provide for military training while striving to maintain a vital, developing, and diverse ecosystem. Generally, FTC uses prescribed fires to reduce natural fuels on the range. If the fuels are not controlled, rangeland wildfires may get out of control. Impacts associated with soil erosion resulting from wildland fires caused by training activities on FTC are expected because of the arid climate, often-dry vegetation conditions, and occurrence of electrical storms.

Regulatory and Administrative Mitigation 4: The impact is considered less than significant with implementation of the mitigation measures described above and detailed in the FTC INRMP (DECAM 2002b). Continued implementation of the Prescribed Burn Plan will create buffer zones where required, thereby reducing the potential extent of an accidentally ignited wildfire.

Less than Significant Impacts

Exposure to Soil Contaminants. Munitions are fired from firing points downrange and into the range impact areas. Public access to these areas would be restricted because of the explosives risk to human safety. The impact associated with exposure to munitions soil contamination during live-fire training on FTC is considered less than significant because military personnel or public contact with downrange, impacted soil is unlikely and there are relatively few areas with high levels of widespread existing chemical constituent concentrations. Additionally, as described for cantonment and range construction, selenium study results provide FTC managers with site-specific selenium knowledge. Resulting management decisions ensure that land user activities do not create a selenium environmental reception hazard.

Seismic Hazards. Similar to cantonment and range construction, live-fire training on the two new ranges on FTC is not expected to have any effect on the frequency of earthquakes; therefore, the impact would be the hazards associated with training occurring in areas in which seismic hazards exist. There is low potential for significant seismic activity near the ranges. Range structures would likely be designed to withstand the expected range of seismic shaking, and the impact is considered less than significant.

5.4.2.4 Impacts from Maneuver Training

Significant Impacts

Impact 5: Soil Erosion. Maneuver training would occur on both FTC and PCMS. Compared to the existing IBCT training, Alternative C would intensify maneuver training by approximately doubling the MIMs at the existing ranges at both FTC and PCMS (49,576 MIMs associated with the IBCT versus 104,898 MIMs associated with the SBCT). Additionally, the frequency and intensity of small unit (squad, platoon, and company) maneuver training at FTC would increase by about 50 percent compared to the existing IBCT training. Mounted and unmounted maneuver training using Stryker vehicles is expected to damage or remove vegetation and disturb soils to an extent that would substantially increase soil erosion rates and alter drainage patterns in the training areas, which could lead to gullying, and indirectly to downstream sedimentation, particularly when the vehicles travel off-road. Over all, given the qualitative

differences between the ways the two types of units train, surface disturbance created by IBCT training and SBCT training is relatively comparable and both can lead to long-term significant soil erosion.

Increased potential for wind and water soil erosion resulting from Stryker vehicle maneuver training and weapons firing would result from the ground-disturbing activities. Stryker vehicle maneuver training on dry soils on FTC and PCMS would result in significant soil loss from wind erosion. Fugitive dust is an indirect impact of wind erosion of dry soils, which can impact air quality. Areas where there are steep slopes with unstable soils would experience high rates of surface water runoff erosion when disturbed. Off-site transport of the eroded sediments downslope and potentially into surface water sources would be an indirect impact of soil erosion by water.

Soils that present the greatest potential for surface water runoff erosion are clays, silty clays, and clay loams (DECAM 2003a). The eastern portion of FTC, located within the Fountain Creek Watershed, contains soils that have been identified as having moderate to high potential for erosion, which would be highest in areas disturbed by maneuver training activities. The range on FTC covers the majority of land on post and supports the greatest area of native, undisturbed soils because of its lack of development. Severe wind erosion is a problem in the western portion of the range where areas have been cleared (and modified in the case of berms) for training operations (USACE 2007a). As described above, the soil erosion impact at FTC would be significant.

Soil loss from wind erosion would be more widespread on PCMS in areas disturbed by maneuver training activities than water erosion because of the lack of precipitation in the region and the relatively flatter topography. Soils that are considered highly wind erosive when disturbed are located throughout PCMS, particularly in the flat-to-sloping plains in the western portion of the PCMS and in the upland valley that crosses the installation from southwest to northeast between limestone ridges and the Purgatoire River. High rates of water erosion would occur in areas disturbed by natural processes and maneuver training activities. Erosion rates increase on the steeper slopes and finer soils. Mechanized training usually does not occur on slopes greater than 25 percent. The soil erosion impact at PCMS would be significant.

Regulatory and Administrative Mitigation 5: The Army would continue to implement as well as revegetation and other land restoration projects implemented by the LRAM, TRI, and SRA programs of the FTC and PMCS INRMP and ITAM annual work plan, but they would likely not be sufficient to substantially reduce the soil erosion impact to less than significant levels in the event that all units are training at home station and not in deployment status. These institutional programs would likely need to be adjusted to remediate the additional damage that would result from the SBCT maneuver training.

Significant But Mitigable To Less Than Significant Impacts

Impact 6: Soil Compaction and Rutting. Impacts associated with compaction resulting from vehicle maneuver training would occur on FTC and PCMS. Compared to existing IBCT training, the compaction and rutting impacts under Alternative C would not be substantially greater. Soil and vegetation at FTC and PCMS are particularly susceptible to vehicle maneuver damage when the soils are wet (DECAM 2002b). Rutting is the primary impact of maneuver training on wet soils. During dry conditions, the vegetation is disturbed, but roots generally remain intact. When roots are intact, vegetation can regenerate during the next growing season under average climate conditions. When maneuver training occurs on wet soils, deep ruts can be created, up to 24 inches in some places in past training activities, increasing the potential for the root systems to be destroyed and natural revegetation to be unsuccessful.

Regulatory and Administrative Mitigation 6: In current training exercises, and in accordance with FTC Regulation 350-10, training is adjusted when vehicles are making ruts 3 inches deep. The impact is expected to be less than significant with implementation of BMPs, adherence to Regulation 350-10, and

other land management and restoration projects implemented by the LRAM, TRI, and SRA programs of the FTC INRMP and ITAM annual work plan.

Impact 7: Increased Potential for Slope Failure. Areas of steep slopes and erosive soils that could be prone to slope failure are located in the eastern portion within the Fountain Creek Watershed on FTC. Areas of steep slopes and erosive soils that could be prone to slope failure on PCMS are located on the steep side slopes of the limestone ridges that cross the northwestern corner of the PCMS, and in the steep areas of the landscape where the Purgatoire River and associated side canyons form a series of rock-strewn cliffs and rolling mesa tops. No landslides are known to have occurred on FTC within the past few years (Goss 2006), although localized slides resulting in slope wash have occurred in the past given the colluvial nature of soil deposits. A major landslide occurs every 20 to 40 years at the PCMS affecting soils with slopes that are greater than 30 percent. Landslides tend to occur at the PCMS from approximately the middle of the western boundary, southwest to Dillingham Ridge (Goss 2006). Stryker vehicle maneuver training tends to avoid slopes greater than 30 percent. Increased potential for slope failure from impacts from maneuver training would be a significant impact mitigable to less than significant with mitigation measures.

Regulatory and Administrative Mitigation 7: The impact is considered less than significant with implementation of standard road maintenance BMPs other land management and restoration projects implemented by the LRAM, TRI, and SRA programs of the FTC INRMP and ITAM annual work plan.

Less Than Significant Impacts

Volcanic and Seismic Hazards. As described previously, FTC and PCMS are located within the low-risk Seismic Zone 1 (DECAM 2002a) and there is low potential for significant seismic activity in the vicinity of the installations. The seismic hazards associated with maneuver training are considered less than significant.

5.4.3 WATER RESOURCES

Potential impacts to water resources from the proposed permanent stationing of an SBCT at FTC and PCMS include impacts on surface water quality, floodplains, and groundwater quality and supply (**Table 5-38**).

Table 5-38 Summary of Potential Water Resource Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

At FTC, Alternative C may result in impacts to surface water quality due to increased erosion and sedimentation related to training activities and construction of new facilities. Other impacts include increased loading to the existing stormwater system, impacts on water quality from munitions use, spills and leaks, and depletion of groundwater resources from staffing increases. At PCMS, impacts to surface water quality may occur from increased erosion and sedimentation related to maneuver training and potential impacts on water quality from spills and leaks. All of these impacts are considered less than significant.

5.4.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Nonpoint source contamination of surface water and groundwater. No cantonment construction to accommodate the addition of 567 soldiers, their families, support personnel, and SBCT-specific facilities would be required at FTC initially to accommodate the permanent stationing of the 2/25th SBCT at FTC. The initial needs would be met by the facilities being vacated by the 4/4th IBCT that the SBCT would be replacing. The associated facilities needs for the SBCT would not be significantly different from the current needs at FTC that are on going as part of the transformation at FTC and any future construction is likely to occur in previously disturbed areas of the cantonment. Temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed to make up the identified shortfall of approximately 20,000 square yards. Future construction activities and temporary parking could result in short-term, localized increases in erosion and runoff. Use of heavy construction equipment would cause compaction of near surface soils that could result in increased runoff and sedimentation. Clearing and grading during construction would expose the soils to erosion. Dewatering may also be needed during construction, particularly for the utility trenches. However, engineering controls and BMPs including SWPP Plan would be used to minimize these potential impacts during construction.

Construction and operation of new facilities would increase the use of fuels, solvents, and other hazardous and toxic substances, which might result in indirect impacts to surface and/or groundwater if accidentally released into the environment. Fort Carson would implement BMPs and the SPCC to address leaks or spills of hazardous materials. Potential spills would be typically small in magnitude and localized. Even a large, uncontained spill, however, would have a low probability of affecting surface water, as the streams at FTC are intermittent. In addition, Fountain Creek is on the opposite side of a major highway (I-25), making it highly unlikely for any spill to directly or indirectly affect this water body.

Groundwater from nine existing wells is used at FTC for natural resource support and rehabilitation, support of training capabilities, and fire suppression. Increase in personnel stationed at FTC related to the permanent stationing of the 2/25th SBCT may result in increased groundwater use. This increase, however, would be small enough (16 percent) that it could likely be accommodated under existing subsurface water rights.

Stormwater runoff. The stormwater conveyance system, utilities, and ditches within the cantonment area may be unable to handle the increased loading from additional construction and facilities operation, even with the upgrade of the "B" Ditch and the Magrath/O'Connell drainage system. Insufficient capacity in the stormwater conveyance system could result in adverse affects to floodplains in the cantonment under this alternative. Implementing the remaining phases of the USACE (2005) study would address shortcomings in the stormwater system.

Flood potential. There could be adverse impacts to flood-prone areas if future construction of permanent facilities or temporary parking were to occur within flood-prone areas. Any construction activity within

the 100-year floodplain in El Paso County requires a Floodplain Development Permit issued by El Paso County. To avoid adverse impacts, known flood-prone areas including areas immediately adjacent to arroyos would be avoided to the extent practicable. Floodwaters could also affect personnel and equipment, however, when training in flood-prone areas, especially during flash flooding. Safety of troops and equipment is a priority during training, and training procedures direct that troops relocate from flood-prone areas when conditions are favorable for sudden storms and flash flooding.

No significant impacts to water resources are expected from cantonment construction specific to the SBCT; however, the following measures would be implemented to protect water resources further. It is the policy of FTC to eliminate or minimize the degradation of all water resources on Fort Carson and ensure compliance with all applicable federal, state, and local water quality standards. As described in the INRMP, water resources at FTC are managed in coordination with the USGS, NRCS, USFWS, U.S. Department of Justice, USACE, and the Colorado State Division of Water Resources. The Water Resources Management Program on FTC includes watershed/sedimentation monitoring and management, and project reviews for erosion and sediment control.

The primary regulation directing operations at FTC is the Clean Water Act (CWA) and its National Pollutant Discharge Elimination System (NPDES) requirements, which are administered by USEPA. USACE has the primary responsibility for administering Section 404 of the Clean Water Act as it pertains to discharge into any waters of the United States (DECAM 2002a and USACE 2002b).

The use of surface water and groundwater is governed by Colorado water law, and all use or diversion of water must be coordinated with DECAM prior to use. Specific objectives for water resources on Army lands were established in accordance with AR 200-1 (Army 1997); EO 11988 provides requirements for floodplain management (DECAM 2002a).

Pursuant to provisions in the CWA, contractors must submit an NOI to obtain coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities for each construction project that disturbs 1 acre or more of land. In addition, contractors must develop and implement an SWPPP for each project that outlines mitigation strategies to reduce impacts associated with stormwater runoff during construction (USEPA 2006b). Permanent treatment of storm runoff is required as part of the installation's MS4 permit in Colorado.

Impacts from spills would be addressed effectively through the Spill Prevention Control and Countermeasure Plan and standard procedures, including training personnel in spill prevention and control techniques and requirements, maintaining appropriate spill control equipment in areas where refueling may occur, and complying with all hazardous materials management regulations. Preventive measures would also include safe driving practices, and proper transport of hazardous materials in compliance with Army, state, and federal regulations.

5.4.3.2 Impacts from Range Construction

Less Than Significant Impacts

Nonpoint source contamination of surface water and groundwater. Construction activities for the two ranges on FTC could result in short-term, localized increases in erosion and runoff. However, the MPMG range would be developed by upgrading or renovating an existing range and the UAC would only involve 3 acres of new construction that would occur on a previously undisturbed site. Use of heavy construction equipment would cause compaction of near surface soils that could result in increased runoff and sedimentation. Clearing and grading during construction would expose the soils to erosion. Dewatering may also be needed during construction, particularly for the utility trenches. However, engineering

controls and BMPs including SWPP Plan would be used to minimize these potential impacts during construction.

Construction and operation of new facilities would increase the use of fuels, solvents, and other hazardous and toxic substances, which might result in indirect impacts to surface water if accidentally released into the environment. FTC would implement BMPs and the SPCC to address leaks or spills of hazardous materials. Potential spills would be typically small in magnitude and localized. Even a large, uncontained spill, however, would have a low probability of affecting surface water, as the streams at Fort Carson are intermittent. In addition, Fountain Creek is on the opposite side of a major highway (I-25), making it less likely for any spill to directly or indirectly affect this water body.

Flood Potential. Floodplains in the southern part of the installation have not been delineated. There could be adverse impacts to flood-prone areas if construction of permanent facilities occurs within flood-prone areas. Any construction activity within the 100-year floodplain in El Paso County requires a Floodplain Development Permit issued by El Paso County. To avoid adverse impacts, new facilities would be located to the extent practicable outside of known flood-prone areas including areas immediately adjacent to arroyos. Floodwaters could also affect personnel and equipment, however, when training in flood-prone areas, especially during flash flooding. Safety of troops and equipment is a priority during training, and training procedures direct that troops relocate from flood-prone areas when conditions are favorable for sudden storms and flash flooding.

Measures described under Impacts from Cantonment Construction would also be followed for range construction. These measures will ensure impacts remain less than significant.

5.4.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Nonpoint source contamination of surface water. The munitions use increase could lead to increased localized sediment loads and concentrations of ordnance constituents in impact area waterways. However, the munitions constituents would be identical to those currently in use. Studies have shown that these constituents degrade rapidly over time and distance from point of impact, so environmental effects on groundwater would be limited (Houston 2002; Ferrick et al. 2001). Impacts are expected to be less than significant.

Increased training at FTC would increase the use of fuels, solvents, and other hazardous and toxic substances, which might result in indirect impacts to surface and/or ground water if accidentally released into the environment. FTC would implement BMPs and SPCC to address leaks or spills of hazardous materials. Impacts are expected to be less than significant.

Flood potential. Personnel and equipment could be affected by floodwaters when training in flood-prone areas, especially during flash floods. The safety of troops and equipment is a priority during training, and training procedures direct that troops relocate away from flood-prone areas when conditions are favorable for sudden storms and flash flooding.

The following mitigation measures would be implemented to protect water resources from potential impacts resulting from live-fire training:

- Modify current practices to reduce firing high-explosive munitions into active river channels. Firing only into abandoned channels and banks would reduce the direct impact of munitions on waterways including munitions constituents and sedimentation.

- Place new targets farther away from open waterways. Providing distance between waterways and targets would reduce the direct impact of munitions on waterways including munitions constituents and sedimentation.
- Promote vegetated buffer zones between small arms range footprints and lakes and streams. Vegetated buffer zones intercept runoff from the ranges, trapping sediment that can contain dissolved and particulate metals.
- Impacts from spills would be addressed effectively through the Spill Prevention Control and Countermeasure Plan and standard procedures, including training personnel in spill prevention and control techniques and requirements.
- Impacts from spills would be addressed effectively through the Spill Prevention Control and Countermeasure Plan and standard procedures, including training personnel in spill prevention and control techniques and requirements, maintaining appropriate spill control equipment in areas where refueling may occur, and complying with all hazardous materials management regulations. Preventive measures would also include safe driving practices, and proper transport of hazardous materials in compliance with Army, state, and federal regulations.

5.4.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Erosion impacts on surface water quality. Maneuver training at FTC and PCMS could increase for an SBCT when compared to an IBCT. The MIMs would by nearly double (49,576 MIMs associated with the IBCT versus 104,898 MIMs associated with the SBCT. However, because SBCTs use trails more during training than an IBCT, the overall comparative impacts would be approximately the same. Maneuver training could occur during wet weather when soils are more susceptible to damage and increased erosion. Increased sediment from erosion could be transported by stormwater or carried by wind to receiving or nearby waterbodies including Fountain Creek and Purgatorie River. This could result in decreased surface water quality from increased turbidity or sedimentation. To mitigate potential adverse effects, the ITAM program and INRMP requirements would be used to address increased training requirements and maintain sustainability of the training areas. Continued implementation of these programs and efforts by the Watershed Team would repair training land damage and minimize the potential for wind and water erosion of soils and subsequent indirect impacts to water quality. These institutional programs would likely need to be adjusted to respond to the additional maneuver training that would be associated with the SBCT.

Vehicles crossing dry drainages could modify drainage structures through erosion or compaction and could modify the drainages, resulting in increased erosion. Such erosion could result in indirect impacts to water quality. The PCMS implements multiple plans to reduce the effects of erosion, including the MDC Program and the Rest/Rotation/Deferment Program. Stream crossings would be permitted by the Section 404 regional permit.

Nonpoint source contamination of surface water. Increased training would also increase the use of fuels, solvents, and other hazardous and toxic substances, which might result in indirect impacts to surface water if accidentally released into the environment. However, implementing BMPs, including the SPCC, would minimize potential impacts resulting from leaks or spills of hazardous materials. Potential spills would be typically small in magnitude and localized. Even a large, uncontained spill, however, would have a low probability of affecting surface water, as the streams at FTC are intermittent. In addition, Fountain Creek is on the opposite side of a major highway (I-25), making it less likely for any spill to directly or indirectly affect this water body.

Flood potential. Floodplains have not been mapped at the PCMS. However, personnel and equipment could be affected by floodwaters when training in flood-prone areas, especially during flash floods. The safety of troops and equipment is a priority during training, and training procedures direct that troops relocate away from flood-prone areas when conditions are favorable for sudden storms and flash flooding.

Measures described under Impacts from Cantonment Construction would also be followed for maneuver training. These measures will ensure impacts remain less than significant.

5.4.4 WILDFIRE MANAGEMENT

Table 5-39 lists the types of impacts associated with wildfire management that would occur under Alternative C. General descriptions of the impacts are also provided. Construction at FTC would not impact wildfire risk. Live-fire training at FTC would increase both the number of soldiers and the number of rounds fired. This would create a significant wildfire risk. Maneuver training at FTC and PCMS would approximately double (when comparing MIMs of the IBCT versus the SBCT) and small unit training at FTC would increase by approximately 50 percent. Since there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species or known or unknown cultural resources, the Army has made a conservative determination that although the mitigation will considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level. Implementing fire management plans such as the Prescribed Burn Plan and other fuel management projects will substantially reduce the impact, but not to less than significant.

Table 5-39 Summary of Potential Impacts to Wildfire Management from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-Fire Training	⊗	N/A
Impacts from Maneuver Training	⊗	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

The FTC performance goal with regard to wildland fire management is to facilitate military personnel with planned training opportunities while reducing the possibility of uncontrolled wildland fire escaping the boundaries of FTC and the PCMS (DECAM 2001a). Suppression actions are based on planned analysis consistent with land management objectives including the threat to life and property. FTC personnel advise the on-site Incident Commander concerning suppression methods that may be used to minimize resource losses. No wildfire situation, with the possible exception of a threat to human life, requires unnecessary exposure of firefighters and equipment to dangerous situations. Regardless of the level of protection, the Incident Commander makes determines how each fire is to be handled for initial response. Specific tactics for the suppression of wildland fires are generally taken or adapted from the Field Reference Guide for Control of Wildlife Fires (National Wildfire Coordinating Group 1989).

5.4.4.1 Impacts from Cantonment Construction

No Impacts

When compared to the IBCT that it would be replacing, permanent stationing of the 2/25th SBCT at FTC would slightly increase the overall population with the addition of soldiers, their families, and support personnel. Cantonment construction to accommodate the new population and SBCT-specific facilities would not be required initially. Temporary parking for Stryker vehicles would need to be provided in the cantonment area. This could create a small potential for accidental ignition from the contact of hot equipment with vegetation or carelessness by personnel. This short-term, negligible increase is not expected to impact the risk of accidental wildfire ignition because the area would be mowed as needed to minimize contact with the vehicles and vegetation.. No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from cantonment construction.

5.4.4.2 Impacts from Range Construction

No Impacts

Construction of two new ranges at FTC would temporarily increase human presence and activity at construction sites. Only 3 acres of undisturbed land for construction of the UAC would be impacted. This would create a small potential for accidental ignition from the contact of hot equipment with vegetation or carelessness by construction workers. This short-term, negligible increase is not expected to impact the risk of accidental wildfire ignition. No range construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from range construction.

5.4.4.3 Impacts from Live-Fire Training

Significant Impacts

Impact 1: Increased Wildfire Risk. A larger number of soldiers would use existing and newly constructed ranges at Fort Carson for live-fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. An increased risk of accidental wildfire ignition would come from ordinance, vehicles, flammable materials, or cigarettes. Reclassification of fire management options may occur as needed to ensure fire management meets anticipated changes in wildfire risk. Prescribed burning resulting from any management prescriptions would create short-term adverse impacts to air quality and would require a permit. With implementation of the mitigation measures below, fire risk would be reduced, but the impacts of a wildfire would remain significant.

Regulatory and Administrative Mitigation 1. If necessary, fire management practices and guidelines, as well as fire detection and firefighting resources, would be modified to reflect SBCT training. All parties would continue to implement the Prescribed Burn Plan (DECAM 2003b) to limit fire hazards. Prescribed burning to create buffer areas would provide additional protection from wildfires near live-fire training activities.

5.4.4.4 Impacts from Maneuver Training

Significant Impacts

Impact 2: Increased wildfire risk. Maneuver training would occur at both FTC and PCMS. Except for the differences described below, SBCT training would have similar impacts as current IBCT training at each location. Brigade- and battalion-level training would primarily occur at PCMS at levels similar to those

that occur for an IBCT. The frequency of maneuver training at FTC and PCMS is expected to be the same but the MIMs would increase by nearly double existing levels (49,576 MIMs associated with the IBCT versus 104,898 MIMs associated with the SBCT). Platoon- and company-level training would primarily occur at FTC, and would increase in frequency also by about 50 percent. Munitions use is not part of maneuver training, so the risk of wildfire ignition is from vehicle use and general human activity. The inherent minor risk of accidental ignition resulting from SBCT maneuver training is expected to be similar to the existing IBCT maneuver training. However, SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently. These areas may not have been managed to reduce wildfire risk or have been incorporated into fire management strategies. Implementation of Mitigation Measures described above under *Impact 1* would reduce increased risk, but the impacts of a wildfire would remain significant.

Regulatory and Administrative Mitigation 2. If necessary, fire management practices and guidelines, as well as fire detection and firefighting resources, would be modified to reflect SBCT training. All parties would continue to implement the Prescribed Burn Plan (DECAM 2003b) to limit fire hazards. Prescribed burning to create buffer areas would provide additional protection from wildfires near live-fire training activities.

5.4.5 CULTURAL RESOURCES

Impacts on cultural resources including historic structures, prehistoric and historic archaeological sites, and PRTCSs could include intrusion of new buildings or structures that are not consistent with the historic characteristics of a historic site or district, renovation or demolition of historic buildings, ground disturbance at archaeological sites, removal of objects or artifacts from eligible sites, increased access to archaeologically sensitive areas, or restriction of access to sacred sites.

Stationing of an additional 567 SBCT soldiers and their support staff and their families would require eventual construction of additional residential and support facilities and would result in increased overall use and traffic. Construction of training support facilities could disturb or damage cultural resources. The overall increase in traffic and use could result in accelerated disturbance and degradation. New training ranges would be required on FTC, including 3 acres of disturbed land associated with the UAC. Increased frequency and intensity of training would result in more extensive and more frequent damage to cultural resources. The acquisition of new systems and equipment, including Stryker vehicles, could entail the use of more extensive areas during maneuver training, resulting in more damage to cultural resource sites. However, Stryker vehicle exercises tend to focus more on rapid deployment and remain on existing roads than training with conventional vehicles. Management activities, land stewardship, policy and programs implementation, on the other hand, are expected to improve data collection and management and improve the protection and enhancement of cultural resources. **Table 5-40** summarizes the types of impacts to cultural resources that would occur under Alternative C.

5.4.5.1 Impacts from Cantonment Construction

Significant Impacts Mitigable To Less Than Significant

Impact 1: Impacts to cultural resources: Stationing of an additional 567 SBCT personnel, support staff, and their families would not initially require construction of additional residential and support facilities but would result in increased overall use and traffic. Temporary parking of Stryker vehicles within the cantonment area could disturb or damage cultural resources. Approximately 1,693 archaeological sites have been documented on FTC. Of these, 131 individual sites are evaluated as eligible for the NRHP, and four NRHP-eligible districts have been identified. Only a small proportion of the sites are on the cantonment. Known eligible archaeological sites can be avoided and protected. There are three NRHP-

eligible Historic Districts located on FTC: the Old Hospital Complex, the Wastewater Treatment Plant and Incinerator Complex, and the Turkey Creek Recreation Area. In all, 68 buildings are contributing properties of these Historic Districts. Given the low number of sites in cantonment areas, and the footprints of the proposed projects, mitigation would reduce any impacts to less than significant.

Table 5-40 Summary of Potential Cultural Resources Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊘	N/A
Impacts from Range Construction	⊗	N/A
Impacts from Live-Fire Training	⊘	N/A
Impacts from Maneuver Training	⊗	⊗

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Regulatory and Administrative Mitigation 1: An ICRMP has been implemented for FTC and PCMS. The ICRMP for FTC and PCMS establishes a formal mechanism to identify and manage cultural resources. The overall strategic goal of the ICRMP is to conserve and protect cultural resources consistent with the military mission for present and future generations. Objectives include inventory and evaluation of cultural resources on FTC and PCMS, streamlining of consultation, avoidance and protection of NRHP eligible sites, monitoring of any potential impacts, and implementation of mitigation and data recovery plans when appropriate. Preferred measures are the avoidance of sites and the mitigation of adverse effects to sites. Should modification and upgrading of existing ranges require disturbance of areas not surveyed for cultural resources, the appropriate surveys would be conducted. If eligible sites cannot be avoided, they are to be treated and documented in accordance with appropriate standards.

5.4.5.2 Impacts from Range Construction

Significant Impacts

Impact 2: Impacts to cultural resources: There would be limited construction for two new training ranges on FTC associated with the stationing of the SBCT. However, the MPMG range would be developed by upgrading or renovating an existing range and the UAC would only involve 3 acres of new construction that would occur on a previously undisturbed site. No range construction is anticipated for PCMS. If the new range construction is in areas that have not been surveyed for cultural resources, surveys would be completed. If they are in areas of past surveys or if new cultural resources are found, plans would be adjusted to the extent feasible to avoid impacts to cultural resources. The guidance in the ICRMP would be followed to identify, evaluate, and protect cultural resources. All ground-disturbing activities would be monitored for undocumented cultural resources. If any eligible site cannot be avoided, a treatment plan for mitigation would be developed and implemented. Even with implementation of ICRMP, destruction or damage to previously unknown properties of traditional importance could occur. Mitigation measures would minimize impacts to cultural resources; however, the loss of cultural resources is considered a significant impact.

Regulatory and Administrative Mitigation 2: SOPs and guidance in the ICRMP would be followed to identify, evaluate, and protect cultural resources. All ground-disturbing activities would be monitored for undocumented cultural resources. If any eligible site cannot be avoided, a treatment plan for mitigation would be developed and implemented. The protection, monitoring, and mitigation measures described for cantonment construction would be implemented to protect cultural resources sites.

5.4.5.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 3: Impacts to cultural resources. The stationing of the SBCT at FTC would entail use of new training ranges, an increased intensity of use of existing ranges and use of new weapons on the training ranges. There would be no change in live-fire training on PCMS. Existing ranges have been surveyed for cultural resources and measures are in place to monitor impacts to these resources. Locations of new ranges would be inventoried for cultural resources. An increase in live-fire training would occur, and the resulting impacts from increased risk of wildfire are presented in Section 5.4.4.

Regulatory and Administrative Mitigation 3: SOPs and guidance in the ICRMP would be followed to identify, evaluate, and protect cultural resources. All ground-disturbing activities would be monitored for undocumented cultural resources. If any eligible site cannot be avoided, a treatment plan for mitigation would be developed and implemented. The protection, monitoring, and mitigation measures described for cantonment construction would be implemented to protect cultural resources sites.

5.4.5.4 Impacts from Maneuver Training

Significant Impacts

Impact 4: Impacts to cultural resources. Potential significant impacts from maneuver training would be the most widespread impacts associated with the SBCT. The stationing of the SBCT at Fort Carson would entail qualitatively different maneuver training over larger areas than existing IBCT maneuver training. Current maneuver training areas would be used but the amount of MIMs associated with training would be expected to increase by nearly double over current levels (49,576 MIMs associated with the IBCT versus 104,898 MIMs associated with the SBCT). However, the SBCT would use existing trails more than the IBCT, but maneuvers would extend over larger training areas. The SBCT has more and heavier vehicles, but is less likely to go cross-country. The SBCT is also more mobile and creates less ground disturbance for bivouacs and fighting positions. The potential for significant impacts to cultural resources from maneuver training is greater with the SBCT because of the more extensive training exercises but the nature of the impacts is somewhat different.

To date, 6,806 archaeological sites have been recorded on FTC and PCMS, and 619 are recommended as eligible or need to be evaluated for eligibility. Approximately 87 percent of the archeological sites (5,940) include prehistoric materials. This includes 529 that contain both prehistoric and historic components. Construction or upgrading of facilities and the use of training areas has the potential for significant impact to archaeological sites. However, measures for avoidance, protection, and mitigation will reduce the severity of those impacts and have a beneficial impact in the collection of information about the prehistory and history of the region.

Approximately 25 percent (1,693) of the known archaeological sites are on FTC. Of these, 131 individual sites are evaluated as eligible for the NRHP, and four NRHP-eligible districts have been identified. Known eligible archaeological sites can be avoided and protected from known areas of construction and training activities.

Of the 5,113 archaeological sites reported on PCMS, 88 percent (4,511) include prehistoric materials. This includes 474 that contain both prehistoric and historic components. A total of 488 of the archaeological sites are considered eligible for the NRHP, and 11 NRHP-eligible historic archaeological districts have been identified. Known eligible archaeological sites can be avoided and protected from known areas of construction and training activities.

The use of training areas on FTC and PCMS has the potential for significant impacts to historic buildings or structures. Fourteen historic districts that include historic buildings and structures have been recorded on FTC and PCMS. Intact architectural properties at PCMS are predominantly farms, ranches, and related rural sites. These were all abandoned by 1983. There are also two stage stations along a stage road and an early pipeline booster station with an associated company settlement. These sites are treated as both archaeological sites and historic architectural properties. They include 11 NRHP-eligible historic districts: La Placita Hispanic Settlement, Cross Ranch, Bar VI Ranch, Mary Doyle Homestead, Red Rocks Ranch, Sharps Ranch, Crowder's Ranch and Big Canyon, Brown's Sheep Camp, Bent Stage Station, Lockwood Stage Station, and Piñon Booster Station. Maneuver training could result in the destruction or damage to previously unknown properties of traditional importance, an impact that cannot be mitigated to less than significant.

Regulatory and Administrative Mitigation 4: Locations of eligible archaeological resources would be identified as sensitive areas where traffic and training activities are restricted or prohibited. If new plans or programs cannot avoid eligible cultural resources, appropriate mitigation measures would be developed under the SOP for mitigation of adverse effects in the current ICRMP. If unanticipated cultural resources are discovered during construction or training activities, the SOPs for discoveries and consultation would be implemented.

5.4.6 LAND USE AND RECREATION

Table 5-41 summarizes the potential impacts to land uses and recreation resources under implementation of Alternative C. No land acquisition would be required and the proposed project activities would be located on land within the existing Army installations. No agricultural land would be converted to training land under this alternative. Impacts to land use and recreation would be less than significant. Mitigation would be implemented to minimize impacts.

Table 5-41 Summary of Potential land Use and Recreation Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊘	⊙+

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.4.6.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Conflicts with existing land uses and recreational resources or conflicts with land use or resource management plans or policies. Under this alternative, permanent stationing of the 2/25th SBCT at FTC would not initially require cantonment construction to accommodate the new population and SBCT-specific facilities. Most needed facilities are already planned for construction as part of the Army transformation at FTC. Temporary parking of Stryker vehicles that will be needed would occur within the cantonment, and such use would be consistent with the existing, developed land uses in the cantonment area. In some cases, regulations and plans may need to be updated to reflect new mission activities.

Impacts on land use during construction activities. Since no new construction would be initially required within the cantonment area, existing land uses (including recreation and hunting) in the vicinity would not be temporarily affected. Nearby land uses would not be affected by the temporary parking of Stryker vehicles within the cantonment area because of increased noise, dust, odors, adverse effects on public views, and human presence and activity would occur in areas already used for military activities on base. These impacts would be localized, temporary, and less than significant. No mitigation is necessary for impacts from cantonment construction. No cantonment construction would be necessary at PCMS; therefore, impact analysis is not applicable.

5.4.6.2 Impacts from Range Construction

Less Than Significant Impacts

Impacts on land use during construction activities. Construction of two new ranges at FTC could indirectly affect nearby on-post land uses because of increased noise, dust, odors, adverse effects on public views, and human presence and activity in the vicinity of the construction sites. However, the MPMG range would be developed by upgrading or renovating an existing range and the UAC would only involve 3 acres of new construction that would occur on a previously undisturbed site. Therefore, the impacts would be localized (within the installation), temporary, and less than significant. No mitigation is necessary. No range construction would be necessary at PCMS; therefore, no impact from this activity would occur. No mitigation is necessary for impacts from range construction.

5.4.6.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Conflicts with existing land uses, recreation resources, or resource management plans. Under implementation of this alternative, additional live-fire training would occur as a result of an increased number of soldiers training at both existing and the new ranges at FTC. In addition, new weapons would be used and the use of large caliber munitions would increase. SBCT training would result in an increased number of soldiers training at all ranges, thus increasing the number of rounds fired as well as increased vehicular traffic. Increased noise, dust, or other indirect effects associated with this alternative are not expected to affect off-post land uses. The surrounding areas are uninhabited lands within the FTC installation. No residential areas, schools, hospitals, or businesses are expected to be affected. These impacts would be localized to the vicinity around the ranges. With continued implementation of current Army SOPs to minimize potential noise and safety impacts, impacts localized to the vicinity around the ranges are expected to be less than significant. No additional mitigation would be required.

5.4.6.4 Impacts from Maneuver Training

Significant But Mitigable To Less Than Significant

Impact 1: Training Impacts to Surrounding Land Use. Under this alternative, maneuver training would occur at both FTC and PCMS. Except for the differences described below, SBCT training would have similar impacts as current IBCT training at each location. Brigade- and battalion-level training would primarily occur at PCMS, and the frequency of this maneuver training at PCMS is not expected to increase above existing levels. Platoon- and company-level training would primarily occur at FTC, and would increase in frequency by approximately 50 percent. MIMs at both FTC and PCMS would be expected to nearly double for the SBCT when compared to the existing IBCT. Munitions use is not part of maneuver training; however, SBCT maneuver training typically covers a larger area, potentially extending training into areas that have not been used as frequently. Under this alternative, noise levels would increase because of new weapon training and the use of Stryker vehicles, but these effects would be localized and temporary during training. The increased noise levels in areas outside the FTC and PCMS installation boundaries might discourage residential development or development of other sensitive receptors in these areas in the future. Noise impacts are discussed further in the noise section of this document. Impacts to land uses and recreation resources are expected to be significant but mitigable to less than significant.

*Regulatory and Administrative Mitigation 1:*To mitigate for additional encroachment on range areas from additional development, the Army would continue to coordinate among Directorate of Public Works Master Planning Division; G-3; and DPTM – Range Division staff in siting of new facilities. To mitigate for noise outside of the installation boundaries, the Army would continue to follow Army Regulation (AR) 200-1 and Installation Environmental Noise Management Plan to monitor noise and discourage incompatible new development around FTC and PCMS.

Less Than Significant Impacts

Conflicts with existing land uses, recreation resources, or resource management plans. Implementation of this alternative could result in an increase in the frequency of training area closures at FTC. The increased training activities would likely reduce the availability of downrange training areas for recreational uses, such as hunting. However, hunting would likely still be allowed in deferred areas if such use would not interfere with the training mission. Special areas used for recreation and wildlife protection are currently off limits to training and would likely remain off limits to training in the future.

Because the maneuver training under this alternative would affect a larger area at PCMS, it would likely reduce or remove the availability of the some areas for hunting. The potential limitations on hunting would affect recreation uses by further limiting or removing the single largest contiguous area of public hunting grounds in southeast Colorado. However, because other available hunting areas exist on nearby public lands, it is expected that this alternative would result in less than significant impacts to opportunities for recreation or hunting.

SBCT training on lands currently used for training. The increased training requirements on the installation would be required to comply with FTC regulations for training activities. In some cases, regulations and plans may need to be updated to reflect new mission activities.

Operation at the PCMS would have only minimal adverse impacts to land use on the installation. The PCMS would remain a military training facility, which is the current land use designated by Las Animas County and recognized by surrounding property owners. Although SBCT training could occur in areas

not currently heavily used for the training mission or for recreational activities, it would be consistent with the training land uses in that area.

Increased maneuver training could degrade training lands and affect the long-term availability of training lands for military use. Because Stryker vehicle exercises tend to remain on existing roads, impacts to training lands are expected to be less than significant.

Additional measures are currently in place and are continually revised and reviewed to respond to new or increasing impacts to land uses and recreation resources. To minimize degradation of training lands from increased training activities, the Army would continue to implement land management and environmental programs to balance training requirements and the need to maintain quality training lands for sustained military use.

5.4.7 TRAFFIC AND TRANSPORTATION

Table 5-42 summarizes the potential impacts to traffic and transportation resources under implementation of Alternative C. Under implementation of this alternative, traffic volumes on public roadways in the ROI would increase from additional soldiers and their families relocating to FTC and from construction activities. Convoys would travel from FTC to PCMS for maneuver training; however, convoy frequency would not increase compared to current conditions. Some of the traffic would affect regional roadways currently operating at or near capacity. Based on the expected traffic impacts, mitigation measures are proposed, and would reduce traffic impacts to less than significant.

Table 5-42 Summary of Potential Traffic and Transport Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊘	⊘+

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.4.7.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Construction traffic. No cantonment construction would initially be required to accommodate the permanent stationing of the 2/25th SBCT at FTC. During future construction that could occur, traffic on roads on Fort Carson and surrounding the post would increase temporarily. Construction traffic would consist of construction vehicles and equipment, including bulldozers, graders, backhoes, excavators, dump trucks, cement trucks, and hoe-ram excavators. Transport vehicles would move the construction equipment to and from work sites.

Construction traffic would be routed through Gate 3, Fort Carson's primary commercial traffic gate, and continue south on Chiles Avenue. This is similar to current construction traffic patterns. Construction traffic would pass by a school at Chiles Avenue and Burris Street. Crossing guards are currently employed, and speed zones are enforced to ensure safety of school children in the area. Chiles Avenue is presently the primary route for commercial and construction traffic, and the introduction of minimal amounts of additional traffic for temporary construction purposes would not negatively affect school children. If needed, construction traffic can be rerouted onto Specker Avenue to avoid sensitive resources.

On-post roadways may need to be temporarily closed during construction activities. Use of traffic control procedures, including flaggers and posted detours, would minimize impacts to traffic flow. Other BMPs to address potential traffic impacts include minimizing construction vehicle movement during peak rush hours on the installation and placing construction staging areas in locations that would minimize construction vehicle traffic within administrative, housing, and school areas. During construction, impacts to traffic on public roadways would be temporary and are expected to be less than significant.

Intersection Operations. Traffic volumes at signaled intersections on-post would increase slightly because of the stationing of 567 additional soldiers and their families at FTC. Capacity improvements may be required along three major post roadways, Chiles, O-Connell and Prussman, on which there are ten signaled intersections. Increased traffic volumes at FTC's active entry control points would be minimized by opening Gate 6 and Gate 19 to reduce traffic at the other entry control points. With the opening of these gates, impacts to traffic on public roadways are expected to be less than significant.

Roadway Segment Operations. Traffic volumes would increase slightly on both the regional roadways and on the roads within the FTC property because of the additional personnel stationed at FTC. The 2/25th SBCT would increase the number of soldiers stationed at FTC by approximately 567 Soldiers.

Because access to FTC is provided off I-25, Academy Boulevard, or SH 115, these roadways experience the largest daily traffic-volume increases on their segments adjacent to the installation. The roadway network in the area in and around the City of Fountain would likely experience the highest percent traffic-volume increases because a large number of soldiers reside in this area and additional residential development is projected for this area in the future.

In addition, in the immediate proximity of FTC at SH 16, I-25 is near capacity (CDOT 2006a) and SH 16 is currently operating at LOS E (over capacity). Additional traffic on SH 16 would potentially reduce the LOS to F (unacceptable); however, CDOT has proposed reconstruction of SH 16. Under this alternative, the additional personnel would represent a less than one percent increase in population compared to the existing personnel in the ROI; therefore, very little additional traffic is likely to affect SH 16. Impacts to vehicular traffic on SH 16 are expected to be less than significant for this alternative. Impacts to traffic on public roadways are expected to be significant, but mitigable to less than significant.

New facilities constructed at FTC could change travel patterns on the installation roads. The traffic increases on the FTC property would primarily affect Constitution Avenue (east of I-25) to the north, the southern boundary of Fort Carson to the south, Marksheffel Road (south of Airport Road) to the east, and approximately 1 mile west of SH 115 (between Academy Boulevard and I-25) to the west. Because the additional personnel would represent an increase of less than 1 percent compared to the current population, impacts to traffic on both on-post and public roadways are expected to be less than significant. No mitigation would be required.

Measures are continually revised and reviewed to respond to new or increasing impacts to traffic, including those below, which would further reduce traffic impacts.

- Implementation of standard traffic control procedures during construction and limiting construction vehicle movements during rush hours and within administrative, housing, and school areas would minimize temporary construction impacts.
- Implementation of the suggested transportation improvements outlined in the FTC Transportation Study would minimize impacts of increased traffic volumes.
- Implementation by local agencies of programmed improvements contained in the PPACG Transportation Improvement Plan would accommodate FTC traffic growth.
- Continue to coordinate with Mountain Metropolitan Transit to assess whether Fort Carson's transit needs would accommodate for increased bus usage.

Parking. A small increase in parking demand associated with the additional personnel stationed at Fort Carson would occur. Stryker vehicles would need to be temporarily parked within the cantonment area. Impacts to parking are expected to be less than significant.

5.4.7.2 Impacts from Range Construction

Less Than Significant Impacts

Construction traffic. Traffic would increase slightly during construction of the two new ranges at FTC. Traffic impacts associated with intersection operations and roadway segments, as well as parking impacts, are expected to be less than significant. No range construction would be necessary at PCMS; therefore, the impact analysis is not applicable. No mitigation is required for traffic impacts from range construction.

5.4.7.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Traffic from military vehicles. SBCT training would result in an increased number of soldiers at all live-fire ranges. Traffic would increase slightly because a larger number of soldiers would use the existing and newly constructed ranges at FTC for live-fire training. However, traffic impacts associated with intersection operations and roadway segments, and parking are expected to be less than significant. No mitigation is necessary. No live-fire training would occur at PCMS; therefore, the impact analysis is not applicable.

5.4.7.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Intersection and Roadway Segment Operations. Under implementation of Alternative C, travel to and from FTC to PCMS for maneuver training would occur two to three times per year. Convoys would include approximately 317 Stryker armored vehicles; however, fewer wheeled support vehicles and tracked vehicles would be used for SBCT training compared to the current IBCT training.

Military vehicles traveling between the FTC and PCMS would cross public roadways. Convoy frequency would not increase compared to current conditions. Because some of the traffic would affect regional roadways that are currently operating at or near capacity, impacts to traffic on public roadways are expected to be significant but mitigable to less than significant.

The frequency of the convoys at FTC would not increase compared to the current IBCT training; however, some of the traffic would affect regional roadways that are currently operating at or near capacity. The City of Pueblo, located approximately 30 miles south of the FTC Cantonment area, is the only city transected by the I-25 portion of the deployment route. The remainder of the route runs through sparsely populated rural areas. I-25 through Pueblo is expected to be operating at or near capacity by 2030. Traffic from training deployments could adversely affect traffic on I-25 through Pueblo. According to the CDOT, there is sufficient excess roadway capacity along the majority of the segment of I-25 between Fort Carson and Pueblo.

Regulatory and Administrative Mitigation 1: Impacts to the regional roadway network from training deployment convoys would be mitigated by scheduling all movements to occur during off-peak traffic periods through Pueblo and staggering convoy vehicles into groups of no more than 24 vehicles each that are spaced at least 15 minutes apart. Improvements to the SH 16/I-25 interchange (currently underway) and the addition of passing lanes on U.S. 160 and U.S. 350 were recommended in the Piñon Canyon Maneuver Site Traffic Study (DPW 2006) and could also be implemented to mitigate the impacts of military convoys on regional roadways.

Additional Mitigation 1: Standard Army operating procedures are continually revised and reviewed to respond to new or increasing impacts to traffic, including those below, and would further reduce traffic impacts.

- Schedule all PCMS-related traffic movements to occur during off-peak periods on roadways operating near capacity.
- Stagger convoy vehicles into groups of no more than 24 vehicles each, spaced at least 15 minutes apart.
- Schedule all convoy movements through the Installation Transportation Officer at least 60 days in advance of the training rotation.
- Add passing lanes on U.S. 160 and U.S. 350 as recommended in the 2006 PCMS Traffic Study.
- Schedule construction activities so that they would not interfere with training. Use traffic control procedures, such as detours, when appropriate.

Less Than Significant Impacts

Roadway Segment Operations. Maneuver training at the PCMS property would not increase in frequency; however, Stryker vehicle exercises tend to remain on existing roads compared to training with conventional vehicles and would likely require the use of more extensive areas during maneuver training compared to current training activities. The use of Stryker vehicles in the training areas could result in degradation of the roads within the PCMS property because of additional traffic on the installation roads.

5.4.7.5 Beneficial Impacts

Roadway Segment Operations. The use of Stryker vehicles may require road improvements on the PCMS installation. Expansion and improvement of roads may occur under implementation of this alternative, but the extent of improvement is not known. This would result in beneficial impacts to transportation resources within PCMS.

5.4.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Table 5-43 summarizes the potential impacts to socioeconomic resources, environmental justice, and the protection of children under implementation of Alternative C. Mitigation would be implemented to minimize impacts as summarized in the following subsections.

Table 5-43 Summary of Potential Impacts to Socioeconomics from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

This section analyzes the potential impacts to socioeconomics, environmental justice, and protection of children. This alternative includes additional soldiers and equipment at FTC and maneuver training at both FTC and PCMS. **Table 5-44** summarizes the EIFS Construction Model Output for FTC. The proposed activities at PCMS would be limited to maneuver training modifications; therefore, there would be no impacts to population, employment, income, housing, or schools in this area.

Table 5-44 EIFS Construction Model Output for Fort Carson, Colorado

Indicator Variable	Project Change	Percent Change	RTV
Direct sales volume	$6,565,568		
Induced sales volume	$6,959,502		
Total sales volume	$13,525,070	0.11%	-8.6 % % to 17.37 %
Direct income	$20,597,860		
Induced income	$1,448,820		
Total income	$22,046,680	0.29%	-7.68 % to 17.37 %
Direct employment	598		
Induced employment	43		
Total employment	641	0.38%	-3.61 % to 10.06 %
Local population	1,387		
Local off-base population	693	0.55%	-2.06 % to 5.49 %

These analyses indicate that the changes in sales volume (0.11 percent), income (0.29 percent), employment (0.38 percent), and population (0.55 percent) are well within the respective RTVs of 17.37 percent, 17.37 percent, 10.06 percent, and 5.49 percent.
Source: EIFS Model 2007

5.4.8.1 Impacts from Cantonment Construction

No cantonment construction would be required at FTC initially to accommodate the addition of 567 soldiers, their families, support personnel, and SBCT-specific facilities associated with the permanent stationing of the 2/25th SBCT at FTC. Most needed facilities are already planned as part of the Army's transformation at FTC. In comparison to the existing population of FTC, this increase in personnel and associated facilities needs would not be significantly different than the current needs at FTC. However, all unaccompanied Soldiers associated with the SBCT (estimated at 200 to 300 Soldiers) would be stationed off-post until currently needed and planned barracks are built. Also, temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed.

Less Than Significant Impacts

Population. Additional soldiers would be stationed at FTC, resulting in a less than 1 percent change to the total county population. This change would be within the historic RTV range for the ROI and would be less than significant. No mitigation would be required.

Economy (business sales volume). No construction projects would be initially required at FTC to accommodate the permanent stationing of the 2/25th SBCT so no significant, short-term, beneficial effects would be expected from construction. However, the off-base housing of the 200 to 300 unaccompanied soldiers would provide rents to those providing the accommodations. These economic benefits would be temporary, lasting only until the future construction of barracks on-post. Expenditures and employment associated with future construction projects would slightly increase the business sales volume within the ROI. The changes in sales volume would fall well within historical fluctuations, as represented by the RTVs shown in **Table 5-44** above, and would be considered less than significant. No mitigation would be required.

Employment. Implementing this alternative would likely result in a small increase in military employment. The increase in employment would be within the historic RTV ranges for the ROI and would be less than significant. No mitigation would be required.

Income. Implementing this alternative would result in a small increase in income within the ROI. This change would be within the historic RTV range for the ROI and would be less than significant. No mitigation would be required.

Housing . An increase in demand for housing would occur because of the additional personnel stationed at FTC and because initially the unaccompanied soldiers would be stationed off-post. However, the available housing stock would accommodate the demand for housing. Impacts to the availability and cost of housing would be less than significant. No mitigation would be required.

Schools. Minimal, long-term effects on schools serving FTC are expected. The additional soldiers stationed at FTC would represent a less than 1 percent change in population compared to existing conditions. A minimal increase in school enrollment for the schools servicing FTC is expected to occur. The school districts near FTC have sufficient capacity to accommodate the small number of new students. The impact of additional students would vary with the school, but is expected to be less than significant.

Environmental Justice. No minority or low-income populations would be affected by this alternative. The proportion of the minority population in the FTC area does not meet the 50 percent threshold, and it is not substantially greater than the minority population percentage in El Paso County, the ROI, or Colorado.

Similarly, the poverty rate in the FTC area is not greater than 20 percent or substantially greater than the poverty rate in El Paso County, the ROI, or the state.

However, increased noise, fugitive dust, or traffic from construction or training activities may indirectly affect off-post residential areas. All communities would be affected to the same degree by these indirect effects associated with this alternative. There would be no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. There is a potential for less than significant short-term adverse impacts to children. Because construction sites can be appealing to children, construction activity could be an increased safety risk. Because the exact locations of proposed construction projects have not yet been identified, specific construction projects with greater potential risk because of their proximity to family housing, schools, and other locations where children are concentrated cannot be identified. Therefore, this analysis evaluates the potential impacts to the children in general terms.

Barriers and "no trespassing" signs would be placed around construction sites to deter children from playing in these areas, as well as to keep out other trespassers. All construction vehicles, equipment, and materials would be stored in fenced areas and secured when not in use. During construction, safety measures stated in 29 CFR 1926, "Safety and Health Regulations for Construction," and other applicable regulations and guidance would be followed to protect the health and safety of all residents on FTC, as well as construction workers.

5.4.8.2 Impacts from Range Construction

Less Than Significant Impacts

The minor amount of range construction that would occur at FTC would not impact the local economy, population, or infrastructure.

Environmental Justice. No minority or low-income populations would be displaced by the proposed range construction. Indirect effects, such as increased noise, fugitive dust, or traffic from construction or training activities are expected to have less than significant impacts on off-post populations because the surrounding properties are uninhabited federal and state lands. Under implementation of this alternative, there would be no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. No construction projects would take place near schools, day care facilities, or other areas with large populations of children. Minor adverse indirect impacts on nearby schools or private residences would be similar to those described for cantonment construction; however, no adverse impacts to the health and safety of children are expected. Construction would take place in areas that are off-limits to the general public. No adverse effects to the protection of children are expected under this alternative. No range construction would occur on PCMS; therefore, impact analysis is not applicable.

5.4.8.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The increase in live-fire training that would occur at FTC would not impact the local economy, population, or infrastructure.

Environmental Justice. Indirect effects, such as increased noise, fugitive dust, or traffic associated with live-fire training would have less than significant adverse effects on off-post properties. The areas that

would be affected are primarily uninhabited federal and state lands. Under implementation of this alternative, there would be no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. No live-fire training would take place near schools, daycares, or other areas with large populations of children. No adverse effects to the health and safety of children are expected under this alternative.

5.4.8.4 Impacts from Maneuver Training

Less Than Significant

Economy. Maneuver training would occur at both FTC and PCMS; however, no additional personnel would be permanently stationed at PCMS. Soldiers would travel from FTC to PCMS for training. Soldiers traveling from FTC to PCMS for training may purchase some supplies and result in a slight increase in business sales volume. This change would be within the historic RTV range for the ROI and would be less than significant. No mitigation would be required.

Environmental Justice. All maneuver training activities would occur within the installation properties. No minority or low-income residences would be displaced by training modifications; however, increased noise, fugitive dust, or traffic generated from construction or training activities could have less than significant adverse impacts on nearby schools or private residences. Indirect effects from construction would last only for the duration of the construction project and would be limited to daytime hours. Noise, dust, and traffic impacts from training activities would be long-term, but training is currently occurring at the installations. All communities would be affected to the same degree by these indirect effects associated with this alternative. Under implementation of this alternative, there would be no disproportionate impacts to low-income or minority populations within the ROI.

Protection of Children. No adverse effects to the protection of children are expected under this alternative. No children live near the maneuver training areas. Existing security measures that prevent trespassing on the PCMS would protect children from hazards during maneuver training.

5.4.9 HUMAN HEALTH AND SAFETY

Table 5-45 summarizes the potential human health and safety impacts under implementation of Alternative C. Additional personnel stationed at FTC, increased training at FTC and PCMS, and the proposed construction activities would result in use of additional hazardous materials and the generation of hazardous wastes would increase slightly. As additional hazardous materials and wastes are used, the risk of less than significant spills is anticipated to increase slightly. However, all parties would continue to implement the existing Army protocols for waste minimization, spill prevention, and proper hazardous waste management. There would be no significant and immitigable impacts associated with human health and safety. Mitigation would be implemented to minimize impacts.

5.4.9.1 Impacts from Cantonment Construction

No cantonment construction would be required at FTC initially to accommodate the addition of 567 soldiers, their families, support personnel, and SBCT-specific facilities associated with the permanent stationing of the 2/25th SBCT at FTC. Temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed.

Table 5-45 Summary of Potential Human Health and Safety Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊘	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Less Than Significant Impacts

Contaminated Sites. Future construction of facilities for this alternative may result in the disturbance of SWMUs. If construction within the boundary of an SWMU were proposed, coordination with the IRP Program would be required to address design features, avoidance measures, or other aspects of construction project siting to avoid or minimize disturbance of existing contaminated sites and prevent new spills.

Lead, Asbestos, PCBs, and Chlorofluorocarbons. Potential short-term construction-related impacts could expose workers to lead and asbestos and generate hazardous wastes during renovation or demolition of older buildings on FTC. Lead, asbestos, PCBs, and chlorofluorocarbon wastes may be generated at the cantonment and Butts Army Airfield. Demolishing unused buildings to construct a vehicle maintenance facility, expanding the rail yard, and upgrading utilities are potential sources for generating these wastes. FTC would continue to implement the Asbestos Management Plan (DECAM 2004a), Lead Management Plan (DECAM 2004e), and PCB Management Plan (DECAM 2004g) for handling, transporting, and disposing of these wastes. Impacts would be less than significant, and no mitigation is required.

Petroleum, Oils, and Lubricants. Fuels, lubricants, used oils, and other petroleum products would continue to be stored in ASTs and USTs at FTC. Vehicle maintenance facilities would be used to perform routine oil changes and lubes, wash-downs, and refueling. Stryker vehicle storage would temporarily occur on vacant areas within the cantonment area. The number of vehicles on-post would increase slightly because of additional personnel stationed at FTC. Because of the additional vehicles on post and the use of Stryker vehicles, it is expected that petrochemicals would be used at a greater rate on FTC. The risk of petrochemical spills is expected to increase slightly under this alternative; however, impacts are expected to be less than significant. No additional mitigation is required.

Hazardous Materials Use and Management. An increase in the use of hazardous materials and petroleum-based products would occur at the cantonment, Butts Army Airfield, and the Range at FTC. Fort Carson would continue to implement the P2 Plan (DECAM 2004f), Hazardous Waste Management Plan (DECAM 2004c), SPCCP (DECAM 2004j), and FC Regulation 200-1, Chapter 13 (USTs and ASTs) for waste minimization efforts, hazardous waste management procedures, and spill prevention measures. All hazardous waste generated at FTC would be transported to the Hazardous Waste Storage Facility, Building 9248, for storage and eventual shipment offsite for disposal. With implementation of the Army

protocols and SOPs, impacts to human health and safety are expected to be less than significant. No additional mitigation is required.

Biomedical Waste. A small amount of biomedical or infectious waste would be generated by treating injuries associated with the additional soldiers. All medical waste generated at FTC or PCMS would be disposed of through a MEDDAC contractor permitted to dispose of that type of waste. Less than significant amounts of medical waste that may be generated during construction and operation would be transported, stored, and handled in accordance with the EACH Hazardous Material/Hazardous Waste Management Program, MEDDAC Regulation Number 40-5-6 (Army 2005a) and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army 2005b) to minimize potential adverse effects. With implementation of Army SOPs, impacts are expected to be less than significant. No additional mitigation is required.

Radiological Materials. Management of radiological materials from cantonment facilities would continue in accordance with the existing Radioactive Materials Management Plan for FTC (DECAM 2004i). Impacts would be less than significant, and no mitigation is required.

5.4.9.2 Impacts from Range Construction

Less Than Significant Impacts

Ammunition and UXO. The two new ranges constructed at FTC would be located primarily within lands previously used for Army activities. During range construction within areas previously used for ranges as is proposed for the MPMG range, UXO and lead could be encountered. Construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from construction in this area. Although UXO presents a significant impact, the Army would follow proper abatement techniques, which would reduce this impact to acceptable. In addition to these mitigation measures, the Army would continue to educate soldiers on how to identify UXO and the proper safety procedures for handling UXO. Continued implementation of standard Army regulatory and administrative requirements, would reduce this impact to less than significant. No additional mitigation is required.

Hazardous Materials and Wastes Use and Management. Hazardous materials and wastes associated with range construction would be similar to those previously described for cantonment construction. With continued implementation of regulatory and administrative mitigation, no new impacts to human health and safety are expected. No additional mitigation is required. No range construction would occur on PCMS; therefore, impact analysis is not applicable.

5.4.9.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Ammunition use, storage, and wastes. Additional live-fire training would occur because of an increased number of soldiers training at both the existing and new ranges. SBCT training would result in an increased number of soldiers training at all ranges, thus increasing the number of rounds fired. In addition, new weapons would be used, and the use of large caliber munitions would increase. The 105 mm cannon on the Stryker MGS and the 120 mm mortar are the only new weapons that would be introduced to training. These weapons would be used at ranges on FTC. Although ammunition use would increase from the elevated level of training and expansion in military force, the impact of this increase would not be significant because artillery and ammunition management would not change.

Regulatory and Administrative Mitigation 1: Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations; therefore, impacts are expected to be less than significant.

Additional Mitigation 1: Mitigation measures for FTC and PCMS are provided below. The regulatory and administrative measures to be used to minimize potential impacts to human health and safety are summarized in the following paragraphs.

Fort Carson

- Continue to implement existing management plans to minimize impacts from increased use of hazardous materials.
- Continue to implement management plans and SOPs for munitions handling, UXO removal, lead management, and reduction of fire hazards to minimize impacts from increased training.
- Continue to implement hazardous waste and radon management plans to minimize impacts from increased waste use and production during construction, and to minimize potential for radon exposure in new facilities.
- Management of radiological materials (and waste) in accordance with existing plans would minimize impacts from construction of new medical/dental facilities.
- Coordination with the Restoration Program and consultation with plans, site documents, and DECAM staff to address design, avoidance, and project siting would help to avoid or minimize impacts to existing contaminated sites.
- Implement the Fort Carson Lead Management Plan to remove, encapsulate, enclose, or manage sources of lead.
- Continue to implement the Evans Army Community Hospital, Hazardous Material/Hazardous Waste Management Program, and Fort Carson Management of Regulated Medical Waste to address any medical waste generated.
- Continue to recycle and reuse petrochemicals.

PCMS

- Until required otherwise, manage hazardous waste at PCMS as a Conditionally Exempt Small Quantity Generator under RCRA.
- Prepare and implement a Hazardous Waste Management Plan for hazardous waste potentially generated at PCMS.
- Develop and implement a P2 Plan, SPCC Plan, and Installation Pest Management Plan for waste minimization, spill prevention, and to minimize any potential adverse effects from transporting, storing, and handling additional hazardous materials.
- Continue to dispose of "solid" wastes properly at an off-post, permitted facility.
- Continue to implement the ASP SOP for storage and transportation of additional munitions and targets.
- Detonate all live grenades prior to leaving the proposed hand grenade range.
- Use the best available technology to accomplish lead remediation if required. BMPs for Lead at Outdoor Shooting Ranges would be useful in developing remediation practices.

- Continue prescribed burning to create buffer areas in and around the Small-arms Live-fire Ranges and the Live Hand-grenade Range.
- Develop and implement a SPCC Plan for the storage and use of petroleum products.
- Continue to recycle and reuse petrochemicals.

Impact 2: Unexploded Ordnance. Training as projected under this alternative would lead to a proportionate increase in UXO and could also result in an increase in the spread of lead wastes on the range within live-fire impact zones. With implementation of Army SOPs, impacts are expected to be less than significant, and no additional mitigation is required.

Regulatory and Administrative Mitigation 2: UXO would only be within the impact areas, which are fenced and posted as restricted to public access. Fort Carson would continue to implement the Ammunition Supply Point SOP for storage and transportation of additional munitions. The 62nd Explosives Ordnance Detachment would continue to respond to discoveries of UXO for safe open detonation in place or at Range 121. Protocols for removing, encapsulating, enclosing, or managing sources of lead are provided in Fort Carson's Lead Management Plan (DECAM 2004e).

5.4.9.4 Impacts from Maneuver Training

Petroleum, Oils, and Lubricants. Implementation of Alternative C would result in increased use of petroleum-based products in the cantonment at FTC and the training areas at PCMS. POLs that would be used at the PCMS include gasoline, diesel fuel, oil, and lubricants used during routine maintenance. Under this alternative, fuels would continue to be stored in ASTs and USTs at PCMS. The use of Stryker armored vehicles for training is expected to result in increased fuel transport and additional refueling operations in the field to support training requirements. The risk of petrochemical spills is expected to increase slightly under this alternative. The PCMS would continue to implement the SPCC Plan (DECAM 2004j) and USTs and ASTs (DECAM 2004k) to minimize potential adverse effects from accidental leaks resulting from the storage of additional petroleum products. With continued implementation of Army SOPs, impacts to human health and safety are expected to be less than significant. No additional mitigation is required.

Hazardous Materials and Wastes Use and Management. In addition, the increased maneuver training that would occur under this alternative may contribute to the potential for generating hazardous waste. Hazardous materials that would be used at FTC and PCMS include pesticides; chemical agents; and explosive and pyrotechnic devices used in military training operations. With implementation of the Army protocols and SOPs, impacts to human health and safety are expected to be less than significant.

5.4.10 BIOLOGICAL RESOURCES

Table 5-46 lists the types of impacts on biological resources that would occur under Alternative C. Impacts to wetlands, vegetation, noxious weeds, threatened and endangered species, habitats, and general wildlife are presented. No direct impacts to wetlands from cantonment and range construction or live-fire and maneuver training are anticipated at FTC or PCMS. If future training or construction activities have the potential to affect wetlands, the Army would coordinate with USACE to assess impacts and mitigation for disturbance of wetland areas. Most direct impacts to wetlands would be avoided, and those that cannot be avoided would be mitigated through the Section 404 process (either through complying with the FTC /PCMS regional permit or by applying for coverage under a nationwide permit).

Table 5-46 Summary of Potential Biological Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Wetlands		
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-fire Training	○	N/A
Impacts from Maneuver Training	○	○
Vegetation		
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-fire Training	⊙	N/A
Impacts from Maneuver Training	⊘	⊘
Noxious Weeds		
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙
Threatened and Endangered Species		
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-fire Training	⊗	N/A
Impacts from Maneuver Training	⊗	⊗
General Wildlife and Habitats		
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

Construction activities in the FTC cantonment and range areas could result in temporary ground disturbance and permanent loss of small areas of native vegetation. Only 3 acres of new range construction is proposed for the UAC within a previously undisturbed area. Areas disturbed during construction would be reclaimed and revegetated with native or other suitable vegetation, as appropriate. Although construction and operation of facilities in the FTC range areas would result in physical

disturbance of habitat, the cantonment and range areas are currently disturbed, and/or already developed. Impacts to vegetation from construction of cantonment and range areas would be less than significant.

Direct impacts to vegetation could be attributable to direct damage by small-arms ammunition and by crushing. Munitions explode and create craters, resulting in areas of bare ground. However, the craters accumulate organic matter, and vegetation usually recovers. Impacts to vegetation from live-fire training would be less than significant. Impacts to vegetation from maneuver training under Alternative C would be significant but mitigable to less than significant. The amount of impacts to vegetation from SBCT would increase with the need for larger training areas and the nearly doubling of MIMs; however, the intensity of the impacts would decrease through their more frequent use of existing roads. Therefore, the impacts to vegetation from SBCT maneuver training would be expected to be similar to those resulting from the current IBCT training.

In general, construction and training has the potential to increase direct and indirect impacts related to the introduction and spread of noxious weeds. FTC has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives or eliminating the weed species from the area (DECAM 2004d). Cultural, mechanical, biological, and chemical control methods are currently used to reduce populations and stop the spread and of noxious weeds on the PCMS. As such, impacts from noxious weeds are expected to be less than significant.

Impacts to threatened and endangered species from cantonment and range construction at FTC would be less than significant. Live-fire training at FTC would increase both the number of soldiers and the number of rounds fired. This would create significant risk of impact to threatened and endangered species. No live-fire training would occur at PCMS. Maneuver training at FTC and PCMS, particularly small unit training at FTC, would increase by nearly 50 percent, and the maneuver miles that would nearly double at both locations, and the potential increase in impacts to special status species would be significant. Mitigation measures would greatly reduce the potential for live-fire and maneuver training to impact special status species; however, the possibility cannot be reduced to a less than significant degree.

General wildlife and habitats will be affected by range construction and training activities. Impacts will primarily be in previously disturbed areas. Construction and use of new ranges at FTC would not be expected to cause additional permanent habitat loss because they are expected to be located within previously disturbed areas. Increased maneuver training at FTC and PCMS would be expected to impact general wildlife and habitats less than significantly, given the limited size of the ranges compared to the surrounding available habitat.

5.4.10.1 Impacts from Cantonment Construction

No cantonment construction would be required at FTC initially to accommodate the addition of 567 soldiers, their families, support personnel, and SBCT-specific facilities associated with the permanent stationing of the 2/25th SBCT at FTC. Most of the facilities needed long term for the SBCT are already planned as part of the Army's transformation at FTC. Temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed.

Less Than Significant Impacts

Impacts to vegetation: Permanent stationing of the 2/25th SBCT at FTC would not require cantonment construction to accommodate the new population and SBCT-specific facilities. Temporary parking of Stryker vehicles within the FTC cantonment area would most likely occur in areas that have already been disturbed.

Future construction activities in the FTC cantonment areas associated with the Army transformation at FTC could also result in temporary ground disturbance and permanent loss of small areas of native vegetation. Areas disturbed during construction would be reclaimed and revegetated with native or other suitable vegetation, as appropriate. Although future construction and operation of facilities in the FTC cantonment area would result in physical disturbance of habitat, the cantonment area is currently disturbed, and most of the area is already developed. In the cantonment areas, the loss of native habitat, if any, would be minor.

To protect long-term land sustainability on FTC, Alternative C would continue to use the Army's land and environmental management programs on FTC to provide for sustainable land management. The following measures would be implemented to protect vegetation resources further:

- Areas disturbed during construction would be reclaimed and revegetated with native or other suitable vegetation, as appropriate.
- Continue to use the Army's land and environmental management programs on FTC to provide for sustainable land management. Continue to coordinate training activities among G-3, DPTM-Range Division, and DECAM staff. Continue to follow environmental plans and regulations, and use ITAM to repair vegetation damage.
- Existing species management plans would continue to be implemented.

Impacts to vegetation from activities within the cantonment area at FTC would be less than significant. No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable.

Introduction and spread of invasive plants and noxious weeds: In general, temporary parking of Stryker vehicles within the cantonment area has the potential to increase direct and indirect impacts related to the introduction and spread of noxious weeds. Impacts to vegetation increase the potential for the introduction and spread of noxious weeds. Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity.

FTC has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives or eliminating the weed species from the area (DECAM 2002a). As such, impacts from noxious weeds related to activities within the cantonment area under Alternative C are expected to be less than significant. No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable.

Impacts to Threatened and Endangered Species: The temporary parking of Stryker vehicles within the cantonment area would result in temporary ground disturbance, loss of small areas of native vegetation, and minimal loss of native wildlife habitat. Loss of native plant communities, fragmentation of wildlife habitat, and disturbance and displacement of special status species within the cantonment area could occur, but is highly unlikely. No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. Impacts from cantonment construction is expected to be less than significant

Impacts to general wildlife and habitats. Temporary parking of Stryker vehicles would be located in existing, disturbed cantonment areas to the extent possible, thereby creating little or no direct impacts to vegetation. Habitats within these areas would likely be either developed, disturbed, or otherwise managed. Wildlife would be temporarily disturbed; however, species likely to be present in areas of cantonment are those habituated to human presence, and would not be adversely affected. Impacts to general wildlife and habitats in the cantonment areas would be less than significant, and no mitigation is

necessary. No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable.

No Impacts

Impacts to Wetlands: Permanent stationing of the 2/25th SBCT at FTC would not initially require cantonment construction to accommodate the new population and SBCT-specific facilities. Therefore, no direct impacts to wetlands from cantonment construction on FTC are anticipated. If future training or construction activities have the potential to affect wetlands, the Army would coordinate with the USACE to assess impacts and mitigation for disturbance of wetland areas. Most direct impacts to wetlands would be avoided, and those that could not be avoided would be mitigated through the Section 404 process (through either complying with the FTC regional permit or applying for coverage under a Nationwide Permit). No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from cantonment construction.

5.4.10.2 Impacts from Range Construction

Less Than Significant Impacts

Impacts to vegetation: Range construction activities on FTC could result in temporary ground disturbance and permanent loss of native vegetation. Although range construction on FTC would result in physical disturbance of habitat, the construction is likely to occur in areas that are currently disturbed, except for the 3 acres associated with the UAC. Areas disturbed during construction would be reclaimed and revegetated with native or other suitable vegetation, as appropriate. Impacts to vegetation from range construction at FTC would be less than significant. No range construction would be necessary at PCMS; therefore, impact analysis is Not Applicable.

To protect long-term land sustainability on FTC, Alternative C would continue to use the Army's land and environmental management programs on FTC to provide for sustainable land management. Mitigation measures for impacts to vegetation from range construction would be the same as those described under Impacts from Cantonment Construction.

Introduction and spread of invasive plants and noxious weeds: In general, range construction has the potential to increase direct and indirect impacts related to the introduction and spread of noxious weeds on FTC. Impacts to vegetation increase the potential for the introduction and spread of noxious weeds. Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity.

FTC has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives or eliminating the weed species from the area (DECAM 2004d). As such, impacts from noxious weeds related to range construction are expected to be less than significant. No range construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from range construction.

Impacts to Threatened and Endangered Species: Construction in the ranges would result in temporary ground disturbance, permanent loss of small areas of native and non-native vegetation in the previously disturbed areas that would be affected, and minimal loss of native wildlife habitat. Loss of native plant communities, fragmentation of wildlife habitat, and disturbance and displacement of special status species during construction could occur, but is highly unlikely because the areas where range construction would

occur have been previously disturbed. This is not expected to increase impacts to threatened and endangered species. No range construction would be necessary at PCMS; therefore, impact analysis is not applicable. Impacts from range construction on threatened and endangered species is expected to be less than significant.

Impacts to general wildlife and habitats. Construction of new ranges at FTC would result in long-term or permanent loss of previously disturbed habitat and 3 acres of undisturbed habitat associated with the UAC. Construction noise and related human presence would disrupt the normal activities of animals. Mortality may occur to individual animals that are small or less mobile. Building new roads and ranges could increase habitat fragmentation. Construction and development of ranges would provide habitat for species that prefer edge habitat, open areas, or early succession. Overall, the short-term impacts of range construction would be minor. Range construction would have the long-term impact of reducing the available habitat for some species; however, the relatively small size of the proposed ranges compared to available habitat resources is less than significant.

The following measures would be implemented to reduce the impacts to general wildlife and habitats further.

- Buffer zones around sensitive wildlife locations, such as bird nests, would be accommodated where feasible.
- Existing species management plans would continue to be implemented.
- Continue weed prevention and control, avoid nesting birds by restricting mowing of road shoulders and prescribed burns to the extent possible during the nesting season.
- Continue surveys of power lines to minimize bird electrocutions.
- Continue practice of identifying golden eagle nest sites annually, establishing 1,640-feet buffers around each nest site, and restricting training in buffer zones between April and June.

No Impacts

Impacts to Wetlands: No direct impacts to wetlands from the new ranges proposed for construction on FTC are anticipated. If future training or construction activities have the potential to affect wetlands, the Army would coordinate with the USACE to assess impacts and mitigation for disturbance of wetland areas. Most direct impacts to wetlands would be avoided, and those that could not be avoided would be mitigated through the Section 404 process (through either complying with the FTC regional permit or applying for coverage under a Nationwide Permit). No range construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. No mitigation is necessary for wetland impacts from range construction.

5.4.10.3 Impacts from Live-Fire Training

Significant Impacts

Impact 1: Impacts to Threatened and Endangered Species: A larger number of soldiers would use existing and newly constructed ranges at FTC for live-fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. Increased live-fire training activities would likely increase prairie dog burrow damage, and direct mortality could increase from increased live-fire training in prairie dog habitat. Effects to prairie dogs from increased training would directly and indirectly affect associated species, including burrowing owl, mountain plover, and bald and golden eagles. Disturbance and destruction of prairie dog habitat would directly affect burrowing

owls and mountain plovers if these species were present in the colony, and would reduce suitable habitat in areas not currently occupied by these species. If prairie dog populations decline on FTC, use of the installation for foraging and/or nesting by bald and golden eagles and ferruginous hawks (*Buteo regalis*) would decline or be eliminated. Mitigation measures would minimize impacts to threatened and endangered species and their habitats; however, impacts to or mortality of sensitive species could occur, an impact that cannot be reduced to less than significant.

Regulatory and Administrative Mitigation 1: Black-tailed prairie dogs on FTC would continue to be managed according to the Biological Assessment and Management Plan for the Black-Tailed Prairie Dog on FTC and the PCMS (DECAM 2004m). Buffer zones around mountain plover nests on FTC would be accommodated where feasible. If buffers were maintained, mountain plovers would not be affected by increased military training during the breeding season. DECAM annually provides G-3 with wildlife information and recommendations for minimizing potential effects to nesting birds. The Biological Assessment and Management Plan for the Mexican Spotted Owl on Fort Carson (DECAM 2002b) would be maintained. Fire suppression and prescribed burning would be maintained in Mexican spotted owl management areas, as recommended in the management plan (DECAM 2002b). Mexican spotted owls would not be affected by increased military training on FTC as long as the management plan is followed. Effects to sensitive plant species from increased training on FTC could include risk of wildfire, habitat loss, and disturbance.

Less Than Significant Impacts

Impacts to vegetation. Direct impacts to vegetation could be attributable to direct damage by small-arms ammunition and by crushing. Munitions explode and create craters, resulting in areas of bare ground that are susceptible to erosion from wind and water (Houston 2002). However, the craters accumulate organic matter, and vegetation usually recovers.

Restricted Areas, which have been designated to protect resources on particular sites from training impacts, are subject to various constraints to training. To the extent that training is could occur these areas, there would be minor impacts to vegetation in Restricted Areas from training.

The frequency of live-fire training would not change from the current condition; however, the number of rounds and the numbers of soldiers and weapons would increase. Environmental conditions would be monitored, evaluated, and considered if warranted as the level of training was increased. This process of monitoring and adaptive management feedback would continue to be governed by the ITAM program, document the level of impact that is occurring, and serve to establish the upper acceptable level of impacts that would be allowed to occur without precluding achievement of sustainable land management goals under the Army's ITAM program. The ITAM program, along with continued the use of the INRMP, balances the Army's training needs with the need to sustain the quality and sustainability of environmental resources in the training areas.

No live-fire training would occur at PCMS; therefore, impact analysis is Not Applicable. Impacts to vegetation from live-fire training at FTC would be less than significant. Measures to reduce impacts to vegetation from live-fire training would be the same as those described under Impacts from Cantonment Construction.

Introduction and spread of invasive plants and noxious weeds: In general, live-fire training has the potential to increase direct and indirect impacts related to the introduction and spread of noxious weeds on FTC. Impacts to vegetation increase the potential for the introduction and spread of noxious weeds. Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the environment created through human activity.

FTC has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives or eliminating the weed species from the area (DECAM 2002a). As such, impacts from noxious weeds related to live-fire training are expected to be less than significant. No live-fire training would occur at PCMS; therefore, impact analysis is Not Applicable. No noxious weed mitigation is necessary for impacts from live-fire training.

Impacts to general wildlife and habitats. Operation of ranges has the potential to displace various wildlife species. Displacement would be caused by increased human presence in the area, as well as by elevated noise levels. Wildlife species that are more tolerant of human activity may remain in or around these ranges. Individuals that remain within the impact area and associated surface danger zones could be directly affected by ordnance or other munitions. Higher training levels at existing ranges would increase incidental mortality to wildlife could occur. However, such mortality is not expected to cause measurable impacts to wildlife populations. Therefore, SBCT training on the new and existing ranges would have a less than significant impact to wildlife and habitats. Measures described previously under Impacts from Range Construction would further reduce the impacts of live-fire training.

No Impacts

Impacts to Wetlands: A larger number of soldiers would use existing and newly constructed ranges for live-fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. No direct impacts to wetlands from live-fire training are anticipated at FTC. If future training or construction activities have the potential to affect wetlands, the Army would coordinate with USACE to assess impacts and mitigation for disturbance of wetland areas. Most direct impacts to wetlands would be avoided, and those that cannot be avoided would be mitigated through the Section 404 process (through complying either with the FTC regional permit or by applying for coverage under a nationwide permit). No live-fire training would occur at PCMS; therefore, wetland impact analysis is Not Applicable.

5.4.10.4 Impacts from Maneuver Training

Significant Impacts

Impact 2: Impacts to Threatened and Endangered Species: Maneuver training would occur at both FTC and PCMS. Except for the differences described above, SBCT training would have similar impacts as current IBCT training at each location. The restrictions on maneuver training in protected Arkansas darter habitat would continue, and potential sites would continue to be unprotected. Increased maneuver activities may add erosion to Turkey Creek. The buffer zones around greenback cutthroat trout habitat would be maintained, and increased training activities would not affect the greenback cutthroat trout. The restriction on training in southern redbelly dace (*Phoxinus erythrogaster*) habitat would continue, and increased training activities on FTC would not affect the southern redbelly dace. An increase in maneuver training activities would likely increase prairie dog burrow damage and direct mortality could increase from increased maneuver training in prairie dog habitat. Effects to prairie dogs from increased training would directly and indirectly affect associated species, including burrowing owl, mountain plover, and bald and golden eagles. Disturbance and destruction of prairie dog habitat would directly affect burrowing owls and mountain plovers if these species were present in the colony, and would reduce suitable habitat in areas not currently occupied by these species. If prairie dog populations decline on FTC, use of the installation for foraging and/or nesting by bald and golden eagles and ferruginous hawks would decline or be eliminated.

Regulatory and Administrative Mitigation 2: Mitigation measures for impacts to threatened and endangered species from maneuver training would be the same as those described under Impacts from Live-Fire Training.

Significant Impacts Mitigable To Less Than Significant

Impact 3: Impacts to vegetation. The number of large-maneuver rotations would not be expected to differ from the current condition under Alternative C; however, there are qualitative differences between IBCT and SBCT maneuver training. The SBCT would use existing roads and trails more than the IBCT; however, it requires large training areas. The SBCT causes less surface disturbance does less digging during maneuver rotations than the IBCT. There are more vehicles of heavier gross weight in the SBCT, and the quantity of small-unit collective maneuver rotations at FTC would be expected to increase by 50 percent. The MIMs associated with maneuver training at both FTC and PCMS would be expected to be nearly double for an SBCT when compared to an IBCT (49,576 MIMs associated with the IBCT versus 104,898 MIMs associated with the SBCT). Brigade- and battalion-level training would primarily occur at PCMS, and the frequency of maneuver training at PCMS is not expected to increase above existing levels.

Maneuver activities can have a serious effect on the understory species in the juniper woodlands from vehicles maneuvering between the larger trees. Decreases in density and cover of woody plants are especially detrimental in juniper woodlands because they typically occur on steep slopes with low initial cover and highly erodible soils. Such effects on woodland vegetation may be less severe at FTC (as compared with the PCMS studies) because there are many established trails on which vehicles may travel through the woodland areas (Savoy 2006).

Indirect impacts from movement of vehicles can result from vegetation loss, soil disturbance, disaggregation, compaction, and consequently erosion, each of which can change the nature and availability of microsites for seed germination (Shaw and Diersing 1989; Shaw and Diersing 1990; Diersing et al. 1988). Disturbance of the soil crust in arid ecosystems can accelerate erosion, decrease water retention, disrupt plant nutrient cycling at the microbial level, and expose the reservoir of weed seeds in the soil to conditions favorable for germination (USGS 2002). Reseeding efforts by DECAM and ITAM reduce the overall recovery period at FTC and PCMS by allowing succession to skip the initial weedy stage.

Maneuver Training Area studies have been conducted for the PCMS to assess the effects of training activities on vegetation at the PCMS. These vegetation studies are also applicable to assessing the potential impacts of mechanized military training at FTC (Shaw and Diersing 1989; Shaw and Diersing 1990). The studies indicate that grasslands, woodlands, and shrublands have been affected by prior maneuver training based on readily visible imprints of tracks on the soil (tracking) compared with untracked sites (Shaw and Diersing 1989; Shaw and Diersing 1990; and Diersing et al. 1988). Direct impacts from the passage of vehicles such as the Stryker include crushing of herbaceous and woody vegetation that might not resprout or otherwise recover and injury to shallow roots that might kill the plants or retard development.

Pedestrian traffic also can affect vegetation. For grasses and herbaceous cover, these impacts would range from negligible to substantive depending on use factors, such as the number of troops traversing a particular area and how they move across the landscape. Direct damage to shrubs and trees from pedestrian movements is expected to be negligible.

Overall, impacts to vegetation from maneuver training would be significant but mitigable to less than significant. The amount of impacts to vegetation from SBCT would increase with the need for larger

training areas; however, the intensity of the impacts would be similar to those for an IBCT through their more frequent use of existing roads.

Regulatory and Administrative Mitigation 3: Mitigation measures for impacts to vegetation from maneuver training would be the same as those described under Impacts from Cantonment Construction.

Less Than Significant Impacts

Introduction and spread of invasive plants and noxious weeds: In general, maneuver training has the potential to increase direct and indirect impacts related to the introduction and spread of noxious weeds. Impacts to vegetation increase the potential for the introduction and spread of noxious weeds. Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity.

FTC has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives or eliminating the weed species from the area (DECAM 2002a).

Cultural, mechanical, biological, and chemical control methods are currently used to reduce populations and stop the spread and of noxious weeds on the PCMS. Military vehicles are washed before and after their use at the PCMS to reduce the potential for spreading weed seeds on and off the installation. These practices would continue under Alternative C (DECAM 2002a). As such, impacts from noxious weeds related to maneuver training are expected to be less than significant.

Impacts to general wildlife and habitats: Increased military training on FTC might displace maneuvers on the grassland/pinyon-juniper interface farther into current pinyon-juniper habitat. Revegetating disturbed areas with plant species that are valuable to mule deer (*Odocoileus hemionus*) for forage and cover as soon as possible after military training would continue to provide suitable mule deer habitat on FTC (USFWS 1991). Direct disturbance to wildlife species would increase in areas where vehicular activity, fire, and noise increase. Increased pedestrian activity in training areas also would increase disturbance of wildlife species sensitive to human presence. Species that are more tolerant of human presence, vehicular activity, and noise would be increasingly favored in areas where military training occurs, while species that are less tolerant of these factors would decline.

Potential impacts to mule deer from mechanized military training maneuvers could occur. One study of mule deer demonstrates that, if harassed, mule deer exhibit increased overall activity levels, increased use of cover, increased sensitivity to vehicles, increased flight distance, and decreased reproduction the following spring (Yarmoloy, Bayer, and Geist 1988; Trame 1997). Training restrictions during severe winters and the fawning season (June 20 to August 20) could minimize impacts to mule deer. Revegetating disturbed areas could also reduce impacts from military training on mule deer (USFWS 1991).

Studies conducted on the PCMS indicate that movements or temporary shifts in home ranges caused by military training activities did not have measurable effects on pronghorn (*Antilocapra americana*) productivity or physical condition at the PCMS (Gerlach and Vaughan 1990). Direct impacts to swift fox (*Vulpes velox*) caused by military training are minimal. Overall degradation of shortgrass prairie habitat on a large enough scale would likely result in a localized decline in swift fox populations (USFWS, 1991).

Many raptors are intolerant of high levels of human activity, especially during the nesting season (April through June). Some species of raptors can habituate to high levels of human activity. Short-term impacts

to raptors from military training on the PCMS have been documented, including nesting failures, lowered nesting success, displacement, and changes in wintering distribution and behavior (Andersen et al. 1990 and Fyfe and Olendorff 1976).

Impacts to wildlife and most wildlife habitat loss would be less than significant and temporary; therefore, no specific mitigation is necessary. BMPs for species could be implemented to minimize impacts to wildlife.

No Impacts

Impacts to Wetlands: No direct impacts to wetlands from maneuver training are anticipated at FTC or PCMS. If future training or construction activities have the potential to affect wetlands, the Army would coordinate with USACE to assess impacts and mitigation for disturbance of wetland areas. Most direct impacts to wetlands would be avoided, and those that cannot be avoided would be mitigated through the Section 404 process (through complying either with the FTC/PCMS regional permit or by applying for coverage under a nationwide permit). Increased maneuver training could result in indirect impacts to wetlands from erosion and sedimentation processes in drainages upstream of the man-made erosion control dams at the PCMS. Sediments could silt in these small wetlands, changing their nature or converting them to upland habitats.

5.4.11 AIR QUALITY

General Conformity Analysis and visibility assessment apply to all activity groups. General Conformity analysis is a process that compares projected emissions with the regulatory threshold and then, if necessary, demonstrates how an action would conform to the SIP in areas designated as “non-attainment” or “maintenance” for the NAAQS. The analysis is based on the most recent estimates of emissions, which were developed using the current population, employment, travel, and congestion estimates.

If the net increase in emissions for the peak year exceeds the General Conformity de minimis levels or any milestone year for attainment of standards, additional conformity determination is required. The de minimis level for a CO maintenance area is 100 tpy for each federal action [40 CFR 51.853 and 93.153(b)(1)].

Alternative C would conform if the net increase in emissions from facility construction and stationary source operation for the peak year would not exceed the emission limits specified in the SIP inventory [93.158(a)(5)(i)(A)]. The most recent version of the Colorado Springs Area CO Maintenance Plan was adopted by the PPACG in September 2003 and the AQCC in December 2003. This plan extends the maintenance year through 2015 and revises the CO emission budget from 270 to 531 tons per day for the period 2010 and beyond (APCD 2003).

The home stationing of an SBCT at FTC would not generate CO emissions in excess of the General Conformity de minimis level of 100 tpy. Visibility is measured by determining the change in light extinction. As light extinction becomes greater, visibility decreases. If a project contributes greater than 5 percent change in light extinction, it would result in impacts to air quality. Current modeling demonstrates that the PCMS does not contribute to light extinctions greater than 5 percent for any Class I area; therefore, visibility effects from implementing Alternative D would not exceed established standards.

Deposition estimates the total amount of acid deposition on an area. For the State of Colorado, the Federal Land Managers have established threshold levels of nitrogen and sulfur deposition. If a project does not exceed these levels, the effects to air quality are deemed acceptable. PCMS demonstrated that the

deposition rates estimated for nitrogen and sulfur are much lower than the established thresholds, and air quality effects to the nearby Class I areas from deposition would not exceed established standards.

At the request of EPA, Class II Current modeling results demonstrated that the PCMS does not contribute to the degradation of visibility at the scenic views that are more than approximately 31 miles from the PCMS. Modeling results for Class II areas within 31 miles indicate that the plumes of dust may be visible during active training exercises. However, given the limited number of actual training days per year, it is not expected to result in effects to the Class II Area Scenic Views along the border of PCMS. Therefore, the PCMS does not contribute to the degradation of visibility at the Class II Area Scenic Views. Consequently, Alternative D would not result in effects to visibility.

Table 5-47 lists the types of impacts associated with air quality that would occur under Alternative C. Impacts from all activity groups would be less than significant.

Table 5-47 Summary of Potential Impacts to Air Quality from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.4.11.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Impacts from vehicles and construction. Permanent stationing of the 2/25th SBCT at FTC would slightly increase the overall population with the addition of soldiers, their families, and support personnel. However, no cantonment construction would be required at FTC initially to accommodate the additional soldiers, their families, support personnel, and SBCT-specific facilities. Temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed.

Future construction of additional support facilities at FTC associated with the Army's transformation at FTC could result in effects to air quality because of wind-blown dust created by construction equipment, exhaust emissions from construction equipment, and the increased number of vehicle trips by construction workers. Wind-blown dust contributes to PM emissions. Pollutants associated with construction equipment exhaust include NO_x, PM, CO, and VOCs. Construction-related effects are expected to be short-term and limited to the duration and area of the construction activities. Regional emissions of pollutants (other than CO) are well below NAAQS thresholds.

Increases in military personnel, dependents, civil servants, and contractors would lead to increased vehicle travel, which could increase traffic congestion. An increase in traffic congestion typically raises

the amount of exhaust emissions from increases in the number of vehicles operating and longer idling times. A detailed traffic study was previously performed in the Fort Carson Comprehensive Transportation Study (FTCCTS) (DPW 2005). The FTCCTS used a larger increase in population than is predicted for Alternative D. The results of the FTCCTS indicate that areas with the highest traffic congestion would be below the thresholds that would trigger an air quality analysis. Because the personnel increases for Alternative C are lower than the increase used in the FTCCTS, off-post traffic increases resulting from implementation of Alternative C would not exceed regulatory thresholds.

BMPs could be implemented to minimize short-term air quality effects further during construction. Additionally, all construction activities are subject to the installation-wide Fugitive Dust Control Plan (DECAM 2004b), and site-specific dust control plans as a part of land development permits are required for all projects greater than 25 acres or disturbed for 6 months or longer (state permit), and an El Paso County permit is required for disturbances of land greater than 1 acre.

No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. Overall impacts from cantonment construction would be less than significant.

5.4.11.2 Impacts from Range Construction

Less Than Significant Impacts

Impacts from construction activities. Construction of two new ranges at FTC would temporarily increase human presence and activity at construction sites. Construction impacts would be temporary and short-term. This increase is not expected to impact the risk of accidental wildfire ignition.

Construction emissions and their potential to result in impacts to air quality are evaluated under the General Conformity requirements. For operations, the impacts on both a facility-wide basis and for stationary sources are assessed under PSD and General Conformity requirements. For construction of additional support facilities, construction could result in impacts to air quality because of wind-blown dust created by construction equipment, exhaust emissions from construction equipment, and the increased number vehicle trips by construction workers. Wind-blown dust contributes to PM emissions; pollutants associated with construction equipment exhaust include NO_x, PM, CO, and VOCs. Construction-related impacts are expected to be short term and limited to the duration and area of the construction activities

No range construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. Impacts from range construction would be less than significant.

5.4.11.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Emissions from ordnance. A larger number of soldiers would use existing and newly constructed ranges for live-fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic. An increased risk of accidental wildfire ignition would come from ordinance, vehicles, flammable materials, or cigarettes. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use pose very little risk of creating adverse air quality effects. Prescribed burning resulting from any management prescriptions would create short-term adverse impacts to air quality and would require a permit. Impacts form live-fire training would be less than significant.

5.4.11.4 Impacts from Maneuver Training

Less Than Significant Impacts

Fugitive dust from military vehicles. The only potential effect to air quality from additional training activities would result from increased traffic on dirt roads and trails. Long-term adverse effects have the potential to result from mobile sources and increased training exercises. Mobile sources have the potential to result in effects to air quality from increased emissions of fugitive dust (PM) and vehicle exhaust. Increases in training exercises have the potential to result in effects to air quality because of additional troop movements that result in fugitive dust emissions. Increases in criteria pollutants have the potential to decrease visibility and violate the NAAQS.

To determine the effect that increases in training would have on air quality at FTC, findings of a study conducted for the PCMS were extrapolated. FTC has similar soil types and training activities as the PCMS and, therefore a direct comparison can be made with impact. Off-road activity would increase in the FTC maneuver training areas by approximately double. The anticipated increase in activity, however, would be much less than the increase at the PCMS. The PCMS evaluation indicates that from increases in off-road vehicle emissions at the PCMS would be far below applicable thresholds and would not violate the NAAQS or visibility standards. Therefore, because the off-road activity at FTC is less than the activity at the PCMS and does not include off-post transportation, the impacts from off-road activity from maneuver training at FTC would be much less than NAAQS and visibility standards threshold levels, and would not result in impacts to air quality. Based on an evaluation of convoy travel between FTC and the PCMS, it was determined that emissions from increased convoy travel would not result in effects to air quality.

Overall, impacts from maneuver training would be less than significant.

No Impacts

Emissions from prescribed burning. Emissions from prescribed burning would occur. Prescribed burning however would occur regardless of whether Alternative C is implemented. The requirements of AQCC Regulation No. 9 would be followed to ensure that conditions are acceptable for prescribed fires and that air quality is not compromised.

5.4.12 NOISE

Table 5-48 lists the types of impacts associated with noise that would occur under Alternative C. Noise from range construction would be less than significant. Noise from live-fire and maneuver training would be mitigable to less than significant.

5.4.12.1 Impacts from Cantonment Construction

No cantonment construction would be required at FTC initially to accommodate the addition of 567 soldiers, their families, support personnel, and SBCT-specific facilities associated with the permanent stationing of the 2/25th SBCT at FTC. Temporarily, Stryker vehicles would be parked in vacant fields within the cantonment area until a future date when permanent parking would be developed.

Table 5-48 Summary of Potential Impacts to Noise from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Less Than Significant Impacts

Construction and operation noise. The increased number of vehicle trips by the increased number of military personnel, dependents, civil servants, and contractors could increase noise impacts. Permanent stationing of the 2/25th SBCT at FTC would slightly increase the overall population with the addition of soldiers, their families, and support personnel. Cantonment construction to accommodate the new population and SBCT-specific facilities would initially not be required. Elevated noise levels from the temporary parking of Stryker vehicles would not be expected to extend outside the boundaries of FTC. Future construction within the cantonment area would temporarily increase human presence and activity at construction sites. Increased noise impacts would be intermittent and short term. No cantonment construction would be necessary at PCMS; therefore, impact analysis is Not Applicable.

Noise from military vehicles. Traffic on local roadways adjacent to FTC is expected to increase. As a result, projected increases in traffic at off-post locations would not result in a perceivable increase in traffic noise. On-post traffic is expected to increase at most locations in the cantonment. Given the low traffic volumes in noise-sensitive areas and low posted speeds, it is unlikely that such an increase in traffic volumes would result in a noise impact.

5.4.12.2 Impacts from Range Construction

Less Than Significant Impacts

Construction and operation noise. Construction of two new ranges at FTC would temporarily increase human presence and activity at construction sites. Construction activity would potentially result in elevated noise levels at noise-sensitive locations adjacent to the construction sites. Elevated noise levels during construction would not be expected to extend outside the boundaries of FTC and would be temporary and short-term in duration. Adverse effects could occur from elevated noise levels at noise-sensitive locations adjacent to construction sites.

The following measures are proposed to decrease noise impacts further:

- Modification of construction activities, such as limiting nighttime construction or use of backup alarms, could be implemented to reduce noise around construction areas.

- To limit adverse noise effects in the future, the PCMS would follow AR 200-1 and the Installation Environmental Noise Management Plan to monitor noise.
- No range construction would be necessary at PCMS; therefore, impact analysis is Not Applicable. Noise from range construction would be less than significant.

5.4.12.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise from ordnance use. A larger number of soldiers would use existing and newly constructed ranges for live-fire training. There would be a corresponding increase in the total number of rounds fired as well as increased vehicular traffic.

Currently estimated noise contours for large-caliber weapons were generated based on the proposed changes in activity at the weapon ranges. The exchange of an IBCT for an SBCT at FTC may increase the area of these contours, but the effect is expected to be less than significant. Noise contours for large-caliber weapon noise would extend farther into adjacent noise-sensitive areas, and slightly increased noise levels in those areas could be expected. The only sensitive on-post receptors are within the cantonment area are located on the north end of the installation and are outside of the areas where noise impacts could increase.

5.4.12.4 Impacts from Maneuver Training

Less Than Significant Impacts

Noise from military vehicles. Increased vehicles in convoy movements would result in increased traffic noise levels between FTC and PCMS. Daily traffic volumes along I-25 would be expected to increase slightly during convoy movements. Convoys would be timed to avoid peak traffic periods along I-25 through Pueblo, and they would not contribute to the peak hour noise levels in that area. Daily traffic volumes along U.S. Highway 160 (U.S. 160) and U.S. 350 would temporarily increase. The increases in daily traffic volumes would be expected to occur intermittently for approximately 30 days per year under maximum training conditions. Based on the expected traffic increases, hourly average traffic noise levels at locations along area roadways where convoy movements would occur are estimated to have less than a perceptible change to area residents.

Training activities at BAAF would not change at FTC under Alternative C. In some instances, training activity could decrease based on stationing of some types of aircraft elsewhere (e.g., Blackhawk helicopters). Noise levels resulting from aircraft activity are expected to be less than significant.

Based on current analyses, noise effects from SBCT training should not extend beyond the installation boundary of the PCMS. If grazing occurs near the western installation boundary when the hand-grenade range is in use, cattle could be disturbed by the intermittent noise from grenade explosions. No known noise-sensitive receptors are located in the areas outside the installation boundaries where noise increases are anticipated. Therefore, less than significant impacts to sensitive receptors under current land uses would be expected.

The noise increases in areas outside the installation boundaries might discourage residential development or settling of other sensitive receptors in these areas in the future. The following measures are proposed to decrease noise impacts further:

- Modification of construction activities, such as limiting nighttime construction or use of backup alarms, could be implemented to reduce noise around construction areas.
- To limit adverse noise effects in the future, the PCMS would follow AR 200-1 and the Installation Environmental Noise Management Plan to monitor noise.

5.4.13 AIRSPACE RESOURCES

Table 5-49 summarizes the impacts associated with airspace resources that would occur under Alternative C. No impacts are expected from cantonment construction, range construction, or live-fire training. Less than significant effects are expected from flights of UAVs during maneuver training on FTC that would restrict use of airspace during the training. No impacts are expected during maneuver training at PCMS.

Table 5-49 Summary of Potential Impacts to Airspace Resources from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	○	N/A
Impacts from Range Construction	○	N/A
Impacts from Live-Fire Training	○	N/A
Impacts from Maneuver Training	⊙	○

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.4.13.1 Impacts from Cantonment Construction

No Impacts

When compared to the IBCT that it would be replacing, permanent stationing of the 2/25th SBCT at FTC would slightly increase the overall population with the addition of soldiers, their families, and support personnel. Initially, no cantonment construction to accommodate the new population and SBCT-specific facilities would be required. No modifications to existing controlled or special use airspace and no new special use airspace would be needed.

5.4.13.2 Impacts from Range Construction

No Impacts

Construction of two new ranges at FTC would temporarily increase human presence and activity at construction sites. This construction would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed. No mitigation is necessary for impacts from range construction.

5.4.13.3 Impacts from Live-Fire Training

No Impacts

Implementation of this alternative would have no major direct or indirect effects on airspace resources at FTC. This alternative would not require modifications to existing controlled or special use airspace and no new special use airspace would be needed for live-fire training. Consequently, current airspace and airfield restrictions would remain in effect on all FTC lands. Procedures established for existing restricted airspace would continue to apply to all aircraft, including UAV operations. Although closures of currently restricted airspace are expected to increase in frequency because of increased training, the UAV is not designed to fly during high wind or extremely cold conditions, which would limit the periods during which operation is possible.

A CFA may have to be established above new firing ranges at FTC. However, CFAs pose no problems for VFR or IFR flights because activities within a CFA must be suspended immediately when radar, spotter aircraft, or ground lookouts detect an approaching aircraft. No live-fire training would occur at PCMS; therefore, impact analysis is Not Applicable. No mitigation is necessary for impacts from live-fire training.

5.4.13.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would occur at both FTC and PCMS. Except for the differences described below, SBCT training would have similar impacts as current IBCT training at each location. Brigade- and battalion-level training would primarily occur at PCMS, and the frequency of maneuver training at PCMS is not expected to increase above existing levels. Platoon- and company-level training would primarily occur at FTC, and would increase in frequency by approximately 50 percent.

UAVs would be the only permanently assigned aerial equipment associated with the SBCT at FTC. UAVs could be used throughout FTC, as needed, to support training activities. Restricted airspace at FTC would allow UAVs to be used safely throughout the installation. Procedures established for existing restricted airspace would continue to apply to all aircraft, including UAV operations.

Unlike at FTC, UAVs could not be used at the PCMS under current conditions. PCMS lacks restricted airspace (that is, an area that is restricted from entry, usually up to a certain elevation, by other aircraft). UAVs can only operate in areas without restricted airspace if they are accompanied by manned aircraft. No manned aircraft are assigned to FTC. Consequently, none are available to accompany UAVs over PCMS.

5.4.14 ENERGY DEMAND AND GENERATION

Table 5-50 summarizes the potential energy impacts under implementation of Alternative C. Impacts to energy use and costs are expected to be less than significant; however, to minimize energy use and costs, additional measures are proposed.

Table 5-50 Summary of Potential Energy Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.4.14.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Energy demand and costs. A slight increase in energy demand and costs would occur at FTC because of the additional personnel residing at FTC. The number of additional personnel would represent an increase of less than 3 percent compared to the existing on-post population. FTC uses renewable energy sources and is purchasing electrical power generated from renewable sources. In addition, upgrades to the electrical and natural gas systems are proposed under this alternative. Impacts to energy use and costs are expected to be less than significant. No mitigation would be required.

Based on the increase in population, a less than ten percent increase in energy use would occur at FTC. The number of additional personnel under this alternative would represent an increase of less than 8 percent compared to the existing on-post population. The current energy output is sufficient to meet the energy demands of the SBCT as well as other future and ongoing activities on or near FTC. No mitigation is required because electricity demand on the cantonment would be met by the available electrical supply; demand in the training areas would be met with continued use of batteries and portable generators. Impacts to energy use and costs are expected to be less than significant.

The following measures are proposed to minimize potential energy demand and costs further:

- Planned upgrades to electrical and natural gas systems and coordination with Colorado Springs Utilities to provide additional capacity would satisfy increased demand.
- Installation of an additional electric substation, transformer upgrades, and coordination with Colorado Springs Utilities to provide additional capacity would minimize impacts from increased demand on the energy supply.
- Installation of power distribution lines to provide electricity to training facilities located on the west side of the training areas and installation of natural gas lines, new electrical distribution, and transformer upgrade for the Cantonment to support increased demand for energy.

5.4.14.2 Impacts from Range Construction

Less Than Significant Impacts

Impacts to energy use and costs would be similar to those described for the cantonment area and are expected to be less than significant. No mitigation would be required.

5.4.14.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Live-fire training would increase under this alternative; however, impacts to energy use and costs are expected to be less than significant. No mitigation would be required.

5.4.14.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would occur at both FTC and PCMS. Increased maneuver training would be performed at FTC, resulting in a slight increase in energy use. The frequency of maneuver training at PCMS is not expected to increase. The demand for electricity is below the existing capacity and heating oil and propane provide adequate fuel for heating at the Cantonment. Impacts to energy use and costs are expected to be less than significant. No mitigation would be required.

5.4.15 FACILITIES

Table 5-51 summarizes the potential impacts to facilities under implementation of Alternative C. Facility changes would not initially be needed for additional personnel stationed at FTC except for the addition of two ranges. With continued implementation of regulatory and administrative mitigation such as ITAM, INRMPs, ecosystem management, and the sustainable range management program, impacts to facilities are expected to be less than significant. No mitigation is required.

5.4.15.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Facilities. Impacts to facilities at FTC may occur from the stationing of additional personnel at FTC and the associated increased use of existing facilities. Initially, no new construction is expected to be necessary within the cantonment area. Future construction includes new barracks facilities. Impacts would be a beneficial and less than significant. No mitigation would be required. No housing or community facilities construction is planned at PCMS under this alternative; therefore, impact analysis is not applicable.

Public Services. A slight increase in demand on public services would occur under this alternative as a result of additional personnel stationed at FTC. Because the additional personnel would represent an increase of less than 1 percent compared to the existing population in the ROI, impacts to public services are expected to be less than significant. No mitigation would be required.

Utilities. A slight increase in demand on utilities would occur under this alternative as a result of additional personnel stationed at FTC. Because the number of additional personnel under this alternative would represent an increase of less than 1 percent compared to the existing population in the ROI, impacts to utilities are expected to be less than significant. No mitigation would be required.

Table 5-51 Summary of Potential Facilities Impacts from Alternative C

Activity Group	Location	
	Fort Carson	PCMS
Impacts from Cantonment Construction	⊙	N/A
Impacts from Range Construction	⊙	N/A
Impacts from Live-Fire Training	⊙	N/A
Impacts from Maneuver Training	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.4.15.2 Impacts from Range Construction

Less Than Significant Impacts

Facilities. Under this alternative, two new training ranges would be constructed at FTC. Impacts to facilities would be beneficial and less than significant. No mitigation would be required. No range construction is planned at PCMS under this alternative; therefore, impact analysis is not applicable.

Infrastructure and Utilities. A slight increase in demand on utilities would occur under this alternative as a result of range construction; however, impacts to utilities are expected to be less than significant. No mitigation would be required.

No Impacts

Public Services. No impacts to public services are expected because of range construction.

5.4.15.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Facilities. Range utilization would increase on each range type and increased amounts of ammunition would be used, resulting in a proportionate increase in the generation of UXO and lead contamination on training ranges. With implementation of Army SOPs, impacts are expected to be less than significant. No additional mitigation is required.

Utilities. A slight increase in demand on utilities would occur under this alternative because of increased live-fire training; however, impacts to utilities are expected to be less than significant. No mitigation would be required.

No Impacts

Public Services. Under this alternative, there would be a slight increase in usage of the live-fire training ranges; however, no impacts to public services are expected. No live-fire training would is planned at PCMS under this alternative; therefore, impact analysis is not applicable.

5.4.15.4 Impacts from Maneuver Training

Under this alternative, the frequency of maneuver training would increase at FTC and a larger maneuver training area would be required at PCMS. The projects proposed for construction in the training areas involve little ground disturbance either during construction or operation. A minor increase in demand on public services and utilities would occur at FTC. Utilities affected could include water or wastewater systems, storm water systems, electricity and gas, solid waste management systems, or communication systems. Infrastructure and utility upgrades are associated with this alternative; therefore, impacts are expected to be less than significant. No mitigation would be required.

Facilities. Under this alternative, new facilities would be constructed. Impacts would be beneficial and less than significant.

Public Services. A slight increase in demand on public services would occur under this alternative. However, because the number of additional personnel under this alternative would represent an increase of less than one percent compared to the existing population in the ROI, impacts to public services are expected to be less than significant.

Utilities. Impacts to utilities, including potable water supply, the wastewater and stormwater systems, energy sources, communications, and solid waste because of training under this alternative would be less than significant, although training would increase at the PCMS. Under this alternative, upgrades to infrastructure would be implemented to support the expected increased demands on utilities resulting from additional number of Soldiers and increased training at the PCMS. Impacts to utilities infrastructure would be less than significant.

5.4.16 IMPACTS OF RELOCATING IBCT FROM FTC TO HAWAII

Selection of Alternative C – Colorado for the permanent stationing of the 2/25th SBCT would require that the IBCT currently stationed at FTC be relocated to Hawaii. Relocating an IBCT from FTC would not significantly change the number of soldiers currently supported by cantonment and range facilities in Hawaii. Although an IBCT would be an increase of 430 soldiers from the current 2/25th ID, it is still less soldiers than the 567 with the 2/25th SBCT currently training there temporarily. Therefore, no additional IBCT-specific cantonment or range construction would be required that would contribute to increased short-term construction-related surface disturbance and soil erosion at the cantonments or ranges, as current facilities and ranges adequately support the larger temporary 2/25th SBCT unit.

The majority of the projects in Hawaii identified in the transformation EIS (USAG-HI 2004) would be completed, although some would be down-scoped to exclude elements exclusive to SBCT training. Conditions and impacts at SBMR would be similar to the No Action Alternative. Ongoing transformation projects would be completed, but the increase in live-fire training and training maneuvers in Hawaii would involve a modular IBCT rather than the existing SBCT.

Since no new construction would be required to accommodate the relocation of an IBCT to Hawaii, live-fire or maneuver training would the primary potential contributors to impacts to all resources. Since this training for the IBCT is not expected to differ greatly from existing training frequency or intensity, the impacts associated with IBCT training would be expected to be similar to current levels. Also, the degree of ground disturbance typically caused by munitions and military vehicles used for IBCT training is similar to that caused by the vehicles used for other types of training that already occur at the ranges in Hawaii.

Because the amount of ground disturbance resulting from IBCT training would be similar to the existing conditions, the potential impacts to soils, water, vegetation, wildlife, sensitive species, and cultural resources are expected to be approximately the same. Because the frequency and intensity of training would be similar to that occurring on the ranges now, wildfire, noise, air quality, and land use impacts would also be similar.

Relocating an IBCT from FTC would not significantly change the number of soldiers currently supported by cantonment and range facilities in Hawaii so impacts associated with the number of soldiers would not be expected to change appreciably. The presence of the IBCT would also not be expected to change significantly the population, economy (business sales, volume), employment, income, housing and schools, socioeconomic conditions, minority and low-income populations, environmental justice, the protection of children in Hawaii. Likewise, impacts to traffic and transportation, human health and safety, and energy would be expected to be approximately the same. Live-fire and maneuver training, the primary contributors to indirect impacts to surrounding populations, would not change appreciably from current condition.

Impacts to all resources in Hawaii from relocating an IBCT from FTC to Hawaii would be less than significant.

5.5 ALTERNATIVE D — NO ACTION BASELINE CONDITION OF STATIONING OF THE 2/25TH ID LIGHT

5.5.1 SUMMARY OF THE ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE D

Table 5-52 presents the potential impacts of implementing Alternative D as it is described in Chapter 2. For each VEC, impacts from four activity groups were analyzed: Cantonment Construction, Range Construction, Live-Fire Training, and Maneuver Training. Impacts from the four activity groups are summarized by a single impact rating for each area affected by the alternative. Details of each activity group's impacts are presented below in the resource sections.

All impacts are less than significant or mitigable to less than significant. Impacts to all resources would occur from continued use of Army lands. Construction and training activities would continue to introduce or spread noxious weeds and increase the possibility of accidental ignition of a wildfire. Mitigation measures would reduce these impacts to less than significant. General wildlife, habitats, and vegetation would sustain only less than significant impacts. No impacts to wetlands would be expected.

Air quality, cultural resource, and water resource impacts, primarily from training activities would be significant. The implementation of several administrative mitigation measures would reduce those impacts to less than significant.

Impacts to land use, socioeconomics, and hazardous materials would be largely mitigable to less than significant. Traffic, noise, airspace, energy, and facilities would all experience less than significant impacts at all affected areas.

Table 5-52 Summary of the Environmental Consequences of Alternative D

VEC	Location		
	Hawaii	Alaska	Colorado
Soil Erosion	⊘	⊙	⊙
Water Resources	⊘	⊙	⊙
Wildfire Management	⊘	⊙	⊙
Cultural Resources	⊘	⊘	⊘
Land Use and Recreation	⊙	⊙	⊙
Traffic and Transport	⊙	⊙	⊘
Socioeconomics	⊙	⊙	⊙
Hazardous Materials and Hazardous Waste	⊙	⊙	⊙
Wetlands	○	⊙	⊙
Vegetation	⊙	⊙	⊙
Noxious Weeds	⊘	⊙	⊙
Threatened and Endangered Species	⊙	⊙	⊙
Wildlife and Habitats	⊙	⊙	⊙
Air Quality	⊙	⊙	⊙
Noise	⊙	⊙	⊙
Airspace	⊙	⊙	⊙
Energy Demand and Generation	⊙	⊙	⊙
Facilities	⊙	⊙	⊙
Subsistence	N/A	⊙	N/A

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.2 GEOLOGY, SOILS, AND SEISMICITY

Table 5-53 lists the types of impacts associated with soil erosion impacts that would occur under the No Action Alternative by activity group. The current baseline of existing conditions would continue under No Action, and soil erosion related impacts would continue at their current levels. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations and no SBCT-specific impacts to soils would occur. However, many of the impacts discussed for Alternative A would still occur at USAG-HI under this alternative, but at a different magnitude or level of significance. Only the differences relative to Alternative A are discussed here. Projects at each installation that were already planned and unrelated to permanent stationing of the 2/25th SBCT would still occur. Impacts are described below for each alternative.

Table 5-53 Summary of Potential Soil Erosion Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊘	⊘	⊘	⊘	○	○	○	○
Impacts from Live-Fire Training	⊘	○	⊘	⊘	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊘	⊘	⊘	⊘	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.2.1 Hawaii

5.5.2.1.1 Impacts from Cantonment Construction

No Impacts

No change in the Soldier population would occur. Consequently, only cantonment construction projects that are not related to the permanent stationing of the 2/25th SBCT in Hawaii would proceed in the future. Although construction of any required projects would proceed as needed, no projects are currently planned. Therefore, no increased soil erosion impacts are expected under this alternative.

5.5.2.1.2 Impacts from Range Construction

Significant Impacts Mitigable To Less Than Significant

Impact 1: Soil Erosion. Several of the range construction or modification projects listed in Chapter 2 are not Stryker-specific and would still need to be completed under the No Action Alternative. Potentially significant soil erosion resulting from construction of these range projects would be mitigable to less than significant with implementation of standard BMPs and the standard mitigation implemented under the ITAM annual work plan for USAG-HI.

Regulatory Administrative Mitigation 1: The Army proposes to minimize and avoid cut slopes, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope and by differentially orienting the slope and the roadbed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope). In accordance with Army design standards, potential mitigation measures for this impact also include, where practicable, selecting the least failure-prone route, geotechnically testing soils where necessary along the route to identify problems, designing the roadbed, slope and surface to avoid slope failure, properly sizing drainage systems, designing storm drainage outfalls for efficient performance, and properly monitoring and maintaining the road. This mitigation measure would be undertaken during construction of proposed roads and would substantially reduce the

potentially significant slope failure impacts caused by intense use of the roads under the Alternative A to less than significant levels.

Impact 2: Increased Potential for Slope Failure. Trail construction or modification projects would need to be completed. Slope failure is the collapse of soils on a steep slope when the internal friction of the materials supporting the slope is exceeded by the weight of the materials. Slope failure can be initiated by several forces, including the presence of water in the pore spaces of the soils, which reduces the internal frictional forces, by a change in the angle of repose of the materials through undercutting the slope, by increasing the loading at the top of the slope, by deeper weathering of the materials in the slope, and by vibration. The combination of steep slopes, easily erodible soils, and the damage or modification to land cover or surface drainage that would occur during construction of roads and trails could increase the short-term potential for slope failure.

The impact of increased potential for slope failure resulting from trail construction is considered potentially significant because slope failure could alter the landscape, obstruct stream channels, and create safety problems for personnel.

Regulatory Administrative Mitigation 2: Implementation of standard construction BMPs and the land management practices, as described under Impacts from Cantonment Construction, would occur as specified in the USAG-HI ITAM annual work plan.

Less Than Significant Impacts

Volcanic and Seismic Hazards. The potential for strong ground motion or volcanic eruptions that could present a hazard to people or property would be the same as that described for the Alternative A. The impacts would be greatest at PTA, but they are not expected to be significant, because existing warning systems would provide sufficient warning of an eruption such that personnel and equipment would likely have time to evacuate from the path of a lava flow. The hazards associated with future earthquakes at PTA are considered less than significant because the area is underlain by thin soils and hard rock, which, unlike thick alluvial deposits, transmits rather than amplifies seismic wave energy.

5.5.2.1.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 3: Soil Erosion and Compaction. Live-fire training would continue on existing and improved ranges. Compaction in the craters caused by larger ordnance explosions can alter the permeability and water-holding capacity of the soils and harden silty clays affecting the ability of vegetation to recover in those areas. Surface disturbance caused by munitions impact would result in larger areas of bare ground than observed under current conditions. Munitions impact can directly create craters and remove patches of vegetation, which normally protects soil from erosion by slowing runoff, intercepts raindrops before they reach the soil surface, and anchors the soil. Compaction in the craters caused by larger ordnance explosions can alter the permeability and water-holding capacity of the soils and harden silty clays affecting the ability of vegetation to recover in those areas. These direct impacts indirectly create large areas of bare ground and exposed soils that are susceptible to wind and water erosion, which can indirectly cause large-scale removal and redeposition of soils, gullying, or unstable slopes in areas of steep slopes and rapid runoff. Although weapons training events would be periodic, long-term impacts are expected because soil disturbance typically requires time and effort to amend.

Regulatory Administrative Mitigation 3: Implementation of standard BMPs, as well as revegetation and other land restoration projects implemented by the LCTR, LRAM, and TRI programs of the INRMP and ITAM annual work plan would reduce these impacts to less than significant.

Impact 4: Soil Erosion from Wildland Fires. Continued use of Army ranges for live-fire training would prolong the threat of accidentally ignited wildfires, which could lead to increased soil erosion.

Regulatory Administrative Mitigation 4: The IWFMP, its Fire Management Areas, and wildland fire SOPs would continue to be followed. The impact would continue to be significant but mitigable to less than significant.

Less Than Significant Impacts

Exposure to Soil Contaminants. Live-fire training would continue at current levels and occur over larger areas and more locations. As described for Alternative A, munitions fired from firing points are directed downrange into the impact areas. The Army restricts access to these areas by Soldiers or members of the public because of the explosive risk to safety they represent. It is unlikely that military personnel or off-post residents would encounter the constituents of these munitions in the downrange impact area soils. The risk to military personnel who use the ranges would be low because contact with downrange impacted soils is unlikely and there are relatively few areas with high chemical constituent concentrations. There would be no risk to the general public from munitions constituents related to range use because there would be no public access to these areas. Exposure to soil contaminants during live-fire training activities is considered a less than significant impact.

Volcanic and Seismic Hazards. As described for Alternative A, portions of the areas that would be used for live-fire training are subject to volcanic eruptions, lava flows, occasional explosive eruptions, volcanic gas venting, and earthquakes. The impact would be the hazards to personnel associated with weapons training in areas in which volcanic and seismic hazards exist. On Oahu, the expected intensity of ground shaking in a reasonably strong earthquake would be moderate to minor because of its distance from the source of the earthquakes. There is very little risk of renewed volcanic activity on Oahu, so the hazards to personnel on the ranges on Oahu are considered less than significant. Existing warning systems are generally expected to provide sufficient warning of a volcanic eruption near PTA, such that personnel and equipment would likely have time to evacuate from the path of a lava flow. The hazards associated with lava flows or earthquakes at PTA are also considered less than significant.

5.5.2.1.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 5: Soil Erosion. Maneuver training would continue using existing equipment and training methods at current off-road training areas. Current training activities, including the use of military vehicles on unimproved roads and off-road areas, have resulted in localized significant soil erosion, particularly in areas underlain by Helemano soils on steep slopes adjacent to streams or gulches. Training activities impair vegetation growth, resulting in gully erosion, which increases in severity as the gullies broaden. This erosion can remove large volumes of soil, which are ultimately deposited downslope or downstream.

Under the No Action alternative, some of the existing erosional problems at KTA result from public access to portions of KTA and to unauthorized activities, such as off-road vehicle use and motocross riding on informal trails adjacent to the motocross raceway. Public use represents a source of potentially significant soil erosion impacts that are comparable to military off-road impacts on soils. These impacts represent a potentially significant baseline impact on soil erosion.

Soil loss from continued use of the military vehicle trail from Kawaihae Harbor to PTA would occur. Without pavement or drainage improvements, dust erosion impacts would continue, as would potential impacts from erosion by surface runoff. The impacts are not considered to be significant relative to long-term soil loss or erosion because the trail occupies a relatively small amount of acreage. Use of the trail would not significantly alter the rate of erosion. The trail would continue to be maintained as needed to ensure that it remains passable.

Regulatory Administrative Mitigation 5: ATTACC modeling indicates that current land condition results in negligible soil erosion impacts at DMR and PTA, and that damage that occurs under current training conditions at SBMR and KTA is significant but mitigable to less than significant levels with application of the USAG-HI ITAM Program. Although ATTACC modeling identifies the current impacts of maneuver training overall on SBMR as "moderate", the INRMP for installations on Oahu suggests that significant soil erosion has occurred in the past in certain ridge top areas at SBMR and current conditions are not sustainable, as land condition has continued to decline. Under the No Action Alternative, no additional lands would be available to enable training to be rotated to other areas while the damaged land recovers. Those areas are expected to be addressed through the ITAM process and will gradually recover under improved land management. Therefore, impacts are considered to be less than significant with implementation of mitigation measures.

Impact 6: Increased Potential for Slope Failure. Because Helemano Trail and would be constructed under the No Action Alternative, off-road maneuvers would take place at SBER. The Kawaihae Harbor to PTA trail would be improved, reducing the potential for slope failure. Slope failure is considered a potentially significant, but mitigable to less than significant impact.

Regulatory Administrative Mitigation 6: Slope failure has not been identified as a noticeable problem from road usage under existing conditions. However, with regular monitoring and early maintenance of the roadways and adjacent slopes as mandated in the USAG-HI ITAM annual work plan, project-related impacts would be reduced to less than significant.

Less Than Significant Impacts

Soil Compaction and Rutting. Soils in training areas would be subject to existing levels of compaction. Most of these effects have already occurred, although continued maneuver training would reduce the ability of soils to recover from these effects, and impacts would be less than significant.

Volcanic and Seismic Hazards. The potential for strong ground motion or volcanic eruptions that could present a hazard to people or property would be the same as that described for the Alternative A. The impacts would be greatest at PTA, but they are not expected to be significant, because existing warning systems would provide sufficient warning of an eruption such that personnel and equipment would likely have time to evacuate from the path of a lava flow. The hazards associated with future earthquakes at PTA are considered less than significant because structures at the ranges and cantonment have been designed to withstand the expected range of seismic shaking and because the area is underlain by thin soils and hard rock, which, unlike thick alluvial deposits, transmits rather than amplifies seismic wave energy.

5.5.2.2 Alaska

5.5.2.2.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed at FRA would remain the same. Therefore, no additional cantonment facilities would be constructed. Consequently, there would be no soil erosion impacts associated with the No Action Alternative.

5.5.2.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers training at FRA and DTA would remain the same. Therefore, no additional ranges would be constructed. Consequently, there would be no soil erosion impacts associated with the No Action Alternative.

5.5.2.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA would be near current levels. Implementation of the USARAK INRMP and ITAM program work plans and associated land management practices and soil erosion mitigation would continue. Soil erosion-related impacts caused by live-fire training would be less than significant.

5.5.2.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FRA and DTA would remain at levels seen today. Implementation of the USARAK INRMP and ITAM program work plans and associated land management practices and soil erosion mitigation would continue. Soil erosion-related impacts caused by maneuver training would be less than significant.

5.5.2.3 Colorado

5.5.2.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The number of Soldiers currently stationed at FTC would remain the same. However, some unaccompanied Soldiers live off post because of an on-post shortage barracks. Therefore, some additional cantonment facilities would be constructed under this alternative to meet the needs of the unaccompanied Soldiers. Although this construction is expected to occur in previously disturbed areas, less than significant soil erosion impacts would occur.

5.5.2.3.2 Impacts from Range Construction

No Impacts

The current number of soldiers training at FTC and PCMS would remain the same. Therefore, no additional ranges would be constructed at FTC or PCMS. Consequently, no soil erosion impacts would occur under the No Action Alternative.

5.5.2.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would be near current levels. Implementation of the INRMP and ITAM program work plans and associated land management practices and soil erosion mitigation would continue. Soil erosion-related impacts caused by live-fire training would be less than significant. No live-fire training would occur at PCMS, so no impacts would occur at PCMS.

5.5.2.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FTC and PCMS would remain at the levels associated with the current stationing. Implementation of the FTC and PCMS INRMP and ITAM program work plans and associated land management practices and soil erosion mitigation would continue. Soil erosion-related impacts caused by maneuver training would be less than significant.

5.5.3 WATER RESOURCES

Potential impacts to water resources identified based on regulatory standards and scientific judgment include impacts on surface water quality, groundwater quality, increased flood potential, and groundwater supply (**Table 5-54**).

Table 5-54 Summary of Potential Water Resource Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊘	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊘	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.3.1 Hawaii

5.5.3.1.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time (although some construction may occur at SBMR on as needed basis in the future). Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to water resources would be anticipated from cantonment construction.

5.5.3.1.2 Impacts from Range Construction

Significant Impacts Mitigable To Less Than Significant

Impact 1: Impacts on surface water quality. Construction of trails or roads could potentially impact waters of the U.S. via the crossings of streams. All stream crossings would be reviewed by the USACE prior to construction to determine if the activity is regulated under Section 404 of the Clean Water Act (CWA) (Section 404).

Regulatory Administrative Mitigation 1: In accordance with Section 404 of the CWA, any dredge or fill activities in streams associated with the crossings may require an Army permit. If the USACE determines that an Army permit is required, the Army would abide by all appropriate CWA regulations and permit processes administered by the USACE and Hawaii.

Less Than Significant Impacts

Impacts on surface water quality. Alternative D could affect waters of the U.S. via stream crossings involved in projects. All stream crossings would be reviewed by USACE prior to construction to determine if the activity is regulated under Section 404 of the CWA. Accordingly, any dredge or fill activities in this stream associated with the crossings may require an Army permit. If the USACE determines that an Army permit is required, the Army would abide by all appropriate CWA regulations and permit processes administered by the USACE and the State of Hawaii.

Nonpoint source pollution. During construction trail projects, grading and widening, making cuts and fills, trenching to install fiber optic cable, and installing box culverts and other drainage controls could increase the short-term potential for stormwater runoff to come into contact with disturbed soils. This may result in increased sediment loading of stormwater runoff and could degrade water quality in receiving streams. The potential for the occurrence of these impacts would be minimized by implementing standard construction BMPs for runoff control. These would be specified in the construction SWPPP for the project.

Chemical spills or nonpoint source discharges. Vehicles would transport equipment and supplies along Dillingham Trail. Operating vehicles at safe speeds would minimize the potential for spills or releases along Dillingham Trail. Because accidents cannot be ruled out, there is a small potential for spills of petroleum products or other substances that may be transported along Dillingham Trail. The impact on surface water quality would be lower compared to existing conditions because, in addition to the lower risk of not traveling on public roads, appropriate spill response equipment would be carried with any vehicles transporting chemical or petroleum products, and trained response personnel would be immediately dispatched to the spill site to begin cleanup, according to standard spill response procedures.

Use of dust control palliatives. Controlling dust using calcium or magnesium chloride, calcium lignosulfonates, or other materials or measures could affect surface water quality, either by increasing the

biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals would be applied according to industry standards (Parametrix 2001).

Impacts on surface water quality. Construction of trails and roads could potentially affect waters of the U.S. via stream crossings at streams that might require new crossings. All stream crossings would be reviewed by USACE prior to construction to determine if the activity is regulated under Section 404 of the CWA. In accordance with Section 404 of the CWA, any dredge or fill activities in these streams associated with the crossings may require an Army permit. If the USACE determines that an Army permit is required, the Army would abide by all appropriate CWA regulations and permit processes administered by the USACE and the State of Hawaii.

During construction of projects at PTA, soils may be exposed to stormwater runoff, which may enhance erosion. However, using construction BMPs to control runoff would minimize erosion, and the impacts would be less than significant on surface water. Under natural conditions, the intermittent streams carry large amounts of sediment, and a small amount of additional sediment, if it were present because of construction activities, would be negligible.

Impacts on groundwater quality at DMR. Groundwater occurs at various depths along Dillingham Trail. Accidental spills or releases could occur during routine operations as described above and, instead of affecting surface water quality, could infiltrate the subsurface and affect groundwater quality. The impacts are expected to be less than significant because, as described for surface water, spills would be quickly contained and then cleaned up using standard procedures described in the SPCC Plan.

Regulatory, administrative, and additional mitigations described under Alternative A would be implemented to protect water resources from potential impacts resulting from range construction.

5.5.3.1.3 Impacts from Live-fire Training

Less Than Significant Impacts

Nonpoint source contamination of surface water: Current training activities have resulted in soil contamination at firing points and ranges within the boundaries of the PTA. Based on the results of recent soil sampling at the PTA, the most significant explosive constituent found in soils was RDX. Several metals, including iron and aluminum, occur naturally at concentrations above USEPA PRGs for soils. The concentrations of some other metals, including zinc and lead (which were found above soil PRGs), may be attributable in part to training activities.

No surface water samples have been collected at PTA and there are no perennial streams, so the ultimate result of the interaction of chemicals in soils with intermittent surface water runoff would be transport of the chemicals with the intermittent stream flows and sediment and deposition downslope. Potential impacts on surface water quality are expected to be less than significant because surface water is present only intermittently following large storms.

Impacts on groundwater quality: Infiltration and percolation of surface water could dissolve and transport chemicals deposited in surface soils to the subsurface. However, with a few exceptions, most of the mass of chemical residues are expected to dissolve relatively slowly in water and would remain in shallow soils. It would require large volumes of recharge to carry dissolved contaminants to the great depths at which groundwater may occur beneath the PTA and relatively long time periods for the chemicals to be transported. Even if relatively soluble compounds, such as perchlorate, were transported with the

recharge, the concentrations would be very dilute when they arrived at the depth of basal groundwater (provided it is present beneath the PTA).

There are no groundwater wells in the area, and therefore no groundwater monitoring has been performed to confirm that groundwater beneath the PTA has not been affected by chemical contaminants. However, groundwater is not used locally as a source of drinking water, so there are no receptors in the area that would be impacted if trace constituents were to reach the groundwater aquifer. For these reasons, potential impacts on groundwater resources from chemicals generated by current force training or construction activities under the No Action Alternative are considered less than significant.

Use of new ranges at current levels would be used under the No action Alternative at SBMR, DMR, and KTA/KLOA. Impacts to surface and groundwater resources from live-fire training would be less than significant. Regulatory, administrative, and additional mitigations described under Alternative A would be implemented to protect water resources from potential impacts resulting from live-fire training.

5.5.3.1.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 2: Impacts to surface water: Significant impacts to surface water quality could result from soil erosion associated with training activities at KTA/KLOA. However, these impacts would be mitigable to less than significant level. The potential for eroding soils to affect surface water quality would continue to be potentially significant. ATTACC modeling results indicate that the current land condition has been affected by training and that the current rates of soil erosion exceed the goal of long-term sustainability.

Regulatory Administrative Mitigation 2: Regulatory, administrative, and additional mitigations described under Alternative A would be implemented to protect water resources from potential impacts resulting from range construction.

Less Than Significant Impacts

Impact on surface water quality. The loading and unloading activities planned under the Alternative D would be similar to the activities that currently take place as part of the current force training. The Army and the operator of the harbor are responsible for preventing spills and for cleaning them up if they occur, according to standard spill prevention and response procedures. Therefore, these activities are not expected to result in any appreciable impacts on the water quality in Kawaihae Harbor.

Similarly, use of the PTA Trail is not expected to result in significant impacts on surface water in or adjacent to the harbor because spills and erosion would be addressed by implementing construction BMPs and standard spill prevention and response procedures.

Impacts on groundwater quality. The proposed route of the PTA Trail would approach some potable wells at lower elevations. Spills of fuels or other chemicals could occur. The impacts on groundwater quality are expected to be less than significant because bulk fuel would not be transported on the PTA Trail, but on the paved state and county roads. The Army would implement the existing spill prevention and response plan to all new lands and activities. All convoys using the PTA Trail would carry spill response equipment and personnel trained in the use of the equipment.

In addition, the Army proposes to place bollards around the wellheads in coordination with the utility and property owners to protect the structures from potential damage. If the coordination results in a change in

alignment, which might cause environmental impacts not analyzed in the EIS, the Army would conduct all appropriate NEPA, ESA, and NHPA consultations before making a final decision on a new alignment.

Regulatory and administrative mitigation 1, 2, and 3 and additional mitigations 1, 2, and 3 described under Alternative A would be implemented to protect water resources from potential impacts resulting from maneuver training.

5.5.3.2 Alaska

5.5.3.2.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed at FRA would remain the same. Therefore, no additional cantonment facilities would be constructed. Consequently, there would be no impacts to water resources associated with the No Action Alternative.

5.5.3.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers training at FRA and DTA would remain the same and no additional ranges would be constructed. Consequently, there would be no new impacts to water resources associated with the No Action Alternative.

5.5.3.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA would be near current levels. Implementation of the USARAK INRMP and ITAM program work plans and associated land management practices and water resources mitigation would continue. Impacts to water resources caused by live-fire training would be less than significant.

5.5.3.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FRA and DTA would remain at levels seen today. Implementation of the USARAK INRMP and ITAM program work plans and associated land management practices and water resources mitigation would continue. Consequently, impacts to water resources caused by maneuver training would be less than significant.

5.5.3.3 Colorado

5.5.3.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The number of Soldiers currently stationed at FTC would remain the same. However, some unaccompanied Soldiers live off post because of an on-post shortage barracks. Therefore, some additional cantonment facilities would be constructed under this alternative to meet the needs of the unaccompanied

Soldiers. Although this construction is expected to occur in previously disturbed areas, less than significant impacts to surface water would occur from potential runoff that could transport sediment.

5.5.3.3.2 Impacts from Range Construction

No Impacts

The current number of soldiers training at FTC and PCMS would remain the same. Therefore, no additional ranges would be constructed at FTC or PCMS. Consequently, no impacts to water resources would occur.

5.5.3.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would be near current levels. water resource mitigation would continue. Impacts to water resources caused by live-fire training would be less than significant. No live-fire training would occur at PCMS, so no impacts would occur at PCMS.

5.5.3.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FTC and PCMS would remain at the levels associated with the current stationing. Implementation of the FTC and PCMS INRMP and ITAM program work plans and associated land management practices and water resource mitigation would continue. Impacts to water resources caused by maneuver training would be less than significant.

5.5.4 WILDFIRE MANAGEMENT

Table 5-55 lists the types of impacts associated with wildfire management that would occur under Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to wildfire risk or management would occur. Impacts are described below for each location.

5.5.4.1 Hawaii

5.5.4.1.1 Impacts from Cantonment Construction

No Impacts

No change in the Soldier population would occur. Consequently, only cantonment construction projects that are not related to the permanent stationing of the 2/25th SBCT in Hawaii would proceed in the future. Although construction of any required projects would proceeds as needed, no projects are currently planned. Therefore, no increased risk of wildfire is expected.

Table 5-55 Summary of Potential Impacts to Wildfire Management from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	○	N/A
Impacts from Range Construction	○	○	○	○	○	○	○	○
Impacts from Live-Fire Training	⊘	○	⊘	⊘	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.5.4.1.2 Impacts from Range Construction

No Impacts

Range projects would proceed as needed. Construction of these projects would temporarily increase human presence and activity at construction sites. This increase is not expected to impact the risk of accidental wildfire ignition.

5.5.4.1.3 Impacts from Live-Fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Increased wildfire risk. Live-fire training, the primary factor contributing to wildfire risk, would continue. Several range improvement projects would occur. Army use of those ranges would produce a significant wildfire risk because live-fire training would occur over a larger area and at more locations.

Regulatory Administrative Mitigation 1: The IWFMP, its Fire Management Areas, and wildland fire SOPs, all of which are designed to prevent and manage wildfires, would continue to be followed. These impacts from continued training would remain a significant impact, but Administrative Mitigation measures would reduce the impact to less than significant.

5.5.4.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would continue using existing equipment and training methods at current off-road training areas. Continued use of Army land for training under would prolong the threat of wildfires. Fire management programs and resources adequately address the existing wildfire risk. Therefore, Alternative D would have less than significant impacts.

5.5.4.2 Alaska

5.5.4.2.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed and training at FRA and DTA would remain the same. Therefore, no additional cantonment facilities would be constructed. Consequently, there would be no impacts to wildfire risk or wildfire management.

5.5.4.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers stationed and training at FRA and DTA would remain the same. Therefore, no additional range facilities would be constructed. Consequently, there would be no impacts to wildfire risk or wildfire management.

5.5.4.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA would be near current levels. Thus, no additional wildfire risk is expected, and the overall impacts to fire management would be less than significant.

5.5.4.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FRA and DTA would remain at levels seen today. Therefore, no additional wildfire risk is expected, and the overall impacts to fire management would be less than significant.

5.5.4.3 Colorado

5.5.4.3.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. This construction is expected to occur in previously disturbed areas within the cantonment. Consequently, there would be no impacts to wildfire risk or wildfire management.

5.5.4.3.2 Impacts from Range Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. Therefore, no additional range facilities would be constructed. Consequently, there would be no impacts to wildfire risk or wildfire management.

5.5.4.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would be near current levels. Implementation of the Prescribed Burn Plan and other wildfire management programs would continue. Therefore, no additional wildfire risk is expected, and the overall impacts to fire management would be less than significant. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.4.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FTC and PCMS would remain at levels seen today. Implementation of the Prescribed Burn Plan and other wildfire management programs would continue. Therefore, no additional wildfire risk is expected, and the overall impacts to fire management would be less than significant.

5.5.5 CULTURAL RESOURCES

Table 5-56 summarizes the types of impacts to cultural resources that would occur under Alternative D. Impacts would result from ongoing training activities and infrastructure projects. Existing brigades at each of these installations would remain in their current configuration at their current troop levels. Only at FTC would there be any cantonment construction to accommodate current troop levels and that construction would be limited. There would also be no need for new range construction, although existing projects for range improvements would continue. Ongoing training activities would include continued off-road vehicle use, which would result in impacts on cultural resources in the training areas caused by ground troop activities, off-road vehicle movement, and ground disturbance.

Table 5-56 Summary of Potential Cultural Resources Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	○	N/A
Impacts from Range Construction	⊙	○	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	○	○	○	○	○	○	○	○
Impacts from Maneuver Training	○	⊘	⊘	⊘	⊘	⊘	⊘	⊘

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.5.5.1 Hawaii

5.5.5.1.1 Impacts from cantonment construction

No Impacts

There would be no new project related cantonment construction. The existing brigades would remain in their current configuration at their current troop levels. Consequently, no increased cultural resources impacts are expected.

5.5.5.1.2 Impacts from range construction

Less Than Significant Impacts

The 2006 annual report of cultural resource management (USAG-HI 2006) identified several projects that are being implemented regardless of the permanent location of the 2/25th SBCT. Some of these projects may be down-scoped if they do not need to accommodate the SBCT. All areas of range and support facility construction are being surveyed for cultural resources. The annual report lists more than 360 newly documented cultural resource sites. To date, all of the sites have been avoided. There remains a potential for impact to undocumented sites, but these impacts can generally be mitigated to less than significant by the implementation of appropriate treatment plans.

5.5.5.1.3 Impacts from Live-fire Training

No Impacts

Existing conditions would continue at all of the training areas. There would be no project-related increase in frequency or intensity of training, no use of new ranges, and no change in weapons or equipment. All of the areas of live-fire training have been surveyed for cultural resources and protective measures have been implemented for all known sites.

5.5.5.1.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Existing conditions would continue at all of the training areas. Impacts would result from ongoing training activities. Ongoing training activities include continued off-road vehicle use. This would result in significant but mitigable impacts on cultural resources in the maneuver areas caused by ground troop activities, off-road vehicle movement, and ground disturbance. Because current force training would continue, there would be no incremental increase in impacts on cultural resources. Mechanisms and procedures are in place to monitor the effects of operations, maintenance, and training exercises, and to respond to any unanticipated discoveries.

The Army would continue to inventory and evaluate cultural resources in compliance with Section 110 of the NHPA, and project planning would comply with Section 106 and its implementing regulations. The locations of eligible cultural resources or areas considered likely to contain eligible cultural resources would be designated as sensitive areas, and access to or use of these areas would be restricted and monitored. There would be regular monitoring of known sites by cultural resource personnel after training activities to identify any impacts and adjust protection if needed. If any sites cannot be avoided, appropriate mitigation measures that may include data recovery would be implemented. Any construction or maintenance that entails ground disturbance would also be monitored, and any discovery of

undocumented cultural resources or human remains would be treated in accordance with installation guidelines and policies.

5.5.5.2 Alaska

5.5.5.2.1 Impacts from Cantonment Construction

No Impacts

The existing brigades at each of these installations would remain in their current configuration at their current troop levels. Therefore, no additional cantonment construction projects would be implemented and no impacts to cultural resources would occur.

5.5.5.2.2 Impacts from Range Construction

No Impacts

The existing brigades would remain in their current configuration at their current troop levels. In addition, there are no plans for additional range construction. Consequently, there would be no impacts to cultural resources.

5.5.5.2.3 Impacts from Live-fire Training

No Impacts

Existing conditions would continue. Consequently, there would be no project-related increase in frequency or intensity of training, no use of new ranges, and no change in weapons or equipment. All of the areas of live-fire training have been surveyed for cultural resources and protective measures have been implemented for all known sites.

5.5.5.2.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Impacts to cultural resources. Existing conditions would continue, so impacts would result from ongoing training activities. Ongoing training activities include continued off-road vehicle use. This would result in significant but mitigable impacts on cultural resources in the maneuver training areas caused by ground troop activities, off-road vehicle movement, and ground disturbance. Because current force training would continue, there would be no incremental increase in impacts on cultural resources. Mechanisms and procedures are in place to monitor the effects of operations, maintenance, and training exercises, and to respond to any unanticipated discoveries.

Regulatory and Administrative Mitigation 1: The installations would continue to inventory and evaluate cultural resources in compliance with Section 110 of the NHPA, and project planning would comply with Section 106 and its implementing regulations. The locations of eligible cultural resources or areas considered likely to contain eligible cultural resources would be designated as sensitive areas and access to or use of these areas would be restricted and monitored. There would be regular monitoring of known sites by cultural resource personnel after training activities to identify any impacts and adjust protection if needed. If any sites cannot be avoided, appropriate mitigation measures that may include data recovery would be implemented. Any construction or maintenance that entails ground disturbance would also be monitored, and any discovery of undocumented cultural resources or human remains would be treated in accordance with installation guidelines and policies.

5.5.5.3 Colorado

5.5.5.3.1 Impacts from Cantonment Construction

No Impacts

The number of Soldiers currently stationed at FTC would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. This construction is expected to occur in previously disturbed areas within the cantonment. Consequently, there would be no impacts to cultural resources.

5.5.5.3.2 Impacts from Range Construction

No Impacts

The existing brigades would remain in their current configuration at their current troop levels. No additional ranges would be constructed. Consequently, there would be no impacts to cultural resources from range construction.

5.5.5.3.3 Impacts from Live-fire Training

No Impacts

Existing conditions would continue. There would be no project-related increase in frequency or intensity of training, no use of new ranges, and no change in weapons or equipment. All of the areas of live-fire training have been surveyed for cultural resources and protective measures have been implemented for all known sites. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.5.3.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Impacts to cultural resources. Existing conditions would continue and impacts would result from ongoing training activities. Ongoing training activities include continued off-road vehicle use. This would result in significant but mitigable impacts on cultural resources in the training and maneuver areas caused by ground troop activities, off-road vehicle movement, and ground disturbance. Current force training would continue, and there would be no incremental increase in impacts on cultural resources. Mechanisms and procedures are in place to monitor the effects of operations, maintenance, and training exercises, and to respond to any unanticipated discoveries.

Regulatory and Administrative Mitigation 1: The installations would continue to inventory and evaluate cultural resources in compliance with Section 110 of the NHPA, and project planning would comply with Section 106 and its implementing regulations. The locations of eligible cultural resources or areas considered likely to contain eligible cultural resources would be designated as sensitive areas, and access to or use of these areas would be restricted and monitored. There would be regular monitoring of known sites by cultural resource personnel after training activities to identify any impacts and adjust protection if needed. If any sites cannot be avoided, appropriate mitigation measures that may include data recovery would be implemented. Any construction or maintenance that entails ground disturbance would also be monitored, and any discovery of undocumented cultural resources or human remains would be treated in accordance with installation guidelines and policies.

5.5.6 LAND USE AND RECREATION

Table 5-57 lists the potential impacts associated with land use and recreation under implementation of Alternative D. The 2/25th SBCT would not be stationed at any of the alternative locations. Therefore, no SBCT-specific impacts to land use and recreation would occur. Impacts are summarized in the following subsections for each location.

Table 5-57 Summary of Potential Land Use and Recreation Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	○	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	○	○	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.5.6.1 Hawaii

5.5.6.1.1 Impacts from Cantonment Construction

Less Than Significant Impacts

No change in the Soldier population would occur. Consequently, only cantonment construction projects that are not related to the permanent stationing of the 2/25th SBCT in Hawaii would proceed in the future. Construction of any required projects would proceed as needed. Motorpool projects are planned as part of transformation and upgrading. These projects would occur within the cantonment area, and would have a less than significant impact.

5.5.6.1.2 Impacts from Range Construction

Less Than Significant Impacts

Range projects would proceed as needed, and would not adversely affect existing land use or recreation resources. Impacts associated with construction of the PTA Trail could be significant because of the presence of UXO along the alignment. However, UXO cleanup before construction would involve identifying the MPM and clearing a safety radius associated with UXO. Owners and occupants of the areas within the MPM would be notified, and, as needed, road closures and coordination with local law enforcement agencies, fire departments, and transportation agencies would occur. In addition, structures within the MPM may be temporarily evacuated as appropriate UXO cleanup activities are conducted

(Streck 2003). These impacts would be significant, but continued implementation of regulatory and administrative mitigation measures would reduce the impacts to less than significant.

5.5.6.1.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Live-fire training, which is one of the primary factors contributing to indirect effects to surrounding land uses, would continue. Army use of new and old ranges would result in live-fire training over a larger area and at more locations. Continued use of Army land for training would result in additional land disturbances and degradation. Continued implementation of regulatory and administrative mitigation measures with ongoing training would reduce the impacts to less than significant.

5.5.6.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training, which is one of the primary factors contributing to indirect effects to surrounding land uses, would continue. Maneuver training would continue using existing equipment and training methods at current off-road training areas. Continued use of Army land for maneuver training would result in additional land disturbances and degradation. Continued implementation of regulatory and administrative mitigation measures would reduce the impacts to less than significant.

5.5.6.2 Alaska

5.5.6.2.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed at FRA would remain the same. Therefore, no additional cantonment facilities would be constructed. Consequently, there would be no impacts to land use or recreation.

5.5.6.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers training at FRA and DTA would remain the same and no additional ranges would be constructed. Consequently, there would be no new impacts to land use or recreation.

5.5.6.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA and DTA would be near current levels. Implementation of the USARAK institutional programs and associated land management practices would continue. Consequently, impacts to land use and recreation caused by live-fire training would be less than significant.

5.5.6.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FRA and DTA would remain at levels seen today. Implementation of the USARAK institutional programs and associated land management practices would continue. Consequently, impacts to land use and recreation caused by live-fire training would be less than significant.

5.5.6.3 Colorado

5.5.6.3.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. This construction is expected to occur in previously disturbed areas within the cantonment. Consequently, there would be no impacts to land use or recreation.

5.5.6.3.2 Impacts from Range Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. Therefore, no additional range facilities would be constructed. Consequently, there would be no impacts to land use or recreation.

5.5.6.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would be near current levels. Implementation of FTC's institutional programs and associated land management practices would continue. Consequently, impacts to land use and recreation caused by live-fire training would be less than significant. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.6.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FTC and PCMS would remain at levels seen today. Implementation of FTC's institutional programs and associated land management practices would continue. Continuing noise, dust, or other indirect effects outside the installation boundaries could preclude locating residences or other sensitive receptors in these areas in the future. Consequently, impacts to land use and recreation caused by live-fire training would be less than significant.

5.5.7 TRAFFIC AND TRANSPORT

Table 5-58 lists the potential impacts associated with traffic and transportation resource under implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to traffic and

transportation resources would occur. Impacts are summarized in the following subsections for each location.

Table 5-58 Summary of Potential Traffic and Transportation Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	N/A	N/A	○	○	○	○
Impacts from Live-Fire Training	○	○	○	○	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊘	⊘

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.7.1 Hawaii

5.5.7.1.1 Impacts from Cantonment Construction

No Impacts

There would be no new project related cantonment construction. The existing brigades would remain in their current configuration at their current troop levels. Consequently, no changes to traffic or transportation resources are expected.

5.5.7.1.2 Impacts from Range Construction

Less Than Significant Impacts

Range projects would proceed as needed. Construction of these projects would generate additional traffic from worker vehicles and trucks, but construction traffic would be temporary and would result in less than significant impacts. Construction-related traffic would not significantly affect operations at the intersections and street segments in the project vicinity, and traffic would generally be free flowing. The impacts are expected to be less than significant and no mitigation would be required.

5.5.7.1.3 Impacts from Live-Fire Training

No Impacts

The number of required live-fire user days per year at FTC would be near current levels and would not affect traffic or transportation resources away from the training areas. Consequently, impacts to traffic and transportation resources caused by live-fire training would not be expected.

5.5.7.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Under No Action, there would continue to be traffic impacts on public roadways associated with current force activities. This would include convoy traffic on public roads that may periodically cause traffic congestion. Traffic conditions are currently operating at acceptable levels (LOS C). However, during certain periods, traffic congestion occurs on roads to WAAF and SBMR. Under this alternative, the traffic volumes along the public roadways would remain at current levels, and the LOS would not change.

Military vehicles traveling between the Army installations would continue to cross public roadways. Convoy frequency would not increase compared to current conditions. Because some of the traffic would affect regional roadways that are currently operating at acceptable levels, impacts to traffic on public roadways are expected to be less than significant.

5.5.7.2 Alaska

5.5.7.2.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed at FRA would remain the same. Therefore, no additional cantonment facilities would be constructed. Consequently, there would be no impacts to traffic or transportation resources.

5.5.7.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers training at FRA and DTA would remain the same and no additional ranges would be constructed. Consequently, there would be no new impacts to traffic or transportation resources.

5.5.7.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA would continue at current levels. Thus, impacts to transportation resources and traffic caused by live-fire training would remain at less than significant levels.

5.5.7.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FRA and DTA would remain at levels seen today. Thus, impacts to transportation resources and traffic caused by maneuver training would remain at less than significant levels.

5.5.7.3 Colorado

5.5.7.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Construction of these projects would generate additional traffic from worker vehicles and trucks, but construction traffic would be temporary. The impacts are expected to be less than significant and no mitigation would be required.

5.5.7.3.2 Impacts from Range Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. Therefore, no additional range facilities would be constructed. Consequently, there would be no impacts to traffic or transportation resources.

5.5.7.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would continue at current levels. No additional impacts to traffic or transportation resources would occur. Consequently, impacts to traffic and transportation resources would be less than significant. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.7.3.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 1: Intersection and Roadway Segment Operations. Maneuver training intensity and frequency at FTC and PCMS would remain at levels seen today. Some of the traffic would affect regional roadways that are currently operating at or near capacity. In particular, traffic from training deployments could adversely affect traffic on I-25 through Pueblo. Impacts to traffic on public roadways are expected to be significant, but mitigable to less than significant.

Regulatory and Administrative Mitigation 1: Impacts to the regional roadway network from training deployment convoys would be mitigated by scheduling all movements to occur during off-peak traffic periods through Pueblo and staggering convoy vehicles into groups of no more than 24 vehicles each that are spaced at least 15 minutes apart. Improvements to the SH 16/I-25 interchange (currently underway) and the addition of passing lanes on U.S. 160 and U.S. 350 were recommended in the Piñon Canyon Maneuver Site Traffic Study (DPW 2006) and could also be implemented to mitigate the impacts of military convoys on regional roadways.

Additional Mitigation 1: Standard Army operating procedures are continually revised and reviewed to respond to new or increasing impacts to traffic, including those below, and would further reduce traffic impacts.

- Schedule all PCMS-related traffic movements to occur during off-peak periods on roadways operating near capacity.
- Stagger convoy vehicles into groups of no more than 24 vehicles each, spaced at least 15 minutes apart.
- Schedule all convoy movements through the Installation Transportation Officer at least 60 days in advance of the training rotation.
- Add passing lanes on U.S. 160 and U.S. 350 as recommended in the 2006 PCMS Traffic Study.
- Schedule construction activities so that they would not interfere with training. Use traffic control procedures, such as detours, when appropriate.

5.5.8 SOCIOECONOMICS

Table 5-59 lists the potential impacts associated with socioeconomic resources, environmental justice, and protection of children under implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to socioeconomic resources, environmental justice, and protection of children would occur. Impacts are summarized in the following subsections for each location.

Table 5-59 Summary of Potential Socioeconomic Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	⊙	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.5.8.1 Hawaii

5.5.8.1.1 Impacts from Cantonment Construction

No Impacts

No change in the Soldier population would occur. Only cantonment construction projects that are not related to the permanent stationing of the 2/25th SBCT in Hawaii would proceed in the future. Although construction of any required projects would proceed as needed, no projects are currently planned. Consequently, no impacts are expected to the local population, economy, employment, income, or

environmental justice. No effects on housing are expected because the number of people requiring housing on- or off-post would not change significantly. Finally, there would be no disproportionate effects on minority or low-income populations or changes in the health or safety risks that could affect children.

5.5.8.1.2 Impacts from Range Construction

Less Than Significant Impacts

Several range improvement and other construction projects would occur at the various training areas. However, implementing this alternative would have less than significant impacts on the local population, economy, employment, or income and there would be no disproportionate effects on minority or low-income populations or changes in the health or safety risks that could affect children.

5.5.8.1.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise and fugitive dust generated from training areas could have less than significant adverse indirect impacts on nearby schools or private residences. Noise and fugitive dust would be limited to daytime hours. Long-term noise impacts would result from training, but training is currently occurring at the installations. Fugitive dust emissions at SBMR could affect low-income and minority populations in Wahiawa and Mililani Town. However, these impacts would be mitigated, if necessary, as described in the Air Quality section of this document. Indirect impacts would be less than significant and would not disproportionately affect low-income or minority populations. No disproportionate endangerment of children would occur on or near the installations.

No Impacts

Live-fire training would have no impacts on population, economy, employment, income, housing, or schools. No live-fire training would occur on DNR; therefore, impact analysis is not applicable.

5.5.8.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would have no impacts on population, economy, employment, income, housing, or schools. Long-term noise impacts would continue from the training that is currently occurring at the installations.

5.5.8.2 Alaska

5.5.8.2.1 Impacts from Cantonment Construction

Less Than Significant Impacts

No change in the Soldier population would occur. No new construction projects are currently planned. Consequently, no impacts are expected to the local population, economy, employment, income, or environmental justice. No effects on housing are expected because the number of people requiring housing on- or off-post would not change significantly. Finally, there would be no disproportionate effects on minority or low-income populations or changes in the health or safety risks that could affect children.

5.5.8.2.2 Impacts from Range Construction

No Impacts

No new range construction projects are currently planned. Consequently, no impacts are expected to the local population, economy, employment, income, or environmental justice. No effects on housing are expected. Finally, there would be no disproportionate effects on minority or low-income populations or changes in the health or safety risks that could affect children.

5.5.8.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise and fugitive dust generated from training areas could have less than significant adverse indirect impacts on nearby schools or private residences. Noise and fugitive dust would be limited to daytime hours. Long-term noise impacts would result from training, but training is currently occurring at the installations. No live-fire training would take place near schools, day care facilities, or other areas with large populations of children. No adverse effects to the protection of children are expected under this alternative.

5.5.8.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would have no impacts on population, economy, employment, income, housing, or schools. Long-term noise impacts would continue from the training that is currently occurring at the installations.

5.5.8.3 Colorado

5.5.8.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Consequently, less than significant impacts are expected to the local population, economy, and housing. Finally, there would be no impacts to employment, income, or environmental justice nor would there be disproportionate effects on minority or low-income populations or changes in the health or safety risks that could affect children.

5.5.8.3.2 Impacts from Range Construction

No Impacts

No new range construction projects are currently planned. Consequently, no impacts are expected to the local population, economy, employment, income, or environmental justice. No effects on housing are expected. Finally, there would be no disproportionate effects on minority or low-income populations or changes in the health or safety risks that could affect children.

5.5.8.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise and fugitive dust generated from training areas could have less than significant adverse indirect impacts on nearby schools or private residences. Noise and fugitive dust would be limited to daytime hours. Long-term noise impacts would result from training, but training is currently occurring at the installations. No live-fire training would take place near schools, day care facilities, or other areas with large populations of children. No adverse effects to the protection of children are expected under this alternative. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.8.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would have no impacts on population, economy, employment, income, housing, or schools. However, long-term noise impacts would continue from the training that is currently occurring at the installations.

5.5.9 HUMAN HEALTH AND SAFETY

Table 5-60 lists the potential human health and safety impacts associated with implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific human health and safety impacts would occur. Impacts are summarized in the following subsections for each location.

5.5.9.1 Hawaii

5.5.9.1.1 Impacts from Cantonment Construction

No Impacts

No change in the Soldier population would occur. Only cantonment construction projects that are not related to the permanent stationing of the 2/25th SBCT in Hawaii would proceed in the future. Although construction of any required projects would proceed as needed, no projects are currently planned. Consequently, no impacts are expected to human health and safety.

No impacts would be expected from asbestos, LBP, PCBs, pesticides/herbicides, biomedical waste, or radon under the No Action. Overall, impacts to human health and safety are expected to be less than significant. Continued implementation of regulatory and administrative mitigation measures is expected to reduce the potential impacts to human health and safety to less than significant.

5.5.9.1.2 Impacts from Range Construction

Less Than Significant Impacts

Under the No Action Alternative, range projects would proceed as needed. Hazardous materials would continue to be used and the amounts of hazardous wastes generated would increase over time at the Army installations. Hazardous materials and wastes that would be used during range construction would continue to be managed in accordance with existing federal, state, installation-wide hazardous materials management plans, the current Army protocols, and SOPs.

Table 5-60 Summary of Potential Impacts for Human Health and Safety from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Unexploded Ordnance. Construction could involve former ranges so there could be impacts from encountering UXO during construction. In addition, potential impacts associated with construction of PTA Trail would be less than significant because of the presence of UXO along the alignment. Prior to construction, UXO cleanup would involve identifying the MPM and clearing a safety radius associated with UXO. Because UXO remains a potential presence on ranges, USAG-HI EOD specialists would continue abatement procedures to minimize exposing current forces to UXO during training. Continued implementation of regulatory and administrative mitigation measures would keep impacts to less than significant.

Depleted Uranium. Ongoing remediation activities associated with the DU found at the range complex at Schofield Barracks would continue under implementation of the No Action Alternative. A comprehensive remediation strategy would be developed and implemented in consultation with the appropriate state and federal regulators.

5.5.9.1.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Ammunition. Live-fire exercises would continue at current levels as a part of current force training. Continued use of munitions by current forces during training could affect the training lands. Under the No Action alternative, ammunition handling, storage, and disposal would continue at current levels. Existing weapons would continue to be used as part of current force training. Range contamination would continue to accumulate until range closure and remedial cleanup, but there would be no increase in ammunition used, so there would be only consistent levels of ongoing increased contamination. It is not likely that general training would result in any significant impacts. Current force training would continue to follow existing USAG-HI protocol.

Unexploded Ordnance. The quantity of ammunition used during training would not increase. Therefore, no increases in potential impacts from the presence of UXO are expected.

Contaminated Sites. Current force training would continue at current levels on all military installations. The IRP investigations on SBMR, SBER, and WAAF would continue under existing USAG-HI protocol.

Lead. Current force would continue live-fire training with lead-containing ammunition at SBMR and PTA. Continued ammunition use could increase the volume of soil that needs to be remediated for lead in the future. All live-fire activities that could present a source of lead contamination to the soils would be contained in the existing ordnance impact area, and no new ordnance impact areas would be introduced. Ordnance clearance and cleanup would follow existing federal, state, and Army protocols. There would be no change to training operations at these installations.

5.5.9.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Petroleum, Oils, and Lubricants. The Army would continue to follow federal, state, and Army protocol. Wheeled vehicles would continue to be used by current forces in maneuver training on SBMR, DMR, KTA, and PTA. Consequently, the potential exists for spills of these products during maneuver training. However, continued implementation of regulatory and administrative mitigation measures is expected to limit the potential impacts to human health and safety to less than significant.

5.5.9.2 Alaska

5.5.9.2.1 Impacts from Cantonment Construction

No Impacts

No change in the Soldier population would occur. Although construction of any required projects would proceed as needed, no projects are currently planned. Consequently, no impacts are expected to human health and safety.

No impacts would be expected from asbestos, LBP, PCBs, pesticides/herbicides, biomedical waste, or radon under the No Action. Overall, impacts to human health and safety are expected to be less than significant. Continued implementation of regulatory and administrative mitigation measures is expected to reduce the potential impacts to human health and safety to less than significant.

5.5.9.2.2 Impacts from Range Construction

No Impacts

No change in the Soldier population would occur. No range construction projects are currently planned. Consequently, no impacts are expected to human health and safety.

5.5.9.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Ammunition. Live-fire exercises would continue at current levels as a part of current force training. Continued use of munitions by current forces during training could affect the training lands. Under the No Action alternative, ammunition handling, storage, and disposal would continue at current levels. Existing

weapons would continue to be used as part of current force training. Range contamination would continue to accumulate until range closure and remedial cleanup, but there would be no increase in ammunition used, so there would be only consistent levels of ongoing increased contamination. It is not likely that general training would result in any significant impacts.

Unexploded Ordnance. The quantity of ammunition used during training would not increase. Therefore, no increases in potential impacts from the presence of UXO are expected.

Lead. Current force would continue live-fire training with lead-containing ammunition at FRA and DTA. Continued ammunition use could increase the volume of soil that needs to be remediated for lead in the future. All live-fire activities that could present a source of lead contamination to the soils would be contained in the existing ordnance impact area, and no new ordnance impact areas would be introduced. Ordnance clearance and cleanup would follow existing federal, state, and Army protocols.

5.5.9.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Petroleum, Oils, and Lubricants. The Army would continue to follow federal, state, and Army protocol. Wheeled vehicles would continue to be used by current forces in maneuver training on FRA and DTA. Consequently, the potential exists for spills of these products during maneuver training. However, continued implementation of regulatory and administrative mitigation measures is expected to limit the potential impacts to human health and safety to less than significant.

5.5.9.3 Colorado

5.5.9.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Construction of these facilities would proceed as needed and less than significant impacts are expected to human health and safety.

No impacts would be expected from asbestos, LBP, PCBs, pesticides/herbicides, biomedical waste, or radon under the No Action. Overall, impacts to human health and safety are expected to be less than significant. Continued implementation of regulatory and administrative mitigation measures is expected to reduce the potential impacts to human health and safety to less than significant.

5.5.9.3.2 Impacts from Range Construction

No Impacts

No change in the Soldier population would occur. No range construction projects are currently planned. Consequently, no impacts are expected to human health and safety.

5.5.9.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Ammunition. Live-fire exercises would continue at current levels as a part of current force training. Continued use of munitions by current forces during training could affect the training lands. Ammunition handling, storage, and disposal would continue at current levels. Existing weapons would continue to be used as part of current force training. Range contamination would continue to accumulate until range closure and remedial cleanup, but there would be no increase in ammunition used, so there would be only consistent levels of ongoing increased contamination. It is not likely that general training would result in any significant impacts.

Unexploded Ordnance. The quantity of ammunition used during training would not increase. Therefore, no increases in potential impacts from the presence of UXO are expected.

Lead. Current force would continue live-fire training with lead-containing ammunition at FTC. Continued ammunition use could increase the volume of soil that needs to be remediated for lead in the future. All live-fire activities that could present a source of lead contamination to the soils would be contained in the existing ordnance impact area, and no new ordnance impact areas would be introduced. Ordnance clearance and cleanup would follow existing federal, state, and Army protocols. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.9.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Petroleum, Oils, and Lubricants. Under this alternative, fuels would continue to be stored in ASTs and USTs at FTC and PCMS. The Army would continue to follow federal, state, and Army protocol. Wheeled vehicles would continue to be used by current forces in maneuver training on FTC and PCMS. Consequently, the potential exists for spills of these products during maneuver training. However, continued implementation of regulatory and administrative mitigation measures is expected to limit the potential impacts to human health and safety to less than significant.

5.5.10 BIOLOGICAL RESOURCES

Table 5-61 lists the potential impacts on biological resources associated with implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to biological resources would occur. Impacts are summarized in the following subsections for each location.

5.5.10.1 Hawaii

5.5.10.1.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Cantonment projects would proceed as needed, and would not adversely affect the risk to threatened and endangered species. Continued use of Army land for cantonment construction under No Action would prolong the impact to threatened and endangered species. These impacts from continued training would remain a less than significant impact.

Table 5-61 Summary of Potential Biological Impacts from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Wetlands								
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	○	○	N/A
Impacts from Range Construction	○	○	○	○	⊙	⊙	○	○
Impacts from Live-Fire Training	○	○	○	○	⊙	⊙	⊙	⊙
Impacts from Maneuver Training	○	○	○	○	⊙	⊙	⊙	⊙
Vegetation								
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	○	○	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	⊙	⊙	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Noxious Weeds								
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	○	⊙	N/A
Impacts from Range Construction	⊘	⊘	⊘	⊘	○	○	○	○
Impacts from Live-Fire Training	⊘	⊘	⊘	⊘	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊘	⊘	⊘	⊘	⊙	⊙	⊙	⊙
Threatened and Endangered Species								
Impacts from Cantonment Construction	⊙	N/A	N/A	N/A	○	N/A	○	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	⊙	⊙	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
General Wildlife and Habitats								
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	○	○	○
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

No Impacts

Under Alternative D, there would be no increase in Soldiers and no cantonment construction. On-going military activities would continue and new projects would be developed as needed. No impacts to wetlands, vegetation, noxious weeds, general wildlife and habitats from cantonment construction would occur.

5.5.10.1.2 Impacts from Range Construction

Significant Impacts Mitigable To Less Than Significant

Impact 1: Introduction and spread of invasive plants and noxious weeds. The construction of all trails would introduce more invasive species to the area. Activities associated with Dillingham Trail and activities along this trail could facilitate the spread of invasive species into the native wiliwili forest and the adjacent rare Lonomea forest. The Lonomea forest supports sensitive species *Schiedea kealiae* (a federally listed plant), ahakea, and kokio. Impacts from noxious weeds from range construction under Alternative D would be significant, but mitigable to less than significant.

Regulatory and Administrative Mitigation 1: Mitigation measures for effects to noxious weeds from range construction are the same as those described under Alternative A.

Less Than Significant Impacts

Impacts to vegetation: Habitats within the proposed range construction areas on SBMR, DMR, and KTA/KLOA is, for the most part, disturbed natural and introduced landscapes. If activities in these areas were to occur, they would mostly affect nonnative species adapted to stressed or nonnative environments. Vegetation within the proposed footprints of these projects, which primarily includes nonnative grasses, shrubs, and pineapple fields, would be removed.

Grading during construction would involve turning up the ground, moving topsoil and vegetation, and staging the heavy machinery area, and would cause intensive short-term disturbance to vegetation. Following any construction, the Army would seed disturbed areas with native or noninvasive vegetation. Mitigation measures described under Alternative A would ensure the impacts are less than significant levels.

Impacts to general wildlife and habitats. Construction noise and related human presence would disrupt the normal activities of animals. Mortality may occur to individual animals that are small or less mobile. Building new roads and ranges could increase habitat fragmentation. Overall, the short-term impacts of range construction would be minor. Range construction would have the long-term impact of reducing the available habitat for some species; however, given the relatively small size of the proposed ranges in the context of the surrounding disturbed military training area, impacts to general wildlife and habitats are less than significant.

Impacts to Threatened and Endangered Species: Range projects would proceed as needed, and would not adversely affect the risk to threatened and endangered species. Continued use of Army land for range construction would prolong the impact to threatened and endangered species. These impacts from continued training would remain a less than significant impact.

No Impacts

Impacts to wetlands: Numerous projects would be constructed under Alternative D. No wetlands have been identified on DMR or PTA. There are possible wetlands on or adjacent to SBMR (USARHAW and

25th ID[L] 2001a), but they are not expected to be affected by construction of these projects. No impacts to wetlands related to range construction would occur under Alternative D.

5.5.10.1.3 Impacts from Live-fire Training

Significant Impacts Mitigable To Less Than Significant

Impact 2: Introduction and spread of invasive plants and noxious weeds. The proposed impacts from live-fire training at SBMR, DMR, PTA, and KTA/KLOA would be expected to affect the introduction and spread of invasive species by potential fires that would put native plant species at competitive disadvantage. Impacts from noxious weeds under Alternative D would be significant, but mitigable to less than significant.

Regulatory and Administrative Mitigation 2: Mitigation measures for effects to noxious weeds from live-fire training are the same as those described in under Alternative A.

Less Than Significant Impacts

Impacts to vegetation: Vegetation communities within the proposed range areas on SBMR, PTA, and KTA/KLOA would be disturbed by live-fire training. Training would continue at current levels under Alternative D. The majority of the training areas are nonnative vegetation and common native plants, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. The use of certain types of ammunition increases the chances of starting fires in the impact area and within the surface danger zones. The potential introduction of fire resulting from the operation of the proposed ranges is discussed under Wildfire Management. Impacts to vegetation from live-fire training under Alternative D would be less than significant. Mitigation measures for effects to vegetation from live-fire training are the same as those described under Alternative A.

Impacts to general wildlife and habitats. Impacts to general wildlife and habitats are not expected to change under Alternative D. Live-fire training would continue to displace various wildlife species. Displacement would be caused by increased human presence in the area, as well as by elevated noise levels. Wildlife species that are more tolerant of human activity may remain in or around these ranges. Individuals that remain within the impact area and associated surface danger zones could be directly affected by ordnance or other munitions. Incidental mortality to wildlife could occur. However, such mortality is not expected to cause measurable impacts to wildlife populations. Training on the new and existing ranges would have a less than significant impact to wildlife and habitats. Measures described previously under Alternative A would further reduce the impacts of live-fire training.

Impacts to Threatened and Endangered Species: Live-fire training would continue and under the No Action Alternative, several range improvement projects would occur. Army use of those ranges would produce a less than significant impact to threatened and endangered species because live-fire training would occur over a larger area and at more locations. Continued use of Army land for training under No Action would prolong the impact to threatened and endangered species. These impacts from continued training would remain a less than significant impact.

No Impacts

Impacts to wetlands: No impacts to wetlands are expected from live-fire training under Alternative D. No wetlands have been identified at KTA or PTA. A wetland delineation of DMR identified one jurisdictional wetland (USACE 2002e). This wetland is within DMR but outside of the area that will be

used for live-fire training. There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID[L] 2001a), but they are not expected to be impacted by live-fire training.

5.5.10.1.4 Impacts from Maneuver Training

Significant Impacts Mitigable To Less Than Significant

Impact 3: Introduction and spread of invasive plants and noxious weeds. The impacts from maneuver raining at SBMR, DMR, PTA, and KTA/KLOA would be expected to affect the introduction and spread of invasive species by potential fires that would put native plant species at competitive disadvantage. Impacts from noxious weeds under Alternative D would be significant, but mitigable to less than significant.

Regulatory and Administrative Mitigation 3: Mitigation measures for effects to noxious weeds from maneuver training are the same as those described in Alternative A.

Less Than Significant Impacts

Impacts to vegetation: Vegetation communities within the proposed range areas on SBMR, PTA and KTA/KLOA would be disturbed by maneuver training. Training with existing vehicles would continue at current levels. Maneuver training would occur on established roads or trails, as well as areas designated for maneuver training throughout the installations. Vegetation resources would not be expected to be affected by maneuvers on existing roads and trails. Maneuvers training would generally occur in unforested areas at PTA and the Keamuku Parcel that contain nonnative vegetation communities. Vegetation that would be impacted on SBER and KTA is also primarily nonnative. Impacts to vegetation from maneuver training under Alternative D would be less than significant. Mitigation measures for effects to vegetation from maneuver training are the same as those described under Alternative A.

Impacts to general wildlife and habitats. No change in impacts to general wildlife and habitats is expected from the No Action Alternative. Current maneuver training frequency and type would continue using existing vehicles. Off-road training areas would not expand, so no new habitat loss would occur. Wildlife would continue to be disturbed by noise and human presence during training, but the level of disturbance would not change from existing levels and remain a less than significant impact.

Impacts to Threatened and Endangered Species: Maneuver training would continue and under the No Action Alternative, several range improvement projects would occur. Army use of those ranges would produce a less than significant impact to threatened and endangered species because training would occur over a larger area and at more locations. Maneuver training would continue using existing equipment and training methods at current off-road training areas. Continued use of Army land for training under No Action would prolong the impact to threatened and endangered species. These impacts from continued training would remain a less than significant impact.

No Impacts

Impacts to wetlands: No impacts to wetlands are expected from maneuver training under Alternative D. No wetlands have been identified at KTA or PTA. A wetland delineation of DMR identified one jurisdictional wetland (USACE 2002e). This perched wetland is within DMR but outside of the area that will be used for maneuver training. There are possible wetlands on or adjacent to SBMR (USARHAW and 25th ID[L] 2001a), but they are not expected to be impacted by maneuver training.

5.5.10.2 Alaska

5.5.10.2.1 Impacts from Cantonment Construction

No Impacts

Under Alternative D, there would be no increase in soldiers and no cantonment construction related to the 2/25th SBCT at FRA or DTA. On-going military activities would continue and new projects would be developed as needed. No impacts to wetlands, vegetation, noxious weeds, wildlife and habitats, or threatened and endangered species from cantonment construction related to the 2/25th SBCT would occur under Alternative D.

5.5.10.2.2 Impacts from Range Construction

Less Than Significant Impacts

Numerous projects, including currently planned mission-essential projects including range upgrades would be constructed at DTA under Alternative D. Additionally, on-going military activities would continue and new projects would be developed as needed. Wetlands at FRA and DTA could be impacted from these activities. Wetland permitting, which is regulated by the U.S. Army Corps of Engineers, would be required if range construction were to impact wetlands. Impacts to wetlands would likely be less than significant.

Vegetation at FRA and DTA would also be impacted from these activities. Impacts would be less than significant. Mitigation measures for impacts to vegetation from range construction would be the same as those described under Alternative A. The invasive species problem is currently minimal, and USARAK is committed to proactive management, so no impacts from noxious weeds would occur. No additional impact to threatened and endangered species is expected under the No Action Alternative, and the overall impacts would be less than significant.

5.5.10.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Numerous projects, including currently planned mission-essential projects including training facilities would be constructed at DTA under Alternative D. Additionally, on-going military activities would continue and new projects would be developed as needed at FRA and DTA. Wetlands at FRA and DTA could be impacted from these activities. Wetland permitting, which is regulated by the U.S. Army Corps of Engineers, would be required if range construction were to impact wetlands. The number of required live-fire user days per year at FRA would be near current levels under Alternative D. Impacts to wetlands would be less than significant. For the same reasons, impacts to vegetation, general wildlife and habitats, noxious weeds, and threatened and endangered species would be less than significant.

5.5.10.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Impacts from the No Action alternative would be less than significant for wetlands, general wildlife and habitats, noxious weeds, and threatened and endangered species.

5.5.10.3 Colorado

5.5.10.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Because this construction is expected to occur in previously disturbed areas, Impacts to noxious weeds would be less than significant. No impacts would occur to wetlands, vegetation, wildlife and habitats, or threatened and endangered species from cantonment construction.

5.5.10.3.2 Impacts from Range Construction

No Impacts

No change in the Soldier population would occur. No range construction projects are currently planned. Consequently, no impacts are expected to wetlands, vegetation, noxious weeds, general wildlife and habitats, or threatened and endangered species.

5.5.10.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA would be near current levels under Alternative D. Consequently, conditions would remain the same as they currently are and impacts to wetlands, vegetation, general wildlife and habitats, noxious weeds, and threatened and endangered species would be less than significant.

5.5.10.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would continue to occur as it currently does. Consequently, impacts would be less than significant for wetlands, general wildlife and habitats, noxious weeds, and threatened and endangered species.

5.5.11 AIR QUALITY

Table 5-62 lists the types of impacts associated with air quality that would occur under Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to air quality would occur. Impacts are described below for each location.

5.5.11.1 Hawaii

5.5.11.1.1 Impacts from Cantonment Construction

Less Than Significant Impacts

No cantonment construction is proposed at this time (although some construction may occur at SBMR on as needed basis in the future). Furthermore, no additional Soldiers would be stationed at the base.

Therefore, current levels of impacts to air quality, which are less than significant, would continue to occur.

Table 5-62 Summary of Potential Impacts to Air Quality from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	⊙	N/A	N/A	N/A	⊙	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.11.1.2 Impacts from Range Construction

Less Than Significant Impacts

Construction contractors would comply with the provisions of Hawaii Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of construction contracts. Consequently, construction-related emissions would have a s less than significant impaction on air quality. Impact from range construction at PTA also would be less than significant.

Nitrogen oxide emissions are of concern primarily as an ozone precursor. Even though construction emissions would increase, annual emissions of ozone precursors from construction activities would be too small to have a measurable effect on ozone levels. Consequently, impacts would be less than significant.

5.5.11.1.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Live-fire training would continue across the training areas at levels similar to current levels. Emissions from ordnance, military vehicles, and wildfires would continue at current levels, which result in less than significant impacts. Consequently, impacts under this alternative are expected to continue to be less than significant.

5.5.11.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

The types of impacts from maneuver training would be similar to the types of impacts occurring currently. Maneuver training involves the movement of vehicles over large areas, which would generate dust and emissions. The levels of dust and emissions generated would be similar to those that occur

currently. The Army has developed and implemented a DuSMMoP for the training areas. The plan addresses measures such as, but not limited to, restrictions on the timing or type of training during high-risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. With this plan, the impacts on air quality would continue to be less than significant.

5.5.11.2 Alaska

5.5.11.2.1 Impacts from Cantonment Construction

Less Than Significant Impacts

Under Alternative D, there would be no increase in soldiers and no cantonment construction at FRA. On-going military activities would continue and new projects would be developed as needed. Impacts to air quality from dust and emissions would continue at current levels, which are less than significant.

The following mitigation measures are currently implemented on USARAK lands and are part of the No Action Alternative.

- Continue to comply with asbestos and lead National Emission Standard for Hazardous Air Pollutants during renovation or demolition activities when friable asbestos materials are present.
- Continue to submit required construction permit applications to the Alaska Department of Environmental Conservation.
- Continue to collect PSD ambient air quality data.
- Continue to monitor air quality.

5.5.11.2.2 Impacts from Range Construction

Less Than Significant Impacts

The current number of Soldiers training at FRA and DTA would remain the same and no additional ranges would be constructed. Consequently, there would be no new impacts to air quality. Impacts would continue to be less than significant.

5.5.11.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

The current number of soldiers stationed and training at FRA and DTA would remain the same and the number of required live-fire user days per year at FRA and DTA would continue to be near current levels. Thus, overall impacts to air quality would remain the same and would be less than significant.

5.5.11.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

The current number of soldiers stationed and training at FRA and DTA would remain the same and the frequency and intensity of maneuver training at FRA and DTA would continue at near current levels. Thus, overall impacts of maneuver training to air quality would remain the same and would be less than significant.

5.5.11.3 Colorado

5.5.11.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Construction of these projects would cause only temporary impacts to air quality in the form of dust and vehicle emissions. After construction is completed, dust and emissions from vehicular travel on FTC would be similar to baseline conditions. Consequently, impacts to air quality would continue to be less than significant.

5.5.11.3.2 Impacts from Range Construction

Less Than Significant Impacts

Under the No Action alternative, no range construction projects are currently planned. Therefore, no additional dust or air emissions would be generated from construction. The overall impacts to air quality would be less than significant.

5.5.11.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Under the No Action alternative, training activities at FTC would remain the same as current levels and the number of required live-fire user days per year at FTC would be at current levels. Emissions from ordnance, military vehicles, and wildfires would continue at current levels, which result in less than significant impacts. Prescribed burn activities would continue to minimize the potential for wildfires sparked by live-fire training are anticipated to continue, but will be dependent on many factors such as drought and meteorological conditions. However, FTC would continued to adhere to the requirements of AQCC Regulation No. 9, *Open Burning, Prescribed Fire and Permitting,* to ensure that conditions are acceptable for prescribed fires and that air quality is not compromised (DECAM 2003b). Consequently, impacts to air quality would continue to be less than significant. No live-fire training would occur at PCMS.

5.5.11.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

The current number of soldiers stationed and training at FTC and PCMS would remain the same and the frequency and intensity of maneuver training at FTC and PCMS would continue at current levels. Thus, overall impacts of maneuver training to air quality would remain the same and would be less than significant.

5.5.12 NOISE

Table 5-63 lists the types of impacts associated with noise that would occur under Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to noise would occur. Impacts are described below for each location.

Table 5-63 Summary of Potential Impacts to Noise from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
+ = Beneficial Impact
N/A = Not Applicable

5.5.12.1 Hawaii

5.5.12.1.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time (although some construction may occur at SBMR on as needed basis in the future). Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to noise would occur.

5.5.12.1.2 Impacts from Range Construction

Less Than Significant Impacts

Construction projects at SBMR, PTA, and DMR would temporarily increase human presence and activity at construction sites. Individual items of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. With multiple items of equipment operating concurrently, noise levels can be relatively high during the day at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet from the site of major equipment operations. Locations more than 1,000 feet from construction sites seldom experience significant levels of construction noise.

Construction activities would generate average daytime noise levels of about 55 dBA at the closest noise-sensitive area. Because incremental Ldn contributions from construction activities would be lower than 65 dBA at the nearest noise-sensitive areas (1,950 feet distant), impacts from construction noise would be less than significant. Most other construction projects would be further removed from noise-sensitive locations than the projects discussed above. Noise effects from these projects would be less than significant.

No SBCT-specific range construction would be necessary at KTA or KLOA; therefore, impact analysis is not applicable. No mitigation is necessary for impacts from range construction. Impacts from range construction would be less than significant.

5.5.12.1.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise from ordnance use. Noise from live-fire training would continue at levels that are similar to those occurring currently. As discussed under Alternative A, noise levels from weapons firing and ordnance detonations are quite variable, with noise levels at long distances influenced in part by weather conditions. Small arms firing can produce relatively high peak noise levels at localized areas around the range. As indicated by past estimates of noise contours, firing noise levels do not cause noise levels in off-post residential areas to exceed generally accepted land use compatibility criteria. Noise from weapon firing would constitute a less than significant impact.

Noise from military vehicles. Tactical and support vehicles would travel within SBMR during military training exercises. Vehicles would also travel from SBMR to other installations in support of training exercises at those installations. Convoys of tactical and support vehicles using public roads on Oahu are limited to no more than 24 vehicles in a group. Vehicles within a convoy group (also called convoy serials) typically are spaced about 165 to 330 feet apart and are timed at least 15 to 30 minutes apart. These convoy procedures prevent situations where convoy vehicles dominate local traffic flow for substantial periods. Instead of creating conditions where military vehicle traffic dominates traffic noise conditions for a noticeable amount of time, convoy procedures result in noise from convoy traffic occurring as a sequence of multiple individual vehicle pass-by events within a background of normal traffic noise conditions. Therefore, there would be no significant change in traffic noise levels along public roads.

5.5.12.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Noise from military vehicles. Maneuver training would continue using existing equipment and training methods at current off-road training areas. Impacts are likely to be less because maneuver training would occur within the boundaries of training areas where sensitive noise receptors are fewer. Noise impacts from maneuver training would be a less than significant impact.

5.5.12.2 Alaska

5.5.12.2.1 Impacts from Cantonment Construction

No Impacts

Under Alternative D, there would be no increase in soldiers and no cantonment construction at FRA. On-going military activities would continue and new projects would be developed as needed. No impacts to noise would occur.

5.5.12.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers training at FRA and DTA would remain the same and no additional ranges would be constructed. Consequently, there would be no impacts to noise.

5.5.12.2.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise from ordnance use. Noise from live-fire training would continue at levels that are similar to those occurring currently. Noise levels from weapons firing and ordnance detonations are quite variable, with noise levels at long distances influenced in part by weather conditions. Small arms firing can produce relatively high peak noise levels at localized areas around the range. As indicated by past estimates of noise contours, firing noise levels do not cause noise levels in off-post residential areas to exceed generally accepted land use compatibility criteria. Noise from weapon firing would constitute a less than significant impact.

Noise from military vehicles. Tactical and support vehicles would travel within FRA during military training exercises. Vehicles would also travel from FRA to DTA in support of training exercises at those installations. Convoys of tactical and support vehicles are typically are spaced about 165 to 330 feet apart and are timed at least 15 to 30 minutes apart. These convoy procedures prevent situations where convoy vehicles dominate local traffic flow for substantial periods. Instead of creating conditions where military vehicle traffic dominates traffic noise conditions for a noticeable amount of time, convoy procedures result in noise from convoy traffic occurring as a sequence of multiple individual vehicle pass-by events within a background of normal traffic noise conditions. Therefore, there would be less than significant impacts from traffic noise levels along public roads.

5.5.12.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Noise from military vehicles. The current number of soldiers stationed and training at FRA and DTA would remain the same and the frequency and intensity of maneuver training at FRA and DTA would continue at near current levels. Maneuver training would continue using existing equipment and training methods at current off-road training areas. Impacts are likely to be less because maneuver training would occur within the boundaries of training areas where sensitive noise receptors are fewer. Noise impacts from maneuver training would be a less than significant impact.

5.5.12.3 Colorado

5.5.12.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Construction of these projects would cause only temporary noise impacts. After construction is completed, noise levels would be similar to baseline conditions. Consequently, impacts to noise would continue to be less than significant.

5.5.12.3.2 Impacts from Range Construction

No Impacts

Under the No Action alternative, no range construction projects are currently planned. Therefore, no additional noise would be generated from construction and no impacts would occur.

5.5.12.3.3 Impacts from Live-Fire Training

Less Than Significant Impacts

Noise from ordnance use. Noise from live-fire training would continue at levels that are similar to those occurring currently. Noise levels from weapons firing and ordnance detonations are quite variable, with noise levels at long distances influenced in part by weather conditions. Small arms firing can produce relatively high peak noise levels at localized areas around the range. As indicated by past estimates of noise contours, firing noise levels do not cause noise levels in off-post residential areas to exceed generally accepted land use compatibility criteria. Noise from weapon firing would constitute a less than significant impact.

Noise from military vehicles. Tactical and support vehicles would travel within FTC during military training exercises. Vehicles would also travel from FTC to PCMS in support of training exercises at those installations. Convoys of tactical and support vehicles are typically are spaced about 165 to 330 feet apart and are timed at least 15 to 30 minutes apart. These convoy procedures prevent situations where convoy vehicles dominate local traffic flow for substantial periods. Instead of creating conditions where military vehicle traffic dominates traffic noise conditions for a noticeable amount of time, convoy procedures result in noise from convoy traffic occurring as a sequence of multiple individual vehicle pass-by events within a background of normal traffic noise conditions. Therefore, there would be less than significant impacts from traffic noise levels along public roads.

5.5.12.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Noise from military vehicles. The current number of soldiers stationed and training at FTC and PCMS would remain the same and the frequency and intensity of maneuver training at FTC and PCMS would continue at near current levels. Maneuver training would continue using existing equipment and training methods at current off-road training areas. Impacts are likely to be less because maneuver training would occur within the boundaries of training areas where sensitive noise receptors are fewer. Noise impacts from maneuver training would be a less than significant impact.

5.5.13 AIRSPACE RESOURCES

Table 5-64 summarizes the impacts associated with airspace resources that would occur under Alternative D. No impacts are expected from cantonment construction, range construction, or live-fire training. Less than significant effects are expected from flights of UAVs during maneuver training that would restrict use of airspace during the training.

5.5.13.1 Hawaii

5.5.13.1.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time (although some construction may occur at SBMR on as needed basis in the future). Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to airspace resources would be anticipated from cantonment construction.

Table 5-64 Summary of Potential Impacts to Airspace Resources from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	○	N/A
Impacts from Range Construction	○	○	○	⊙	○	○	○	○
Impacts from Live-Fire Training	○	○	○	○	○	○	○	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.13.1.2 Impacts from Range Construction

Less Than Significant Impacts

Range projects would proceed as needed, and would not adversely affect airspace resources.

5.5.13.1.3 Impacts from Live-fire Training

No Impacts

The number of required live-fire user days per year would be near current levels and would not affect airspace resources around the training areas. Consequently, impacts to airspace resources caused by live-fire training would not be expected.

5.5.13.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would continue at all current training areas using existing equipment and training methods. Maneuver training, which would occur at SBMR, DMR, KTA, and PTA, could include flights by UAVs. The proposed UAV flights primarily would be conducted within previously designated

restricted areas (e.g., R-3109 and R-3103). For UAV flights that could not be conducted entirely within restricted areas, operations would occur in accordance with well-defined FAA procedures for remotely operated aircraft. Consequently, flights by UAVs are expected to have less than significant effects to airspace resources.

5.5.13.2 Alaska

5.5.13.2.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed at FRA would remain the same. Therefore, no additional cantonment facilities would be constructed. Consequently, there would be no impacts to airspace resources.

5.5.13.2.2 Impacts from Range Construction

No Impacts

The current number of Soldiers training at FRA and DTA would remain the same and no additional ranges would be constructed. Consequently, there would be no new impacts to airspace resources.

5.5.13.2.3 Impacts from Live-Fire Training

No Impacts

The number of required live-fire user days per year at FRA and DTA would continue at current levels. Thus, impacts to airspace resources caused by live-fire training would remain at current levels.

5.5.13.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

The current number of soldiers stationed and training at FRA and DTA would remain the same. Maneuver training intensity and frequency at FRA and DTA would remain at levels seen today. Airspace restrictions and UAV flights in support of maneuver training would continue in their current conditions.

5.5.13.3 Colorado

5.5.13.3.1 Impacts from Cantonment Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. Construction of these projects would not cause any impacts to airspace resources.

5.5.13.3.2 Impacts from Range Construction

No Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. No additional range facilities would be constructed. Consequently, there would be no impacts to airspace resources.

5.5.13.3.3 Impacts from Live-Fire Training

No Impacts

The number of required live-fire user days per year at FTC would continue at current levels. No additional impacts to airspace resources would occur. No live-fire training occurs at PCMS, so no impacts would occur at PCMS.

5.5.13.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training intensity and frequency at FTC and PCMS would remain at levels seen today. Airspace restrictions and UAV flights in support of maneuver training at FTC would continue in their current conditions. Thus, less than significant impacts are expected. No UAV flights are conducted in the airspace over PCMS. Therefore, no impacts to airspace resources at PCMS are expected

5.5.14 ENERGY DEMAND AND GENERATION

Table 5-65 lists the potential energy impacts associated with implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific energy impacts would occur. Impacts are summarized in the following subsections for each location.

Table 5-65 Summary of Potential Impacts to Energy from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.14.1 Hawaii

5.5.14.1.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to energy would be anticipated from cantonment construction.

5.5.14.1.2 Impacts from Range Construction

Less Than Significant Impacts

Range projects would proceed as needed. Construction of these projects would temporarily increase the use of energy (fuels) at the construction sites. This increase would be temporary and less than significant in the overall context of energy usage.

5.5.14.1.3 Impacts from Live-fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at Hawaii would be near current levels and would not change the amount of energy use (fuels) around the training areas. Consequently, live-fire training is not expected to cause any changes to energy impacts, which would be less than significant.

5.5.14.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would continue at all current training areas using existing equipment and training methods. Maneuver training, which would occur at SBMR, DMR, KTA, and PTA, could include flights by UAVs. Impacts to energy use would be similar to what occur currently. Therefore, impacts to energy use would be less than significant.

5.5.14.2 Alaska

5.5.14.2.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to energy would be anticipated from cantonment construction.

5.5.14.2.2 Impacts from Range Construction

No Impacts

No range construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to energy would be anticipated from range construction.

5.5.14.2.3 Impacts from Live-fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FRA and DTA would occur near current levels and would not change the amount of energy use (fuels). Consequently, live-fire training is not expected to cause any changes to energy impacts, which would be less than significant overall.

5.5.14.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would continue at all at both FRA and DTA using existing equipment and training methods. Maneuver training could include flights by UAVs. Impacts to energy use would be similar to those that occur currently. Therefore, impacts to energy use would be less than significant.

5.5.14.3 Colorado

5.5.14.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. This construction would result in a slight increase in energy demand and costs would occur at FTC because of the additional personnel that would reside at FTC. The number of additional personnel would represent slight increase compared to the existing on-post population. In addition, FTC uses renewable energy sources and is purchasing electrical power generated from renewable sources. Consequently, the impacts to energy demand are expected to be less than significant.

5.5.14.3.2 Impacts from Range Construction

No Impacts

No range construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to energy demand would be anticipated from range construction.

5.5.14.3.3 Impacts from Live-fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would occur near current levels and would not change the amount of energy use (fuels). Consequently, live-fire training is not expected to cause any changes to energy impacts, which would be less than significant overall. No live-fire training occurs at PCMS. Therefore, no energy demand would occur at PCMS for live-fire training.

5.5.14.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Maneuver training would continue at all at both FTC and PCMS using existing equipment and training methods. Maneuver training at FTC could include flights by UAVs. Impacts to energy use would be similar to those that occur currently. Therefore, impacts to energy demand and use would be less than significant.

5.5.15 FACILITIES

Table 5-66 lists the potential impacts to facilities associated with implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to facilities would occur. No Action is expected to have no long-term adverse impacts on existing facilities, including public services and utilities because no new facilities would be constructed to add demands to utilities infrastructure. No changes to the provision of police, fire, and emergency services would occur. Impacts are summarized in the following subsections for each location.

Table 5-66 Summary of Potential Impact to Energy from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	○	N/A	N/A	N/A	○	N/A	⊙	N/A
Impacts from Range Construction	⊙	⊙	⊙	⊙	○	○	○	○
Impacts from Live-Fire Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○
Impacts from Maneuver Training	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.15.1 Hawaii

5.5.15.1.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to facilities would be anticipated from cantonment construction.

5.5.15.1.2 Impacts from Range Construction

Less Than Significant Impacts

Range construction projects would proceed as needed. Construction of these projects would add new facilities to the inventory of facilities in Hawaii. These facilities would slightly increase the demand for utilities and public services. However, the overall effects of the range construction projects would be beneficial and less than significant.

5.5.15.1.3 Impacts from Live-fire Training

Less Than Significant Impacts

Range use would continue at current levels on each range type. Therefore, no changes are expected in the amounts of ammunition that would be used or in the generation of UXO and lead contamination on training ranges. No changes in the demand for public services or utilities are expected. With implementation of Army SOPs, impacts are expected to continue to be less than significant and no additional mitigation would be required.

5.5.15.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Use of maneuver training areas would continue at current levels. Ongoing use of maneuver training areas would continue to degrade these facilities. However, with continued implementation of regulatory and administrative mitigation such as ITAM, INRMPs, ecosystem management, and the sustainable range management program, impacts to facilities are expected to be less than significant.

5.5.15.2 Alaska

5.5.15.2.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to facilities would be anticipated from cantonment construction.

5.5.15.2.2 Impacts from Range Construction

No Impacts

No range construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to facilities or the demand for utilities or public services would be anticipated from range construction.

5.5.15.2.3 Impacts from Live-fire Training

Less Than Significant Impacts

Range use would continue at current levels on each range type. Therefore, no changes are expected in the amounts of ammunition that would be used or in the generation of UXO and lead contamination on

training ranges. No changes in the demand for public services or utilities are expected. With implementation of Army SOPs, impacts are expected to continue to be less than significant and no additional mitigation would be required.

5.5.15.2.4 Impacts from Maneuver Training

Less Than Significant Impacts

Use of maneuver training areas would continue at current levels. Ongoing use of maneuver training areas would continue to degrade these facilities. However, with continued implementation of regulatory and administrative mitigation such as ITAM, INRMPs, ecosystem management, and the sustainable range management program, impacts to facilities are expected to be less than significant.

5.5.15.3 Colorado

5.5.15.3.1 Impacts from Cantonment Construction

Less Than Significant Impacts

The current number of Soldiers stationed and training at FTC and PCMS would remain the same. However, some additional cantonment facilities would be constructed to meet the needs of the unaccompanied Soldiers that are currently housed off post. This construction would result in a some new facilities and a slight increase in demand for public services and utilities at FTC. The number of additional personnel would represent slight increase compared to the existing on-post population. Consequently, the impacts to energy demand are expected to be less than significant.

5.5.15.3.2 Impacts from Range Construction

No Impacts

No range construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, no impacts to facilities or the demand for utilities or public services would be anticipated from range construction.

5.5.15.3.3 Impacts from Live-fire Training

Less Than Significant Impacts

The number of required live-fire user days per year at FTC would occur near current levels. Therefore, no changes are expected in the amounts of ammunition that would be used or in the generation of UXO and lead contamination on training ranges. No changes in the demand for public services or utilities are expected. With implementation of Army SOPs, impacts are expected to continue to be less than significant and no additional mitigation would be required. No live-fire training occurs at PCMS. Therefore, no impacts would occur at PCMS for live-fire training.

5.5.15.3.4 Impacts from Maneuver Training

Less Than Significant Impacts

Use of maneuver training areas would continue at current levels at both FTC and PCMS. Ongoing use of maneuver training areas would continue to degrade these facilities. However, with continued

implementation of regulatory and administrative mitigation such as ITAM, INRMPs, ecosystem management, and the sustainable range management program, impacts to facilities are expected to be less than significant.

5.5.16 SUBSISTENCE

Table 5-67 lists the potential impacts to public access and subsistence resources associated with implementation of Alternative D. Under the No Action Alternative, the 2/25th SBCT would not be stationed at any of the alternative locations, and therefore no SBCT-specific impacts to public access or subsistence resources would occur. Impacts are summarized in the following subsections for each location.

5.5.16.1 Alaska

5.5.16.1.1 Impacts from Cantonment Construction

No Impacts

No cantonment construction is proposed at this time. However, some construction may occur on an as needed basis in the future. Furthermore, no additional Soldiers would be stationed at the base. Therefore, cantonment construction would have no impacts on access closures or subsistence resources.

Table 5-67 Summary of Potential Impacts to Subsistence from Alternative D

Activity Group	Location							
	Hawaii				Alaska		Colorado	
	SBMR	DMR	KTA/ KLOA	PTA	FRA	DTA	FTC	PCMS
Impacts from Cantonment Construction	N/A	N/A	N/A	N/A	○	N/A	N/A	N/A
Impacts from Range Construction	N/A	N/A	N/A	N/A	○	○	N/A	N/A
Impacts from Live-Fire Training	N/A	N/A	N/A	N/A	⊙	⊙	N/A	N/A
Impacts from Maneuver Training	N/A	N/A	N/A	N/A	⊙	⊙	N/A	N/A

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

5.5.16.1.2 Impacts from Range Construction

No Impacts

Under this alternative, no construction of new ranges would occur. Therefore, range construction would have no impacts on access closures or on subsistence resources.

5.5.16.1.3 Impacts from Live-fire Training

Less Than Significant Impacts

Range use would continue at current levels on each range type. Therefore, no changes are expected in the frequency and intensity of range use, the amounts of ammunition that would be used, or in the generation of UXO and lead contamination on training ranges. Continued use of the live-fire training areas would have less than significant impacts on access closures or on subsistence resources.

5.5.16.1.4 Impacts from Maneuver Training

Less Than Significant Impacts

Use of maneuver training areas would continue at current levels. Ongoing use of maneuver training areas would continue to affect access closures or on subsistence resources. However, with continued implementation of regulatory and administrative mitigation such as ITAM, INRMPs, ecosystem management, and the sustainable range management program, species of plants and wildlife that are of interest for subsistence would continue to be available. Consequently, impacts to subsistence are expected to be less than significant.

5.6 CUMULATIVE IMPACTS

The cumulative impact analyses for the various alternatives focus on impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. **Table 5-68** below summarizes and compares the cumulative impacts that are anticipated for each VEC under each alternative.

5.6.1 ALTERNATIVE A — HAWAII

The cumulative impact analysis for Alternative A focuses on impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Past and present actions are accounted for in the description of the affected environment for each resource. Past actions include the cantonment and range projects identified in the 2004 EIS that have already been completed. Reasonably foreseeable future actions for Hawaii vary by island. About 40 reasonably foreseeable future actions were identified for the island of Oahu and about 11 were identified for the island of Hawai. Some of these actions are ongoing projects that would continue into the future, whereas others would be discrete projects that would be conducted in the reasonably foreseeable future.

Table 5-68 Summary of Cumulative Impacts to Each VEC for Each Alternative

VEC	Alternative			
	A – Hawaii	B- Alaska	C – Colorado	D – No Action
Soil Erosion	⊘	⊘	⊘	○
Water Resources	⊘	⊘	⊘	○
Wildfire Management	⊗	⊘	⊘	○
Cultural Resources	⊗	⊘	⊘	○
Land Use and Recreation	⊗	⊙	⊙	○
Traffic and Transport	⊙	⊙	⊙	○
Socioeconomics	⊘	⊙	⊙	○
Hazardous Materials and Hazardous Waste	⊙	⊘	⊙	○
Wetlands	○	⊘	○	○
Vegetation	⊙	⊙	⊘	○
Noxious Weeds	⊗	○	⊘	○
Threatened and Endangered Species	⊗	⊙	⊘	○
General Wildlife and Habitat	⊙	⊙	⊘	○
Air Quality	⊙	⊙	⊘	○
Noise	⊙	⊘	⊙	○
Airspace	○	⊙	○	○
Energy	⊙	⊙	⊙	○
Facilities	⊙	⊙	⊙	○
Subsistence	N/A	⊙	N/A	○

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than Significant
○ = No Impact
\+ = Beneficial Impact
N/A = Not Applicable

Reasonably foreseeable future actions for the Island of Oahu include:

Military

- Golf Course at Fort Shafter
- Expand Physical Fitness Center
- Funston Road roundabout
- Construct new Ft. Shafter chapel
- Macomb roundabout
- New Brigade Complex, PH I and II
- Parking structure Quad F7
- AAFES shopping center 6
- Central wash facility

- Combat Support Brigade
- Whole Barracks Renewal Program
- Soldier and Family Readiness Center
- Construction of Child Development Center
- Gate Alignments
- Army Facility Strategy Program
- Prescribed Burns at Army Installations in Hawaii
- Makua Implementation Plan
- Live-Fire Training
- Residential Communities Initiative
- Integrated Training Area Management (ITAM)
- 25th ID(L) and USAG-HI Revitalization Program
- Implementation of the Integrated Natural
- Resources Management Plan (INRMP)
- Implementation of the Integrated Cultural Resource Management Plan (ICRMP)
- Implementation of Proposed Range and Training Land Program Development Plan actions
- Drum Road Upgrade
- Road Construction, SBMR to HMR
- Air Force Housing Privatization Program

Non-military

- Residential Development at Koa Ridge between Pearl City and Mililani
- Central Oahu Sustainable Communities Plan
- Construction of Navy facility at NCTAMS/Kunia Tunnel
- North-South Road
- Farrington Highway Improvement
- Renton Road Improvements (ewa Town)
- Residential Development – up to 900 new homes at Ocean Point
- Kapolei Parkway
- Waianae Sustainable Communities Plan
- Waianae Coast Emergency Alternate Route
- North-South Road
- Kamehameha Hwy, Replacement of South Kahana Stream Bridge
- 2121 Kuhio Avenue Condominium/Timeshare Development

- Oahu Arts Center
- Hawaii Superferry

Reasonably foreseeable future actions for the Island of Hawaii include:

Military

- Kawaihae Deep Draft Harbor
- TSV Pier Use
- Theater Support Vessel (TSV)

Non-military

- Saddle Road Realignment
- Kawaihae/Waimea Road
- New Highway
- Waimea to Kawaihae
- UXO Cleanup
- Former Waikoloa Maneuver Area and Nansay Sites
- PanSTARRS Project
- Outrigger Telescopes Project
- Light Rail Transit Project

The following sections describe the cumulative impacts to each resource that would be expected to result if Alternative A were implemented.

5.6.1.1 Geology, Soils, and Seismicity

Alternative A is likely to contribute to cumulative impacts from soil erosion. The major influence on soil erosion in the area is the disturbance of soils; modification of slopes and drainage features; and loss or disturbance of vegetation due to agricultural conversion, military activities, fires, roads, modification of slopes and drainage features, and other development. While soil erosion and deposition is a naturally occurring phenomenon in any landscape, adverse impacts may occur when erosion rates are accelerated by human or natural disturbances.

Activities that disturb or remove vegetative cover are presently occurring or would occur in the reasonably foreseeable future, which would continue to result in greater soil erosion and loss than without these activities. Areas with well-developed (deep) soils have the potential to be revegetated and stabilized; however, areas with newly formed soils or shallow soil profiles may not be able to recover from soil erosion or soil loss impacts. In areas of the PTA where soils can be thin and fragile, the effects of soil loss may be irreversible. Maintaining a persistent vegetative cover in areas of intensive use or development would not be possible because of the nature of the proposed use.

In light of past, ongoing, and reasonably foreseeable future actions, the cumulative soil erosion impacts associated with the Alternative A could be locally substantial. However, at the regional level, the effects

are not expected to be substantial compared to natural rates of erosion because of the implementation of BMPs as required by federal and state regulations.

Seismic or volcanic eruption hazards could result in cumulative effects if, for example, evacuation of personnel or treatment of casualties were to overwhelm the capacity of the available infrastructure. The most likely site for severe seismic or volcanic impacts to occur is at PTA, where the seismic and volcanic hazards are greatest. However, the Army is expected to have internal capacity to evacuate its personnel and to support civilian emergency response efforts in a seismic or volcanic emergency.

No other cumulative geologic impacts are expected from Alternative A.

5.6.1.2 Water Resources

For Alternative A, cumulative impacts to water resources could occur where Alternative A would be implemented, within the watershed downstream of the installation boundaries (for surface water impacts), or the aquifer(s) downgradient of the installation boundaries (for groundwater impacts).

Nonpoint source pollution is recognized as one of the principal causes of degradation of surface water quality. Enforcing stormwater management regulations would help reduce pollutant loading to surface waters by requiring industrial facilities, municipalities, and military and other facilities to implement stormwater management practices to reduce their individual nonpoint source contributions of pollutants. Any contribution to pollutant loading from a source in the watershed of an impaired water body, if it is greater than natural background levels, can be regarded as substantive. However, with the implementation of required Regulatory and Administrative mitigation measures the Army concludes that the impacts on surface water quality from nonpoint source pollutants would be significant but mitigable to less than significant level.

There would potentially be less than significant to significant but mitigable long-term cumulative impacts on surface water quality from suspended sediment resulting from training activities. Trace levels of explosives residues could be transported by runoff from training ranges to streams. However, the trace concentrations that have been found to be present in soils and that may be transported by runoff into stream waters are not expected to be much greater relative to background concentrations of natural organic compounds. Also, with the implementation of required BMPs for Alternative A under the Clean Water Act, and the other potentially cumulative actions, the Army concludes that the cumulative impacts on surface water quality from contaminated sediment suspension would be significant but mitigable to less than significant.

The soil loss from Alternative A would not be expected to add substantially to the overall trend of sedimentation resulting from erosion. All construction projects that involve disturbance of more than 1 acre of land would be required to comply with stringent stormwater pollution prevention requirements. The implementation of these BMPs would also minimize the effects of chemical contaminant loading could also contribute to cumulative impacts on stream water quality. These measures would collectively be expected to mitigate potential watershed impairment impacts to less than significant levels.

Alternative A is not expected to contribute greatly to a cumulative increase in the potential for flooding. Impacts from construction projects are not expected to decrease appreciably the amount of stormwater runoff retained by soils in the high-intensity short-duration storms that cause most flooding in Hawaiian watersheds.

The Army continues to address potential groundwater contaminants resulting from past practices through its Installation Restoration Program. Infiltrating surface water containing nonpoint source pollutants is not

likely to have a great impact on groundwater quality because the pollutants are typically highly dilute and tend to be adsorbed or biodegraded during infiltration through soils. Spills and other accidental releases may occur from time to time and could have greater local impacts on groundwater quality. Standard operating procedures are in place to reduce the potential and impacts of accidental spills and releases.

Alternative A would increase the number of Army personnel and their families and this would increase water demand. In addition, operating certain proposed new facilities, such as the vehicle wash facilities, would increase water use. These increases are not expected to be significant with respect to the overall demand for water in the hydrologic units in which the Alternative A would occur.

5.6.1.3 Wildfire Management

There would be a cumulative increase in the potential for fire on Oahu and the island of Hawaii as a result of the proposed action. The cumulative projects are expected to contain mitigation measures and SOPs to minimize potential environmental impacts involving wildfires similar to those applied to Alternative A. Roadway improvement projects would be required to adhere to Hawaii Department of Transportation safety requirements to protect the public and environment. Other construction projects on the installations could involve activities and materials capable of starting a wildfire, and therefore, Army BMPs and SOPs would be required to reduce the potential for starting a wildfire. The Army has developed an IWFMP for all installations on the Islands of Oahu and Hawaii to prevent and control fires. The standard operating procedures within the IWFMP will reduce the potential impacts involving wildfires. However, since there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species or known or unknown cultural resources, the Army has made a conservative determination that although the mitigation will considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level. In light of historic, ongoing, and reasonably foreseeable future actions, the cumulative impacts involving wildfires are expected to be significant.

5.6.1.4 Cultural Resources

There would be cumulative impacts on cultural resources from planned and reasonably foreseeable future projects and from the construction and training associated with Alternative A. Public concerns include access to traditional areas and the potential destruction of cultural sites and landscapes from training. Historically residential, commercial, and military development throughout the state has destroyed or damaged many cultural resource sites.

Military construction projects at SBMR, WAAF, and HAFB could result in cumulative impacts to cultural resources including NRHP-eligible historic buildings, on military installations in Oahu. Local highway projects and bridge replacements could damage archaeological resources along the road alignments.

Construction projects on the Island of Hawaii could also result in cumulative impacts on cultural resources. Public comments indicate that there are significant Native Hawaiian resources in the area around Kawaihae Harbor, including an underwater heiau. The harbor deepening and the new highway from Waimea to Kawaihae Harbor could affect these resources

Current practices under the PA include restriction of access to facilities and training areas and measures for avoidance, monitoring, and mitigation of eligible historic resources. There is also ongoing consultation with Native Hawaiian groups to avoid disturbance to PRTCSs and assure authorized access to sacred areas. No non-military undertakings are anticipated in these controlled areas. Implementation of the ICRMP is beneficial to cultural resources because of the programs for identification, evaluation, and management of cultural resources. Even with the PA, there would be cumulative impacts on cultural

resources on both Oahu and Hawaii because archaeological sites, TCPs, and historic buildings would be damaged or destroyed by these projects. Although specific actions proposed under SBCT can be mitigated on a case-by-case basis, the overall effect of increased training, reduced access, and continued development throughout Oahu and Hawaii would be expected to be significant.

5.6.1.5 Land Use and Recreation

Individually, Alternative A would in significant impacts on existing land uses or recreational lands. Ongoing loss of agricultural land would continue because of regional development in the State of Hawaii. Land easement for the Dillingham Trail under Alternative A, in combination with other ongoing land acquisition projects, would contribute to a statewide decline in farmland. Individually, the proposed action would not result in significant impacts on the conversion of agricultural land. However, in the State of Hawaii, there is an ongoing loss of agricultural land due to development. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the cumulative impacts would be significant.

5.6.1.6 Traffic and Transport

Individually, Alternative A would not increase the volume of military traffic on the state and county road systems because the number of new personnel is consistent with historic trends, and much of the traffic would use military vehicle trails rather than public roadways. Traffic impacts associated with the military vehicle trail crossings of public roadways would be minimal because the convoy traffic yielding to public traffic and traffic-related impacts associated with construction would be minimal. Traffic along the roadways in the area is expected to increase because of the projected population growth and development on both Oahu and Hawaii; however, Alternative A would not result in significant cumulative impacts on traffic.

5.6.1.7 Socioeconomics, Environmental Justice, and Protection of Children

Under Alternative A, long-term direct and indirect beneficial cumulative effects are expected because of increased sales volume and employment in the area. Additional increases in sales, employment, and income could also occur from other foreseeable actions. The beneficial economic effects (i.e., increased spending, employment, and income) of these actions are expected to last for the duration of the projects, but they could extend beyond that.

The increase in population from Alternative A would increase the population within the region by less than 1 percent and other known actions are not expected to increase population. Collectively, the cumulative actions would not substantially alter the current and projected trends for population, employment, income, or housing. However, cumulative impacts would be significant but mitigable to less than significant for the economy (business sales volume) and schools.

There would be no disproportionate impacts on low-income or minority populations expected. No adverse cumulative effects to the health and safety of children would be expected. To minimize potential safety risks, strict adherence to applicable safety regulations and procedures would continue. Construction and training activities under Alternative A would, for the most part, take place in areas that are off limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards.

5.6.1.8 Hazardous Materials and Hazardous Waste

Under implementation of Alternative A, the primary cumulative impacts to human health and safety would be those associated with ammunition and UXO. During construction activities, significant impacts

may arise from excavation or exposure of UXO or IRP sites, or from pesticides during the aerial broadcast spraying of range areas. With proper abatement procedures and conformance with existing regulations, these impacts would be less than significant. All other issues are considered less than significant, would have no impacts, or the potential impacts would be handled or addressed in accordance with existing BMPs and SOPs, thus introducing no new impacts on the public or environment. Under Alternative A, cumulative impacts associated with hazardous materials and wastes could be significant, but impacts to human health and safety are expected to be less than significant with implementation of the proposed mitigation.

5.6.1.9 Biological Resources

Some of the projects identified as contributing to cumulative impacts would impact biological resources. The cumulative projects are expected to contain mitigation measures and SOPs to minimize potential biological impacts. The cumulative impacts involving wetlands, general vegetation, wildlife, and habitat are expected to be less than significant. Cumulative impacts from noxious weeds and to threatened and endangered species are expected to be significant.

There would be no cumulative impacts to wetlands under Alternative A.

The cumulative impacts on vegetation would be less than significant. Habitat in the area is, for the most part, disturbed natural and introduced landscapes. Activities limited to this area would mostly affect nonnative species adapted to stressed or nonnative environments. Other projects would have detrimental affects on vegetation in their vicinity, and consequently on the species that have been supported by these habitats.

There would be a cumulative increase in the number of nonnative species because of the Alternative A and the cumulative projects. Construction and increased use of roads would introduce additional nonnative species and further spread those that already occur on Oahu and the Island of Hawaii. The disturbance caused by construction and demolition and the increased use of improved roads would leave the surrounding habitats vulnerable to nonnative species that can thrive in conditions where native species cannot. Mitigation and conservation measures associated with the Army's proposed actions would limit the spread of nonnative species by washing construction and military vehicles and incoming equipment into Oahu and the island of Hawaii. However, the overall cumulative impact from the spread of non-native species from other proposed projects in the area could be significant.

Alternative A is likely to contribute to cumulative effects to threatened, endangered, and special status species from habitat loss, erosion and runoff, fire, and introduction of non-native species. The cumulative effect on sensitive species that would result from project-related habitat loss and degradation would be significant. Development of land throughout the state continues to degrade special status species, but habitats throughout the state continue to support common and sensitive species of plants and wildlife. A spread of invasive plants could cause landscape changes and thereby modify habitats important to sensitive species.

The Kawaihae Harbor deepening project would temporarily degrade the quality of the water in the harbor and diminish its value to aquatic species, including protected marine mammals. Soil erosion is likely to have a minor cumulative effect on coral ecosystems and other critical habitat. The cumulative noise and visual effects on marine wildlife would be minor. The relatively sparse distribution of marine mammals in the portion of the area that abuts the coastline and the seasonality of many species in the project area combine to make the probability of substantive effects on marine mammals extremely low and not adverse. This project is not expected to result in a significant cumulative effect on marine wildlife.

The cumulative impacts on general habitat and wildlife would be less than significant. Noise levels are not expected to increase to such a degree that it would be harmful to terrestrial wildlife. General vegetation and wildlife would be disturbed by vegetation removal. Habitat within the area is, for the most part, disturbed natural and introduced landscapes. Other projects would have detrimental affects on habitat in their vicinity, and consequently on the species that have been supported by these habitats. This project is expected to result in less than significant cumulative impacts on general wildlife and habitat.

5.6.1.10 Air Quality

Construction equipment, motor vehicle traffic, and aircraft flight activity are important sources of ozone precursor emissions. From a cumulative perspective, Alternative A would do little to alter overall vehicle traffic or air traffic activity on Oahu or Hawaii. However, the identified cumulative projects include several construction projects that would at least partially overlap the timeframe of construction projects identified for Alternative A. Federal ozone standards have not been exceeded in Hawaii during the past decade, despite the cumulative emissions from highway traffic, commercial and military aircraft operations, commercial and industrial facility operations, agricultural operations, and construction projects in both urban and rural areas. Given historical air quality conditions, the cumulative effect of emissions associated with Alternative A, in combination with other construction projects and the continuing emissions from highway traffic and other sources, is not expected to violate any state or federal ozone standards. The cumulative air quality effects on ozone or other secondary pollutants would be less than significant under Alternative A.

Fugitive dust sources and wildfires are the major contributors to PM_{10} emissions. Fugitive dust sources include construction activity, vehicle traffic on unpaved roads or off-road areas, and wind erosion from areas with exposed soils. As discussed above, the identified projects that would at least partially overlap the timeframe of construction projects identified for Alternative A. However, spatial separation among these various construction projects would minimize or eliminate cumulative PM_{10} effects from those projects with overlapping construction timeframes. The cumulative air quality effects from primary air pollutants, such as PM_{10}, would be less than significant under Alternative A.

5.6.1.11 Noise

The steady development in the state has continued to contribute to noise. Urban and military development and operations produce major noise from vehicles, aircraft, military training, and construction activities. Noise conditions near proposed activities associated with Alternative A are not likely to have substantively changed in recent years because activity levels for major noise sources have not grown or declined substantively.

Noise effects are inherently localized because sound levels decrease relatively quickly with increasing distance from the source. Cumulative noise effects would occur when multiple projects affect the same geographic areas simultaneously or when sequential projects extend the duration of noise effects on a given area over a longer period of time.

Cumulative noise effects under Alternative A would stem primarily from temporary construction activities and military training. Private development construction projects, highway improvement projects, and military construction projects at sites other than USARHAW installations would not produce cumulative noise effects under Alternative A due to distance or differences in construction timing. The cumulative noise effects under Alternative A would be less than significant.

5.6.1.12 Airspace Resources

No cumulative effects would occur to airspace resources under this alternative. None of the reasonably foreseeable future actions identified for Hawaii would directly or indirectly affect airspace resources. Therefore, Alternative A's direct and indirect impacts to airspace resources would not overlap those of the reasonably foreseeable future actions in time or space. Without any overlap of impacts, cumulative effects would not occur.

5.6.1.13 Energy

Individually, Alternative A is expected to result in less than significant impacts to the energy. A number of other projects would contribute cumulative impacts in or near the range and cantonment projects, as well as live-fire and maneuver training, would proceed as needed at the Army installations. Impacts to energy use and costs could be significant but continued implementation of energy conservation measures would reduce these impacts to less than significant. Cumulative impacts to energy for Alternative A would also be less than significant.

5.6.1.14 Facilities

Individually, Alternative A is expected to result in less than significant impacts to the facilities in Hawaii. A number of other projects would contribute cumulative impacts in or near the range and cantonment projects, as well as live-fire and maneuver training, and would proceed as needed at the Army installations. Cumulative impacts to facilities for Alternative A would be less than significant.

5.6.2 ALTERNATIVE B – ALASKA

The cumulative impact analysis for Alternative B focuses on impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Past and present actions are accounted for in the description of the affected environment for each resource. Reasonably foreseeable future actions for Alaska vary between the Anchorage area in south-central Alaska (FRA) and interior Alaska (DTA).

In south-central Alaska, about 10 reasonably foreseeable future actions were identified for the FRA area. They include management of Nike Site Summit, USARAK Mission-Essential Projects, other military projects:

- Cantonment Area Projects at Fort Richardson
- Rapid Deployment Facility
- Ammunition Supply Point Upgrade
- Whole Barracks Renewal
- Range Upgrade and Expansion Projects at Fort Richardson
- Mission Operations on Urbanized Terrain (MOUT)
- Sniper Range
- Multi-purpose Training Range
- Fence Project

- U.S. Air Force (Elmendorf AFB) - 13,130 acres to the west of FRA and north of the Municipality of Anchorage.
- Knik Arm Bridge

A variety of reasonably foreseeable future actions were also identified for the interior Alaska — DTA area. They include USARAK Mission-Essential Projects:

- Range Upgrade and Expansion at Donnelly Training Area
- Collective Training Range
- Cold Regions Test Center Automotive Test Complex
- Space and Missile Defense System
- U.S. Air Force (Eielson AFB)

In addition, a number of other future military projects were identified, including:

- ITAM Projects
- Range Operations Center
- C-17 Landing Strip
- Direct Fire Range
- USAF Training – Airspace

Other future non-military activities and projects were also identified:

- Community Development at Delta Junction & Big Delta
- Alaska Railroad Expansion – 35 acres
- Tanana River Bridge
- Natural Gas Pipeline
- Richardson Highway Upgrade
- Richardson & Alaska Highways
- Delta Agricultural Project
- Multiple use land management under the Tanana Valley Management Plan
- Subsistence on public and private lands
- Recreation on public and private lands

Some of these actions are ongoing projects that would continue into the future, while others would be discrete projects that would be conducted in the reasonably foreseeable future. The following sections describe the cumulative impacts to each environmental resource that would be expected to result if Alternative B were implemented.

5.6.2.1 Geology, Soils, and Seismicity

Alternative B is likely to contribute to cumulative impacts from soil erosion near Delta Junction and Fort Greeley, which includes Delta Junction, Big Delta, Fort Greeley, DTA, GRTA, and the BRTAs. The major historic influences on soil erosion in the area include the disturbance of soils, modification of slopes and drainage features, and loss or disturbance of vegetation due to agricultural conversion, military activities, fires, roads, modification of slopes and drainage features, and other development. The recent trend for soil erosion and/or loss has been improved in recent years by better management of disturbed lands and application of BMPs. However, activities that disturb or remove vegetative cover are presently occurring or will occur in the reasonably foreseeable future, which will continue to result in greater soil erosion and loss than without these activities. Use of the training ranges is likely to result in continued enhanced wind soil erosion, as well as compaction, rutting, and damage to permafrost in some areas. These effects are expected to be locally significant. However, at the regional level, the effects are not expected to be significant compared to natural rates of erosion and the cumulative impacts caused by other activities in the region.

Soil resources in interior Alaska are likely to be impacted from other military activities associated with Fort Greeley DTA, GRTA, and the BRTAs, including USARAK, U.S. Air Force, Cold Regions Test Center Automotive Test Complex, and the Space and Missile Defense System. These activities have the potential contribute to increased soil erosion, compaction, and rutting, as well as damage to permafrost. USARAK mission-essential range improvement and upgrade projects could cause negative impacts to soils at DTA (USARAK 2004). Current USARAK maneuver training has involved stream crossings on, DTA (USARAK 2004). DTA training has occurred in winter, which prevents direct sedimentation impacts due to streambed disturbance. However, erosion at the crossing points may lead to soil erosion and subsequent sedimentation through runoff, as well as damage to permafrost. In addition, weapons training involving explosive munitions may also have had impacts to soils through ordnance impact and residual chemical contamination (USARAK 2004). Most other planned military projects will occur on already disturbed areas, such as the cantonment area or impact areas. These projects are sufficiently separated (in time and location) from transformation activities to prevent additive or synergistic impacts to soil. The Cold Regions Test Center Automotive Test Complex would be designed to avoid impacts to Jarvis Creek and its floodplain (Stout 2003). Deployment of the Space and Missile Defense System at Fort Greely could result in cumulative impacts to soil resources.

Infrastructure projects, including the Alaska, Richardson, and Parks Highways and the Trans-Alaska Pipeline System and Northern Intertie project, could contribute to surface runoff and subsequent soil erosion and sedimentation. Future permafrost melting from road construction and use is expected in the region. Impacts would be localized and not result in synergistic regional effects. Future natural gas pipeline construction would disturb area soil and permafrost. Other gas and oil exploration projects would also negatively impact soil resources. Additionally, some resource extraction, such as timber harvesting and mining, can also contribute to increased soil erosion and subsequent sedimentation. The TAPS, Knox, True North, and Pogo gold mines all have an increased potential to disturb local surface soils. These impacts are generally short-term.

Community development can also affect soil resources. Community growth in the Delta Junction and Big Delta areas could lead to increased overland water runoff soil erosion and subsequent sedimentation from areas downflow of the impervious surfaces. These impacts are considered long-term due to the ongoing nature of such impacts. Use of ORVs has impacted area soils and permafrost in the form of erosion and rutting.

Seismic or volcanic eruption hazards could result in cumulative effects if, for example, evacuation of personnel or treatment of casualties were to overwhelm the capacity of the available infrastructure. The

most likely site for severe seismic or volcanic impacts to occur is at FRA, where the seismic and volcanic hazards are greatest. However, the Army is expected to have internal capacity to evacuate its personnel and to support civilian emergency response efforts in a seismic or volcanic emergency. Alternative B would not cause significant cumulative impacts regarding seismic and volcanic hazards.

No other cumulative geologic or soils impacts are expected from Alternative B. Overall, cumulative impacts to soils and geologic resources associated with Alternative B would be expected to be significant but mitigable to less than significant.

5.6.2.2 Water Resources

USARAK maneuver training has involved stream crossings on Yukon Training Area (YTA), DTA, and TFTA (USARAK 1979a, b). TFTA training has occurred in winter, which prevents direct sedimentation impacts due to streambed disturbance. However, erosion at the crossing points may have led to sedimentation through runoff. In addition, weapons training involving explosive munitions may also have had impacts to surface water quality. However, water quality tests have shown no detectable quantities of munitions constituents in recent studies. This indicates that any impacts would be ephemeral at the point and time of impact. Localized contamination from inadvertent chemical releases, such as petroleums, organics, and lubricants, may also have occurred (USARAK 1979a).

Past impacts to groundwater on Army lands have occurred due to weapons training (USARAK 1979a, b). Explosive munitions training on the TFTA and YTA impact areas has led to the presence of unexploded ordnance on USARAK impact areas. Chemical constituents from unexploded ordnance have the potential to leach through the soil into the aquifer, thereby affecting groundwater quality. However, studies (Houston 2002; Ferrick et al. 2001) indicate that ambient conditions sharply curtail the probability of groundwater contamination from munitions constituents.

Water resources in interior Alaska are likely to be impacted from military activities including those conducted by USARAK, U.S. Air Force, Cold Regions Test Center Automotive Test Complex, and the Space and Missile Defense System. These activities have the potential to alter surface water quality. The Cold Regions Test Center Automotive Test Complex would be designed to avoid impacts to Jarvis Creek and its floodplain (Stout 2003b). In addition, some resource extraction, such as timber harvesting and mining, can alter surface flow or increase sedimentation. These impacts are generally short-term.

Construction by any of these can alter groundwater recharge regimes, and such impacts are local and long-term. In addition, disturbance and loss of permafrost can also alter local groundwater flow by increasing connectivity to lower groundwater sources. Military activities also have the potential to affect groundwater quality through munitions practice. These impacts can be long-term. The development and use of the Cold Regions Test Center Automotive Test Complex would not impact groundwater quality, although two wells (approximately 400 feet deep each) would be drilled.

Infrastructure projects, including the Alaska, Richardson, and Parks Highways and the Northern Intertie project, can affect surface flow by channelizing flow patterns or altering surface runoff rates by installing impermeable surfaces such as roadway. They can affect groundwater flow long-term by altering permafrost or altering surface recharge rates.

Oil and gas exploration, extraction, transport, and mining and timber activities also have long and short-term impacts to groundwater resources. The TAPS and Pogo gold mines both have an increased potential to affect local surface and groundwater quality and can alter groundwater flow and recharge. Some management practices do improve surface waters, such as managing for fish and game, or for public recreation.

Overall, cumulative impacts to water resources associated with Alternative B would be expected to be significant but mitigable to less than significant.

5.6.2.3 Wildfire Management

Some of the projects contributing to cumulative impacts would occur in or adjacent to areas where wildland fires could occur. Like Alternative B, the cumulative military projects are expected to contain mitigation measures to minimize potential environmental impacts involving wildfires. The importance of fire for the Alaskan interior ecosystems is recognized but military fires are usually quickly controlled. The FRA Fire Department provides the initial response for wildfire suppression, which has traditionally been confined to areas behind the small arms complex. Cumulative fire management impacts to the region would mainly result from the addition of new firing ranges, and expansion of existing or development of new maneuver areas, and population growth in the forested areas bordering installations.

There will be some negative additive wildfire impacts expected from the USARAK mission-essential projects planned at FRA (Stout 2002c). The multi-purpose training range, infantry squad battle course, infantry platoon battle course locations were all assessed as wildfire risks. USARAK mission-essential construction, including the multi-purpose training range and infantry squad battle course, are planned for FWA. They would be located between Main Post and the Tanana River. These ranges are described as having risk due to the availability of fuels and past fire behavior (Stout 2002a). The ranges are expected to represent an additive cumulative impact to fire management in the area. In June 2006, the Final Environmental Impact Statement was released for the BAX/CACTF (USARAK 2006). The selected location for the BAX and CACTF facilities was the Eddy Drop Zone in DTA. The 1st SBCT currently stationed at FWA will train at the DTA BAX and CACFT once they are operational. The 2/25th SBCT would not train at the DTA BAX and CACFT, but would conduct maneuver training at DTA, thereby contributing to the cumulative increased risk of accidental ignitions at DTA.

Overall, stationing the 2/25th SBCT at FRA would contribute significantly to cumulative wildfire risk to the region. High-risk areas would be treated to reduce the spread of fire, and training would follow established training protocols, or those created specifically for the 2/25th SBCT. These measures would reduce the overall cumulative impact to wildfire risk to less than significant.

5.6.2.4 Cultural Resources

Military and non-military activities can affect cultural resources in a number of ways. The nature of cultural resources makes any impact potentially irreversible or irretrievable. Because cultural interactions with the landscape are regional in scope, cumulative impacts to cultural resources are also regional.

Past activities on USARAK lands, such as range construction and modification, creation of roads and trails, and maneuver training, have impacted cultural resources. Current and future military activities and projects, such as training activities and construction, would also impact cultural resources. Activities outside DTA, such as oil and natural gas exploration and extraction, development of transportation and communication corridors, timber harvesting and mining, and the growth and development of communities, would cumulatively impact the regional cultural resource base.

Past military activities, such as range construction and modification, creation of roads and trails, and maneuver training on Fort Richardson, have also impacted an unknown number of cultural resources. However, given the low number of prehistoric sites found on Fort Richardson, this impact has probably been minor. Unsympathetic uses of the buildings and structures that make up either the unlisted eligible historic district that encompasses part of the Fort Richardson cantonment area, or the Nike Site Summit historic property, including modification or demolition of relevant structures, would also have impacted

the integrity of the landmark. Similarly, present and future actions would have an impact on archaeological sites, but may also involve modification or destruction of eligible historic buildings and structures. Cultural resources in the region have been and will continue to be impacted by highway and railroad construction, oil, gas, and mining exploration, and real estate development outside Fort Richardson. Growth and development of Anchorage and smaller communities in the region also impact the region's cultural resources.

Management of cultural resources on DTA and Fort Richardson under their respective ICRMPs can mitigate the contribution to cumulative impacts by implementation of Alternative B through the identification, evaluation, and management of cultural resources. The protection of sites that can be avoided and data recovery on those that cannot be avoided would effectively mitigate potential cultural resource impacts so that cumulative impacts associated with Alternative B would be expected to be significant but mitigable to less than significant.

5.6.2.5 Land Use and Recreation

Individually, Alternative B would result in less than significant impacts to existing land uses, public access, or recreation. However, continued population growth and development in the region are expected to create more pressure on existing land use and recreation over time.

Past, ongoing, and planned military activities would continue to impact public access and recreation or subsistence activities on USARAK lands. Past military activities have impacted public access for recreation or subsistence activities because of permanent and temporary closures of some areas of USARAK lands. Construction of roads and trails on Army properties has resulted in beneficial impacts to public access by increasing the amount of Army lands feasibly accessible for recreational purposes.

Ongoing USARAK activities, including training and range construction and expansion, are expected to continue to impact public access and recreation activities. Military training requires access closures to ensure training viability and public safety. Impact areas must remain permanently off-limits to public access. For live-fire ranges, SDZs are closed for up to 280 days per year, which would be a significant impact to public access. Because alternate areas on USARAK lands would still be available for public access, cumulative impacts would be less than significant.

A variety of capital improvement projects is planned or currently underway within the FRA cantonment area. In addition, future range construction and improvement projects are planned on USARAK lands. Other military activities may also impact land use, public access, and recreation activities in the area.

Ongoing and planned nonmilitary activities would also contribute to cumulative impacts on USARAK lands. Ecosystem-level inventory and planning would promote long-term sustainability of public access and recreation or subsistence opportunities within Alaska. Cumulative impacts to land use and recreation resources under Alternative B are expected to be less than significant.

5.6.2.6 Traffic and Transport

Individually, Alternative B would result in less than significant impacts to traffic and transport in the area. A variety of capital improvement projects is planned or currently underway on installation cantonment areas. In addition, future range construction and improvement projects are planned on USARAK lands. Other military activities may also impact traffic and transportation resources in the area. However, because of the wide distribution of the potential cumulative activities over time and space, cumulative impacts to traffic and transport resources are expected to be less than significant for Alternative B.

5.6.2.7 Socioeconomics, Environmental Justice, and Protection of Children

Individually, Alternative B would result in less than significant and mostly beneficial impacts to socioeconomic resources, environmental justice, and protection of children. Continued socioeconomic impacts are expected in the areas surrounding USARAK posts as the result of projected population growth and development. Ongoing USARAK activities, including training and range construction and expansion, are expected to continue to impact socioeconomic resources. A variety of capital improvement projects is planned or currently underway on installation cantonment areas. In addition, future range construction and improvement projects are planned on USARAK lands. Under implementation of Alternative B, cumulative impacts to population, employment, income, housing, and schools are expected to be less than significant.

Individually, Alternative B would have no disproportionate impacts to minority or low-income populations or the health and safety of children. Ongoing mission-essential USARAK activities such as construction of ranges and structures, as well as continued use of training lands, may result in impacts to some low-income populations by affecting access to subsistence activities. Steady population growth in the Anchorage and Fairbanks areas may increase the level of recreational hunting and fishing activities, thereby putting pressure on low-income populations dependent on subsistence. With implementation of Alternative B, cumulative impacts to low-income populations would be less than significant and would not be expected to cause significant impacts to subsistence activities. Existing and proposed USARAK mitigation measures as previously described would help minimize any disproportionate effects under this alternative.

No construction projects or training exercises would take place near schools, daycares, or other areas with large populations of children. No cumulative adverse effects to the health and safety of children are expected under this alternative.

5.6.2.8 Hazardous Materials and Hazardous Waste

Individually, Alternative B is expected to result in less than significant impacts to the human health and safety from the use of hazardous materials and waste. Under implementation of Alternative B, the expected impacts to human health and safety are expected to be significant but mitigable to less than significant at FRA and less than significant at DTA. However, additional cumulative impacts to human health and safety could result from continued development in the region. Increased development in Alaska would result in an increased risk of inadvertent releases of hazardous materials and wastes.

Ongoing Army training activities would continue to use hazardous materials and generate hazardous wastes. Hazardous materials and wastes used and generated on interior USARAK lands would primarily include explosive munitions, fuels, oils, and lubricants. Inadvertent releases of hazardous materials, primarily petroleum products and solvents, have resulted in contaminated sites on USARAK lands. UXO would continue to occur at roughly the same or higher relative frequency as current conditions. However, all UXO would be contained within the impact areas, which are off-limits to public and most military access. Cumulative impacts to human health and safety are expected to be less than significant to significant but mitigable to less than significant for Alternative B.

5.6.2.9 Biological Resources

The projects identified as contributing to cumulative impacts would impact biological resources. The cumulative projects are expected to contain mitigation measures and SOPs to minimize potential biological impacts. In light of historic, ongoing, and reasonably foreseeable future actions, the cumulative impacts involving vegetation, threatened and endangered species, and wildlife and habitat are expected to

be less than significant. Cumulative impacts to wetlands are expected to be significant, but mitigable to less than significant. There would be no cumulative impacts from noxious weeds under Alternative B.

Wetland permitting, which is regulated by the U.S. Army Corps of Engineers, would be required if construction were to impact wetlands. U.S. Army range improvement and upgrade projects could cause negative impacts to wetlands at DTA and Fort Richardson (Stout 2002a, b). In light of historic, ongoing, and reasonably foreseeable future actions, cumulative impacts to wetlands under Alternative B would be significant but mitigable to less than significant.

Prior activities on Army lands have impacted vegetation, primarily through maneuver training exercises, and construction of ranges and cantonment buildings. Total cantonment area acreage includes approximately 10,230 acres of USARAK lands. Vegetative structure within the cantonment has been heavily altered to accommodate construction of buildings, roads, and other infrastructure. In addition, training ranges on interior Army lands occupy approximately 6,500 acres, which require ongoing vegetative modification. Drop zones and assault strips occupy approximately 4,900 acres on interior lands. These areas must remain free of high-standing vegetation, which prevents the areas from progressing through successionary stages.

Range improvement and upgrade projects and construction at the cantonment area cause some adverse impacts to vegetation at DTA and FRA (e.g., Stout 2002a, b). Although additional construction projects would affect vegetation, the impacts to natural vegetation would be less than significant.

There are no known federally endangered or threatened species on USARAK lands. However, management policies exist and are outlined in the Integrated Natural Resources Management Plans for each post (USARAK 2002d,e,f). Use of Army lands could contribute to cumulative effects to plants and animal species of concern. Mission-essential construction projects would not affect any species of concern (Stout 2002a, b, c). The range construction projects could compromise habitats of forest-dwelling bird species of concern at DTA. Non-military projects in the area could contribute to cumulative impacts to sensitive species. However, overall, impacts to threatened and endangered species from Alternative B would be less than significant.

Wildlife on USARAK lands, including FWA and DTA, has been affected by military activity for decades. USARAK mission-essential construction projects planned a may affect certain individuals or groups of urban wildlife, but probably would not affect any priority species at the population level (Stout 2002a, b). Likewise, the activities planned would not impact priority species (Clark 2003).

Of the priority species, range improvement projects at FWA and DTA would not impact grizzly bear habitat, but could compromise about 1 percent of the preferred habitats of wolverines, wolves, and olive-sided flycatchers. Although 1 to 2 percent of current moose habitat could be impacted, range construction could create additional habitat. Range development could compromise about 3 percent of trumpeter swan habitat in these areas (Clark 2003).

The range improvement projects and subsequent artillery firing at DTA could negatively affect bison that migrate through the battle area complex area, but maintenance of the battle area complex in an early seral state may also benefit bison. The noise could impact waterfowl and other birds in nearby ponds, but the effect of such training is not known. Development and use of the collective training range could affect portions of grizzly bear and sandhill crane habitat in North Texas Range. This area is already used for weapons training. No additional impacts are expected from use of this range to grizzly bears, sandhill cranes, or other species of wildlife (Stout 2002b). Ongoing USARAK activities could negatively impact fisheries primarily due to habitat degradation or loss of water quality. Overall, cumulative impacts to general wildlife and habitat would be less than significant.

5.6.2.10 Air Quality

The city of Anchorage is classified as a serious non-attainment area for CO, and the Eagle River area outside of Anchorage is in a non-attainment area for PM_{10}. FRA is not within either of these non-attainment areas; however, these pollutants are the main issues of concern in the larger south-central airshed within which FRA resides.

Historically, Anchorage has also been listed among the top 10 worst air quality regions in the western United States for CO. The largest source of CO emissions is motor vehicles (83.6 percent), followed by aircraft (8.6 percent). Most exceedances to the CO NAAQS occur on weekdays when vehicle traffic is the heaviest. Morning starts of vehicles, or "cold starts," are believed to be the leading cause of high CO levels during winter months (Municipality of Anchorage 1999).

Vehicle emissions have decreased significantly in recent decades due to the requirement for emission control equipment on all new vehicles manufactured since 1981. In 1995, Anchorage adopted an Air Quality Control Plan to reduce CO emissions by using oxygenated fuels, increasing vehicle inspection requirements, and implementing a ride-sharing program.

PM_{10} is high in Eagle River due to the number of unpaved roads. Over 90 percent of the particulate matter in the area is generated by travel on paved and unpaved roads. Only 10 percent of the fugitive emissions result from industrial sources, wood stoves, or automobile exhaust (Municipality of Anchorage 1999). In 1987 a plan was implemented to pave or surface gravel dirt roads in the area. The state of Alaska modified winter road maintenance practices in the Anchorage and Eagle River areas to reduce the amount of traction sand on the road. Traction sand is believed to contribute to higher PM_{10} levels. No exceedances of the PM_{10} standard have occurred since 1987 (Municipality of Anchorage 1999).

Major point emission sources in the area include power plants, standby power generating facilities, exhaust emissions from vehicle maintenance shops, small space heaters, and dry cleaning and petroleum storage facilities.

Major emission sources at Fort Greely (DTA) include vehicles and the burning of fuels, including wood, gasoline, diesel oil, and fuel oil. Fugitive dust, forest fire smoke, and the occasional use of helicopters and aircraft were also cited as sources of emissions at DTA. Other currently planned USARAK mission-essential projects would contribute only short-term and relatively small cumulative effects to air quality.

Mission-essential construction projects planned for DTA include the construction of a battle area complex and combined arms collective training facility (BAX/CACTF) and would result in the generation of temporary emissions. Air quality impacts from the BAX/CACTF are essentially negligible. Some cumulative visibility issues remain with respect to Denali, but any BAX/CACTF effects are essentially mitigated. The primary source of impaired visibility is local wildfires and naturally-generated fugitive dust during high winds (Army 2006).

Estimates of baseline air emissions from aircraft operations were calculated for Eielson AFB. Pollutant concentrations from aircraft operations would constitute a small percentage of the NAAQS, thus, no appreciable effects to air quality would result.

Construction of the Cold Regions Test Center Automotive Test Complex would result in temporary release of air pollutants from the combustion of fuel and from dust. Use of test facility buildings and testing of vehicles on the paved track would also result in increased emissions; however, the need for additional air quality permits is not expected.

The addition of new permanent, stationary air emission sources by the Space and Missile Defense System on the Fort Greely cantonment area would affect the overall ambient air quality within the airshed. This project has been issued a construction permit by the ADEC, and construction is underway. The air quality effects may increase if the test bed evolves into a full missile defense system.

The Trans-Alaska Pipeline (TAPS) Renewal Project could affect ambient air quality. The maximum estimated concentrations of criteria air pollutants associated with the TAPS activities have been found to be below applicable NAAQS. HAPs concentrations would contribute little to the background concentrations already found in residential areas. There are no predicted adverse effects to visibility expected to occur because of TAPS. Some of the projects identified as contributing to cumulative impacts would occur in or adjacent to areas where wildland fires could occur.

The cumulative military projects are expected to contain mitigation measures to minimize potential environmental impacts involving wildfires that can also contribute to air quality impacts. Military fires are usually quickly controlled. The FRA Fire Department provides the initial response for wildfire suppression. Cumulative fire management impacts to the region would mainly result from the addition of new firing ranges, and expansion of existing or development of new maneuver areas, and population growth in the forested areas bordering installations.

Cumulative impacts to air quality for Alternative B are expected to be less than significant.

5.6.2.11 Noise

Cumulative noise impacts would result from both non-military and military actions in the area. Noise contributed by the local community includes transportation, construction, and recreation in the Anchorage vicinity.

The noise of existing and planned military training include firing and detonation of munitions, low-flying aircraft, construction activities and general troop maneuvers (both mechanized and pedestrian). Numerous studies have indicated that the introduction of noise into previously undisturbed areas can initially cause behavioral changes and stress in some species of wildlife. However, over an extended period of time, these effects wane as wildlife becomes accustomed to the recurring disturbance. Observations of wildlife on FRA support this general statement that noise is of little significance. Impact from noise on wildlife to not appear to cause population level impacts (USARAK 2004 and 2007).

Construction of mission-essential projects at FRA would result in increased noise levels, but the effect would be short-term and highly localized. There would be no long-term noise effects from these projects.

Activities by the U.S. Air Force and the Alaska Air National Guard contribute to adverse noise effects in the Anchorage area, but the effects are mitigated (U.S. Air Force 1995). Elmendorf Air Force Base does receive off-post noise complaints (U.S. Air Force 1995).

Cumulative noise effects under Alternative B would be significant but mitigable to less than significant.

5.6.2.12 Airspace Resources

The potential exists for cumulative effects to airspace to occur under this alternative. Reasonably foreseeable future actions identified near FRA and DTA may cause direct and indirect effects that could overlap in time and space with the effects of this alternative. Upgrades and expansion at Elmendorf AFB near FRA and at DTA and Eielson AFB may result in impacts that could also cumulatively contribute to airspace effects. If constructed at DTA as planned, the C-17 landing strip would increase the number of

flights in DTA's airspace, which could affect the use of UAVs during maneuver training. In addition, upgrades and expansions are expected for Elmendorf and Eielson AFBs. Depending upon the specifics of these upgrades and expansions, they could cause cumulative impacts when their effects are combined with the airspace impacts of this alternative. Appropriate coordination and planning among the Air Force, Army, and Federal Aviation Administration is expected to keep any cumulative effects to a level that is less than significant.

5.6.2.13 Energy

Alternative B is expected to result in less than significant impacts to energy consumption. Continued energy impacts are expected in the areas surrounding USARAK posts as the result of projected population growth and development. Ongoing USARAK activities, including training and range construction and expansion, are expected to continue to impact energy resources. A variety of capital improvement projects is planned or currently underway on installation cantonment areas. In addition, future range construction and improvement projects are planned on USARAK lands. Cumulative impacts to energy for Alternative B could be significant; but continued implementation of energy conservation measures would be expected reduce these impacts to less than significant.

5.6.2.14 Facilities

Alternative B would result in less than significant impacts to facilities, including public services, infrastructure, and utilities. Continued impacts to facilities are expected in the areas surrounding USARAK posts as the result of projected population growth and development. Ongoing USARAK activities, including training and range construction and expansion, are expected to continue to impact facilities. A variety of capital improvement projects is planned or currently underway on installation cantonment areas. In addition, future range construction and improvement projects are planned on USARAK lands. Cumulative impacts to facilities for Alternative B would be less than significant.

5.6.2.15 Subsistence

Alternative B is expected to have less than significant impacts to both access for subsistence activities and availability of subsistence resources. Much of the proposed activities associated with Alternative B on FRA would be located within previously disturbed areas. While there may be an increase in access closures and some less than significant effects on the availability of subsistence resources for some areas on both FRA and DTA, an adequate amount of land would still be accessible for subsistence activities. In addition, impacts to subsistence hunting and fishing at FRA are unlikely because this region is federally designated as a non-rural area.

However, subsistence resources may be cumulatively affected because of other regional activities including military activities, resource extraction, and community growth. Subsistence access may also be impacted by military activities and area development. Impacts to subsistence in the interior Alaska region of interest are expected to be less than significant. Subsistence is curtailed in south-central Alaska by federal and state regulations, so no significant impacts to subsistence are expected here as well. Overall, Alternative B would is expected to result on less than significant impacts on subsistence.

5.6.3 ALTERNATIVE C – COLORADO

The cumulative impact analysis for Alternative C focuses on impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Past and present actions are accounted for in the description of the affected environment for each

resource. Reasonably foreseeable future actions for Colorado vary between the Fort Carson area and PCMS. At Fort Carson, about 15 reasonably foreseeable future actions were identified. They are:

- Various maintenance and capital improvements projects at and near Fort Carson pertaining to housing, roadways, utilities, and other infrastructure.
- Constructing the arrival/departure air control group facility at the Colorado Springs Airport to support deployment of Fort Carson troops.
- Various capital improvements projects to surrounding municipal and county facilities now being planned or constructed.
- Improvements to roadway connections directly from I-25 to the Colorado Springs Airport, as currently being evaluated in the City's South Metro Accessibility Study and the SH 16 EA.
- Improvements to Powers Boulevard/SH 16 and the I-25 interchange east of the installation.
- Improvements to Academy Boulevard north of the installation.
- Improvements to SH 115 west of the installation.
- Various ongoing construction projects on the installation.
- Development of lands throughout the Pikes Peak region and greater Colorado Springs area.
- Bureau of Reclamation Southern Delivery System - proposal to construct new water storage reservoirs and an extensive network of delivery piping.
- Reconstruction of Powers Boulevard to a freeway with interchanges to enhance traffic movement around the eastern side of Colorado Springs.
- Future improvements to the roadway network to improve capacity on Drennan Road and Powers Boulevard to provide a more direct connection between I-25 and the airport.
- Future improvements to the roadway network to Banning-Lewis Ranch developments, and other features on the east and south sides of Colorado Springs.
- Future foreseeable improvements to SH 115 along the western boundary of the post.

In contrast, no reasonably foreseeable future actions have been identified near PCMS. A primary reason for the absence of potentially cumulative actions is that this area is rural in nature and does not have existing infrastructure to support other types of development. Although, there is potential for future wind power projects in Las Animas County, no specific development plans are under consideration. In Otero County, no substantial projects have been planned or approved according to the Otero County Engineering Department (Baker 2006).

5.6.3.1 Geology, Soils, and Seismicity

Alternative C is likely to contribute to cumulative impacts to soils from erosion. The major historic influences on soil erosion include the disturbance of soils, modification of slopes and drainage features, and loss or disturbance of vegetation due to agricultural conversion, military activities, fires, roads, modification of slopes and drainage features, and other development.

Planned construction activities at and near FTC sponsored by federal, state, local agencies or private entities would contribute to increased short-term regional soil erosion and runoff potential from construction, training, equipment operations, and vehicle travel. Construction projects generate increased short-term erosion potential from areas of bare ground and wind eroded fugitive dust from site clearing and grading. Projects that, along with the Alternative C, could contribute to cumulative soil erosion effects include improving Powers Boulevard/SH 16 and the I-25 interchange east of the installation;

improving Academy Boulevard north of the installation; improving SH 115 west of the installation; and various ongoing construction projects on the installation.

The area surrounding the PCMS has historically been primarily undeveloped and used for agriculture particularly large grazing operations. These activities have disturbed natural areas and contributed to soil erosion to some extent. The only planned development in the area consists of 14 individual homes located throughout Otero County.

Soil erosion caused by implementation of Alternative C and other reasonably foreseeable future projects can be mitigated with BMPs for stormwater management and runoff control. However, maintaining a persistent vegetative cover in areas of intensive use or development would not be possible because of the nature of the proposed use. Therefore, the cumulative soil erosion impacts associated with SBCT training proposed under Alternative C are expected to be locally significant, but at the regional level, the effects are not expected to be significant compared to natural rates of erosion. The contribution of wind soil erosion from training ranges at FTC and PCMS to cumulative soil loss or sedimentation in the Fountain Creek and Purgatoire River watersheds, for example, is expected to be less than significant relative to the contributions from agricultural and urban lands.

Through implementation of BMPs for all potential cumulative projects, as required under federal and state regulations, the cumulative effects to soils associated with Alternative C would be less than significant.

No cumulative impacts to geologic resources are expected.

5.6.3.2 Water Resources

Regional activities at and near Fort Carson would result in increased runoff and potential for increased sedimentation, which could impair water quality in surrounding water bodies. Those regional activities that increase the amount of impervious surface could also add to runoff.

The greater Colorado Springs area has experienced population growth well above state and national averages for several decades. That growth is forecast by PPACG to continue for the foreseeable future, an increase to which the proposed transformation would add incrementally but not substantially. Population growth demands that new water resources be developed, the planning for which is now underway by Colorado Springs Utilities and other municipal providers through projects such as the Southern Delivery System. According to the EIS currently being prepared by the Bureau of Reclamation for the Southern Delivery System proposal to construct new water storage reservoirs and an extensive network of delivery piping, growth in the Colorado Springs area is projected to occur with or without adequate water supplies (Bureau of Reclamation 2006).

The area surrounding the PCMS has historically been devoted primarily to agricultural and rural uses. These activities have disturbed natural areas and affected water resources to some extent. There would be no cumulative impacts to water resources in the vicinity of PCMS.

Overall, cumulative impacts to water resources associated with Alternative C would be expected to be significant but mitigable to less than significant.

5.6.3.3 Wildfire Management

Some of the projects identified as contributing to cumulative impacts would occur in or adjacent to areas where wildland fires could occur because of implementation of Alternative C. The cumulative projects

are expected to contain mitigation measures to minimize the potential for wildfires. Cumulative fire management impacts to the region would mainly result from the addition of new firing ranges, and expansion of existing or development of new maneuver areas, and population growth near FTC.

Training of the 2/25th SBCT at FTC would increase the future use of several planned range improvement projects and those foreseeable activities that involve maneuver training exercises. An increase in training area use would cumulatively increase the likelihood of accidental ignitions. The PCMS is used approximately 4 months per year on average. Use of the PCMS in recent years, however, has been lower because of overseas deployments of military personnel. Future use of the PCMS is projected to increase, and SBCT training would contribute to the training load at PCMS.

Implementation of the Prescribed Burn Plan, as well as any fire management activities developed specifically for SBCT training would reduce the cumulative impacts to wildfire risk to less than significant for Alternative C.

5.6.3.4 Cultural Resources

Before PCMS was acquired as a training area in the 1980s, it was an area of dispersed farming and ranching. This activity in the PCMS has had some effect on archaeological resources. Use of the land was changed to military training in the 1980s. Since that time, access to the area has been restricted, and development of adjacent areas has been limited. There are no other permitted or anticipated projects in the vicinity of PCMS. Implementation of measures for avoidance, monitoring, and mitigation for cultural resources would reduce the severity of impacts that would result from an overall increase in military training activities associated with implementation of Alternative C.

Foreseeable development at Fort Carson would include demolition and renovation of existing facilities, construction of new facilities, and the increase of training activities with greater numbers of rotations, and use of larger geographic areas and accommodation of increased troop strength. The cantonment at Fort Carson has been completely surveyed for cultural resources and contains no known prehistoric sites. The inventory and evaluation of historic resources through the Cold War era is ongoing, and it is not anticipated that these cultural resources would be impacted. There also would be no impact to resources in the two historic districts in the cantonment area. Proposed construction in the downrange area is within previously inventoried areas and would have no impact on known cultural resources. Two National Register districts, the Turkey Creek Recreation Area and the Turkey Creek Rock Art District, are within the downrange area but training activities are restricted in these areas. Increased training activities may have the potential for adverse impact to the Turkey Creek Rock Art District.

Even with the ICRMP, there could be cumulative impacts on known and undiscovered cultural resources on both Fort Carson and PCMS because archaeological sites, TCPs, and historic buildings could be impacted by improvements to facilities and increased training activities. The ICRMP outlines the protection of sites that can be avoided and data recovery on those that cannot to contribute to our knowledge of prehistory and history in this region.

Overall, cumulative impacts to cultural resources associated with Alternative C would be expected to be significant but mitigable to less than significant.

5.6.3.5 Land Use and Recreation

Individually, Alternative C would result in less than significant impacts to the existing land uses, public access, or recreation. However, additional cumulative impacts to land use and recreation resources could result from continued development in the region. Some residential land uses surrounding Fort Carson and

PCMS are currently affected by the noise currently generated by military training activities. Under Alternative C, future use of the PCMS is projected to increase. Noise increases outside of the installation boundaries during training activities could limit the location of new additional residences or other sensitive receptors in the areas adjacent to the installations.

Cumulative land use impacts would also result from the addition of new firing ranges, and expansion of existing or development of new maneuver areas, and population growth near FTC. Training of the 2/25th SBCT at FTC would increase the future use of several planned range improvement projects and those foreseeable activities that involve maneuver training exercises. The PCMS is used approximately 4 months per year on average. Use of the PCMS in recent years; however, has been lower because of overseas deployments of military personnel. Future use of the PCMS is projected to increase, and SBCT training would contribute to the training load at PCMS.

Cumulative impacts to land use and recreation are expected to be less than significant for Alternative C.

5.6.3.6 Traffic and Transport

Alternative C would result in less than significant impacts to the traffic and transportation resources. Cumulative impacts to traffic and transport resources would result from continued population growth and development in the region. Some of the regional roadways are currently operating at or near capacity, and traffic volumes are expected to increase as the projected growth in Colorado occurs. However, cumulative impacts to traffic and transport are expected to be less than significant for Alternative C.

5.6.3.7 Socioeconomics, Environmental Justice, and Protection of Children

Alternative C would have less than significant impacts on population, economy (business sales, volume), employment, income, housing and schools, and no disproportionate impacts to low-income or minority populations or the health and safety of children. Although cumulative impacts to socioeconomic resources could result from continued population growth and development in the region, cumulative impacts to socioeconomic resources, minority and low-income populations and protection of children are also expected to be less than significant for Alternative C.

5.6.3.8 Hazardous Materials and Hazardous Waste

Under implementation of Alternative C, impacts to human health and safety are expected to be less than significant resulting from hazardous materials and waste. However, additional cumulative impacts to human health and safety would result from the other military projects and projected population growth and urbanization in the region. Cumulative human health and safety impacts would result from the addition of new firing ranges, and enlargement of existing or development of new maneuver areas, and population growth near FTC and PCMS. Training of the 2/25th SBCT at FTC would increase the future use of several planned range improvement projects and those foreseeable activities that involve maneuver training exercises. The PCMS is used approximately 4 months per year on average. Future use of the PCMS is projected to increase, and SBCT training would contribute to the training load at PCMS. Cumulative impacts to human health and safety from hazardous materials and waste are expected to be less than significant for Alternative C.

5.6.3.9 Biological Resources

Some of the projects identified as contributing to cumulative impacts would impact biological resources. These projects are expected to contain mitigation measures and SOPs to minimize potential biological impacts. The cumulative impacts involving vegetation, threatened and endangered species, noxious

weeds, and wildlife and habitat are expected to be significant but mitigable to less than significant. There would be no cumulative impacts to wetlands from Alternative C.

The cumulative impact to vegetation resources includes the irreversible changes to plant communities on and surrounding Fort Carson because of implementation of the cumulative projects. The implementation of Alternative C and the other projects in the area would result in a variety of potential impacts including mortality, disturbance, and loss of habitat. The area of undisturbed short-grass prairie and foothills habitats in the region is likely to continue to shrink because of the population growth and economic development along the Front Range anticipated by state and local governments. The cumulative impacts to vegetation resources on PCMS include those from tracked vehicles and compaction from foot traffic. Damage from shells and ammunition could also result in vegetation loss. Overall, cumulative impacts to vegetation are expected to be significant, but mitigable to less than significant.

There could be a cumulative increase in noxious weed infestations because of Alternative C. Construction and increased use of roads associated with all cumulative projects could introduce additional nonnative species and would further spread those that already occur. The disturbance caused by construction and the increased traffic would leave the surrounding habitats vulnerable to noxious weeds that can thrive in conditions where native species cannot. Cumulative impacts from noxious weeds could be significant, but mitigable to less than significant.

Cumulative effects to special status species could result from the irreversible changes to the ecosystem on and surrounding FTC and PCMS. Alternative C and the other cumulative projects would result in a variety of potential effects including mortality, disturbance, or displacement, and loss of habitat or nesting or foraging territory. However, implementation of all projects would include measures to reduce impacts to special status species. Therefore, the overall cumulative impacts to threatened and endangered or sensitive species are expected to be significant, but mitigable to less than significant.

The cumulative effects on general wildlife and habitats are generally similar to those described for vegetation above. Construction of facilities at FTC and PCMS along with the other cumulative projects in the area would contribute to the permanent loss of habitats. Increased training at FTC and PCMS would contribute to the overall impacts of Army activities, and therefore, the temporary disturbance and displacement of wildlife. Overall, cumulative impacts to wildlife and habitats are expected to be significant, but mitigable to less than significant.

5.6.3.10 Air Quality

Planned construction activities at and near Fort Carson would contribute to regional emissions of PM and CO from construction, training, equipment operations, and vehicle travel.

Regional PM Emissions are only approximately half of the NAAQS, so cumulative emissions from construction projects are unlikely to lead to violation of the NAAQS because regional emissions would have to double over the existing emissions to approach the regulatory threshold.

The only project criteria pollutant emissions regulated under the CAA that nears or exceeds regulatory thresholds is CO. The Colorado Springs area once violated the NAAQS for CO and is now a maintenance area for CO. As a maintenance area, regional CO emissions must be maintained to levels outlined in the SIP. The largest source of CO emissions is mobile sources from vehicle travel. All regional Transportation Improvement Plans (TIPs), including the three highway projects identified as cumulative projects, will undergo a transportation conformity determination to review mobile source emissions and verify conformance to the maintenance plan and TIP. The proposed highway projects must evaluate, analyze, and determine that the project would comply with the air conformity regulations under the CAA.

A General Conformity determination was also completed for Alternative D. Because of the regulatory limits that are enforced for CO, cumulative emissions associated with the cumulative projects are unlikely to lead to a violation of the NAAQS. Further, CO monitoring by the APCD would identify any violations, and corrective action would be taken by the region; therefore, the effects would be short-lived.

Therefore, cumulative impacts to air quality from Alternative C could be significant but mitigable to less than significant.

5.6.3.11 Noise

Cumulative noise impacts could result from implementation of this alternative when combined with the other projects identified in the area. Current and future construction projects generate noise during site clearing and grading. As these are temporary activities, the cumulative effects form construction projects are expected to be less than significant.

The largest continuous source of noise in the FTC area is road and highway traffic and training activities. Current and future highway projects will be required to comply with local and Federal Highway Administration (FHWA) noise regulations. Therefore, cumulative noise effects from vehicle traffic are expected to be less than significant.

The area surrounding the PCMS is and has been primarily agricultural including ranching and large grazing operations. U.S. 350 runs along the western edge of the PCMS. There are no other permitted or anticipated projects in the vicinity of the PCMS. The PCMS is a military training facility and has been used for training exercises, on average, approximately 4 months per year. Use of the PCMS in recent years, however, has been less frequent because of overseas deployments of military personnel. Future use of the PCMS is projected to increase.

The cumulative noise impacts associated with Alternative C would be less than significant.

5.6.3.12 Airspace Resources

No cumulative effects would occur to airspace resources under this alternative. None of the reasonably foreseeable future actions identified for Colorado would directly or indirectly affect airspace resources. Therefore, Alternative C's direct and indirect impacts to airspace resources would not overlap those of the reasonably foreseeable future actions in time or space. Without any overlap of impacts, cumulative effects would not occur.

5.6.3.13 Energy

Individually, Alternative C would result in a less than significant impact to energy demand and costs. However, small cumulative impacts to energy use and costs would result from the planned new firing ranges, expansion of existing or development of new maneuver areas, and population growth near FTC. Training of the 2/25th SBCT at FTC would increase the future use of several planned range improvement projects and those foreseeable activities that involve maneuver training exercises. Cumulative impacts to energy would be expected to be less than significant.

5.6.3.14 Facilities

Cumulative impacts to facilities could result from the combination of Alternative C and population growth near FTC. Cumulative impacts to facilities are expected to be less than significant.

5.6.4 ALTERNATIVE D – NO ACTION

The cumulative impact analysis for Alternative D focuses on impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Past and present actions are accounted for in the description of the affected environment for each resource.

Under Alternative D, no project-related construction or training associated with the permanent stationing of the 2/25th SBCT would occur at any of the three locations described under Alternatives A, B, or C. Current ongoing and planned projects not related to permanent stationing of the SBCT unit would continue at all of the installations to meet Army needs. As a result, Alternative D would not contribute to cumulative impacts to any resources in the regions surrounding SBMR, DMR, KTA, PTA, FRA, DTA, FTC, or PCMS, beyond those that are already occurring or would occur because of implementation of the other projects that have been identified within each respective cumulative impact area.

Therefore, Alternative D would result in no cumulative impacts to all resources at each of the three alternative locations.

Chapter 6
Preparers and Contributors

CHAPTER 6
PREPARERS AND CONTRIBUTORS

This EIS was prepared by ARCADIS U.S. Inc. under the direction of the U.S. Army. The following table presents the names of individuals and their area or areas of responsibility in preparing this EIS. Brief biographical information also is presented.

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Chapter 7
Distribution and Review of the DEIS

CHAPTER 7
DISTRIBUTION AND REVIEW OF THE DEIS

The following list identifies individuals or agencies who received a copy of the DEIS. In addition, the DEIS is available for review on the internet at http://www.sbct-seis.org, and at the libraries listed below.

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US Environmental Protection Agency - Region 9; San Francisco, California
US Environmental Protection Agency - Region 10; Seattle, Washington

US Fish and Wildlife Service - Pacific Islands Office; Honolulu, Hawaii
US Fish and Wildlife Service - Alaska Regional Office; Anchorage, Alaska
US Fish and Wildlife Service - Colorado Field Office; Denver, Colorado

USACE Honolulu District; Fort Shafter, Hawaii
USACE Alaska District; Elmendorf AFB, Alaska
USACE Southern Colorado Regulatory Office; Pueblo, Colorado

Pacific West Regional Office - National Park Service; Oakland, California
Alaska Regional Office - National Park Service; Anchorage, Alaska
Intermountain Regional Office - National Park Service; Denver, Colorado

Bureau of Land Management, Alaska State Office; Anchorage, AK

Office of Environmental Quality Control; Honolulu, Hawaii

Libraries

Hawaii

Hilo Public Library; Hilo
Kailua-Kona Public Library; Kailua-Kona, Hawaii
Thelma Parker Memorial Public and School Library; Kamuela, Hawaii
Kahuku Public and School Library; Kahuku, Hawaii
Mililani Public Library; Mililani, Hawaii
Hawaii State Library; Honolulu, Hawaii
Wahiawa Public Library; Wahiawa, Hawaii
Waianae Public Library; Waianae, Hawaii
Waialua Public Library; Waialua, Hawaii
University of Hawaii Environmental Center; Honolulu, Hawaii

Alaska

Alaska State Library; Anchorage, Alaska
Delta Community Library; Delta Junction, Alaska
Fairbanks North Star Borough Public Library; Fairbanks, Alaska
Fairbanks North Star Borough Public Library - North Pole Branch; North Pole, Alaska
Mountain View Branch Library; Anchorage, Alaska
Muldoon Branch Library; Anchorage, Alaska
Samson-Dimond Branch Library; Anchorage, Alaska
University of Alaska Anchorage Consortium Library; Anchorage, Alaska

Colorado

Penrose Public Library; Colorado Springs, Colorado
Woodruff Memorial Library; La Junta, Colorado
Pueblo City-County Library; Pueblo, Colorado
Rocky Ford City Library; Rocky Ford, Colorado
Carnegie Public Library; Trinidad, Colorado
Huerfano County Public Library; Walsenburg, Colorado
Fountain Library; Fountain, Colorado
Fort Carson Grant Library; Fort Carson, Colorado
East Library and Information Center; Colorado Springs, Colorado
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Chapter 8
References Cited

CHAPTER 8
REFERENCES CITED

AECOS, Inc. 2002. Natural resources surveys for the U.S. Army, Drum Road Upgrade project, Oahu, Hawaii. August 2, 2002.

Air Pollution Control Division. 2000. Construction Permit, the Piñon Canyon Maneuver Site. Construction Permit Number 96LA1082. Colorado Department of Public Health and the Environment, Air Pollution Control Division, Denver, Colorado.

Air Pollution Control Division. 2003. Revised Carbon Monoxide Maintenance Plan for the Colorado Springs Attainment/Maintenance Area. Colorado Department of Public Health and the Environment, Air Pollution Control Division, Denver, Colorado.

AirNav.Com. 2002. Airports [Web page]. Located at http://www.airnav.com/airports. Accessed: August 15, 2002.

Akasaki, G. 2002. Personal communication [*July – November* communications with L. Garlinghouse, Tetra Tech, Inc.]. U.S. Army, Directorate of Public Works.

Alaska Department of Commerce, Community, and Economic Development. 2002. Alaska Community Database [Web page] Located at http://www.dced.state.ak.usl/bd/commdb/CF_BLOCK.htm.

Alaska Department of Environmental Conservation. 1996. Water Quality Assessment Report. Alaska Department of Environmental Conservation, Division of Air and Water Quality, Juneau, Alaska.

Alaska Department of Environmental Conservation. 1998. Alaska's 1998 Section 303(d) List and Prioritization Schedule. Revised 6/7/1999. [Web Page]. Located at http://www.state.ak.us/dec/dawq/tmdl/98onepage.htm.

Alaska Department of Fish and Game. 1998. State of Alaska Species of Special Concern [Web page]. Located at http://www.wc.adfg.state.ak.us/index.cfm?adfg=endangered. Concern. Accessed on March 13, 2007.

Alaska Department of Fish and Game. 2000. Subsistence in Alaska: A Year 2000 Update. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

Alaska Department of Fish and Game. 2002. Statewide Stocking Plan for Recreational Fisheries, 2002. Alaska Department of Fish and Game, Sport Fish Division, Anchorage, Alaska.

Alaska Fire Service and State of Alaska. 1998. Cooperative Fire Protection Agreement between the U.S. Department of the Interior, Bureau of Land Management, Alaska Fire Service, and State of Alaska, Department of Natural Resources, Division of Forestry.

Alaska Fire Service and U.S. Army Alaska. 1995a. Inter-departmental support Agreement Number 140138-95089-905.

Alaska Fire Service and U.S. Army Alaska. 1995b. Inter-departmental support Agreement Number WC1SH3-95 8089-502.

Alaska Natural Heritage Program. 2002. Alaska Biodiversity [Web page]. Located at http://www.uaa.alaska.edu/euri/akuhpweb/sitemap.html. Accessed: September 5, 2003.

Alaska Wildland Fire Coordinating Group. 1998. Alaska Interagency Wildfire Management Plan [Web page]. http://www.dnr.state.ak.us/foreestry/pdfs/98AIFMP.pdf. Accessed on April 3, 2002.

Anchorage School District. 2003. [Web page]. http://www.asdk12.org/depts/budget/0304/Overview.pdf. Accessed on September 30, 2003.

Andersen, R., J. D. Linnell, and R. Langvatn. 1996. Short term behavioral and physiological response of moose (*Alces alces*) to military disturbance in Norway. Biological Conservation 77:169-176.

Anderson, B. A., R. J. Ritchie, B. E. Lawhead, J. R. Rose, A. M. Wildman, S. F. Schlenter. 2000. Wildlife Studies at Fort Wainwright and Fort Greely, Central Alaska, 1998. Final Report.

Anderson, D. E., O. J. Rongstad, and W. R. Mytton. 1990. Home-range changes in raptors exposed to increased human activity levels in Southeastern Colorado. Wildlife Society Bulletin 18:134-142.

Anderson, G. S. 1970. Hydrologic Reconnaissance of Tanana Basin, Central Alaska. Map from Hydrologic Investigation Atlas HA-319 (sheet 2 of 4).

Andres, B. A., A. J. Sorenson, and B. T. Browne. 2001. Inventory and Monitoring of Neotropical Migratory Landbirds on Fort Richardson, Alaska.

Andres, B. A., T. E. Katzner, R. J. Capitan, C. T. Schick, T. W. Trapp, and D. L. Brann. 1997. Inventory and Monitoring of Breeding Birds on Fort Richardson, Alaska. U.S. Fish and Wildlife Service, Non-Game Migratory Bird Management, Anchorage, Alaska.

Astley, B. N., C. F. Snyder, D. E. Lawson, C. R. Williams, T. J. Hall, and J. Denner. 2000. Groundwater Data from Fort Richardson, Alaska for the Period April 1997 to March 2000. CRREL Draft Report. Prepared by U.S. Army Corps of Engineers, Engineering Research and Development Center.

Bagley, C. (unpublished data). LAV Tracking Study at Yukon Training Area. Center for Environmental Management of Military Lands, Colorado State University, Fort Collins, Colorado.

Baker, A. 2006. Personal communication [*July 19* telephone conversation with J. Rochlitz, CH2MHill]. Otero County Engineering Department.

Barnwell, W. W., R. S. George, L. L. Dearborn, J. B. Weeks, and C. Zenone. 1972. Water for Anchorage: An Atlas of the Water Resources of the Anchorage Area, Alaska. Prepared by the U.S. Department of the Interior, Geological Survey, Water Resources Division, Alaska District. Published by the City of Anchorage and Greater Anchorage Area Borough.

Beachy, J. 2004. Personal communication. Biologist. Directorate of Public Works, Environmental Division, U.S. Army Garrison, Hawaii. Schofield Barracks, Hawaii.

Belt Collins. 1993. Schofield Barracks Real Property Master Plan. Prepared for USASCH. May 1993.

Belt Collins. 1994. Wheeler Army Airfield Real Property Master Plan Volumes 1and 2. Prepared for the U.S. Army Corps of Engineers under the direction of U.S. Army Hawaii and the 25th IDL.

Benford, D. 2006. Personal communication [*June 13* communication with E. Cutler, CH2MHILL]. DPTM Range Division Manager.

Benson, C. S. 1970. Ice Fog: Low Temperature Air Pollution. Corps of Engineers, U.S. Army, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.

Boreal Partners in Flight Working Group. 1999. Landbird Conservation Plan for Alaska Biogeographic Regions. Version 1.0. U.S. Fish and Wildlife Service, Anchorage, Alaska.

Borja, M. 2002. Personal communication [*August* communication with L. Garlinghouse, Tetra Tech, Inc.]. Range Control, U.S. Army, Schofield Barracks, Hawaii.

Bristol Environmental and Engineering Service. 2003. Draft Sampling Report Range Characterization Jarvis Creek, Fort Greely, Alaska. Contact Report to U.S. Army Engineer District, Alaska.

Bureau of Economic Analysis. 2002a. Regional Accounts Data. Personal income by major source and earnings by industry [Web page]. Located at http://www.bea.doc.gov/bea/regional/reis/action.cfm. Updated May 2002. Accessed: June 25, 2002.

Bureau of Economic Analysis. 2002b. Regional Accounts Data. Total Full and Part Time Employment by Industry [Web page]. Located at http://www.bea.doc.gov/bea/regional/reis/action.cfm. Updated May 2002. Accessed: June 25, 2002.

Bureau of Labor Statistics. No date. Local Area Unemployment Statistics [Web page]. Located at http://data.bls.gov/servlet/SurveyOutputServlet. Accessed: June 25, 2002.

Bureau of Land Management and U.S. Army. 1994. Fort Greely Proposed Natural Resource Management Plan Final Environmental Impact Statement.

Bureau of Land Management. 1998. Northern Intertie Project Environmental Impact Statement.

Bureau of Land Management. 2002. Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right of Way Final Environmental Impact Statement. BLM Alaska State Office, Anchorage, Alaska.

Bureau of Reclamation. 2006. Alternatives Analysis, Southern Delivery System Environmental Impact Statement Great Plains Region. Bureau of Reclamation, Eastern Colorado Area Office.

Calambokidis, J., G. H. Steiger, J. M. Straley, T. J. Quinn, II, L. M. Herman, S. Cerchio, D. R. Salden, M. Yamaguchi, F. Sato, J. Urbán R., J. Jacobsen, O. von Ziegesar, K. C. Balcomb, C. M. Gabriele, M. E. Dahlheim, M. Higashi, S. Uchida, J. K. B. Ford, Y. Miyamura, P. Ladrón de Guevara P., S. A. Mizroch, L. Schlender, and K. Rasmussen. 1997. Abundance and Population Structure of Humpback Whales in the North Pacific Basin. Report to Southwest Fisheries Science Center, National Marine Fisheries Service, La Jolla, California. 71 pages.

Carter-Burgess. 2001. Transportation for Oahu Plan TOP 2025. Prepared for the Oahu Metropolitan Planning Organization.

Cederstrom, D. J., F. W. Trainer, and R. M. Waller. 1964. Geology and ground-water resources of the Anchorage Area, Alaska. U.S. Geological Survey Water-Supply Paper 1773.

Center for Environmental Management of Military Lands, Colorado State University and Installation Fire and Safety Office, United States Army, Hawaii. 2006. Programmatic Environmental Assessment for the Implementation of the Integrated Wildland Fire Management Plan (IWFMP).

Center for Environmental Management of the Military Lands, Colorado State University. 2002. GIS mapping information for the islands of Hawaii and Oahu.

CH2MHill. 1994. Comprehensive Evaluation Report, Eagle River Flats, Fort Richardson, Alaska. Prepared for Department of Public Works, Fort Richardson Alaska. 193 pages.

CH2MHill. 2005. Construction of FY06 Facilities at Fort Carson Final Environmental Assessment. Prepared for U.S. Army Corps of Engineers, Mobile District.

Ching, P. 2002. Personal communication [*August 8*. *RE*: U.S. Army refuse collection and recycling program]. Directorate of Public Works.

City and County of Honolulu. 2000. Department of Planning and Permitting. North Shore Sustainable Communities Plan. City and County of Honolulu, Honolulu, Hawaii.

City and County of Honolulu. 2001. City and County of Honolulu Land Use Ordinance. City and County of Honolulu, Honolulu, Hawaii.

City and County of Honolulu. 2002. Department of Planning and Permitting. Central Oahu Sustainable Communities Plan. City and County of Honolulu, Honolulu, Hawaii.

City of Colorado Springs. 2005. City of Colorado Springs Comprehensive Plan. 2020 Land Use Map. City of Colorado Springs, Colorado Springs, Colorado.

City of Fountain. 2005. City of Fountain Comprehensive Development Plan. City of Fountain, Fountain, Colorado.

Clark, E. 2002. Personal communication. ITAM/Conservation Coordinator, U.S. Army Alaska, Department of Public Works: Donnelly Training Area, Alaska.

Clark, E. 2003. Personal communication. ITAM/Conservation Coordinator, U.S. Army Alaska, Department of Public Works: Donnelly Training Area, Alaska.

Clark, E. 2005. Invasive Species Monitoring and Management Plan. U.S. Army Garrison – Alaska, Department of Public Works: Donnelly Training Area, Alaska.

Collins, C. 2003. Personal communication. Research Physical Scientist, U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, Fairbanks, Alaska.

Colorado Department of Education. 2006. [Web page]. Located at http://www.cde.state.co.us/index_stats.htm. Accessed: May 2006.

Colorado Department of Transportation. 2006a. Straight Line Diagram Tool – 025A from 14 to 132 [Web page]. Located at http://dtdexternal.dot.state.co.us/sld/. Accessed: June 1, 2006.

Colorado Department of Transportation. 2006b. Straight Line Diagram Tool –160C from 344 to 351 [Web page]. Located at http://dtdexternal.dot.state.co.us/sld/ Accessed: June 1, 2006.

Colorado Department of Transportation. 2006c. Straight Line Diagram Tool – 350A from 0 to 24 [Web page]. Located at http://dtdexternal.dot.state.co.us/sld/. Accessed: June 1, 2006.

Colorado Department of Wildlife. 2006. Big Game Harvest Survey Statistics and Hunting Recap Summaries [Web page]. Located at http://wildlife.state.co.us/Hunting/BigGame/Statistics/. Accessed: July 2006.

Colorado Geological Survey. 1997. Selected Faults/Folds Report. Oil Creek Fault [Web page]. Located at http://geosurvey.state.co.us/Default.aspx?tabid=303. Accessed: June 13, 2006.

Colorado Geological Survey. 1999. Colorado Earthquake Information [Web page]. Located at http:// geosurvey.state.co.us/Default.aspx?tabid=303. Accessed: June 13, 2006.

Colorado Natural Heritage Program. 2006. Proposal for Rare Plant Survey of Fort Carson Military Reservation. May 11.

Conrad, C. 2001. Army Energy Management Issues and Opportunities. Recommended Reform Paper. U.S. Department of the Army, Washington, D.C.

Cooper, B. A., R. E. David, and R. J. Blaha. 1996. Radar and Visual Surveys of Endangered Seabirds and Bats in Pohakuloa Training Area, Hawaii during summer 1995. ABR, Inc., Forest Grove, Oregon and Rana Productions, Limited, Kaliua-Kona, Hawaii.

County of Hawaii. 1989. General Plan [Web page]. Located at http://www.hawaiicounty.com/planning/ general_plan.htm#section4. Accessed: June 24, 2002.

County of Hawaii. 2001. Planning Department Zone Maps. January 2, 2001. North and South Kohala Districts Zone Map, Section 25-95A; March 17, 2000. Kawaihae-Puako Zone Map, Section 25-95F; December 7, 1996. Hamakua District Zone Map, Section 7.11; December 7, 1996. Waikoloa Village Zone Map, Section 25-95H.

County of Hawaii. 2002. Map 5: Lava Flow Hazard Zones [Web page]. Located at http://www.Hawaii-county.com/databook_current/map05.htm. Accessed: August 13, 2002.

Dalakar, J., and B.D. Proctor. 2000. U.S. Census Bureau, Current Population Reports, Series P60-210, Poverty in the United States 1999. U.S. Government Printing Office, Washington, D.C.

David, R. E. 1995. Report: Endangered Vertebrate Species Inventory Survey of the Palila Critical Habitat, Pohakuloa Training Area.

Davis, B. 2006. Personal communication [*June 14* communication with K. Lilienbecker, CH2MHILL]. Fort Carson DPW.

Department of Housing and Urban Development. 2006. State of the Cities Data Systems. Policy Development and Information Research Service [Web page]. Located at http://socds.huduser.org/ permits/index.html>.

Department of Land and Natural Resources. 2003a. Fire Management [Web page]. Located at http://www.hawaii.gov/dlnr/dofaw/fmp/default.html. Accessed: May 8, 2003.

Department of Land and Natural Resources. 2003b. Getting to Mt. Kaala [Web page]. Located at http:// www.state.hi.us/dlnr/dofaw/nars/kaala/info.html. Accessed: February 20, 2003.

Diersing, V. E., R. B. Shaw, S. D. Warren, and E. W. Novak. 1988. A user's guide for estimating allowable use of tracked vehicles on nonwooded military training lands. Journal of Soil and Water Conservation March-April: 191–195.

Dingman, S. L., H. R. Samide, D. L. Saboe, M. J. Lynch, and C. W. Slaughter. 1971. Hydrologic Reconnaissance of Delta River and its Drainage Basin, Alaska. U.S. Army Cold Regions Research and Engineering Laboratory Research Report 262.

Directorate of Environmental Compliance and Monitoring. 1998. Environmental Assessment (Programmatic) for the Erosion and Sediment Control Program at Fort Carson, Colorado. Draft. Prepared for Headquarters, Department of the Army.

Directorate of Environmental Compliance and Monitoring. 2001a. DECAM Performance Plan FY02. Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2001b. Environmental Assessment (Programmatic) for Military Installation Land Use, 7th Infantry Division, Fort Carson, Colorado. Prepared by Gene Stout and Associates and URS.

Directorate of Environmental Compliance and Monitoring. 2002a. 7th Infantry Division and Fort Carson Integrated Natural Resources Management Plan and Environmental Assessment for Fort Carson and the Piñon Canyon Maneuver Site 2002-2006. Final. Prepared by Gene Stout & Associates.

Directorate of Environmental Compliance and Monitoring. 2002b. Environmental Assessment for Implementation of the Integrated Natural Resources Management Plan 2002-2006. Directorate of Environmental Compliance and Monitoring, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2002c. Biological Assessment and Management Plan for the Mexican Spotted Owl on Fort Carson. Prepared by Gene Stout and Associates, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2003a. Environmental Assessment for the Reconstruction of Range 111 and Construction of the Digital Multipurpose Range Complex. Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2003b. Fort Carson Prescribed Burn Plan.

Directorate of Environmental Compliance and Monitoring. 2004a. Asbestos Management Plan, Fort Carson, Colorado. November.

Directorate of Environmental Compliance and Monitoring. 2004b. Fort Carson Fugitive Dust Control Plan.

Directorate of Environmental Compliance and Monitoring. 2004c. Hazardous Waste Management Plan, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004d. Installation Pest Management Plan, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004e. Lead Management Plan, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004f. Pollution Prevention Plan, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004g. Polychlorinated Biphenyl (PCB) Management Plan, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004h. Radioactive Materials Management Plan for Fort Carson. Colorado.

Directorate of Environmental Compliance and Monitoring. 2004i. Radon Management Plan, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004j. Spill Prevention, Control, and Countermeasures Plan. Facility-Wide SPCC Plan, Fort Carson, Colorado. Prepared by Shaw Environmental, Inc.

Directorate of Environmental Compliance and Monitoring. 2004k. Underground Storage Tanks and Above Ground Storage Tanks, Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2004l. Integrated Solid Waste Management Plan, Fort Carson, Colorado. November.

Directorate of Environmental Compliance and Monitoring. 2004m. Biological Assessment and management Plan for the Black-Tailed Prairie Dog on Fort Carson and Piñon Canyon Maneuver Site. Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2005a. Fort Carson Utilities Study Expansion Plan through 2010. Prepared by Black & Veatch.

Directorate of Environmental Compliance and Monitoring. 2005b. Environmental Assessment: Construction of Facilities at Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2005c. Fort Carson Restoration Advisory Board Newsletter Number 46 (May).

Directorate of Environmental Compliance and Monitoring. 2005d. Fort Carson Utilities Study Expansion Plan through 2010. Prepared by Black & Veatch.

Directorate of Environmental Compliance and Monitoring. 2005e. Record of Environmental Consideration, Interim Stationing of 2nd Brigade 2nd Infantry Division to Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2006a. Additional Family Housing Units Environmental Assessment, Fort Carson, Colorado. Prepared by Gene Stout and Associates. March.

Directorate of Environmental Compliance and Monitoring. 2006b. Supplemental Environmental Assessment, Construction, and Operation of a 4th Infantry Complex at Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring. 2006c. Environmental Assessment for Master Plan and Expansion of the 10th Special Forces Group (Airborne). Fort Carson, Colorado.

Directorate of Environmental Compliance and Monitoring and Directorate of Public Works. 2005. Energy Management Plan, Fort Carson, Colorado.

Directorate of Public Works. 2004. Butts Army Airfield Real Property Master Plan Digest. Prepared by the Electronic Planning Information Center.

Directorate of Public Works. 2005. Fort Carson, Colorado Comprehensive Transportation Study. Prepared by Gannett Fleming, Inc.

Directorate of Public Works. 2006. Piñon Canyon Maneuver Site Traffic Study. Traffic Engineering.

Doe, W. W, R. B. Shaw, R. G. Bailey, D. S. Jones, and T. E. Macia. 1999. Locations and environments of U.S. Army training lands: an ecoregional framework for assessment. Federal Facilities Environmental Journal: Autumn 1999:9–26.

Downs, K. 2006. Personal communication [*September 18* telephone conversation with E. Cutler, CH2MHILL] Fort Carson Directorate of Environmental Compliance and Monitoring.

Earth Tech. 2002. Final Phase II EE/CA, Former Waikoloa Maneuver Area and Nansay Sites, Hawaii. Prepared for U.S. Army Corps of Engineers, January 2002 [Web page]. Located at http:// www.poh.usace.army.mil/waikoloa/EECA/Ch02.pdf. Accessed: February 28, 2003.

Edward K. Noda and Associates, Inc. 2001. Draft Environmental Assessment for Realignment of Kunia Gate, Wheeler Army Airfield with the Existing Lyman Gate, Schofield Barracks.

Fanscher, H. 2003. Personal communication [*February 27* Conversation with Q. Gillard, QAR Inc. *RE*: helicopter flight operations supporting training activities at Makua Military Reservation]. 25th ID (L) Aviation Brigade, Standardization Office.

Federal Aviation Administration. 2001. FAA Order 7400.2E, Change 1, Procedures for Handling Airspace Matters. Washington, D.C.

Federal Emergency Management Agency. 2000. Flood Insurance Rate Map, City and County of Honolulu, Hawaii, Panel 85 of 395. Map Number 15003C0085.

Federal Emergency Management Agency. 2006. Federal Emergency Management Agency Flood Maps. Map Service Center [Web page]. Located at http://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay?catalogId=10001&storeId=10001&categoryId=12001&langId=-1&userType=G&type=1. Accessed: July 18, 2006.

Ferrick, M. G., J. H. Cragin, L. E. Hunter, C. M. Collins, C. R. Williams, T. J. Hall, and J. T. Walls. 2001. Investigation of Explosives Transport by Surface Water and Groundwater, Washington Range, Donnelly Training Area, Alaska. ERDC/CRREL Report. U.S. Army Corps of Engineers, Engineer Research and Development Center, Anchorage, Alaska.

Foote, D.E., E.L. Hill, S. Nakaura, and F. Stephens. 1972. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service, in Cooperation with the University of Hawaii Agricultural Experiment Station.

Fort Carson. 1999. Fort Carson Regulation 2001. Environmental Quality: Environmental Protection and Enhancement. Fort Carson Regulation 200-1.

Fort Carson. 2005. Real Property Master Plan Digest, Piñon Canyon Maneuver Site, Colorado. Final. Prepared by HB&A.

Freed, L. 1991. Birds and Mammals of the Pohakuloa Training Area, Island of Hawaii.

Fyfe, R. W., and R. R. Olendorff. 1976. Minimizing the Dangers of Nesting Studies to Raptors and Other Sensitive Species. Canadian Wildlife Service, Information Canada Catalogue No. CW69-1/23.

Gabriel, H. W., and G. F. Tande. 1983. A Regional Approach to Fire History in Alaska. U.S. Department of Interior, Bureau of Land Management Technical Report 9.

Garcia and Associates. 2003. Reconnaissance survey for the BAX and AALFTR study areas at PTA between April and July 2002.

Gerlach, T. P., and M. R. Vaughan. 1990. Pronghorn Response to Military Activity in Southeastern Colorado. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Gleason, S. 2003. Personal communication [*February 12* communication. *RE*: BSA 1GIS mapping information for PTA]. Natural Resources Manager.

Global Security. 2007. Fort Richardson/Camp Carroll/Camp Denali [Web page]. Located at http://www.globalsecurity.org/military/facility/fort-richardson.htm. Accessed: January 23, 2007.

Golder Associates. 1998. Remedial Investigation, Del Monte Corporation (Oahu Plantation) Superfund Site, Kunia, Hawaii. Volume 1. Submitted to the U.S. Environmental Protection Agency, Region IX for Del Monte Fresh Produce (Hawaii) Inc.

Gon, S. M., L. Honigman, D. Zevin, W. Fulks, and D. E. Reginald. 1993. Vertebrate Inventory Surveys at Multipurpose Range Complex Pohakuloa Training Area (PTA) Island Of Hawaii.

Goran, W. D., L. L. Radke, and W. D. Severinghaus. 1983. An overview of the Ecological Effects of Tracked Vehicles on Major U.S. Army Installations. USA-CERL Tech. Report N-142.

Goss, B. 2006. Personal communication [*June 19 and July 17* conversations with E. Cutler and J. Rochlitz, CH2MHill]. DECAM Natural Resources Division.

Gossweiler, W. A. 1984. Fort Richardson Natural Resources Management Plan. Natural Resources Branch: Fort Richardson, Alaska.

Guthrie, V. 2005. Personal communication [*October 17* communication with J. Rodriguez, CH2MHILL]. Fort Carson, DPW.

Hammerson, G. A. 1999. Amphibians and Reptiles in Colorado. Second Edition. University Press of Colorado and the Colorado Division of Wildlife.

Harding Lawson Associates. 1992. Final Work Plan for Schofield Army Barracks Remedial Investigation/ Feasibility Study, Island of Oahu, Hawaii. Prepared for the U.S. Army Toxic and Hazardous Materials Agency, Denver, Colorado.

Harding Lawson Associates. 1996. Final Record of Decision for Operable Unit 2, Schofield Barracks, Island of Oahu, Hawaii. Prepared for U.S. Army Environmental Center. Denver, Colorado.

Hart, C. 2002. The Geological Framework of the Yukon Territory [Web page]. Located at http://www.geology.gov.yk.ca/publications/summaries/framework.html. Last Modified June 18, 2002. Accessed: March 8, 2007.

HartCrowser. 1997. Asbestos and Lead-Based paint Risk Assessment, Family Housing, Fort Richardson, Alaska.

Hawaii Coral Reef Assessment and Monitoring Program. 2003. Hawaii Institute of Marine Biology [Web page]. Located at http://cramp.wcc.hawaii.edu/Study_Sites/Hawaii/Kawaihae/. Accessed: February 11, 2003.

Hawaii Department of Business, Economic Development, and Tourism. No date (a). Census 2000 Profiles: Honolulu County [Web page]. Located at http://www.hawaii.gov/dbedt/census2k/profile-honolulu/honolulu-cdp.pdf. Accessed: June 29, 2002.

Hawaii Department of Business, Economic Development, and Tourism. No date (b). Social and Economic Trends during the Past Decade: Hawaii County [Web page]. Located at http://www.hawaii.gov/dbedt/county/hawaiiff.html. Accessed: June 29, 2002.

Hawaii Department of Business, Economic Development, and Tourism. 1991. The Hawaii State Plan: Revised. Hawaii Department of Business, Economic Development, and Tourism, Honolulu, Hawaii.

Hawaii Department of Business, Economic Development, and Tourism. 2001. Federal Activity and Hawaii's New Economy [Web page]. Located at http://www.hawaii.gov/dbedt/federal/fr07-01r.pdf. July 2001. Accessed: June 26, 2002.

Hawaii Department of Business, Economic Development, and Tourism. 2003. The State of Hawaii Data Book 2001 [Web page]. Located at http://www.state.hi.us/dbedt.Accessed: February 25, 2003.

Hawaii Department of Health. 1998. The Hawaii Unified Watershed Assessment. Clean Water Branch, Polluted Runoff Control Program [Web page]. Located at http://www.state.hi.us/dbedt/czm/UWAreport.htm. Accessed: June 25, 2002.

Hawaii Department of Health. 1999. The Groundwater Contamination Maps for the State of Hawaii, 1998. Hawaii Department of Health, Honolulu, Hawaii.

Hawaii Department of Health. 2004. Final 2004 List of Impaired Waters in Hawaii Prepared under the Clean Water Act §303(d). Hawaii Department of Health, Honolulu, Hawaii.

Hawaii Department of Land and Natural Resources. 1995. Groundwater Hydrologic Units Map of Hawaii. Hawaii Department of Land and Natural Resources, Honolulu, Hawaii.

Hawaii Department of Land and Natural Resources. 2002. Commission on Water Resource Management (Water Commission). 7.5-minute USGS quadrangle maps showing locations of permitted wells, and associated well database for the islands of Oahu and Hawaii.

Hawaii Natural Heritage Program. 1994a. Unpublished report. Biological Inventory and Management Assessment for the Makua Training Area. Hawaii National Heritage Program and the Nature Conservancy of Hawaii, Honolulu, Hawaii.

Hawaii Natural Heritage Program. 1994b. Unpublished report. Biological Inventory and Management Assessment for the Schofield Barracks Training Area. Hawaii National Heritage Program and the Nature Conservancy of Hawaii, Honolulu, Hawaii.

Hawaii Natural Heritage Program. 1998. Arthropod Survey at Pohakuloa Training Area, Island of Hawaii, Hawaii. Contract DAHC77-960C-0042. Prepared by The Nature Conservancy of Hawaii, Honolulu in cooperation with P. Oboyski, Entomological Consultant, for U.S. Army Garrison – Hawaii.

Hawaii Natural Heritage Program. 2002. Unpublished Database of Rare and Endangered Plants, Animals, and Natural Communities of the Island of Hawaii and Island of Oahu. Hawaii Natural Heritage Program, Honolulu, Hawaii.

Hawaii State Department of Health. 2007. Clean Air Branch. Federal and State Ambient Air Quality Standards (PDF) [Web page]. Located at http://www.hawaii.gov/health/environmental/air/chart.pdf. Accessed: March 11, 2007.

Hawaiian Electric Company, Inc. 2005. Integrated Resource Plan 2006–2025. Docket No. 03–0253. Hawaiian Electric Company, Inc., Honolulu, Hawaii.

Hawaiian Electric Company, Inc. 2006. Final Environmental Impact Statement, Campbell Industrial Park Generating Station and Transmission Additions. Hawaiian Electric Company, Inc., Honolulu, Hawaii.

Hazdra, R. J. 2001. Air Mobility. The Key to the United States National Security Strategy. Air University Press, Maxwell Air Force Base, Alabama.

Houston, S. 2002. Simulation of Munitions Effects on Ecosystem Contamination in an Army Range Impact Area. Ph.D. Dissertation. Colorado

Hunter, L. E, D. E. Lawson, S. R. Bigl, P. B. Robinson, and J. D. Schlaegel. 2000. Glacial Geology and Stratigraphy of Fort Richardson, Alaska. Technical Report ERDC/CRREL TR-00-3. Prepared for U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory.

Jibson, R. W., and R. L. Baum. 1999. Assessment of Landslide Hazards in Kaluanui and Maakua Gulches, Oahu, Hawaii, following the 9 May 1999 Sacred Falls Landslide. US Geological Survey Open-File Report 99-364 [Web page]. Located at http://pubs.usgs.gov/of/1999/ofr-99- 0364/index.html. Accessed: November 16, 2002.

Jones, D. 1993. Bivouac Impact Assessment and Rehabilitation Management. Land Management Symposium. Fort Sill, Oklahoma.

Jones, D. S., and C. F. Bagley. 1997. Tracked Military Vehicle Impacts on Three Vegetative Communities at Yakima Training Center, Washington. CEMML TPS 97-4. Colorado State University: Fort Collins, Colorado.

Jorgenson, M. T., J. E. Roth, M. D. Smith, S. Schlentner, W. Lentz, E. R. Pullman, and C. H. Racine. 2001. An Ecological Land Survey for Fort Greely, Alaska. U.S. Army Corps of Engineers, Engineer Research and Development Center Report TR-01-4.

Jorgenson, M. T., J. E. Roth, S. F. Schlentner, E. R. Pullman, and M. Macander. 2002. An Ecological Land Survey for Fort Richardson, Alaska. Draft Report. Prepared by ABR, Inc. for U.S. Army Alaska.

Klavetter, M. 2006. Personal communication [*May 25, August 16, August 28, September 13, and September 18* conversations with S. White and K. Oakes, CH2MHILL]. PCMS Wildlife Biologist, Fort Carson, Colorado.

Klein, F. W., A. D. Frankel, C. S. Mueller, R. L. Wesson, and P. G. Okubo. 2001. Seismic Hazard in Hawaii: high rate of large earthquakes and probabilistic ground motion maps, BSSA v. 91, pp. 479-498. Maps available in interim form online from US Geological Survey, National Seismic Hazard Mapping Project [Web page]. Located at http://geohazards.cr.usgs.gov/eq/html/his.html. Accessed: August 13, 2002.

Kuzmiak, J. 2006. Personal communication [*June 26* conversation with J. Rochlitz, CH2MHill]. U.S. Geological Survey.

Larsen, L. S. 1981. Soil Survey of El Paso County Area, Colorado. U.S. Department of Agriculture, Soil Conservation Service. Lakewood, Colorado.

Las Animas County Planning Commission. 1994. Las Animas County Land Development Guide.

Lau, L. S. 1983. Hawaii. Pages 81–96 *in* Ground Water in the Pacific Region. Natural Resources/Water Series No. 12.

Leatherwood, S. R., R. Reeves, W. F. Perrin, and W. E. Evans. 1982. Whales, Dolphins and Porpoises of the Eastern North Pacific and Adjacent Arctic Waters: A Guide to their Identification. National Oceanic and Atmospheric Administration Technical Report. NMFS 444. 245 pages.

Leonard, G. J. 1984. Assessment of Water Resources at Fort Carson Military Reservation near Colorado Springs, Colorado. Water Resources Investigations 83-4270.

Lichvar, R. 2000. Wetland Delineation at Fort Greely, Alaska U.S. Army Engineering and Research Development Center Cold Region Research and Engineering Laboratory; Hanover, New Hampshire.

Lichvar, R., and S. Sprecher. 1998. Wetland Delineation at Fort Richardson, Alaska. Draft Report. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Lichvar, R., C. Racine, B. Murray, G. Tande, R. Lipkin, and M. Duffy. 1997. An Inventory of the Vascular and Cryptogram Plant Species at Fort Richardson, Alaska. Technical Report EL-97-4. U.S. Army Corp of Engineers, Waterways Experiment Station: Vicksburg, Mississippi.

Linner, S. 2006. Personal communication [*June 20* conversation with S. White, CH2MHill]. U.S. Fish and Wildlife Service.

Lobaugh, M. 2003. Personal communication. Foundation Program Administrator, Alaska Department of Education and Early Development, Anchorage, Alaska.

Lucero, R. 2006. Personal communication [*June 16* telephone conversation with C. Roberts, CH2MHill]. . Las Animas County Planner.

Marcotte, J. 1991. Wild Fish and Game Harvest and Use by Residents of Five Upper Tanana Communities, Alaska, 1987-1988. Alaska Department of Fish and Game, Juneau, Alaska.

Mason, J. D. 2004. Personal communication. LCTA Coordinator, Center for Environmental Management of Military Lands, U.S. Army, Alaska.

McGinnis, W. 2002. Personal communication [*August 29* e-mail to L. Garlinghouse, Tetra Tech, Inc. *RE*: Inventory of Air Emissions Sources. SBEmission- Sources.xls. Excel spreadsheet]. U.S. Army Hawaii, Directorate of Public Works, Schofield Barracks, Hawaii.

Mendez, R. 2006. Personal communication [*July 17* telephone conversation with J. Rochlitz, CH2MHill]. U.S. Department of Agriculture, Natural Resources Conservation Service.

Milchunas, D. G., K. A. Schulz, and R. B. Shaw. 1998. Plant Community Structure in Relation to Long-Term Disturbance by Mechanized Maneuvers in a Semiarid Region. Colorado State University: Fort Collins, Colorado.

Milchunas, D. G., K. A. Schulz, and R. B. Shaw. 1999. Plant Community Responses to Disturbance by Mechanized Military Maneuvers. Journal of Environmental Quality 28:1533-1547.

Mink, J. F., and L. S. Lau. 1993. Aquifer Identification and Classification for the Island of Hawaii: Groundwater Protection Strategy for Hawaii. University of Hawaii at Manoa, Water Resources Research Center, Technical Report No. 191.

Mobley, J. R., Jr., R. A. Grotefendt, P. H. Forestell, and A. S. Frankel. 1999. Results of aerial surveys of marine mammals in the major Hawaiian Islands (1993-98): Final Report to the Acoustic Thermometry of Ocean Climate Program (ATOC MMRP), 34 pages.

Mobley, J. R., Jr., S. S. Spitz, K. A. Forney, R. A. Grotefendt, and P. H. Forestell. 2000. Distribution and Abundance of odontocete species in Hawaiian Waters: Preliminary Results of 1993-98 Aerial Surveys. Admin Report LJ.-99-XXC Southwest Fisheries Science Center. National Marine Fisheries Service. La Jolla, California. 26 pages.

Montgomery, Watson, and Herza. 2001a. Installation Environmental Noise Management Plan, Fort Richardson, Alaska.

Moore, D. 2002. Soil Survey of Anchorage Area, Alaska. U.S. Department of Agriculture, Natural Resource Conservation Service.

Municipality of Anchorage. 1999. Air Quality Program, Environmental Services Division, Department of Health and Human Services. Air Quality in Anchorage, a Summary of Air Monitoring Data and Trends (1980-1999).

Nakata Planning Group, LLC. 2000. Range and Training Land Program, Development Plan, Fort Carson, Colorado. Prefinal Submittal (March) prepared through U.S. Army Engineering and Support Center, Huntsville, Alabama.

Nakata Planning Group, LLC. 2001 United States Army Alaska Rang and Training Land Development Plan. Prepared for U.S. Army Engineering and Support Center, Huntsville, Alabama. 303 pages.

National Association of Federally Impacted Schools. 2006. [Web page]. Located at http://www.nafisdc.org. Accessed: May.

National Oceanic and Atmospheric Administration. 1997. NOAA Fisheries Strategic Management Plan [Web page]. Located at http://www.nmfs.noaa.gov/om2/download.html. Accessed: January 6, 2003.

National Oceanic and Atmospheric Administration. 2000a. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Humpback Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Humpback_Whale_(Western_N._Pacific)/AK00humpbackwhale_WesternN.Pacific.pdf. Accessed: July 5, 2002.

National Oceanic and Atmospheric Administration. 2000b. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Fin Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Fin_Whale_(Hawaii)/PO00finwhale_hawaii.pdf. Accessed on July 8, 2002.

National Oceanic and Atmospheric Administration. 2000c. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Blue Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Blue_Whale_(Hawaii)/PO00bluewhale_hawaii.pdf. Accessed: July 8, 2002.

National Oceanic and Atmospheric Administration. 2000d. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Sei Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Sei_Whale_(ENP)/PO00seiwhale_ENP.pdf. Accessed: July 8, 2002.

National Oceanic and Atmospheric Administration. 2000e. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Northern Right Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Northern_Right_Whale_(Eastern_N._Pacific)/AK00northernrightwhale_easternNpacific.pdf. Accessed: July 9, 2002.

National Oceanic and Atmospheric Administration. 2000f. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Bryde's Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Bryde's_Whale_(Hawaii)/PO00brydeswhale_hawaii.pdf. Accessed: July 10, 2002.

National Oceanic and Atmospheric Administration. 2000g. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Pygmy sperm Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Pygmy_Sperm_Whale_(Hawaii)/PO00pygmyspermwhale_hawaii.pdf. Accessed: July 10, 2002.

National Oceanic and Atmospheric Administration. 2000h. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Dwarf sperm Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Dwarf_Sperm_Whale_(Hawaii)/PO00dwarfspermwhale_hawaii.pdf. Accessed: July 10, 2002.

National Oceanic and Atmospheric Administration. 2000i. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Killer Whale. [Web page] Located at: http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Killer_Whale_(Hawaii)/PO00killerwhale_hawaii.pdf. Accessed: July 11, 2002.

National Oceanic and Atmospheric Administration. 2000j. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. False Killer Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/False_Killer_Whale_(Hawaii)/PO01falsekillerwhale_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000k. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Pygmy Killer Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Pygmy_Killer_Whale_(Hawaii)/PO00pygmykillerwhale_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000l. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Pilot Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/ Short-Finned_Pilot_Whale_(Hawaii)/PO00short-finnedpilotwhale_hawaii.pdf. Accessed: July 9, 2002.

National Oceanic and Atmospheric Administration. 2000m. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Cuvier's Beaked Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Cuvier's_Beaked_Whale_(Hawaii)/PO00cuviersbeakedwhale_hawaii.pdf. Accessed: July 10, 2002.

National Oceanic and Atmospheric Administration. 2000n. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Blainsville's Beaked Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Blainsville's_Beaked_Whale_(Hawaii)/PO00blainvillesbeakedwhale_hawaii.pdf. Accessed: July 10, 2002.

National Oceanic and Atmospheric Administration. 2000o. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Melon Headed Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/ Melon-Headed_Whale_(Hawaii)/PO00melonheadedwhale_hawaii.pdf. Accessed: July 9, 2002.

National Oceanic and Atmospheric Administration. 2000p. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Bottlenose Dolphin [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Bottlenose_Dolphin_(Hawaiil)/PO00bottlnosedolphin_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000q. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Spinner Dolphin [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Spinner_Dolphin_(Hawaii)/PO00spinnerdolphin_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000r. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Rough-toothed Dolphin [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Rough_Tooth_Dolphin_(Hawaii)/PO00rough-tootheddolphin_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000s. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Spotted Dolphin [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Pantropical_Spotted_Dolphin/PO00pantropicalspotteddolphin_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000t. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Striped Dolphin [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Striped_Dolphin_(Hawaii)/PO00stripeddolphin_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000u. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Risso's Dolphin [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Risso's_Dolphin_%20(Hawaii)/PO00rissodolphin_hawaii.pdf. Accessed: July 12, 2002.

National Oceanic and Atmospheric Administration. 2000v. Office of Protected Resources. Endangered Species Program. Cetacean Stock Assessment Program. Sperm Whale [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Cetaceans/Sperm_Whale_(Hawaii)/PO00spermwhale_hawaii.pdf. Accessed: July 9, 2002.

National Oceanic and Atmospheric Administration. 2000w. Office of Protected Resources. Endangered Species Program. Pinniped Stock Assessment Program. Hawaiian Monk Seal [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/Pinnipeds/Hawaiian_Monk_Seal/PO01hawaiianmonkseal_hawaii.pdf. Accessed: July 11, 2002.

National Oceanic and Atmospheric Administration. 2000x. Office of Protected Resources. Endangered Species Program. Sea Turtles. Green Sea Turtle [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/species/turtles/green.html. Accessed: March 12, 2003.

National Oceanic and Atmospheric Administration. 2000y. Office of Protected Resources. Endangered Species Program. Sea Turtles. Hawksbill Sea Turtle [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/species/turtles/hawksbill.html. Accessed: March 12, 2003.

National Oceanic and Atmospheric Administration. 2000z. Office of Protected Resources. Endangered Species Program. Sea Turtles. Leatherback Sea Turtle [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/species/turtles/leatherback.html. Accessed: March 12, 2003.

National Oceanic and Atmospheric Administration. 2000aa. Office of Protected Resources. Endangered Species Program. Sea Turtles. Olive Ridley Sea Turtle [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/species/turtles/olive.html. Accessed: March 12, 2003.

National Oceanic and Atmospheric Administration. 2000bb. Office of Protected Resources. Endangered Species Program. Sea Turtles. Loggerhead Sea Turtle [Web page]. Located at http://www.nmfs.noaa.gov/prot_res/species/turtles/loggerhead.html. Accessed: March 12, 2003.

National Oceanic and Atmospheric Administration. 2003. Tsunami Data at NGDC (National Geophysical Data Center) [Web page]. Located at http://www.ngdc.noaa.gov/seg/hazard/tsu.html. Accessed: February 7, 2003.

National Park Service. 1999. Questions and Answers on the National Wild and Scenic Rivers System [Web page]. Located at http://www.nps.gov/rivers. Accessed: May 7, 2002.

National Wildfire Coordinating Group. 1989. Fireline Handbook 3, Field Reference Guide for Control of Wildland Fires. PMS 410-1, NFES #0065, Washington, DC.

Nichols, W. D., P. J. Shade, and C. D. Hunt, Jr. 1996. Summary o f the Oahu, Hawaii, Regional Aquifer-System Analysis. U.S. Geological Survey Professional Paper 1412-A.

Niehaus, R. D., 2005. Housing Market Analysis for Fort Carson, Colorado. R. D. Niehaus Inc., Santa Barbara, California.

Oki, D. S. 1998. Geohydrology of the Central Oahu, Hawaii, Ground-Water Flow System and Numerical Simulation of the Effects of Additional Pumping. U.S. Geological Survey, Water Resources Investigations Report 97-4276.

Pacific Cooperative Studies Unit. 1999. Oahu Training Areas Natural Resource Management Final Report. Prepared for U.S. Army Hawaii.

Pacific Cooperative Studies Unit. 2000. Oahu Training Areas Natural Resource Management Final Report. Prepared for U.S. Army Hawaii.

Pacific Cooperative Studies Unit. 2001. U.S. Army Garrison Hawaii, Oahu Training Areas Natural Resource Management, Final Report. Prepared for the U.S. Army Garrison – Hawaii.

Pacific Cooperative Studies Unit. 2002. Annual report for the Ecosystem Management Program and Kipuka ‘Alala Habitat Management Activities Pohakuloa Training Area, Island of Hawaii.

Pacific Disaster Center. 2001. Civil Defense Tsunami Evacuation Maps for Hawaiian Islands [Web page]. Located at http://www.pdc.org/pdc/pub/Tsunami/EvacuationMaps.htm. Accessed: August 14, 2002.

Page, R. A., G. S. Plafker, and H. Pulpan. 1995. Earthquakes and block rotation in East-Central Alaska. Geological Society of America Abstracts with Programs Vol. 27, No. 5.

Palazzo, A. J., S. E. Hardy, T. J. Cary, C. Collins, and C. Racine 2002. Characterization of the Washington Range at Donnelly Training Area, Alaska: Sampling Results. Draft Report. ERDC-CRREL, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.

Parametrix. 2001. BMPs for Dust Abatement Practices on Unpaved County Roads in Oregon. Prepared for Oregon Association of County Engineers and Surveyors [Web page]. Located at http://www.aocweb.org/em/uploads/Dust%20Abatement%20BMPs_5_01.pdf. Accessed: February 26, 2004.

Peirce, K. 2002. Personal communication [e-mail correspondence]. Range and Training Land Assessment Coordinator, U.S. Army Garrison, Alaska, Fort Richardson, Alaska.

Pikes Peak Area Council of Governments. 2006a. 2005 Survey of Current Troop Residences by Zip Code. Prepared by Booz Allen Hamilton.

Pikes Peak Area Council of Governments. 2006b. Regional Travel Demand Model Volume Plots for 2000, 2030 No Action, and 2030 Build scenarios.

PRC Environmental Management, Inc. 1995. FY94 OMA PCB Testing, Replacement, and Disposal of Electrical Equipment, Various Installations, Hawaii. January 17, 1995. Pages 1–4.

Quirk, W. 1994. A Series of Memoranda for the Record on the Subject: Reconnaissance dating from September 1990 to May 1994. Environmental Resource Department, Fort Richardson, Alaska.

R&M Consultants. 2002. Geotechnical Investigation, Battle Area Complex (BAX). Final Submittal.

R&M Consultants. 2004. Test Boring Explorations, Combined Arms Collective Training Facility (CACTF). Preliminary Draft.

R. M. Towill Corporation. 1997a. Endangered Species Management Plan Report for Oahu Training Areas. Prepared for U.S. Army Garrison – Hawaii and U.S. Army Corps of Engineers, Honolulu, Hawaii

R. M. Towill Corporation. 1997b. Final Outdoor Recreation Plan Report U.S. Army Training Areas in Hawaii. Prepared for U.S. Army – Hawaii.

R. M. Towill Corporation. 1998. Ecosystem Management Plan Report for Oahu Training Areas. Prepared for U.S. Army Garrison – Hawaii and U.S. Army Corps of Engineers, Honolulu, Hawaii.

Racine, C. H., J. C. Walters, and M. T. Jorgenson. 1998. Airboat use and disturbance of floating mat fen wetlands in Interior Alaska, USA. Arctic 51(4): 371–377.

Racine, C. H., R. Lichvar, and M. Duffy. 2001. An Inventory of the Vascular Plants of Ft. Greely, Interior Alaska. ERDC/CRREL Report TR-01-5. Prepared by the U.S. Army Corp s of Engineers, Engineer Research and Development Center, Fairbanks, Alaska.

Radforth, N. W., and A. L. Burwash. 1977. Transportation. Pages 249–263 *in* N. W. Radforth and C. O. Brawner. Muskeg and the Northern Environment in Canada. Muskeg Subcommittee of the NRC Associate Committee on Geotechnical Research. University of Toronto Press: Toronto, Ontario.

Reeves, T. 2006. Personal communication [*August 21 and 29* conversations with E. Cutler, CH2MHill]. Fort Carson, U.S. Army Medical Department Activity.

Renn, R. 2006. Personal communication [*June 6* conversation with E. Cutler, CH2MHill]. Piñon Canyon Maneuver Site National Environmental Policy Act Coordinator.

Richardson, W. J., C. R. Greene, Jr., C. I. Malme, and D. H. Thomson. 1995. Marine Mammals and Noise. Academic Press. San Diego, California.

Rifici, C. 2006. Personal communication [*August 8 and September 18* conversations with S. White, CH2MHill]. Fort Carson Directorate of Environmental Compliance and Management, Fort Carson, Colorado.

Robertson, A. C., J. Raymond-Yakoubian, M. Proue, S. Shirar, J. Burr, H. Robins, and D. Cory. 2006. Annual Report, Archaeological Survey and Evaluation: Donnelly Training Area, Fort Wainwright, Alaska 2005. Center for Environmental Management of Military Lands, Fort Collins, Colorado. Prepared for Conservation Branch, Directorate of Public Works, U.S. Army Garrison Alaska, Fort Richardson, Alaska.

Rosati, J. 2003. Personal communication [*February 24* letter to R. Tsuneyoshi, U.S. Army Engineer District, Honolulu Remedial Project Manager]. U.S. Environmental Protection Agency.

Saldivar, Sgt. 1st Class. 2002. Personal communication [*August 13* conversation with D. Holmgren, Tetra Tech, Inc.]. U.S. Army, Pohakuloa Training Area.

Sato and Associates, Inc. 1996. Pohakuloa Training Area Master Plan. Sato and Associates, Inc.

Savoy, R. 2006. Personal communication [*August 29* conversation with S. White, CH2MHill]. DPTM – Range Division.

Sawyer, J. 2003. Personal communication [*February 20* conversation with Q. Gillard, QAR, Inc. *RE*: the Army's flight safety record in Hawaii]. U.S. Army Pacific Aviation Safety Officer, Fort. Shafter, Hawaii.

Schempf, P. F. 1995. Inventory of Raptors on Fort Richardson, Alaska. U.S. Fish and Wildlife Service, Juneau, Alaska. 6 pages + maps.

Schnell, L., S. Evans, and K. Sherry. 1998. Annual Report for the Ecosystem Management Program at Pohakuloa Training Area, Island of Hawaii. Research Corporation of the University of Hawaii for U.S. Army Garrison – Hawaii, Pohakuloa Training Area, Hilo, Hawaii.

Schnell, L., S. Evans, and K. Sherry. 1999. Annual Report for the Ecosystem Management Program at Pohakuloa Training Area, Island of Hawaii. Research Corporation of the University of Hawaii for US Army Garrison – Hawaii, Pohakuloa Training Area.

Severinghaus, W. D., W. D. Goran, G. D. Schnell, and F. L. Johnson. 1981. Effects of Tactical Vehicle Activity on the Mammals, Birds, and Vegetation at Fort Hood, Texas. USA-CERL Technical Report N-I13/ADA109646. Champaign, Illinois.

Shade, P. J., and W. D. Nichols. 1996. Water Budget and the Effects of Land-Use Changes on Ground-Water Recharge, Oahu, Hawaii. U.S. Geological Survey Professional Paper 1412-C.

Shallenberger, R. J. 1977. Unpublished report. Bird and Mammal Survey of Army Lands in Hawaii. Ahuimanu Production, Kailua, Hawaii.

Shallenberger, R. J., and G. K. Vaughn. 1978. Unpublished report. Avifaunal Survey in the Central Koolau Range, Oahu. Ahuimanu Production, Kailua, Hawaii.

Shaw, R. B., and V .E. Diersing. 1989. Evaluation of the Effects of Military Training on Vegetation in Southeastern Colorado. Headwaters Hydrology, American Water Resources.

Shaw, R. B., and V.E. Diersing. 1990. Tracked vehicle impacts on vegetation at the Piñon Canyon Maneuver Site, Colorado. Journal on Environmental Quality 19:234–243.

Shaw, R. B., S. L. Anderson, K. A. Schulz, V. E. Diersing, 1989. Plant communities, ecological checklist, and species list for the U.S. Army Piñon Canyon Maneuver Site, Colorado. Colorado State University Department of Range Science, Science Series No. 37.

Shaw, R., and J. M. Castillo. 1997. Plant Communities of Pohakuloa Training Area, Hawaii. Center for Ecological Management of Military Lands. Technical Publications Series 97–23.

Space and Missile Defense Command. 2000. Final Environmental Impact Statement for National Missile Defense Deployment. SMDC-EN-V, Huntsville, Alabama.

Springer, J. 2007. Locating the 5th Stryker Brigade at Fort Lewis. U.S. Army Environmental Command, Aberdeen Proving Grounds, Maryland.

State of Colorado. 2006a. Department of Labor and Employment [Web page]. Located at http:// www.coworkforce.com. Accessed: May 2006.

State of Colorado. 2006b. State Demography Office [Web page]. Located at http://dola.colorado.gov/demog/ demog.cfm. Accessed: May 2006.

State of Hawaii. 2002a. Office of Planning. Hawaii Statewide GIS Program [Web page]. Located at http:// www.state.hi.us/dbedt/gis/. Accessed: August-October 2002.

State of Hawaii. 2002b. Revised Perennial Streams Map of the Island of Hawaii [Web page]. Located at http://www.state.hi.us/doh/eh/epo/#Anchor-WQmaps.

Stearns, H. T., and G. A. MacDonald. 1946. Geology and Ground-Water Resources of the Island of Hawaii. U.S. Geological Survey, Bulletin 9.

Stearns, H. T., and K. N. Vaksvik. 1935. Geology and Ground-Water Resources of the Island of Oahu, Hawaii. Prepared in cooperation with the U.S. Geological Survey. Territory of Hawaii, Department of Public Lands, Division of Hydrography, Bulletin 1.

Stoner, D. 2006. Personal communication [*August 30* e-mail to K. Lilienbecker, CH2MHILL]. Fort Carson, NOW, Fort Carson, Colorado.

Stout, G. 2002a. Assembly Building, Barracks, and Mission Support Training Facility, Fort Wainwright, Alaska. Environmental Assessment and Finding of No Significant Impact. Gene Stout and Associates, Loveland, Colorado.

Stout, G. 2002b. Range Expansion Projects, Donnelly Training Area, Alaska. Environmental Assessment and Finding of No Significant Impact. Gene Stout and Associates, Loveland, Colorado.

Stout, G. 2002c. Range Upgrade/Expansion Projects, Fort Richardson, Alaska. Environmental Assessment and Finding of No Significant Impact. Gene Stout and Associates, Loveland, Colorado.

Stout, G. 2003. Cold Regions Test Center Cold Weather/Automotive Test Complex Donnelly Training Area, Alaska. Draft Environmental Assessment and Finding of No Significant Impact. Gene Stout and Associates, Loveland, Colorado. 65 pages.

Streck, C. 2003. Personal communication [*March 10* conversation with Belt Collins Hawaii Ltd]. U.S. Army Corps of Engineers, Environmental and Special Studies Branch.

Takasaki, K. J., and J. F. Mink 1985. Evaluation of Major Dike-Impounded Ground-Water Reservoirs, Island of Oahu. U.S. Geological Survey Water-Supply Paper 2217. 77 pages.

Tamongdon, N. 2003. Personal communication [*April 11* telephone conversation with M. Cannella, Tetra Tech, Inc.]. Registrar, Mililani High School, Mililani, Hawaii.

Tenorio, P. A., R. H. F. Young, N. C. Burbank, Jr., and L. S. Lau. 1970. Identification of Irrigation Return Water in the Sub-surface, Phase III: Kahuku, Oahu and Kahului and Lahaina, Maui. Water Resources Research Center Technical Report No. 44, University of Hawaii at Manoa, Honolulu, Hawaii.

Tetra Tech. 2005. Environmental Assessment for Transformation of Hawaii Troops to a Modular Force Structure (Hawaii Modularity EA).

The Nature Conservancy. 2000. The Honolulu Preserve Master Plan [Web page]. Located at http://nature.org/wherewework/northamerica/states/hawaii/files/finalmp.pdf. Accessed: August 2002.

Thornbury, W. D. 1965. Regional Geomorphology of the United States. John Wiley & Sons, Inc. New York, New York.

Thurow, D. J., S. D. Warren, and D. H. Carlson. 1995. Tracked Vehicle Effects on the Hydrological Characteristics of Central Texas Rangeland. Transactions of the ASAE 36:1645–1650.

Tissot, B. 1998. Changes in the Marine Habitat and Biota of Pelekane Bay, Hawaii over a 20-Year Period. Marine Science Department, University of Hawaii-Hilo, Hilo, Hawaii.

Topozone. 2006. Place Name Search, Timber Mountain, Wild Mountain and Booth Mountain Elevations [Web page]. Located at http://www.topozone.com. Accessed: June 12, 2006.

Trame, A. 1997. Known and Potential Impacts of Physical Disturbance from Maneuver Training on Threatened and Endangered Species. U.S. Army Construction Engineering Research Laboratories Technical Report 97/70.

U.S. Air Force. 1995. Final Environmental Impact Statement, Alaska Military Operations Areas, Volumes I-IV 11th Air Force, Elmendorf Air Force Base, Alaska.

U.S. Army Alaska. 1979a. Draft Environmental Impact Statement. Land Withdrawal, 172nd Infantry Brigade (Alaska) at Fort Wainwright, Alaska.

U.S. Army Alaska. 1979b. Draft Environmental Impact Statement Concerning Installation Utilization for 172nd Infantry Brigade Alaska at Fort Greely.

U.S. Army Alaska. 1980. Final Environmental Impact Statement Land Withdrawal 172nd Infantry Brigade (Alaska). Fort Greely, Alaska.

U.S. Army Alaska. 1998. Proposed Plan for Cleanup Action at Operable Unit C, Fort Richardson, Alaska. Directorate of Public Works, U.S. Army Alaska: Fort Richardson, Alaska.

U.S. Army Alaska. 1999a. Final Legislative Environment Impact Statement for Alaska Army Lands Withdrawal Renewal. U.S. Army Alaska, Department of the Army: Fort Richardson, Anchorage, Alaska.

U.S. Army Alaska. 1999b. Land Use Plan: Fort Richardson, U.S. Army Alaska, Directorate of Public Works: Fort Richardson, Alaska.

U.S. Army Alaska. 1999c. Land Use Plan: Fort Wainwright, U.S. Army Alaska, Directorate of Public Works: Fort Richardson, Alaska.

U.S. Army Alaska. 2002a. Draft Fire Management Plan, Donnelly Training Area, Alaska. Natural Resources Branch.

U.S. Army Alaska. 2002b. Draft Fire Management Plan, Fort Richardson, Alaska. Natural Resources Branch.

U.S. Army Alaska. 2002c. Fort Richardson 2001 Family Housing Market Analysis – Final Report. May 2002. Prepared for Headquarters, US Army Alaska, Fort Richardson, Alaska.

U.S. Army Alaska. 2002d. Integrated Natural Resource Plan 2002-2006: Fort Greely and Donnelly Training Area. Natural Resources Branch, U.S. Army Alaska: Fort Richardson, Alaska.

U.S. Army Alaska. 2002e. Integrated Natural Resource Plan 2002-2006: Fort Richardson. Natural Resources Branch, U.S. Army Alaska: Fort Richardson, Alaska.

U.S. Army Alaska. 2002f. Integrated Natural Resource Management Plan 2002-2006. Fort Wainwright. Natural Resource Branch, U.S. Army Alaska: Fort Richardson, Alaska.

U.S. Army Alaska. 2002h. Fort Richardson 2001 Family Housing Market Analysis – Final Report. May 2002. Prepared for Headquarters, U.S. Army Alaska, Fort Richardson, Alaska.

U.S. Army Alaska. 2003. Family Housing Master Plan - Fort Richardson, Alaska. Prepared for Assistant Chief of Staff, Installation Management, Army Housing Division, Alexandria, VA by NAHB Research Center, Upper Marlboro, Maryland.

U.S. Army Alaska. 2004. Final Environmental Impact Statement for Transformation of U.S. Army Alaska. United States Army Alaska Department of Public Works, Fort Wainwright, Alaska.

U.S. Army Alaska. 2006. Final Environmental Impact Statement for the Construction and the Operation of a Battle Area Complex and a Combined Arms Collective Training Facility within U.S. Army Training Lands in Alaska. United States Army Garrison Alaska, Fort Richardson, Alaska.

U.S. Army Alaska. 2007. Integrated Natural Resource Plan 2007-2001: Fort Richardson. Natural Resources Branch, U.S. Army Alaska: Fort Richardson, Alaska.

U.S. Army Center for Health Promotion and Preventive Medicine. 1999. Draft Environmental Noise Management Plan for U.S. Army Hawaii. U.S. Army Center for Health Promotion and Preventive Medicine. Aberdeen Proving Ground, Maryland.

U.S. Army Center for Health Promotion and Preventive Medicine. 2001. Environmental Noise Management: An Orientation Handbook for Army Facilities. U.S. Army Center for Health Promotion and Preventive Medicine. Aberdeen proving Ground, Maryland.

U.S. Army Center for Health Promotion and Preventive Medicine. 2001. Environmental Noise Management: An Orientation Handbook for Army Facilities. [Web page] http://chppmwww.apgea.army.mil/enp/enp.htm. U.S. Army Center for Health Promotion and Preventive Medicine. Aberdeen Proving Ground, Maryland.

U.S. Army Corps of Engineers. 1998. Construction Engineering Research Laboratory. Alternatives to Open Burning/Open Detonation of Energetic Materials: Summary of Current Technologies. USACERL Technical Report 98/104. Champaign, Illinois. Document downloaded from document list generated using search for “emissions” on CERL. [Web page] http://www.cecer.army.mil/td/tips/browse/publications.cfm.

U.S. Army Corps of Engineers. 2000. Floodplain Delineation Study, Fort Carson, Colorado. U.S. Army Corps of Engineers, Omaha District.

U.S. Army Corps of Engineers. 2001. Preliminary Draft EA Aviation Complex 6A & 6B, FY01-03, Whole Barracks Renewal. Wheeler Army Airfield, Oahu Hawaii.

U.S. Army Corps of Engineers. 2002a. Programmatic Environmental Impact Statement for Army Transformation. Prepared by Tetra Tech, Inc.

U.S. Army Corps of Engineers. 2002b. Regional Permit under Section 404 of the Clean Water Act (33 USC 1344) for Fort Carson and Piñon Canyon Maneuver Site Erosion Control Activities. Regional Permit Number 2002-00707. Draft.

U.S. Army Corps of Engineers. 2002c. Wetland Survey of Dillingham Military Reservation, Mokuleia, Hawaii. Final.

U.S. Army Corps of Engineers. 2002d. Range Investigation: Schofield Barracks and Pohakuloa Training Area, Hawaii. Draft Report.

U.S. Army Corps of Engineers. 2002e. Preliminary Draft Submittal of Schofield barracks to Helemano Military Vehicle Trail Land Acquisition Environmental Baseline Study.

U.S. Army Corps of Engineers. 2004. Geotechnical Findings Report, Material Site (DTA001), in progress. Alaska District.

U.S. Army Corps of Engineers. 2005a. Fountain Creek Watershed Study Task – Order 2 Summary Report, Threatened and Endangered Species. Prepared by URS Group, Inc.

U.S. Army Corps of Engineers. 2005b. Evaluation of Storm Sewer Capacity (Phase 1), Fort Carson Military Reservation. Draft. Prepared by Booz Allen Hamilton, Inc.

U.S. Army Corps of Engineers. 2006a. Environmental Assessment: Construction of FY06 Facilities at Fort Carson, Colorado. Prepared by CH2MHILL.

U.S. Army Corps of Engineers. 2006b. Operational Noise Consultation 52-ON-046N-06, Operational Noise Contours for Fort Carson, Colorado.

U.S. Army Corps of Engineers. 2006c. Environmental Assessment: Construction of FY06 Facilities at Fort Carson, Colorado. Prepared by CH2MHILL.

U.S. Army Corps of Engineers. 2007a. Fort Carson Transformation Draft Environmental Impact Statement. U.S. Army Corps of Engineers, Mobile, Alabama.

U.S. Army Corps of Engineers. 2007b. Piñon Canyon Maneuver Site Transformation Draft Environmental Impact Statement. U.S. Army Corps of Engineers, Mobile, Alabama.

U.S. Army Development Test Command. 2003. Electromagnetic Compability Study for USARPAC Spectrum Management Office, Hawaii, Enhanced Position Location Reporting System, Radio Frequency Spectrum Occupancy Analysis for Site Coverage of Training Areas on the Island of Oahu, Hawaii.

U.S. Army Engineering District, Honolulu. 2000. A Study to Determine the Effects of Noise from Military Training on the Endangered Oahu ‘Elepaio. Schofield Military Reservation, Island of Oahu. Final Report. Prepared by Dr. Eric VanderWerf, Y. Ebisu and Associates, and Wil Chee-Planning, Inc.

U.S. Army Environmental Center. 1998. U.S. Army Environmental Centers Range XXI Team and U.S. Army Training Support enter. Prevention of Lead Migration and Erosion from Small Arms Ranges.

U.S. Army Environmental Center. 2005. Evaluation of Storm Sewer Capacity (Phase I), Fort Carson Military Reservation. Draft. Prepared by Booz Allen Hamilton, Inc.

U.S. Army Environmental Center. 2006. Programmatic Environmental Assessment for Standard Targetry Replacement Support Branch, Training Support Division.

U.S. Army Environmental Hygiene Agency. 1990. Effects of Munitions on Water Quality. Receiving Water Biological Study No. 32-24-0057-91. Fort Greely, Alaska.

U.S. Army Environmental Hygiene Agency. 1993. Environmental Noise Consultation No. 52-34-Q1UN-93, Noise Contours for Wheeler Army Airfield, Hawaii. U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland.

U.S. Army Garrison – Hawaii. 2004. Final Environmental Impact Statement for the Transformation of the 2nd Brigade, 25th Infantry Division (L) to a Stryker Brigade Combat Team in Hawaii. United States Army Garrison Hawaii, Schofield Barracks, Hawaii.

U.S. Army Garrison – Hawaii. 2005. Draft Oahu Implementation Plan for Oahu Training Area, Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawailoa Training Area. Directorate of Public Works, Environmental Division, Schofield Barracks, Hawaii.

U.S. Army Garrison – Hawaii. 2006. Cultural Resource Management of U.S. Army Stryker Brigade Combat Team (SBCT) Transformation Projects, Oahu and Hawaii Islands. Annual Report, January 2004 – July 2006. Prepared by, U.S. Army Garrison – Hawaii, Directorate of Public Works, Environmental Division.

U.S. Army Hawaii and 25th Infantry Division Light. 1996. Draft Environmental Assessment for Construction of Deep Well, Pohakuloa Training Area, Hawaii.

U.S. Army Hawaii and 25th Infantry Division Light. 1997. Pest Management Plan for U.S. Army Garrison – Hawaii.

U.S. Army Hawaii and 25th Infantry Division Light. 2001a. Integrated Natural Resources Management Plan and Environmental Assessment/Finding of No Significant Impact 2002-2006 Oahu.

U.S. Army Hawaii and 25th Infantry Division Light. 2001b. Integrated Natural Resources Management Plan and Environmental Assessment/Finding of No Significant Impact 2002–2006 Pohakuloa Training Area.

U.S. Army Hawaii and 25th Infantry Division Light. 2003. Integrated Wildland Fire Management Plan, Oahu and Pohakuloa Training Areas.

U.S. Army Hawaii and 25th Infantry Division Light. 2006. Programmatic Environmental Assessment for the Implementation of the Integrated Wildland Fire Management Plan.

U.S. Army Hawaii. 2005a. Draft Implementation Plan for Oahu Training Areas.

U.S. Army Hawaii. 2005b. Environmental Assessment for Improvements to Drum Road, Helemano Military Reservation to Kahuku Training Area, Oahu, Hawaii.

U.S. Census Bureau and U.S. Department of Commerce. 1995. Statistical Brief, Poverty Areas.

U.S. Census Bureau. 1990. Persons, Race, Hispanic Origin, Age, Housing Units, Occupancy Status, Tenure, Vacancy Status, 1990 Summary Tape File 1 (STF 1) - 100-Percent data [Web page]. Located at http://factfinder.census.gov/servlet/DTTable?_ts=43075566354. Accessed: June 25, 2002.

U.S. Census Bureau. 2000a. Total Population, Race, Hispanic or Latino, and Not Hispanic or Latino by Race, Census 2000 Summary File 1 (SF1) 100-Percent Data [Web Page]. Located at http://factfinder.census.gov/servlet/DTTable?_ts=43074249615. Accessed: June 25, 2002.

U.S. Census Bureau. 2000b. Sex by Age, Census 2000 Summary File 1 (SF 1) 100-Percent Data [Web page]. Located at http://factfinder.census.gov/servlet/DTTable?_ts=43075946316. Accessed: June 25, 2002.

U.S. Census Bureau. 2000c. DP-1: Profile of General Demographic Characteristics: 2000, Geographic Area: Fort Carson CDP, Colorado.

U.S. Census Bureau. 2001. 1998 Poverty Estimates [Web page]. Located at http://www.census.gov/housing/saipe/estmod98/est98_HI.dat. Updated December 20, 2001. Accessed: June 25, 2002.

U.S. Census Bureau. 2005. Fact Sheets and Selected Housing Characteristics: 2005 State of Hawaii and Hawaii and Honolulu Counties. 2005 American Community Survey, Data Profile Highlights [Web Page]. Located at http://factfinder.census.gov. Accessed: May 18, 2007.

U.S. Census Bureau. 2006a. 2000 Census [Web page]. Located at http://www.census.gov/main/www/cen2000.html. Accessed: June 2006.

U.S. Census Bureau. 2006b. American FactFinder [Web page]. Located at http://factfinder.census.gov. Accessed: July 2006.

U.S. Census Bureau. 2006c. Poverty 2003 [Web page]. Located at http://www.census.gov/hhes/www/poverty/poverty03.html. Accessed: June 2006.

U.S. Department of Agriculture. 1973. Soil Survey – Island of Hawaii, Hawaii.

U.S. Department of Agriculture. 1979. Prime Colorado Farmland by County. NRCS [Web page]. Located at http://www.co.nrcs.usda.gov/technical/soil/important-farmlands/prime-farm-lands.html. Accessed: May 23, 2006.

U.S. Department of Agriculture. 2001a. Adding Modern Soil Erosion Prediction and Rangeland Health Assessment to the LCTA Program at Fort Carson and Piñon Canyon. U.S. Department of Agriculture, Agriculture Resource Service and Natural Resources Conservation Service.

U.S. Department of Agriculture. 2001b. Valuation of Erosion and Sedimentation for TMDL Compliance at Fort Carson and Piñon Canyon. Final Report and Summary of Activities. U.S. Department of Agriculture, Agriculture Resource Service.

U.S. Department of Agriculture. 2003. Statistics of Hawaii Agriculture [Web page]. Located at http://www.nass.usda.gov/hi/stats/t_of_c.htm. Accessed: February 18, 2004.

U.S. Department of Agriculture. 2005. Soil Survey of Fort Greely and Donnelly Training Area, Alaska. Natural Resources Conservation Service.

U.S. Department of Agriculture. No date. Chapters 4-68, Hawaii Administrative Rules. Noxious Weed Rules.

U.S. Department of Defense. 1978. Departments of the U.S. Air Force, U.S. Army, and U.S. Navy. Environmental Protection: Planning in the Noise Environment. AFM 19-10, TM 5- 803-2, and NAVFAC P-970. Washington, DC. Navy [Web page]. Located at http://www.efdlant.navfac.navy.mil/down/Lantops_15.

U.S. Department of the Army, Headquarters. 1999. Army Regulation 200-5 Environmental Quality Pest Management.

U.S. Department of the Army, Headquarters. 2001. Improved Conventional Munitions and Submunitions.

U.S. Department of the Army. 1993. Malfunctions Involving Ammunition and Explosives (RCS CSGLD-1961 [MIN]).Army Regulation 75-1.

U.S. Department of the Army. 1997. Environmental Quality: Environmental Protection and Enhancement. Army Regulation 200-1.

U.S. Department of the Army. 2001. Sound Level Measurements on the Shadow Tactical Unmanned Aerial Vehicle: Fort Huachuca, Arizona.

U.S. Department of the Army. 2002. Final Programmatic Environmental Impact Statement for the Army Transformation.

U.S. Department of the Army. 2002a. Army Wildland Fire Policy Guidance. Assistance Chief of Staff for Installation Management. Washington, D.C.

U.S. Department of the Army. 2002b. Field Manual FM 7.0 Training the Force. Headquarters, Department of Army.

U.S. Department of the Army. 2004. Training Circular TC 25-1: Training Land.

U.S. Department of the Army. 2005a. Evans Army Community Hospital Hazardous Material/Hazardous Waste Management Program. MEDDAC Regulation Number 40-5-6.

U.S. Department of the Army. 2005b. Fort Carson Management of Regulated Medical Waste. MEDDAC Regulation Number 40-5-5.

U.S. Department of the Army. 2005c. U.S. Army Profile FY2005 [Web page]. Located at http://www.armyg1.army.mil/hr/demographics/FY05%20Army%20Profile.pdf. Accessed: May 2006.

U.S. Department of the Army. 2006. 7th ID and FC Regulation 95–1. Aviation Local Flying Rules and Procedures for Fort Carson. U.S. Army Headquarters, Fort Carson, Colorado. 43 pages.

U.S. Environmental Protection Agency. 1998. National Water Quality Inventory: 1998 Report to Congress. Chapter 12.

U.S. Environmental Protection Agency. 2003a. Del Monte Corporation, Oahu Plantation Superfund Site [Web page]. Located at http://yosemite.epa.gov/r9/sfund/overview.nsf/507c94f730e0ebf488256958005cda5f/8abe436a7e6d1ac98825660b007ee6a8?OpenDocument. Updated: August 13, 2002. Accessed: January 17, 2003.

U.S. Environmental Protection Agency. 2003b. Sole Source Aquifer Protection System Overview. Last updated March 12, 2003 [Web page]. Located at http://www.epa.gov/safewater/swp/ssa.html. Accessed: May 28, 2003.

U.S. Environmental Protection Agency. 2006. Stormwater Program website [Web page]. Located at http://cfpub.epa.gov/npdes/home.cfm?program_id=6. Accessed: July 18, 2006.

U.S. Fish and Wildlife Service. 1981. Biological Opinion for the 25th infantry Division Field Training Exercise. Pohakuloa Training Area, Hawaii. September 2

U.S. Fish and Wildlife Service. 1991. Fish and Wildlife Management Recommendations: Piñon Canyon Maneuver Site, Las Animas, Colorado.

U.S. Fish and Wildlife Service. 1998a. Draft Environmental Assessment for the Erosion and Sediment Control Program at Fort Carson, Colorado.

U.S. Fish and Wildlife Service. 1998b. Recovery Plan For The Hawaiian Hoary Bat. Portland, Oregon. 50 pages.

U.S. Fish and Wildlife Service. 2002a. Notice of Proposed Designation of Critical Habitat for Plant species from the Island of Oahu, Hawaii May 31 2002. U.S. Department of the Interior, Fish and Wildlife Service Pacific Islands Ecoregion (With two enclosures).

U.S. Fish and Wildlife Service. 2002b. Office of Subsistence Management [Web page]. Located at http:// alaska fws.gov/asm/home.html.

U.S. Fish and Wildlife Service. 2003a. Endangered and Threatened Wildlife and Plants; Final Designation and Nondesignation of Critical Habitat for 46 Plant Species from the Island of Hawaii, Hawaii. Final Rule. Federal Register 68:39623–39672.

U.S. Fish and Wildlife Service. 2003b. US Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Final Designations or Nondesignations of Critical Habitat for 101 Plant Species from the Island of Oahu, Hawaii. Federal Register 68:35999–36048.

U.S. Fish and Wildlife Service. 2003c. Biological Opinion for Routine Military Activity and Transformation of the 2nd Brigade 25th Infantry Division (Light). U.S. Army Installations. Island of Oahu.

U.S. Fish and Wildlife Service. 2003d. Biological Opinion of the USFWS for Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light). U.S. Army Installations. Island of Oahu.

U.S. Fish and Wildlife Service. 2005. U.S. Fish and Wildlife Service Mountain-Prairie Region, Endangered Species, Colorado [Web page]. Located at http://mountain-prairie.fws.gov/endspp/CountyLists / COLORADO.htm. Accessed: May 18, 2006.

U.S. Fish and Wildlife Service. 2006a. Endangered and Threatened Wildlife and Plants; Determination of Status for 12 Species of Picture-Wing Flies from the Hawaiian Islands, Final Rule. Federal Register 71:26835–26852.

U.S. Fish and Wildlife Service. 2006b. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for 11 Species of Picture-Wing Flies from the Hawaiian Islands; Proposed Rule. Federal Register 71:46994–47054.

U.S. Forest Service. 2005. Draft Cimarron and Comanche National Grasslands Land Management Plan. U.S. Forest Service.

U.S. Geological Survey. 1993. Assessment of Effects of Military Maneuvers on the Streamflow, Water Quality, and Sediment Yields at the U.S. Army Piñon Canyon Maneuver Site, Las Animas County, Colorado. U.S. Geological Survey Water Resources Investigation Report 91-4095.

U.S. Geological Survey. 1996. Storm Water Pollution Control Plan.

U.S. Geological Survey. 1997. Living on Active Volcanoes – The Island of Hawaii. U.S. Geological Survey Fact Sheet 074-97 [Web page]. Located at http://wrgis.wr.usgs.gov/fact-sheet/fs074-97/. Accessed: August 13, 2002.

U.S. Geological Survey. 1998. Kaena Topographic Quadrangle, Oahu, Hawaii.

U.S. Geological Survey. 1999a. Ground Water Atlas of the United States, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands. HA 730-N. 1999.

U.S. Geological Survey. 1999b. Haleiwa Topographic Quadrangle, Oahu, Hawaii.

U.S. Geological Survey. 2000a.Ground Water in Hawaii. Fact Sheet 126-00.

U.S. Geological Survey. 2000b. Volcanic Air Pollution—A Hazard in Hawaii. U.S. Geological Survey Fact Sheet 169-97, Online Version 1.1, revised June 2000 [Web page]. Located at http://wrgis.wr.usgs.gov/factsheet/fs169-97/. Accessed: January 6, 2003.

U.S. Geological Survey. 2001a. Earthquake History of Hawaii. National Earthquake Information Center, World Data Center for Seismology, Denver [Web page]. Located at http://neic.usgs.gov/neis/states/Hawaii/Hawaii_history.html. Accessed: August 13, 2002.

U.S. Geological Survey. 2001b. Kipuka ‘Alalā Terrestrial Arthropod Survey, Pohakuloa Training Area, Hawaii. Peter T. Oboyski, Aaron J. Gregor, Lisa B. Passerello, Justin P. Weber, Jessica E. Hines, and Paul C. Banko.

U.S. Geological Survey. 2002. Biological Soil Crusts, Webs of Life in the Desert. USGS Fact Sheet FS-065-01.

U.S. Geological Survey. 2005. Quaternary Fault and Fold database for the United States: Pueblo Sheet, Colorado [Web page]. Located at http://earthquake.usgs.gov/regional/qfaults/co. Accessed: May 17, 2006.

VanderWerf, E., Y. Ebisu & Associates, and Will Chee-Planning Inc. 2000. Final Report A Study to Determine the Effects of Noise from Military Training on the Endangered Oahu ‘Elepaio. July 1, 2000.

Viereck, L. A., C. T. Dyrness, A. R. Batten, and K. J. Wenzlick. 1992. The Alaska Vegetation Classification. U.S. Forest Service Pacific Northwest Research Station General Technical Report PNW-GTR-286.

Wagner, W. L., D. R. Herbst, S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawaii, Revised Edition. Volumes I & II.

Wahrhaftig, C. 1965. Physiographic divisions of Alaska. Washington, DC: U.S. Geological Survey, Professional Paper 482.

Walker, C. 2006. Personal communication [*June 6* conversation with E. Cutler, CH2MHILL]. Fountain-Fort Carson School District 8.

Walsh, M. E. 2004. Field Portable X-Ray Fluorescence (SP-XRF) Determination of Post-Blast Ordinance Residues. Cold Regions Research and Engineering Lab (CRREL).

Walter Lum Associates, Inc. 1979. Land Management/Erosion Control Study, USASCH Installations, Hawaii, Schofield Barracks Military Reservation. Prepared for US Army Support Command Hawaii.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1 [CD-ROM]. WeatherDisc Associates, Inc., Seattle, Washington.

Widmann, B. L., R. M. Kirkham, M. L. Morgan, and W. P. Rogers. 2002. Colorado Late Cenozoic Fault and Fold Database and Internet Map Server. Colorado Geological Survey Information Series 60a [Web page]. Located at http://geosurvey.state.co.us/pubs/ceno/. Accessed: June 12, 2006.

Wilcox, D. E. 1980. Geohydrology of the Delta-Clearwater Area, Alaska. U.S. Geological Survey Water Resources Investigation 80-92.

Wolfe, R. 2000. Subsistence in Alaska: A Year 2000 Update. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

Y. Ebisu and Associates. 2002. Acoustic Study for the Mission Support Training Facility and Information Services Facility, Schofield Barracks, Oahu, Hawaii. Prepared for Wil Chee Planning, Inc.

Yamamoto, R. 2002. Personal communication [*July and August* conversations with L. Garlinghouse, Tetra Tech, Inc.]. U.S. Army, Directorate of Public Works.

Yarmoloy, C., M. Bayer, and V. Geist. 1988. Behavior responses and reproduction of mule deer, *Odocoileus herionus*, does following experimental harassment with an all-terrain vehicle. Canadian Field-Naturalist 102:425–429.

Young, R. H. F., G. L. Dugan, L. S. Lau, and H. Yamauchi. 1975. Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir. WRRC Technical Report No. 89.

Zier, C. J., and S. M. Kalasz. 1999. Colorado Prehistory: A Context for the Arkansas River Basin. Colorado Council of Professional Archaeologists, Denver, Colorado.

Chapter 9
Index

CHAPTER 9
INDEX

A

Act
  Superfund Amendments and Reauthorization Act, 3-21
Acts
  Base Realignment and Closure Act of 2005 (BRAC), 1-2, 1-11, 2-12, 2-32, 2-33, 2-34, 2-40, 2-41
  Clean Air Act, 3-71, 3-72, 3-74, 3-76, 3-122, 3-123, 3-124, 3-168, 5-11, 5-19, 5-52, 5-250
  Clean Water Act, 3-22, 3-26, 3-62, 3-164, 3-167, 4-8, 4-14, 5-16, 5-51, 5-99, 5-127, 5-179, 5-180, 5-230
  Comprehensive Environmental Response, Compensation, and Liability Act, 3-21, 3-50, 3-52, 3-96, 3-161, 4-14
  Endangered Species Act, 3-56, 3-57, 3-63, 3-71, 3-165, 5-43, 5-99, 5-102, 5-104, 5-182
  National Environmental Policy Act, 1-2, 1-11, 1-12, 1-13, 1-15, 2-23, 3-1, 3-28, 3-29, 3-70, 4-2, 4-13, 5-7, 5-50, 5-182
  National Historic Preservation Act of 1966, 3-32, 3-33, 3-37, 3-148, 4-10, 5-24, 5-81, 5-82, 5-182, 5-187, 5-188, 5-189
Air Field
  Bradshaw Army Air Field, 2-18, 2-21, 2-29, 2-36, 3-37, 3-38, 3-43, 3-76, 3-82, 3-83, 3-86, 3-87, 5-52, 5-60, 5-61, 5-164
  Butts Army Air Field, 2-32, 3-149, 3-161, 3-162, 3-164, 3-170, 3-171, 3-173, 3-174, 5-146
  Wheeler Army Air Field, 2-18, 2-20, 2-21, 2-29, 2-36, 3-3, 3-4, 3-5, 3-8, 3-18, 3-19, 3-20, 3-29, 3-32, 3-35, 3-39, 3-40, 3-44, 3-50, 3-51, 3-53, 3-54, 3-57, 3-58, 3-59, 3-74, 3-75, 3-80, 3-85, 3-87, 3-88, 5-34, 5-43, 5-54, 5-55, 5-60, 5-194, 5-201, 5-231
Air Force Base
  Elmendorf, 3-96, 3-99, 3-100, 3-109, 3-118, 3-125, 3-129, 5-108, 5-236, 5-244
  Hickam, 3-44, 3-52, 3-53, 5-34, 5-231
  Ladd, 3-105
Alaska Range, 3-92, 3-94, 3-96, 3-98, 3-104, 3-107, 3-121, 3-122, 3-126, 3-128, 3-129
Arkansas River, 3-137, 3-138, 3-139, 3-143, 3-144, 3-166

C

Chugach Mountains, 3-90, 3-91, 3-92, 3-95, 3-119
City
  Anchorage, Alaska, 1-14, 3-90, 3-92, 3-94, 3-96, 3-99, 3-102, 3-105, 3-107, 3-108, 3-109, 3-110, 3-111, 3-112, 3-123, 3-125, 3-126, 3-129, 5-68, 5-90, 5-91, 5-235, 5-236, 5-240, 5-241, 5-243, 5-244
  Colorado Springs, Colorado, 1-14, 3-130, 3-137, 3-142, 3-146, 3-149, 3-150, 3-152, 3-154, 3-155, 3-157, 3-168, 3-170, 3-171, 3-172, 3-173, 5-159, 5-167, 5-246, 5-247, 5-250
  Delta Junction, Alaska, 1-14, 3-100, 3-109, 3-111, 3-112, 3-122, 3-126, 3-130, 5-76, 5-79, 5-89, 5-236, 5-237
  Hilo, Hawaii, 1-14, 3-37, 3-45, 3-46, 3-47, 3-48, 3-49, 3-76, 3-83
  Honolulu, Hawaii, 1-14, 3-29, 3-30, 3-31, 3-42, 3-44, 3-45, 3-46, 3-47, 3-48, 3-49, 3-55, 3-62, 3-83, 3-86, 3-87, 3-88, 5-35, 5-46, 5-51, 5-62
  La Junta, Colorado, 1-14, 3-151, 3-157, 3-158
  Lakewood, Washington, 1-14
  Radcliff, Kentucky, 1-14
  Shepherdsville, Kentucky, 1-14

Trinidad, Colorado, 1-14, 3-151, 3-153, 3-157, 3-158, 3-175
Yakima, Washington, 1-14
Comanche National Grasslands, 3-151
Conformity Determination, 3-72, 3-168, 5-159, 5-250
Council on Environmental Quality, 1-12, 1-13, 2-37, 4-2, 4-3

D

Depleted Uranium (DU), 1-14, 3-7, 3-8, 5-200
Dillingham Trail, 3-9, 3-22, 3-33, 3-41, 3-44, 3-85, 3-86, 5-4, 5-12, 5-13, 5-14, 5-22, 5-24, 5-27, 5-28, 5-34, 5-40, 5-44, 5-48, 5-49, 5-58, 5-59, 5-64, 5-65, 5-179, 5-180, 5-205, 5-232
Drum Road, 3-11, 3-13, 3-24, 3-25, 3-41, 3-42, 3-44, 3-45, 3-65, 3-86, 5-10, 5-11, 5-13, 5-21, 5-23, 5-24, 5-34, 5-40, 5-44, 5-48, 5-59, 5-228

E

Eagle River Flats, 3-91, 3-95, 3-103, 3-107, 3-113, 3-116, 3-117, 3-118, 3-120, 3-125, 5-108

F

Farrington Highway, 3-9, 3-22, 5-228
Federal Aviation Administration, 3-82, 4-18, 5-62, 5-110, 5-218, 5-245
Fort Greely, 3-94, 3-97, 3-98, 3-99, 3-100, 3-101, 3-104, 3-105, 3-106, 3-111, 3-112, 3-124, 3-125, 5-81, 5-83, 5-237, 5-243, 5-244
Fugitive Dust, 3-77, 3-133, 3-141, 3-169, 3-170, 4-16, 5-11, 5-19, 5-36, 5-37, 5-51, 5-52, 5-68, 5-77, 5-91, 5-92, 5-93, 5-106, 5-107, 5-120, 5-121, 5-144, 5-145, 5-161, 5-162, 5-197, 5-198, 5-199, 5-210, 5-243, 5-246

G

Glenn Highway, 3-95, 3-108, 3-110, 3-118, 3-125, 3-127, 5-109
Global Defense Posture Realignment (GDPR), 1-2, 1-11, 1-12, 2-12, 2-32, 2-34, 2-40

H

Hamakua Volcano, 3-13
Helemano Trail, 2-23, 3-18, 3-39, 3-40, 3-44, 3-58, 3-60, 3-86, 5-13, 5-24, 5-34, 5-40, 5-43, 5-48, 5-58, 5-59, 5-176
Hiking, 3-24, 3-39, 3-40, 3-41, 3-42, 3-106, 3-107
Honouliuli Forest Preserve, 3-18, 3-30, 3-39, 3-40, 3-58, 3-59, 3-61
Hunting, 3-38, 3-39, 3-40, 3-41, 3-42, 3-43, 3-87, 3-100, 3-104, 3-106, 3-107, 3-129, 3-130, 3-143, 3-144, 3-149, 3-151, 5-31, 5-83, 5-114, 5-115, 5-116, 5-136, 5-137, 5-241, 5-245

I

Integrated Cultural Resources Management Plan, 3-103, 3-104, 4-4, 5-81, 5-82, 5-86, 5-118, 5-133, 5-134, 5-135, 5-228, 5-231, 5-248
Integrated Natural Resources Management Plan, 3-5, 3-10, 3-12, 3-15, 3-58, 3-61, 3-65, 3-67, 3-69, 3-71, 3-88, 3-91, 3-93, 3-120, 3-132, 3-133, 3-135, 3-165, 3-167, 4-4, 5-10, 5-16, 5-42, 5-44, 5-67, 5-68, 5-69, 5-70, 5-73, 5-74, 5-76, 5-86, 5-98, 5-99, 5-101, 5-121, 5-122, 5-123, 5-124, 5-125, 5-127, 5-129, 5-155, 5-175, 5-176, 5-177, 5-178, 5-182, 5-183, 5-228, 5-242
Integrated Training Area Management, 2-28, 3-5, 3-6, 3-10, 3-12, 3-15, 3-91, 3-93, 3-136, 4-4, 5-4, 5-5, 5-6, 5-7, 5-8, 5-11, 5-12, 5-13, 5-16, 5-17, 5-19, 5-20, 5-24, 5-31, 5-54, 5-67, 5-68, 5-69, 5-70, 5-73, 5-74, 5-85,

5-86, 5-112, 5-113, 5-120, 5-121, 5-122, 5-124, 5-125, 5-129, 5-152, 5-155, 5-157, 5-168, 5-173, 5-174, 5-175, 5-176, 5-177, 5-178, 5-182, 5-183, 5-223, 5-224, 5-225, 5-226, 5-228, 5-236
Interstate 25, 3-149, 3-152, 3-153, 5-126, 5-128, 5-129, 5-139, 5-141, 5-164, 5-195, 5-246

K

Kamehameha Highway, 3-10, 3-11, 3-18, 3-23, 3-29, 3-45
Kaukonahua Road, 3-19
Kawaihae Harbor, 3-13, 3-14, 3-26, 3-38, 3-43, 3-44, 3-51, 3-70, 3-87, 5-8, 5-24, 5-40, 5-48, 5-176, 5-181, 5-231, 5-233
Kawaihae Trail, 2-23, 3-14
Kohala Mountains, 3-13, 3-26
Koolau Range, 3-1, 3-3, 3-4, 3-8, 3-10, 3-12, 3-18, 3-20, 3-21, 3-23, 3-24, 3-25, 3-40, 3-41, 3-42, 3-44, 3-57, 3-60, 3-64, 3-65, 3-67, 3-68, 5-6
Koolau Volcano, 3-3, 3-4, 3-10, 3-25
Kunia Road, 3-29, 3-39, 3-44, 3-45

M

Marine Corps, 1-5, 2-29, 3-40, 3-44
Mauna Kea, 3-13, 3-16, 3-25, 3-26, 3-27, 3-31, 3-33, 3-38, 3-43, 3-45, 3-68, 5-57
Mauna Loa, 3-13, 3-16, 3-25, 3-27, 3-33, 3-43, 3-68

N

National Ambient Air Quality Standards, 3-72, 3-73, 3-123, 3-124, 3-168, 3-169, 5-107, 5-159, 5-160, 5-162, 5-243, 5-244, 5-250, 5-251
National Register of Historic Places, 3-32, 3-146, 3-147, 3-148, 5-248

O

Opaeula Reservoir, 3-24

P

Parks Highway, 3-108, 5-237, 5-238
Permafrost, 3-88, 3-91, 3-92, 3-93, 3-94, 3-98, 3-121, 4-15, 5-67, 5-73, 5-100, 5-103, 5-237, 5-238
Prevention of Significant Deterioration, 3-123, 3-168, 5-161, 5-211
Prime Farmland, 3-150, 3-151
Purgatoire River, 3-135, 3-136, 3-138, 3-139, 3-151, 3-166, 3-167, 3-174, 5-124, 5-125, 5-247

R

Richardson Highway, 3-94, 3-102, 3-107, 3-108, 3-109, 3-126, 3-128, 5-79, 5-83, 5-88, 5-89, 5-236

S

Saddle Road, 3-13, 3-14, 3-16, 3-26, 3-37, 3-43, 3-44, 3-45, 3-76, 3-87, 5-10, 5-57, 5-229
Santa Fe Trail, 1-15, 3-144, 3-148
Schofield Barracks Historic District, 3-35
Schofield Plateau, 3-1, 3-3, 3-20, 3-21, 3-24
Scoping, 1-13, 1-14, 1-15, 4-7, 4-9, 4-14, 4-20
Special Management Area, 3-40, 3-41, 3-42, 3-43

State Historic Preservation Officer, 3-33
Stormwater, 3-26, 3-133, 3-164, 3-172, 3-173, 3-175, 3-176, 5-5, 5-6, 5-16, 5-17, 5-19, 5-46, 5-48, 5-51, 5-65, 5-68, 5-69, 5-121, 5-122, 5-126, 5-127, 5-129, 5-170, 5-179, 5-180, 5-230, 5-247
Subsistence, 3-33, 3-106, 3-107, 3-112, 3-117, 3-129, 3-130, 3-143, 4-20, 4-21, 5-1, 5-66, 5-67, 5-83, 5-84, 5-85, 5-91, 5-114, 5-115, 5-116, 5-172, 5-225, 5-226, 5-227, 5-236, 5-240, 5-241, 5-245

T

Tanana Flats Training Area, 3-109, 5-238
Teller Reservoir, 3-137, 3-164
Thermokarst, 3-88, 3-91, 3-93, 4-15, 5-67, 5-73, 5-100, 5-103
Traditional Cultural Property, 3-32, 3-35, 3-36, 3-37, 3-38, 3-103, 3-106, 3-147, 3-149, 4-10, 4-11, 5-232, 5-248

U

U.S. Highway 160, 3-153, 5-141, 5-164, 5-195, 5-196
Unexploded Ordnance, 3-7, 3-32, 3-44, 3-50, 3-51, 3-52, 3-54, 3-87, 3-99, 3-103, 3-112, 3-113, 3-115, 3-121, 3-141, 3-160, 3-163, 4-13, 4-14, 5-9, 5-25, 5-26, 5-28, 5-29, 5-37, 5-38, 5-40, 5-53, 5-64, 5-84, 5-93, 5-95, 5-113, 5-147, 5-148, 5-149, 5-169, 5-190, 5-200, 5-201, 5-202, 5-203, 5-223, 5-224, 5-226, 5-229, 5-232, 5-238, 5-241
Unmanned Aerial Vehicle, 1-5, 2-3, 2-28, 5-52, 5-54, 5-60, 5-61, 5-62, 5-110, 5-166, 5-217, 5-218, 5-219

W

Wahiawa Reservoir, 3-1, 3-3, 3-17, 3-18, 3-19, 3-39
Waianae Range, 3-1, 3-3, 3-8, 3-9, 3-10, 3-18, 3-20, 3-22, 3-23

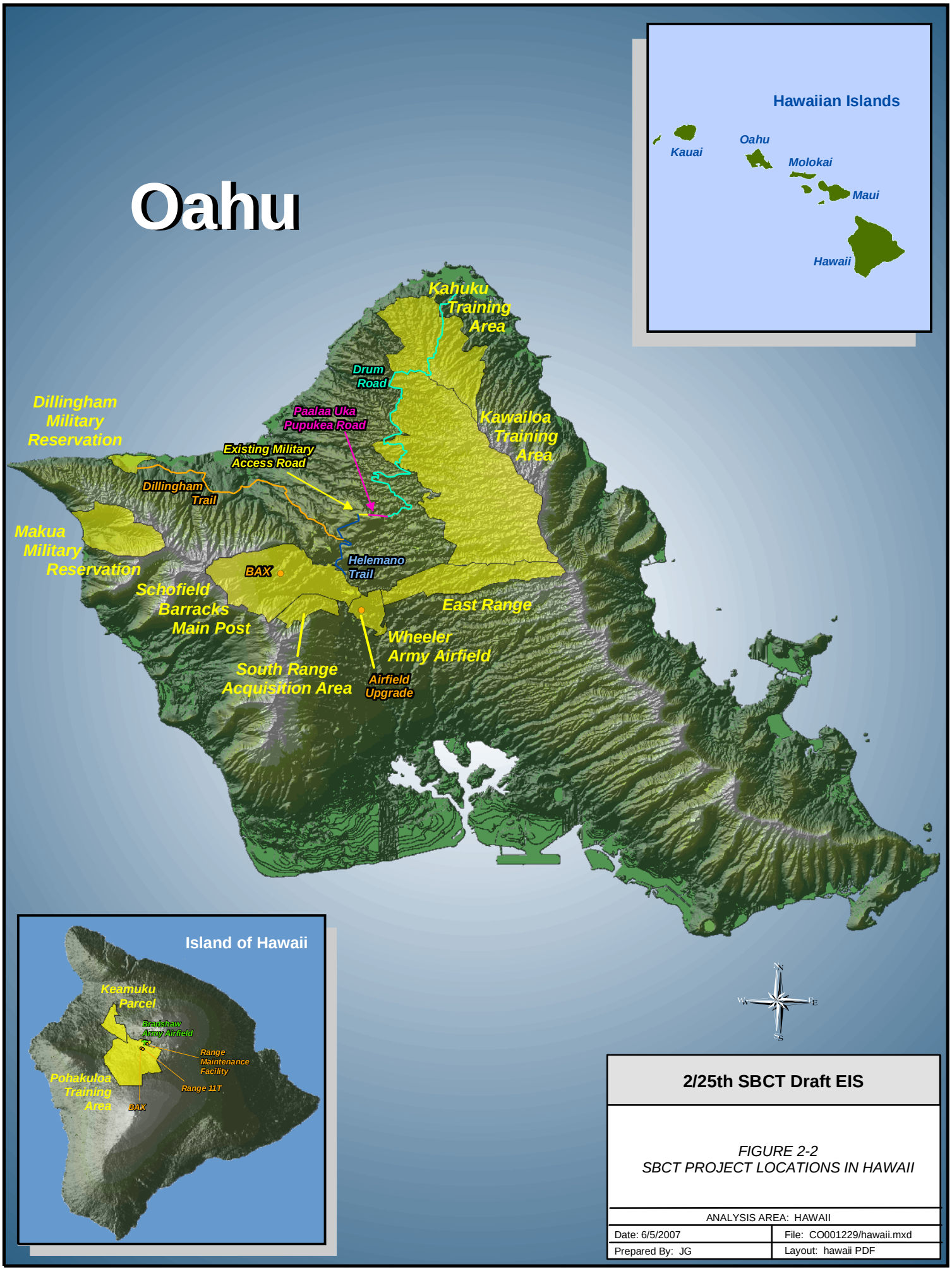

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FIGURE 2-2
SBCT PROJECT LOCATIONS IN HAWAII

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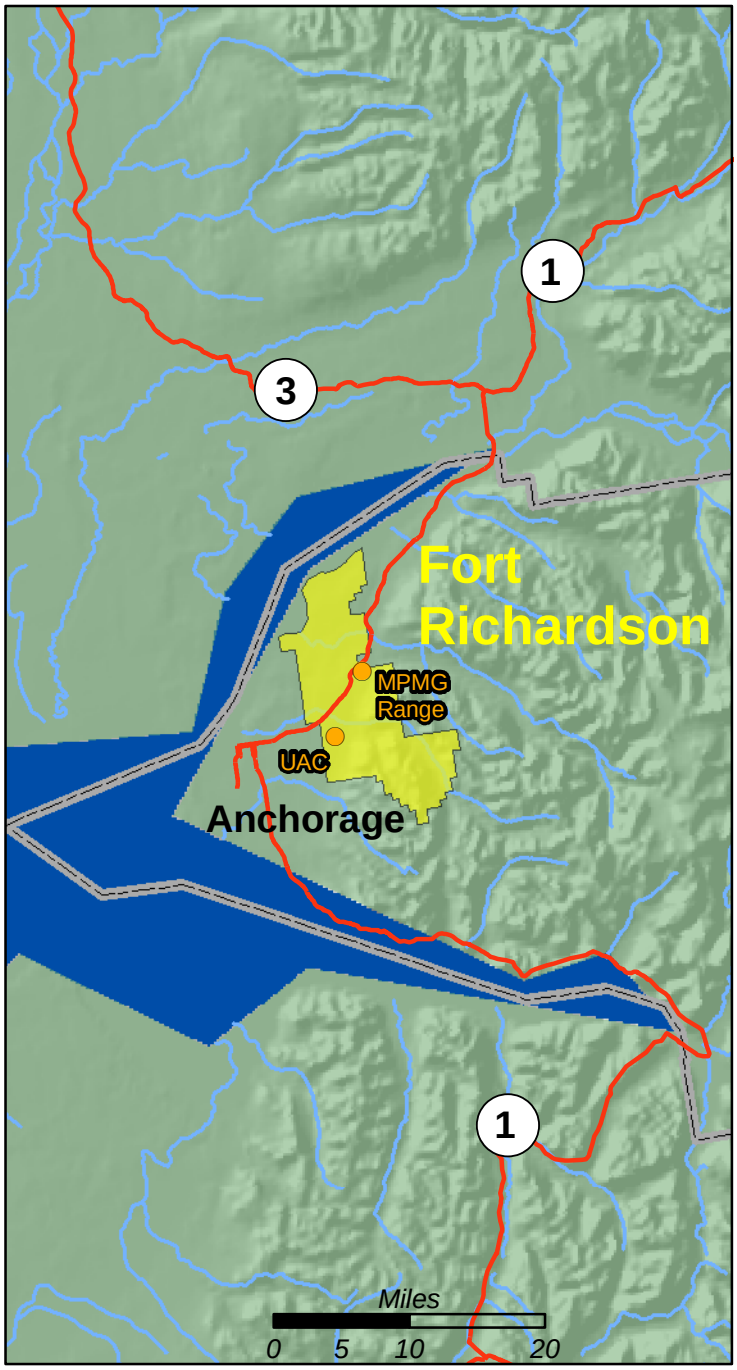
Prepared By: JG	Layout: hawaii PDF



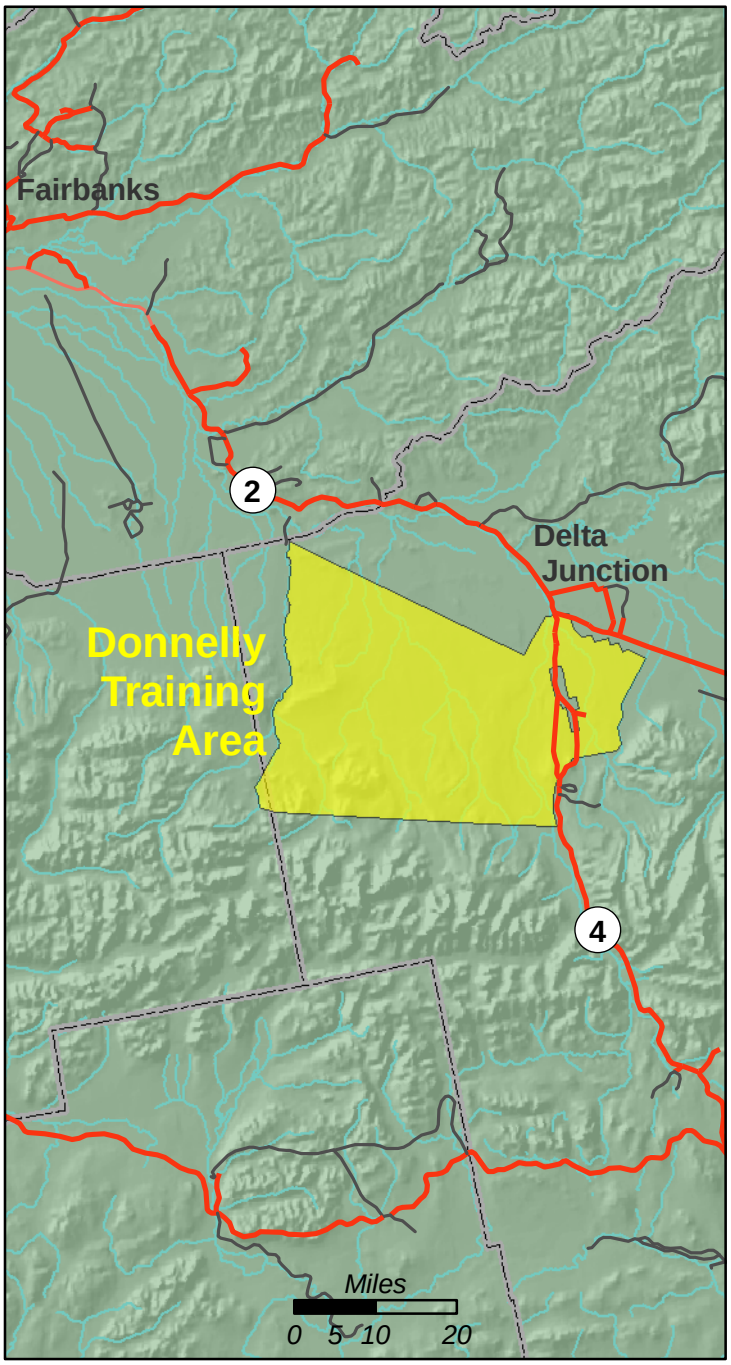


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FIGURE 2-3
SBCT PROJECT LOCATIONS IN ALASKA

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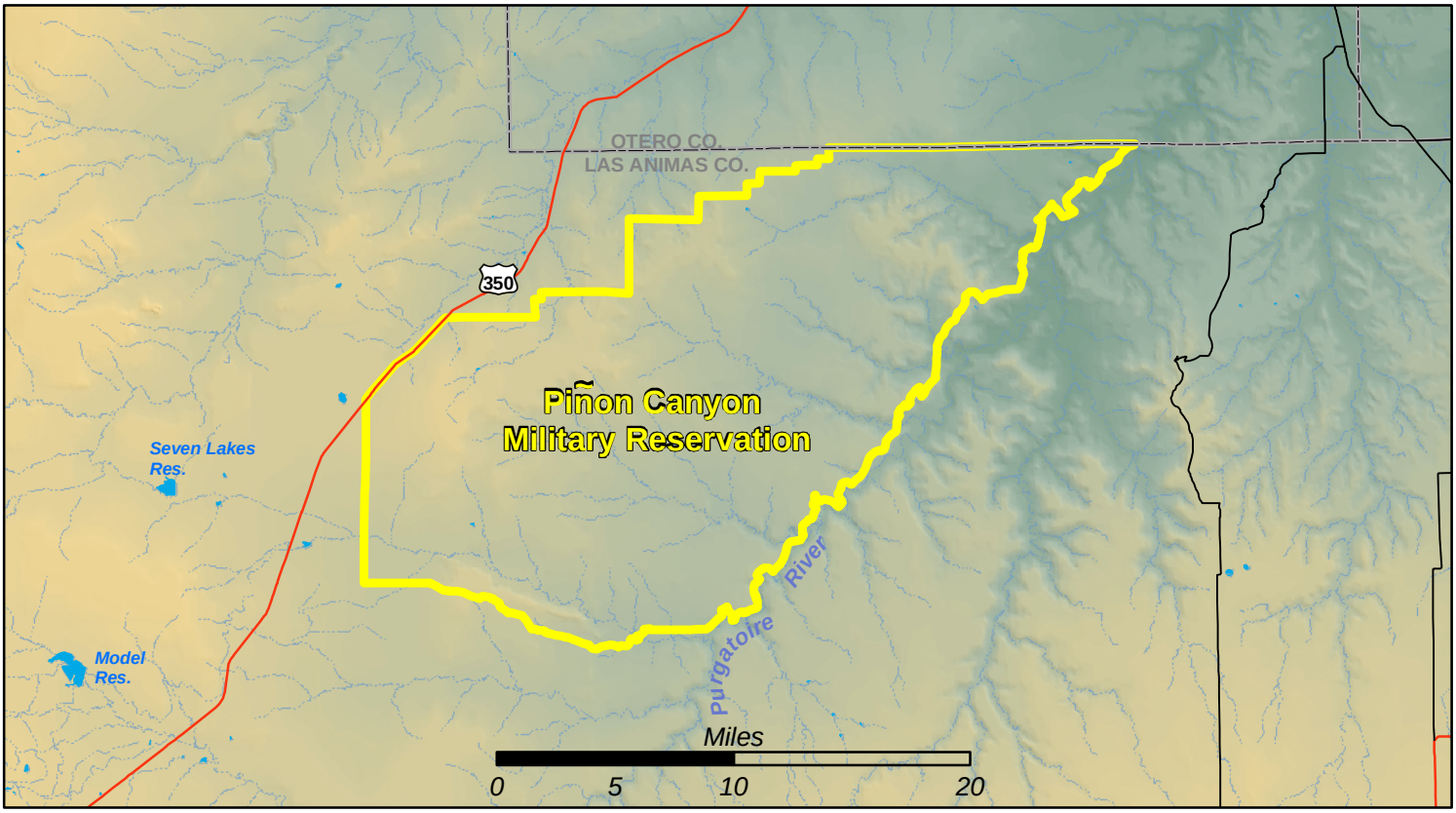

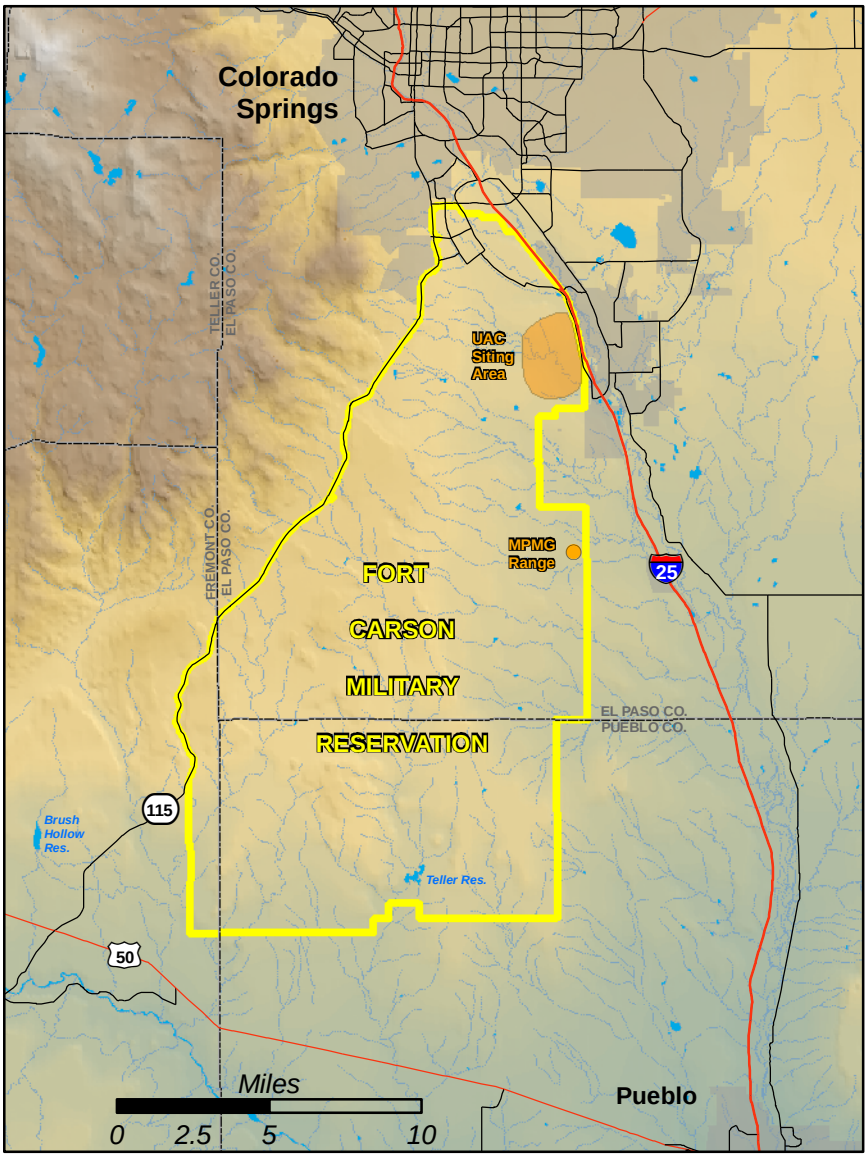

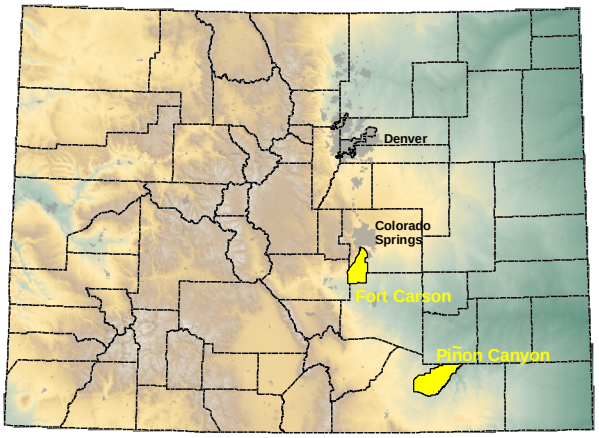

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FIGURE 2-4
SBCT PROJECT LOCATIONS IN COLORADO

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Prepared By: JG	Layout: Colorado PDF

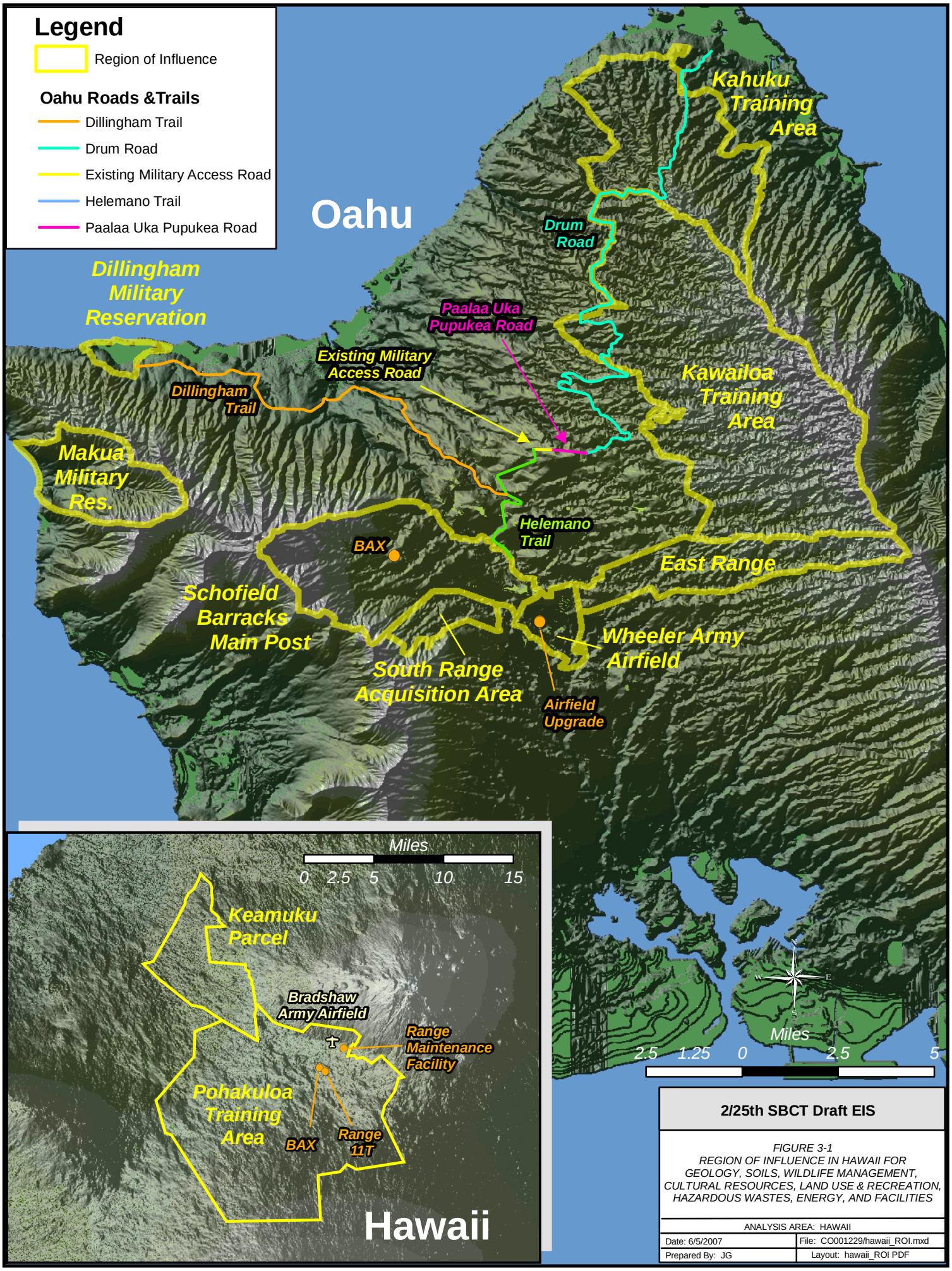

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FIGURE 3-1
REGION OF INFLUENCE IN HAWAII FOR GEOLOGY, SOILS, WILDLIFE MANAGEMENT, CULTURAL RESOURCES, LAND USE & RECREATION, HAZARDOUS WASTES, ENERGY, AND FACILITIES

ANALYSIS AREA: HAWAII

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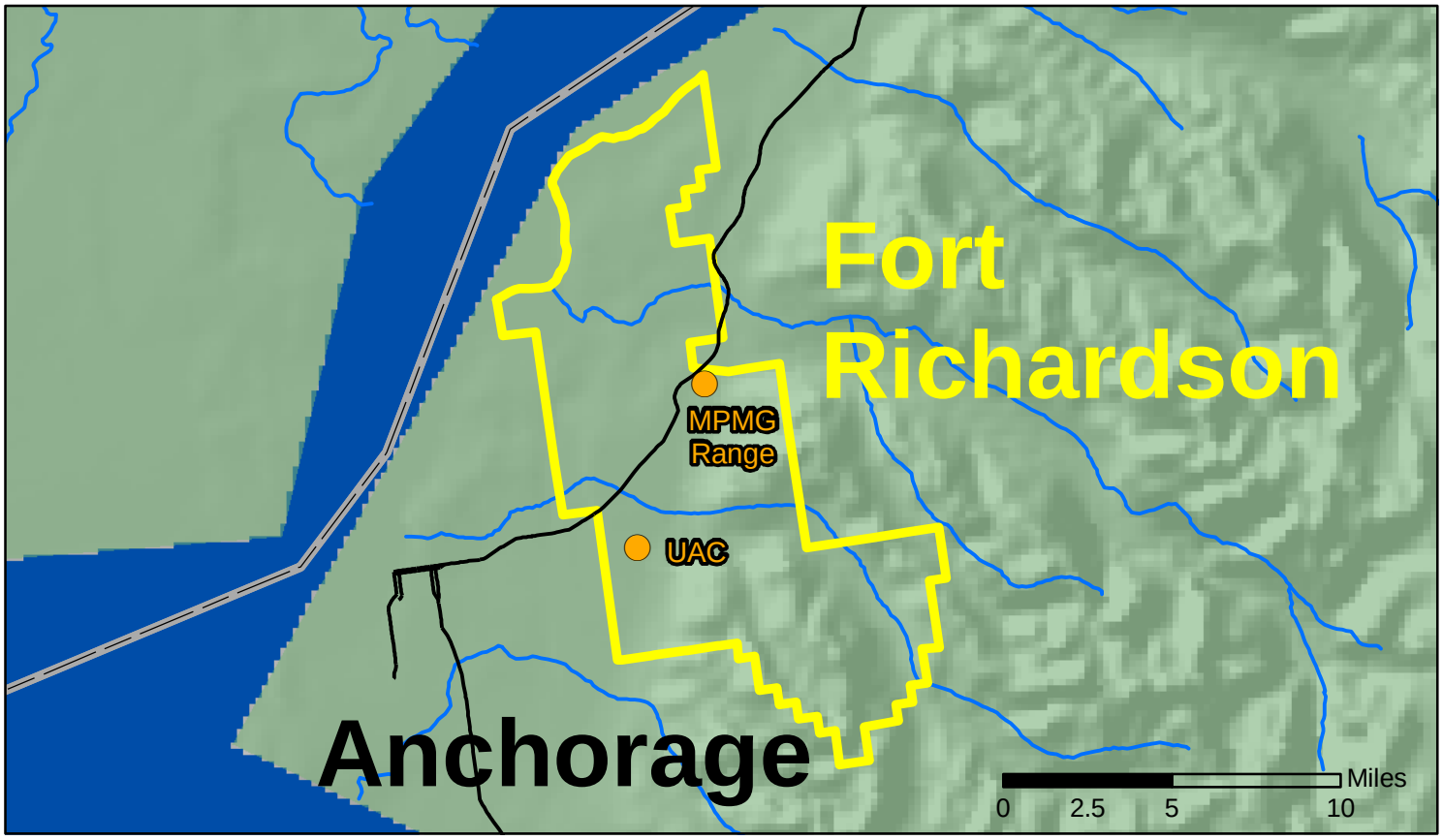
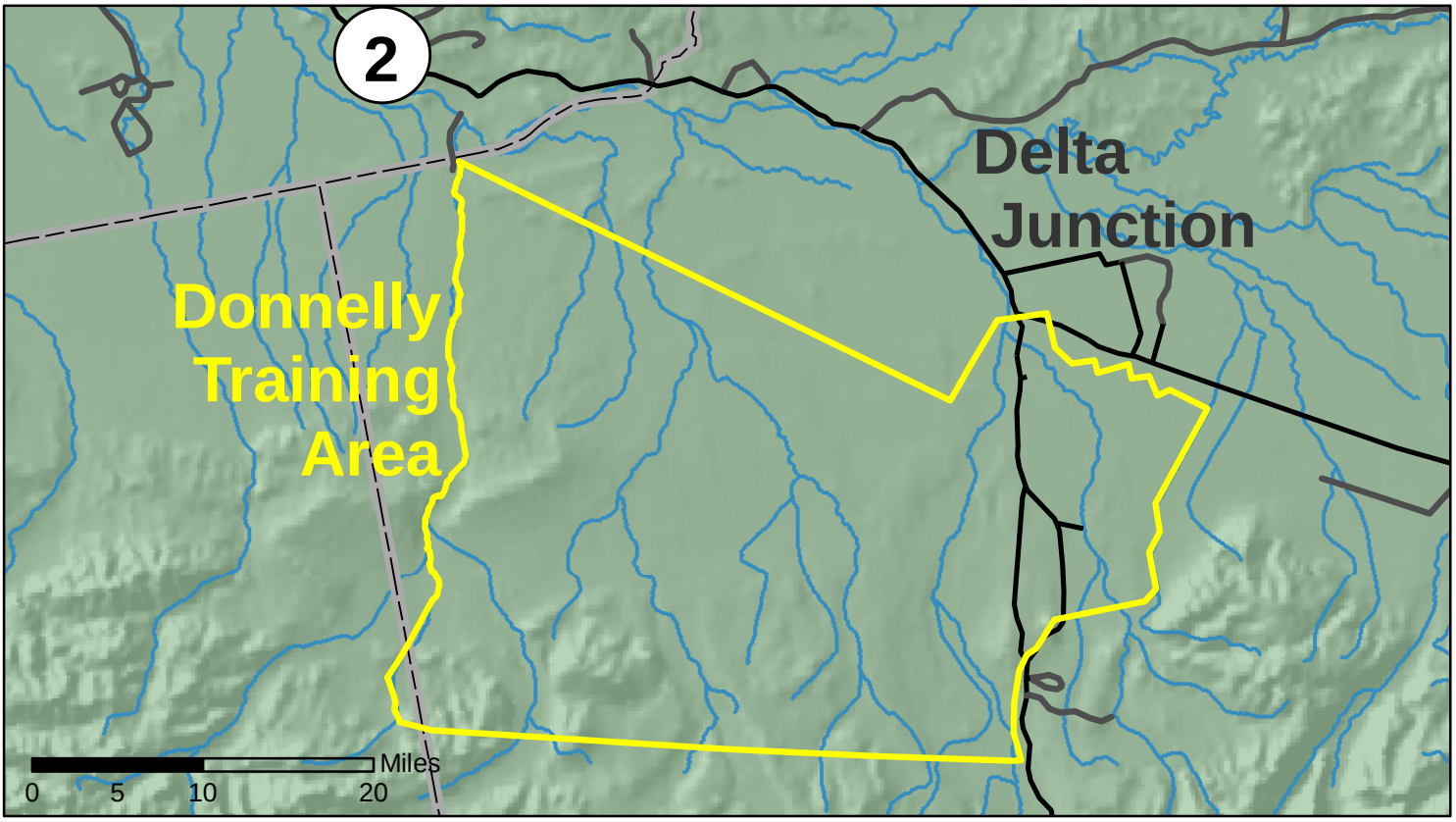
Prepared By: JG	Layout: hawaii_ROI PDF





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Region of Influence

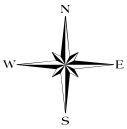

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FIGURE 3-2
REGION OF INFLUENCE IN ALASKA
FOR GEOLOGY, SOILS, WILDLIFE MANAGEMENT, CULTURAL RESOURCES, LAND USE & RECREATION, HAZARDOUS WASTES, ENERGY, AND FACILITIES

ANALYSIS AREA: ALASKA

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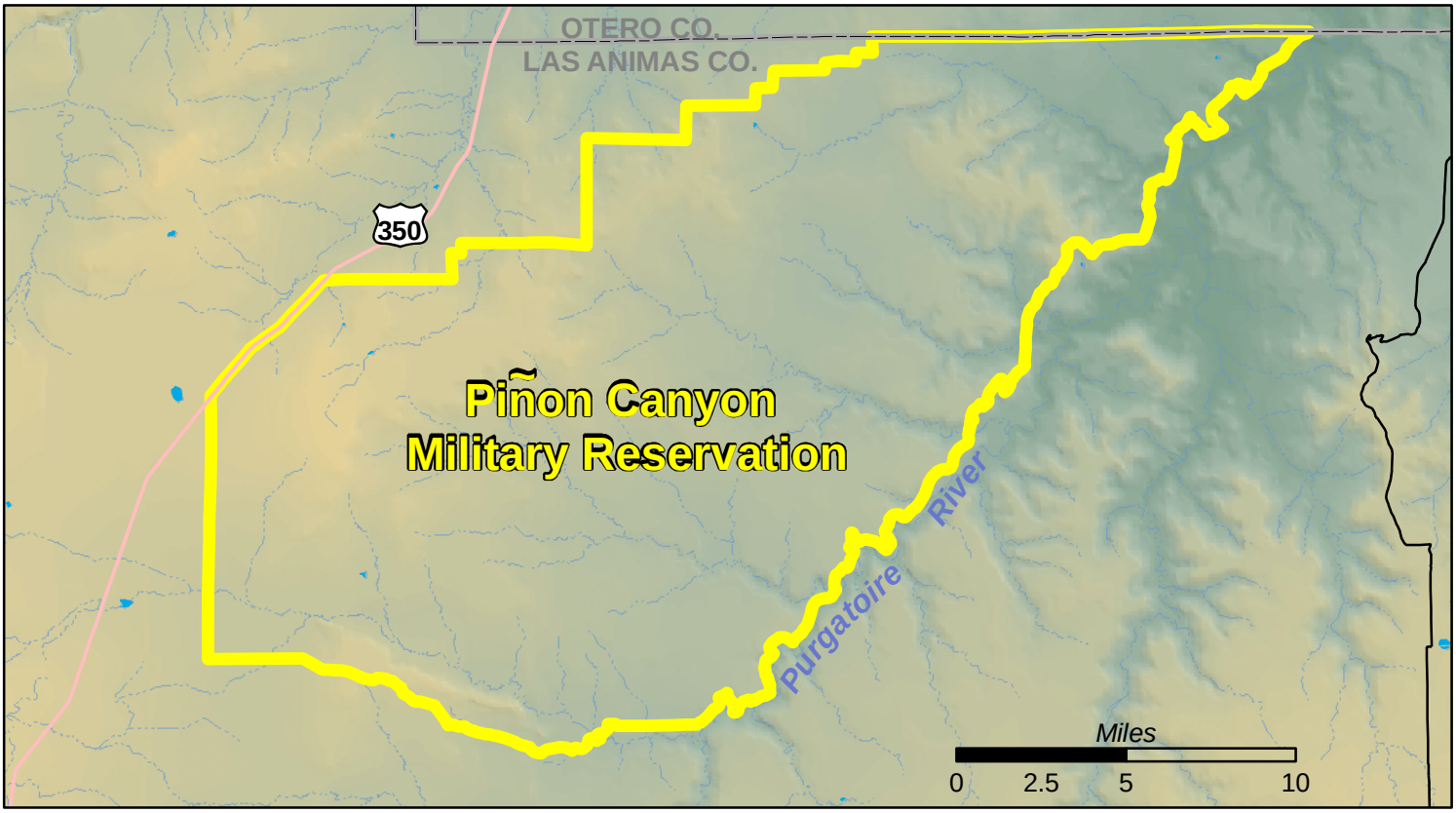

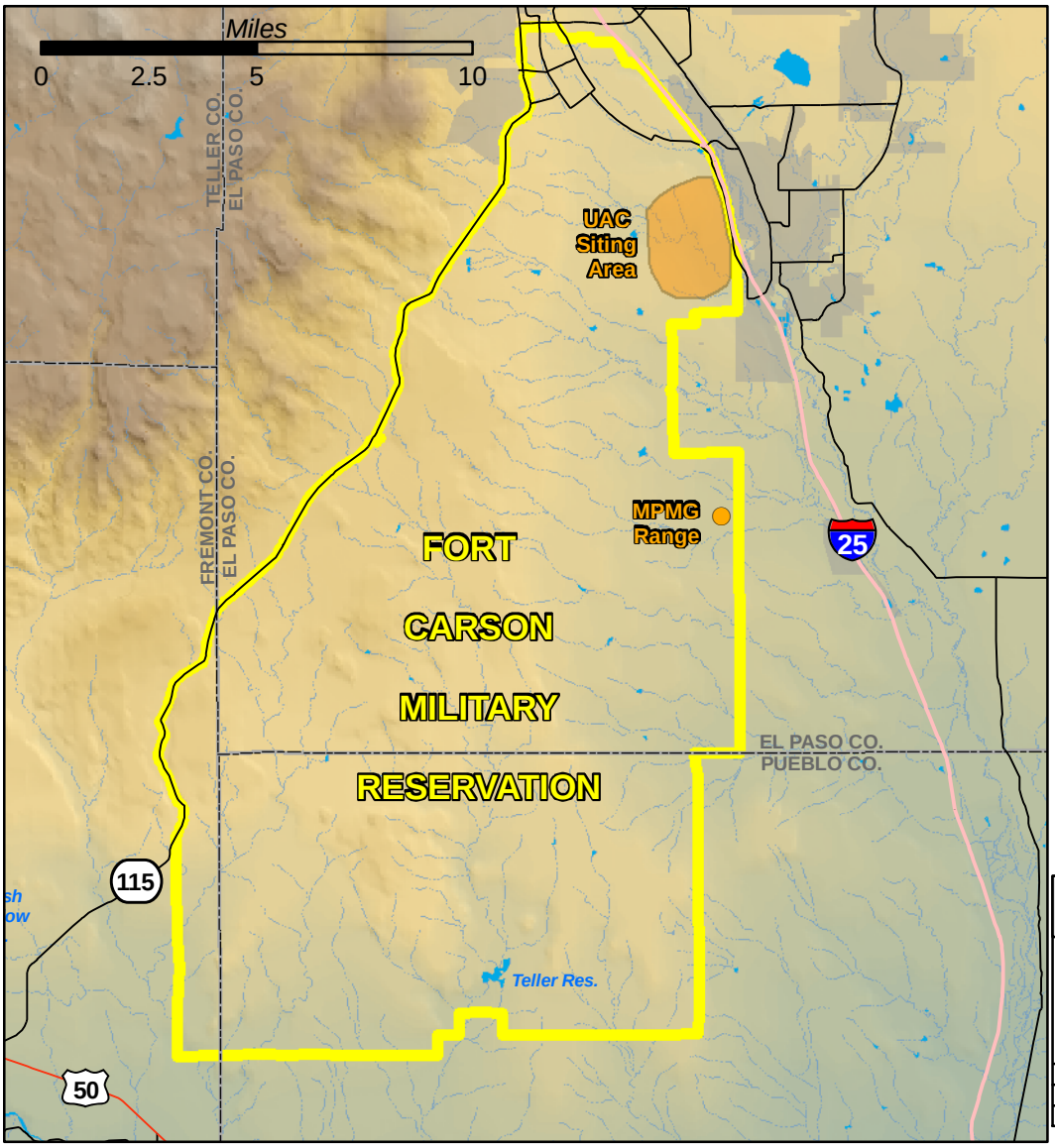

Legend

Region of Influence

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FIGURE 3-3
REGION OF INFLUENCE IN COLORADO FOR GEOLOGY, SOILS, WILDLIFE MANAGEMENT, CULTURAL RESOURCES, LAND USE & RECREATION, HAZARDOUS WASTES, ENERGY, AND FACILITIES

ANALYSIS AREA: COLORADO

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