EXECUTIVE SUMMARY

ES.1 INTRODUCTION AND BACKGROUND

Pursuant to the National Environmental Policy Act (NEPA, 42 United States Code [USC] Sections 4321 to 4370e), Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and Army Regulation (AR) (*Environmental Analysis of Army Actions*, 32 CFR Part 651), the Army has prepared this Environmental Impact Statement (EIS) to address the potential direct, indirect, and cumulative environmental impacts associated with the proposed use of Mākua Military Reservation (MMR) and alternatives for live-fire military training, in particular company-level, combined-arms, live-fire exercises (CALFEXs), and convoy live-fire training.

MMR is 38 miles (61 kilometers) northwest of Honolulu, Hawai‘i, and use of Mākua Valley by the Army and other United States (US) armed forces dates back to the 1920s.

The primary use of MMR has been for company-level CALFEXs by the Army's 25th Infantry Division (25th ID), which is based at Schofield Barracks Military Reservation (SBMR). A company-level CALFEX is a combat training exercise through which the Army unit synchronizes or orchestrates the application of several military units, such as infantry, aviation, artillery, engineers, and others, to achieve a combined effect on the enemy greater than if each weapon system were used individually. In addition to CALFEX training, convoy live-fire exercises (LFXs) have also become an important pre-deployment training requirement for MMR as a result of lessons learned in Iraq and Afghanistan.

In 1985, the Army prepared an Environmental Assessment (EA) for the construction and operation of a company combined-arms assault course

(CCAAC) at MMR. The Army completed construction of the CCAAC in May 1988 and used it for the next 10 years. In September 1998, the Army temporarily suspended training at MMR due to several wildfires that burned outside the south and north firebreak roads. There are over 50 occurring or potentially occurring endangered plant and animal species in the MMR region of influence (ROI). The proximity of these species to a fire hazard presents significant challenges.

The Army consulted with the US Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act (ESA), most recently in 2005. The USFWS issued a final BO on June 22, 2007 (referred to herein as the 2007 BO) (USFWS 2007). The USFWS concluded that implementation of the Proposed Action would not likely jeopardize the continued existence of any species or adversely modify or destroy designated critical habitat. A June 2008 amendment identifies the conservation measures to be implemented on private land.

While MMR was used for limited training from 2001 to 2004, since the suspension of training at MMR in September 1998, the 25th ID has attempted to meet its live-fire training requirements by sending its companies to other training locations.

In May 2001, the 25th ID and US Army Garrison Hawai‘i (USAG-HI) published a Final Supplemental Environmental Assessment (SEA) and Finding of No Significant Impact (FNSI), which analyzed training impacts on the natural, social, and cultural environment of MMR and the surrounding area. In July 2001, the US District Court issued a preliminary injunction barring the Army from returning to live-fire training. Under a 2001 settlement agreement, the Army could conduct a limited number of CALFEXs for up to three years (through October 2004). Since October 2004, the Army has continued to prepare the EIS required under the Settlement Agreement and has conducted only limited, nonlive-fire training at MMR.

The Army’s training program has evolved because of the requirements of the wars in Iraq and Afghanistan. Normally, the Army trains according to standard doctrine without having a specific mission focus. The tasks to be trained are called the Core Mission Essential Task List (CMETL). When a unit is given a specific deployment mission, it trains accordingly to a Directed Mission Essential Task List (DMETL). When Army units on O‘ahu return from a combat deployment, they are already designated for another combat deployment, usually in about a year. The unit must conduct recovery operations, field new equipment, and integrate new Soldiers. The unit has no time to train on CMETL tasks. It must immediately begin training to DMETL tasks.

For the past few years, one of the CMETL tasks Army units have not been able to perform has been CALFEXs. These exercises train soldiers for major combat operations against conventional opponents. This sort of operation is not occurring in Iran or Afghanistan. The Army units receive DMETL requirements. For assignments to Iraq or Afghanistan, these include tasks related to irregular warfare and stability operations. Among other tasks, Soldiers must train to respond to attacks on convoys to include reaction to improvised explosive devices. This includes the need to train to respond with live fire. The Army will ultimately have to shift its emphasis back to training for conventional warfare and major combat operations.

For MMR, these trends have meant that the Army's need for CALFEX (CMETL) has declined, while the need for convoy live fire training (DMETL) has increased. For the foreseeable future, the Army will have a need to conduct both training activities at MMR.

ES.2 PURPOSE OF THE PROPOSED ACTION

The Army's Proposed Action is to conduct the necessary type, level, duration, and intensity of live-fire and other military training exercises, in particular company-level CALFEXs and convoy LFXs, for the combat units assigned to the 25th ID and for other military units to attain and maintain the combat readiness of those units. The purpose of the Proposed Action is to enable the military in Hawai'i to achieve and maintain readiness for immediate deployment. Providing the best and most realistic training for the types of threats the Army expects to encounter during combat operations ensures that the military's leaders and Soldiers are prepared for the full spectrum of operations faced in combat. These operations include offensive, defensive, stability, and support operations.

ES.3 NEED FOR THE PROPOSED ACTION

The 25th ID must be prepared to execute the full spectrum of military operations in complex terrain. To achieve and maintain the combat skills appropriate for each Soldier in the force, training must replicate, as closely as possible, the conditions that would arise in expected combat situations.

In accordance with AR 350-1, *Army Training and Leader Development,* and the 25th ID annual training guidance, each infantry rifle company is required to conduct CALFEX training annually. Training at the company level is one of the key components in the Army's progressive training doctrine, in which smaller units train individually and then collectively as part of a larger unit. Company-level units are generally the smallest units that exercise direct command and control of combined arms elements in the synchronized execution of actual combat operations. The

communication and coordination skills learned during CALFEXs also are essential for successful training when several companies combine in a battalion operation under the control of a battalion commander. Given the present number and types of units stationed in Hawai‘i requiring use of Army live-fire ranges, Hawai‘i needs the range capacity to support 32 company-level CALFEXs annually. 10 of these are companies of the 3/25th Infantry Brigade Combat Team (IBCT) (nine Infantry companies and one Engineer company). Thirteen of these are Stryker Brigade Combat Team (SBCT) companies, which need a suitable mounted maneuver facility in order to conduct a CALFEX to standard, and therefore, could not conduct mounted CALFEX training at MMR. In addition, the Army needs to be prepared to host nine (9) US Marine Corps companies. These are infantry companies that can train to standard at Mākua. Therefore, the minimum required CALFEXs at Mākua would be 19 (10 Army, 9 USMC).

The SBCT units (13 units total) would primarily train with Stryker vehicles (mounted exercises) at either the Schofield Barracks or Pōhakuloa Training Area (PTA) BAX, upon completion of these complexes, to meet their tactical live-fire operational requirement.

The SBCT could also conduct dismounted live-fire training at MMR. The SBCT training would be substantially similar to the CALFEXs proposed to be conducted by the IBCT, however, the Stryker vehicles (up to five at one event) would utilize designated firing points, and would remain stationary from fixed positions while personnel perform dismounted live-fire exercises.

The No Action Alternative and Alternative 1 exclude SBCT training at MMR, while MMR Alternatives 2 and 3, presented in the EIS, are based on the dismounted Stryker scenario, and anticipate that SBCT companies will need the capacity to conduct more than the minimal, doctrinally-required training.

Lessons learned during the conflicts in Afghanistan and Iraq indicate the need for more frequent, realistic, and challenging company LFX training in addition to the smaller unit training (e.g., squad, platoon) that must be accomplished before proceeding to company-level exercises. Other factors, such as deployment of units for combat, influence the precise number of CALFEXs actually conducted in a given year, which may vary accordingly. As a result, full capacity of up to 50 annual CALFEX events per year is analyzed in three of the alternatives (Alternatives 2-4).

The Proposed Action is needed because there are no existing training areas on O‘ahu, outside of MMR, that are currently configured and

available to support a company-level CALFEX or Convoy live-fire training exercise. As such, MMR meets the Army's need to conduct live-fire training within the shortened home station periods that result from accelerated deployments associated with overseas combat activities in Iraq and Afghanistan. A description of the necessary criteria to support military training at this level is as follows:

Range Capacity

The area at MMR used for CALFEXs totals 1,136 acres. This includes a training area of 812 acres, including the 457 acres within the CCAAC. An additional 324 acres are required for the Surface Danger Zones (SDZs), which include some buffer areas. The topography of MMR, with steep valley walls enclosing the relatively flat CCAAC on three sides, and MMR's isolation from population centers provide the necessary buffer areas that facilitate live-fire training at the reservation.

A facility of this size would also have to be available when and where it would not interfere with the current training requirements of other military units. Use of such a replacement range facility should not require the closure of other training facilities or otherwise restrict training at nearby facilities.

The Army has not yet finalized a minimum design standard for convoy live-fire ranges. The USMC has proposed to build a convoy live fire training facility at PTA. The Army would be able to use this range when constructed.

A convoy live fire range must have the capacity to train convoys comprised of at least 5 vehicles travelling at intervals of 25-100 meters. At MMR, a typical training scenario will have normally 5-6 vehicles. It should have roads of such a length that it will appear as a surprise to Soldiers where the ambush or IED attack will occur. It must also have live fire capacity including targets with associated surface danger zones.

Range Design

Based on MMR training capabilities, a live-fire maneuver range for an infantry unit must be substantially similar to either an Infantry Platoon Battle Course (IPBC) or MPRC-L, and of sufficient acreage to accommodate the SDZs for use of the specified munitions. The range must be configured in a manner that would support a CALFEX and smaller unit LFXs described in Sections 2.5.1 through 2.5.3, as well as the additional training activities set forth in Section 2.5.4. In addition, a range would need to have an existing impact area sufficient to support the live-fire munitions contemplated for use at MMR.

A convoy live fire range must have roadways that simulate conditions experienced by tactical convoys. A typical convoy live fire course will have an entry control point with several objectives, consisting of stationary and moving targets with facades to replicate urban areas where the enemy will normally attack. Surface danger zones will always be established for all target arrays and facades throughout the course.

Quality of Life

The amount of required annual training, along with finite training resources, makes it a challenge to schedule training. Infantry companies typically accomplish most of their company-level (or smaller) collective training at or near their home station. Larger training exercises involving battalion (or larger) elements and those involving formal external evaluations often take place away from the home station. Generally, infantry units cannot afford the additional time and resources required for distant deployment/redeployment to accomplish company-level CALFEXs and convoy LFXs at training areas that are great distances from the home station.

Time and Cost

Range assets must be available for access by all O‘ahu-stationed units to meet their annual training requirements and to achieve combat readiness status before they deploy. The time and cost of transporting units to a training area must not have a major impact on the overall training levels for a unit. Each unit has a limited amount of time and financial resources to achieve training requirements. The time and cost of transport cannot be so excessive that it compromises the unit’s ability to meet all mission essential tasks and readiness requirements.

ES.4 PUBLIC INVOLVEMENT

The Notice of Intent (NOI) to prepare the EIS was published in the Federal Register on March 20, 2002. Public notices were published in the major newspapers on O‘ahu announcing the time and location of two public scoping meetings. The public scoping meetings were held in April 2002 to solicit public input and comments on the scope of the EIS. The Army prepared a Draft EIS and published the availability notice on July 22, 2005. The Draft EIS public comment period was initially for 60 days (from July 22 to September 21, 2005), then extended to an additional 15 days to October 6, 2005. Consistent with a 2007 Settlement Agreement, the Draft EIS was also made available for a second 60-day public comment period, from February 2 to April 3, 2007.

The Army made several changes to the Draft EIS in response to public comments, including the evaluation of an additional training alternative at

PTA. The Army therefore published the EIS again as a supplemental draft to seek public comment on September 22, 2008. The 45-day comment period ended on November 3, 2008, with four public meetings held on the islands of O‘ahu and Hawai‘i in early October 2008.

Per Council on Environmental Quality (CEQ) regulations, after issuing the Final EIS, the Army may issue the Record of Decision (ROD) following a 30-day mandatory waiting period. Notices announcing the availability of the Final EIS will be published in the local newspapers and other news outlets.

ES.5 ALTERNATIVES

ES.5.1Introduction

This EIS analyzes the No Action Alternative and four alternatives to accomplish the Proposed Action, which are described in detail in Section 2.4.6:

- No Action Alternative (No Live-Fire Military Training at MMR);
- Alternative 1, Mākua Military Reservation (Reduced Capacity Use with Some Weapons Restrictions);
- Alternative 2, Mākua Military Reservation (Full Capacity Use with Some Weapons Restrictions);
- Alternative 3, Mākua Military Reservation (Full Capacity Use with Fewer Weapons Restrictions); and
- Alternative 4, Pōhakuloa Training Area (Full Capacity Use with Fewer Weapons Restrictions).

Alternative 3 is the Army’s preferred alternative.

This EIS analyzes the use of these MMR and PTA range alternatives by all prospective range users, including other military services. In the past, the Army, Marine Corps, Navy, Coast Guard, Army Reserve, and Hawai‘i Army National Guard have trained at MMR and PTA. These military units would be limited to a company-level CALFEX or convoy LFX as the maximum levels of training and all other services would follow the same training constraints as Army units. SBCT forces may also conduct dismounted live-fire training at MMR under Alternatives 2 and 3. The SBCT training would be substantially similar to the CALFEXs proposed to be conducted by the IBCT.

ES.5.2No Action Alternative

If no action is taken, then there would be no live-fire military training at MMR. The current level of management at MMR is designed to enable the Army to resume training should that decision be reached. If that possibility were eliminated, a reduced level of management would be required. This reduced level of management would be possible because the chances of fire would be greatly reduced. This alternative is not considered to be a reasonable alternative as it would not meet either the purpose or need for undertaking the Proposed Action. This alternative is the environmentally preferred alternative.

Under this alternative, the 25th ID would be unable to meet its company CALFEX and most convoy LFX requirements in Hawai‘i. These would have to be conducted at other training installations outside of Hawai‘i. The No Action Alternative, while not considered a reasonable alternative, must be analyzed in the EIS and will serve as an environmental baseline against which other action alternatives can be evaluated.

ES.5.3Live-Fire Alternatives

This EIS analyzes four live-fire alternatives, all of which include range usage over a 242-day training period. They differ in the intensity under which the Army would train, the types of weapon systems used, and acreage used for training:

- Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). The Army would conduct 10 to 19 company-level CALFEXs per year and 100 convoy LFXs.
- Alternative 2 (Full Capacity Use with Some Weapons Restrictions). The Army would conduct up to 50 company-level CALFEXs per year, including the use of tracer ammunition. Under this alternative, the Army would also conduct up to 200 convoy LFXs.
- Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). The Army would conduct up to 50 company-level CALFEXs per year using increased land area for training as well as tracer ammunition, inert, tube-launched, optically tracked, wire-guided (TOW) missiles, 2.75-inch training rockets, and illumination munitions. Illumination munitions were removed from the scope of Section 7 consultation because of their increased fire risk. The environmental impacts of these illumination munitions are still addressed in the EIS, but separate Section 7 consultation would be required before their use at MMR. This is the Army’s preferred alternative. Under this alternative, the Army would also conduct up to 200 convoy LFXs.

- Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. This alternative includes the same weapons, activities, and intensity as Alternative 3 for a range that would be constructed in the future at PTA.

Some training activities and some munitions usage were removed from the scope of ESA Section 7 consultation. These elements of the Proposed Action are still addressed in the EIS, but separate Section 7 consultation and coordination with the State of Hawai‘i would be required before conducting such exercises.

CALFEXs and convoy LFXs conducted at MMR would not include aerial bombardment (dropping of bombs from aircraft), use of tracked armored vehicles, or training activities on Mākua Beach.

CALFEX training for the PTA alternative would occur at the Twin Pu‘u location. There are currently no established ranges at this particular location, thus this alternative requires the construction of a new range. Since the range boundaries would be located entirely in the existing impact area, unexploded ordnance (UXO) removal would have to take place prior to range construction. Associated range infrastructure would be sited to the north of and adjacent to the maneuver area. This includes a bivouac area, parking lot, ammunition storage facility, covered mess, latrines, range control tower, and covered facility for training prep and after action review.

ES.5.4Current Institutional Programs

Institutional programs can be described as good stewardship plans and programs that could affect, protect, and manage the biological, physical, and socioeconomic environment at USAG-HI installations. Several management programs have been implemented to address the sustainability of specific resources. The following programs are currently established and operating at USAG-HI: range management, ITAM, Wildland Fire Management Program (WFMP), and environmental management programs. These programs would continue as part of the Proposed Action alternatives. Under No Action, the programs would continue at a minimal level, due to the absence of live-fire training at MMR.

ES.5.5Alternatives to Accomplish the Proposed Action

This EIS evaluates the following four alternatives to accomplish the Proposed Action:

- Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions);

- Alternative 2 (Full Capacity Use with Some Weapons Restrictions);
- Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions); and
- Alternative 4, (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area.

For all live-fire alternatives, weapons systems would be similar to those used in the past at MMR. Weapons systems would include rifles, pistols, machine guns, helicopter guns, mortars, artillery, anti-tank weapons, rockets, and mines. The use of tracer ammunition is included in Alternative 2. Alternatives 3 and 4 involve the use of tracer ammunition, inert TOW missiles, 2.75-inch rockets, and illumination munitions. Alternative 3 also includes training on C-Ridge (the ridge between the north and south lobes of the training area). Table ES-1 compares the features of each alternative.

While this EIS evaluates the effects of all weapons systems contemplated for use at MMR, commitments made during ESA Section 7 consultation with the USFWS and in the resultant 2007 BO and 2008 amendment to the BO require that certain weapons and munitions be used only after conditions for their use are achieved. In addition, training at Ka‘ena Point and C-Ridge and the use of illumination munitions were not covered in the MMR ESA Section 7 consultations. However, due to the potential need to use these sites and munitions in the future, the Army assessed the environmental impacts associated with these actions. The Army would initiate and fulfill separate ESA Section 7 consultation prior to using illumination munitions, Ka‘ena Point, or C-Ridge.

Table ES-1
Comparison of Alternatives

	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	**Alternative 2 MMR** (Full Capacity Use with Some Weapons Restrictions)	**Alternative 3 MMR** (Full Capacity Use with Fewer Weapons Restrictions)	**Alternative 4 PTA** (Full Capacity Use with Fewer Weapons Restrictions)
Number of training days	242	242	242	242
Size of training area	1,136 acres (459.7 hectares)	1,136 acres (459.7 hectares)	1,136 acres (459.7 hectares) plus the use of C-Ridge (the ridge between the north and south lobes of the training area)	988 acres (400 hectares) for maneuver + approximately 10,000 acres (4,047 hectares) for SDZ
Number of annual company-level CALFEXs	10 to 19	Up to 50	Up to 50	Up to 50
Number Convoy Live Fire Training Exercises	100	200	200	NA
Weapons systems	Weapons and munitions listed in Table 2-3 and 2-5	Weapons and munitions listed in Table 2-3 and 2-5	Weapons and munitions listed in Table 2-3 and 2-5	Weapons and munitions listed in Table 2-3 and 2-5
Use of live ammunition	Yes	Yes	Yes	Yes
Tracer ammunition[1]	No	Yes	Yes	Yes
Inert TOW missiles, 2.75-inch rockets, and illumination munitions	No	No	Yes	Yes
Squad, section, and platoon maneuvers	Yes	Yes	Yes	Yes
Demolitions training	Yes	Yes	Yes	Yes
Sniper training	Yes	Yes	Yes	Yes
Bivouac	Yes	Yes	Yes	Yes
Staging base (ground or air movement)	Yes	Yes	Yes	Yes
Air assault	Yes	Yes	Yes	Yes
Stryker	No	Yes	Yes	Yes
UAVs	Yes	Yes	Yes	Yes

[1]Tracer ammunition would not be used unless it is in the "green" fire danger rating, which occurs most often from November to March, during the evenings and the early mornings. The 25th ID night fire training techniques would be implemented in accordance with the IWFMP.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

This alternative involves conducting 10 to 19 company-level CALFEXs at MMR during a 242-day training year. Under this alternative, the Army

would train its units at a reduced range capacity on an approved live-fire assault course. Implementing this alternative would allow military units to conduct nighttime, as well as daytime, training exercises. However, nighttime training would not occur until after fire suppression issues have been finalized by the Army and approved by the US Fish and Wildlife Service. Over a typical training year, the Army would conduct other types of training, in addition to the 10 to 19 company-level CALFEXs; this would include squad- and platoon-level LFXs. This alternative also involves conducting up to 100 convoy LFXs. These exercises may be conducted either in conjunction with or independently of CALFEX training.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

This alternative involves conducting up to 50 company-level CALFEXs during a 242-day training year at MMR. This would include squad- and platoon-level LFXs. Under this alternative, the Army would train its units at a full range capacity on an approved live-fire assault course. Implementing this alternative would allow military units to conduct nighttime, as well as daytime, training exercises. Over a typical training year, it is anticipated that the Army would likely conduct fewer than 50 company-level CALFEXs with some training days dedicated to other types of training. However, analysis of up to 50 company-level CALFEXs identifies environmental impacts from the maximum contemplated use of MMR, with some weapons restrictions. This alternative would involve the use of tracer ammunition facilitating nighttime training. All infantry forces of the US military must be trained and ready for daytime and nighttime live-fire combat and maneuvers. The use of tracers is invaluable in showing the trajectory of bullets and verifying the accuracy of aim at night (fire restrictions similar to Alternative 1 would apply). Alternative 2 does not include the use of inert TOW missiles, 2.75-inch rockets, or illumination munitions. This alternative also involves conducting up to 200 convoy LFXs. These exercises may be conducted either in conjunction with or independently of CALFEX training.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

This alternative involves conducting up to 50 company-level CALFEXs over a 242-day training year at MMR. This would include squad- and platoon-level LFXs. In addition to tracer ammunition, live-fire training would include the use of inert tracked optically wire-guided (TOW) missiles, 2.75-inch rockets, and illumination munitions. Alternative 3 is the Army's preferred alternative.

The CALFEXs conducted under the Settlement Agreement were restricted from using certain types of ordnance and ammunition, including inert TOW missiles and illumination munitions, both of which create a greater risk of wildland fire.

This alternative would allow the Army to train its units with maximum realistic training using critical weapons systems on an approved live-fire assault course. Implementing this alternative would allow military units to more effectively conduct nighttime and daytime training exercises.

Alternative 3 also analyzes the impacts from training on the ridge located between the north and south lobes of the training area. Use of the ridge would include live-fire support, nonlive-fire support, and sniper training. The area is too exposed for the use of artillery.

This alternative also involves conducting up to 200 convoy LFXs. These exercises may be conducted either in conjunction with or independently of CALFEX training.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area

This alternative represents the same weapons and intensity usage as Alternative 3. It provides for a maximum use capacity at PTA including conducting up to 50 company-level CALFEXs over a 242-day training year. The weapons and ammunition proposed for use by the Army are listed in Table 2-3. Live-fire training proposed under Alternative 4 would use tracers, inert TOW missiles, 2.75-inch rockets, and illumination munitions.

While training would make use of inert TOW missiles, propellants would still be required for launching the weapons. The quantities of ammunition used depend on the training exercise and scenario being conducted. Estimates of munitions to be expended under Alternative 4 are provided in Table 2-6.

This alternative, however, would allow the Army to train its units with maximum realistic training with critical weapons systems on an approved live-fire assault course. Both daytime and nighttime training exercises would be conducted under this alternative. This alternative would be subject to future ESA and cultural resources consultations, which may add restrictions and mitigation actions similar to those at MMR. Convoy live-fire training would occur at a future USMC convoy LFX range if approved.

ES.6 ALTERNATIVES CONSIDERED BUT ELIMINATED

To be evaluated in detail in this EIS, alternatives had to reasonably meet the purpose and need for the Proposed Action. Alternatives that do not advance the purpose and need are not considered reasonable alternatives. The Army developed four screening criteria based on the purpose and need: 1) range capacity, 2) range design, 3) quality of life, and 4) time and cost. To be carried forward for full evaluation, an alternative must meet all four screening criteria. A full description of these criteria is included in Section 2.5. This section discusses the reasons the Army considered but eliminated other identified alternatives.

The alternatives considered but eliminated from detailed evaluation include conducting military training at other Army installations at the following locations:

1. Conduct CALFEXs at Seven Potential Locations of PTA;
2. Conduct Training at a Replacement Training Facility at Another Army Installation on O‘ahu;
3. Conduct Training at a Site in the Continental United States;
4. Conduct Training at a Site Outside of the United States;
5. Acquire Property on O‘ahu and Conduct Training at a New Training Facility; and
6. Move Stationary Ranges to MMR and Conduct CALFEXs and Convoy Live-Fire at SBMR.

These alternatives have been eliminated because they do not meet the purpose and need or certain screening criteria and eliminated them from further review in this EIS. Table ES-2 provides a summary of the alternatives considered, but eliminated as well as the analysis of each against the 4 screening criteria.

Table ES-2
Summary of Alternatives Considered but Eliminated

	Seven Potential Range Locations on PTA	O'ahu Installations	CONUS Installations	Installations Outside the United States	Acquire Land on O'ahu for New Training Facility	Move Stationary Ranges to MMR and Train at SBMR
Screening Criterion 1: Range Capacity	Does not meet this criterion.	Does not meet this criterion.	Does not fully meet this criterion.	Does not fully meet this criterion.	Does not fully meet this criterion.	Does not meet this criterion.
Screening Criterion 2: Range Design	Does not meet this criterion.	Does not fully meet this criterion.	Meets this criterion.	Meets this criterion.	Does not fully meet this criterion.	Does not meet this criterion.
Screening Criterion 3: Quality of Life	Meets this criterion.	Meets this criterion.	Does not meet this criterion.	Does not meet this criterion.	Meets this criterion.	Meets this criterion.
Screening Criterion 4: Time and Cost	Meets this criterion.	Does not fully meet this criterion.	Does not meet this criterion.	Does not meet this criterion.	Does not meet this criterion.	Does not fully meet this criterion.

ES.7 ENVIRONMENTAL AND SOCIOECONOMIC IMPACTS

Potential environmental and socioeconomic impacts from implementing No Action and Alternatives 1, 2, 3, and 4 are discussed below and are summarized in Table ES-5 at the end of this Executive Summary.

ES.7.1 Land Use and Recreation

No Action Alternative. The absence of live-fire training at MMR would reduce the potential for conflicts with nearby land uses and would improve the installation's compatibility with recreation areas.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Significant and unmitigable impacts on land use would result from impacts on recreational resources at Mākua Beach due to noise caused by demolition training, helicopter overflights, and ordnance use. This alternative also would result in a significant and unmitigable land use conflict because projected noise levels from training exceed those levels considered compatible with recreational land use.

Less than significant impacts would result from training activities disturbing users of nearby hiking trails in certain parts of the Mokulēʻia Forest Reserve and the Waiʻanae Kai Forest Preserve and users of Keawaʻula Bay Beach. Also, less than significant impacts would be caused by use of certain MMR land areas for training. These areas are designated as conservation district subzones and as special management areas. However, environmental management under Alternative 1 would foster resource protection in the Mākua Valley, and this environmental management is consistent with the long-term conservation subzone goal of preserving resources. Therefore, impacts would not be significant.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Impacts would be the same as those described under Alternative 1, except there would be slightly greater impacts on recreational resources at Mākua Beach due to an increase in the amount of training conducted annually.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Impacts would be the same as those described under Alternative 2, except there would be slightly greater impacts on recreational resources at Mākua Beach due to use of additional high explosive weapons.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Less than significant impacts would result from implementation of this alternative. Basic land use would not change with this alternative. The Twin Puʻu area considered for a range replacement would continue to be used for ongoing military training operations, regardless. As a result of safety considerations, the new range may lead to minor restrictions or modifications to training on surrounding ranges while it is in use.

ES.7.2Airspace

No Action Alternative. Under No Action, there would be no reduction in the amount of navigable airspace, no assignment of new or modified special use airspace, and no change to an existing or planned military training route.

The staging base air assault exercises conducted under at MMR would not cause a reduction in navigable airspace, nor would they require new or modified special use airspace. The exercises would have no impacts on military training routes, established air route corridors, or en route airways. The exercises would not restrict access to airports or airfields in the region of influence or affect airport/airfield approach and departure patterns. Similarly, none of these activities would restrict a clear view of runways, helipads, taxiways, or traffic patterns from any airport traffic control tower, decrease airport capacity or efficiency, or affect future visual flight rules or instrument flight rules traffic. They also would not constitute an obstruction to air navigation. There would be no impacts on aviation safety and thus public health and safety. Well-established and understood aviation procedures and rules governing flight operations in both controlled and uncontrolled navigable airspace and special use airspace, coupled with the Army's excellent aviation safety record in Hawai'i, minimize the likelihood of future adverse impacts on public health and safety from aircraft activities.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). There would be no impacts on airspace use. The staging base air assault exercises conducted under this alternative that are associated with CALFEX training, would be similar to the No Action Alternative.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Although there would be a greater number of CALFEXs conducted under Alternative 2, the impacts on airspace would be the same as those described for Alternative 1 because this alternative includes the same training area and similar training activities.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Alternative 3 would have the same impacts as those described for Alternative 2.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. There would be no impacts to Airspace associated with this alternative. Flights in support of CALFEX training under this alternative would not reduce the amount of navigable airspace in the ROI.

No new special use airspace or any modifications to the existing special use airspace would be required under this alternative. All air assault exercises conducted over this training location would be contained within the existing R-3103 restricted area. Restricted areas are designed to contain precisely these kinds of activities.

Potential future UAV flights under Alternative 4 would normally be conducted within the R-3103 restricted area complex. Although the nature and intensity of utilization would vary over time and by individual special use airspace area, the UAV flights would represent precisely the kinds of activities for which the special use airspace was created. As such, the UAV flights would not represent a change in aviation safety risk or an adverse impact on public health and safety.

ES.7.3Visual Resources

No Action Alternative. This alternative would have less than significant impacts to the existing view, visual resources policies, landscape alternations, and view impairment from fugitive dusk. Non-live fire training would be aircraft lasing, with semi-permanent structures and targets, and UAV flights; engineer training associated with road maintenance activities; and a minimal amount of movement to fixed locations associated with staging of command and control elements and blank ammunition training.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Less than significant impacts would occur from the use of MMR for training. Until vegetation was reestablished, areas burned as a result of a wildfire would temporarily detract from views, depending on the extent of the area burned. The presence of personnel and equipment would add temporary features to the valley that are not visually consistent with the natural surroundings. However, most of these features and training activities would not be visible from potentially sensitive viewing locations, such as Mākua Beach, Farrington Highway, and adjacent trails, due to topography or current access restrictions. Training activities conducted under this alternative would be substantially consistent with the visual preservation objectives of local policies.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Impacts associated with Alternative 2 would be similar to those described above for Alternative 1. Impacts on visual resources would remain less than significant. The use of tracers would increase the chance of wildfires. Until vegetation was reestablished, areas burned as a result of fire would temporarily detract from views, depending on the extent of the area burned.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Impacts associated with Alternative 3 would be less than significant and similar to those described above for Alternative 2. The use of tracers, inert TOW missiles, 2.75-inch rockets, and illumination munitions would increase the chance of wildfires. Until vegetation reestablished itself, areas

burned by fire would temporarily detract from views, depending on the extent of the area burned.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Under this alternative, there would be less than significant impacts on modification of the existing view, alteration of the landscape character, and impairment of view from visible fugitive dust for the range projects and training activities at PTA, Keʻamuku Parcel (also referred to as the West PTA Acquisition Area – WPAA), and the PTA Trail. These projects and activities would not be visible from most sensitive view points due to being obscured by topography, lava flows, and vegetation, or at such a distance that visual detail would be lost and not discernable. Implementation of soil erosion mitigations in the training areas at PTA and WPAA would also keep fugitive dust visual impacts to less than significant. Construction projects and training at PTA under this alternative would be substantially consistent with the visual preservation objectives of local policies.

ES.7.4Air Quality

No Action Alternative. Because there would be no use of munitions and ordnance, and much less use of military vehicles under No Action, there would be a minimal increase in air emissions or degradation to air quality above and beyond the existing ambient conditions.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Emissions from vehicles, aircraft, and ordnance under this alternative would result in minor increases in air quality, a less than significant impact.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). The amount of training and the use of tracer ammunition would increase under this alternative, resulting in a short-term increase in air emissions. The impacts on air quality would remain less than significant.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). The impacts under this alternative, which include the use of inert TOW missiles, 2.75-inch rockets, and illuminations munitions, would be similar but greater in magnitude than those under Alternative 2. These impacts would not have a significant impact on the air quality.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Significant impacts mitigable to less than significant would result from this alternative as a result of fugitive dust emissions from construction activities and wind erosion from disturbed areas. PTA soil substrates are primarily fine, volcanic ash prone to wind

erosion and dust generation. Training and construction activities would reduce or eliminate vegetative cover in some sections of the training area, resulting in increased susceptibility to emissions from vehicle travel and wind erosion.

Emissions from vehicles, aircraft, and ordnance under this alternative would result in minor increases in air quality, a less than significant impact.

ES.7.5Noise

No Action Alternative. Because there would be no live-fire training at MMR under No Action, noise impacts would result primarily from aircraft. Because noise impacts from aircraft flyovers would not violate the Army planning guidelines, they are considered less than significant. Noise generated from military vehicles would be less than significant.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Significant and unmitigable noise impacts would be expected under Alternative 1 as a result of ordnance use. At Mākua Beach, ordnance noise levels would exceed the Army's planning guidelines for land use compatibility. While there are no schools, hospitals, or nursing homes in the area, beach goers would experience unexpected impulse noise levels. Because noise impacts from aircraft flyovers would not violate the Army planning guidelines, they are considered less than significant. Noise generated from military vehicles would be less than significant.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Impacts under this alternative would be similar to those described under Alternative 1. Ordnance noise levels would be greater because of the increased level of training under this alternative.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Impacts under this alternative would be similar to those described under Alternative 2.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Impacts under this alternative would be less than significant. Since this range would be located in an existing impact area, implementing Alternative 4 is not expected to shift noise contours beyond their present location. There is no net increase in transportation requirements from O'ahu to PTA under Alternative 4.

ES.7.6Traffic and Transportation

No Action Alternative. Under No Action, there would be very limited military vehicle traffic to and from MMR. There would be no ammunition

transport. This alternative would be substantially consistent with State of Hawai‘i regulations and policies. The Army would coordinate, as appropriate, with Hawai‘i DOT to avoid or minimize traffic impacts. Because very limited military vehicle trips would be added under this alternative, there would be less than significant traffic impacts along Farrington Highway.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Under Alternative 1, Army policy inconsistencies with the Hawai‘i Department of Transportation (DOT) policies and instructions concerning military convoys would create a significant and mitigable impact. Significant and mitigable impacts also would result from inconsistencies with state ammunitions transport policies. Increases in military vehicle trips would have less than significant impacts on Farrington Highway traffic and transportation.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Project impacts would be the same as those described for Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Project impacts would be the same as those described for Alternative 1.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Under this alternative, impacts would be less than significant. Army procedures are, to a great degree, consistent with State policies and regulations concerning military convoys. A new PTA Trail is scheduled to be constructed as a result of the SBCT use of PTA. The trail is expected to be operational no earlier than 2010. At that time, the PTA Trail will be the primary route for convoys traveling between Kawaihae Harbor and PTA. Procedures would be continued or implemented to minimize public traffic impacts and delays where the PTA Trail crosses state highways and where military vehicles need to use public roadways.

ES.7.7Water Resources

No Action Alternative. Under No Action, water resources impacts would be less than significant. The potential for floods at MMR would remain, but, with non-live fire training at MMR, the results of any flooding are not expected to be significant because limited quantities of materials with a potential to affect water quality would be stored at the installation.

Surface runoff would continue to mobilize residual chemical contaminants in soils, affecting downstream surface water quality in intermittent streams (there are no perennial streams at MMR), the *muliwai,* and the ocean. Because residual chemical concentrations would be expected to diminish

over time through natural degradation processes, the potential impacts on water quality would be less than significant.

Due to reduced fuel management and fire fighting resources at MMR, a wildfire could burn more intensely and remain uncontrolled for longer periods under No Action than under existing conditions. This would have an indirect impact on surface water quality because soil could erode from extensive loss of vegetative cover during a major wildfire. The effects of soil erosion on the quality of stream water and ocean water would be less than significant because the potential for a major erosion-producing event following a major wildfire is low. The impacts from this scenario on ocean water quality would be expected to be temporary, and chemical constituent concentrations would be negligible.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Under Alternative 1, significant and mitigable water resources impacts would be expected. Flooding could result in damage to structures in the flood zone or in release of chemicals or hazardous materials that may be stored in the flood zone.

Dispersed (nonpoint source) pollutants may affect surface water quality if they are transported from surface soils on the ranges to intermittent stream channels by runoff. Once mobilized, stream water may transport the chemicals downstream where they may be deposited in the stream channel, on the floodplain (if the stream overflows its channel), in the *muliwai*, or in the ocean. The loadings (total mass per year) of these chemicals to the intermittent streams and ocean water would be extremely low. Therefore, while migration of trace levels of contaminants is likely to occur, the human health and environmental effects would be expected to be less than significant.

Based on information presented in the hydrogeologic investigation report, it appears unlikely that substantial recharge to the aquifer occurs directly beneath the ordnance impact area, due to the presence of a sequence of fine-grained deposits above the aquifer. Therefore, this alternative would have little impact on groundwater quality in this area. Currently available information suggests that impacts on groundwater are and would continue to be less than significant under Alternative 1. The Army would continue to monitor groundwater quality.

Soil erosion resulting from training and wildfires can reduce stream water and ocean water quality by increasing suspended sediment concentrations and turbidity. Suspended sediment may temporarily reduce water clarity. Because the streams at MMR are intermittent, the effects of suspended sediment on stream water quality are not expected to be significant. If

soils are contaminated or contain organic nutrients, the contaminants may be transported to a stream, affecting stream water, *muliwai*, or ocean water quality. Excessive suspended sediment loads may affect marine species, such as corals, if deposited in large quantities over a short period of time. Enhanced soil erosion could occur in areas with reduced vegetation cover or disturbed soils, along roads, or in areas with steep slopes.

Alternative 1 would result in a potential increase in residual concentrations of explosives compounds and metals in surface soils over time use of munitions in live-fire training, which could lead to additional impacts on surface water quality.

Surface water contaminants could be carried downstream and discharged to the *muliwai* or to the ocean. This would occur periodically and infrequently, depending on precipitation, and chemical loadings to these waters would probably be negligible. Surface water monitoring would be performed to document concentrations of selected contaminants of concern.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). The impacts of implementing Alternative 2 would be similar to those discussed for Alternative 1, but because Alternative 2 would involve an increase in the frequency of CALFEXs to as many as 50 per year and use of tracer ammunition, the magnitude of the impacts would be greater than under Alternative 1.

The increased amount of live-fire training would result in deposition of larger amounts of explosives and metals residues on soils, leading to the potential for these residues to be transported by runoff to stream channels and ultimately to the *muliwai* and the ocean. As under Alternative 1, surface water would be monitored.

The potential for wildfires would be greater under Alternative 2 than Alternative 1, and along with that increased potential would come the potential for significant and mitigable water quality impacts from erosion of soils.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). In general, the same types of effects would occur for this alternative as for Alternative 2. Fewer restrictions and the use of illumination munitions, inert TOW missiles, and 2.75-inch rockets may increase the potential frequency of wildfires.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Under this alternative, impacts would be less

than significant for flooding, surface water, and groundwater in the PTA ROI. PTA has a lack of permanent surface water resources and the groundwater is at a great depth. Appropriate facility design and implementation of construction best management practices (BMPs) would minimize impacts of soil erosion, flooding, and runoff potentials. Adherence to spill prevention and response procedures would lessen the likelihood of adverse impacts to the surface water at Kawaihae Harbor.

Training activities may increase the amount of explosives residues in soils at PTA. It also may result in dispersion of these residues by wind and water erosion. However, due to the relatively low concentrations of explosives residues in the soils, lack of permanent streams or water bodies, and the great depth to the groundwater, impacts, if they occur, are considered to be less than significant.

There would be no impacts to altering stream channel or groundwater flow patterns or to the potable water supply at PTA. Drinking water is trucked in from areas with abundant freshwater.

ES.7.8 Geology and Soils

No Action Alternative. Under No Action, significant and mitigable impacts on geology and soils would be expected. Due to reduced fuel management and fire fighting resources at MMR, a wildfire could burn more intensely and remain uncontrolled for longer periods of time under No Action than under existing conditions. While the potential for a major erosion-producing event following a major wildfire is low, the impact from such a combination of events is considered significant because it would likely result in a large volume of soil being eroded, given the nature of the soils and the steep slopes in Mākua Valley.

If a major fire were to occur, the loss of vegetation cover could increase runoff, causing significant erosion and soil loss from hill slopes and increased sediment deposition on the valley floor or in stream channels. Increased runoff could create gullies and damage roads and trails. Sediment deposition could clog stream channels, divert streams, lead to increased flooding, alter vegetation patterns, and have other indirect impacts.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Under this alternative, significant and mitigable impacts on geology and soils would be expected. A major wildfire could remove protective vegetation and expose soils to severe erosion. Live-fire training disturbs soils through explosives detonation and troop training (e.g., use of roads, troop movement, and digging). Disturbed soils tend to be more easily

eroded, and removing protective vegetation exposes soils to wind and water erosion.

Alternative 1 would result in a substantial increase in the intensity of live-fire training compared to recent training levels. Small amounts of explosives, such as royal demolition explosive (RDX), trinitrotoluene (TNT), and octogen (HMX), and lead or other metals would be deposited in surface soils during live-fire training exercises. The mass of these chemical residues from detonating munitions would increase with the increased level of live-fire training. The concentrations in surface soils would be expected to be very low, however, and would be expected to have less than significant impacts on human health and the environment.

Seismic hazards, slope failure, and other geologic hazards are not expected to be significant under Alternative 1. The alternative is not expected to result in any impacts on geologically significant landforms.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Under Alternative 2, the intensity of live-fire training would increase compared to Alternative 1. The impacts would be similar to those discussed for Alternative 1, except the magnitude of the impacts would be greater, with up to 50 CALFEXs per year. The potential for wildfires to occur would be increased by the use of tracer ammunition.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). The impacts would be similar to those discussed for Alternative 2. Under Alternative 3, the use of the range and intensity of training would be comparable to Alternative 2, with the exception of the additional use of inert TOW missiles, 2.75-inch rockets, and illumination munitions. The types of impacts discussed for Alternative 2 would also occur under Alternative 3. The risk of wildland fires would increase due to the addition of weapon systems with greater fire ignition potential.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Under this alternative, there would be less than significant impacts on soil erosion, soil contamination, and geologic hazards to include seismic and volcanic hazards.

CALFEX and convoy training at PTA would be limited in unit size. There would be dismounted maneuver training, with vehicles limited to staying on existing trails and roads. As such, impacts of soil loss, erosion, and compaction would be less than significant. The Army would mitigate soil impacts by following BMPs for construction of range projects and maintenance of the PTA Trail. The Army would develop and implement

an ITAM program and practices, Erosion and Sediment Control Management Plan, and IWFMP for PTA.

The risk due to exposure to contaminated soils by Soldiers training at PTA would be low. The CALFEX and live-fire convoy ranges would be constructed in a converted range impact area. Contamination exposure would be at low levels and limited in duration. There would be a low risk to personnel.

There is little potential for slope failure at PTA. Earthquakes and volcanic eruptions are common on the Island of Hawai‘i. Implementation of standard emergency procedures and engineering and design practices would reduce volcanic and seismic hazards to less than significant levels, although these measures cannot eliminate the hazards.

ES.7.9 Biological Resources

No Action Alternative. Under No Action, significant and unmitigable impacts on biological resources would be expected. The wildfire impacts on sensitive terrestrial species and habitats would be expected to be significant and unmitigable because a wildfire could result in the irretrievable loss of individuals of a sensitive terrestrial species. Although the likelihood of fire would be lower than existing conditions under No Action, the reduction in natural resource management and fire fighting staff on-site would mean a fire could burn longer and cover more acreage before suppression activities could begin, possibly resulting in an irretrievable loss of individuals of a sensitive species. Sensitive species would also suffer significant and unmitigable impacts due to the spread of nonnative species. Impacts on marine wildlife and coral ecosystems from runoff would be expected to be less than significant.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Under Alternative 1, significant and unmitigable impacts on biological resources would be expected. Live-fire training could start wildfires outside the firebreak road and would increase from no training under baseline conditions to 242 days per year under Alternative 1. Fires could result from training or from associated management activities. The likelihood of a training-related fire is moderate to high during live-fire activities. The increase in the potential for wildfires from live-fire training under this alternative would result in unmitigable impacts because a wildfire could result in the irretrievable loss of individuals of a sensitive terrestrial species. Significant and unmitigable impacts on sensitive species would result from the spread of nonnative species. Impacts from ground training on sensitive terrestrial species and habitat would be considered significant and mitigable. Disturbance to marine wildlife from aircraft and ground training would be less than significant. Less than

significant impacts would be expected on sensitive terrestrial species and habitat from aircraft and on marine wildlife and coral ecosystems from runoff.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Alternative 2 actions would have the same impact levels as those under Alternative 1. The inclusion of tracer ammunition under this alternative increases the potential frequency and magnitude of wildfire-related impacts and impact from the spread of nonnative species identified under Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Alternative 3 actions would have the same impact levels as those under Alternative 2. The intensity of the impacts under this alternative would be greater due to use of inert TOW missiles, 2.75-inch rockets, and illumination munitions, which create a greater risk of a wildfire compared to Alternatives 1 and 2. This could lead to more frequent, intense, or widespread wildfires than under Alternative 2.

Ongoing USAG-HI environmental management and stewardship programs would continue to decrease the impact intensity under each alternative and to protect sensitive plants, habitats, and terrestrial species within the region of influence. Updates to the IWFMP would minimize the risk of resource damage from training-related wildland fires. Continued implementation of the MIP pursuant to the 2007/2008 BO would advance the conservation of threatened and endangered species on MMR through invasive species control, habitat enhancement/restoration, and other actions to achieve stabilization of target plant taxa. USAG-HI would rely on SOPs and BMPs to reduce the impacts on marine mammals.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Although Alternative 4 would take place on the Island of Hawai‘i, impacts expected from this alternative would be similar to those under Alternative 3. The potential for and impact of training-related fire on sensitive species and habitat at PTA would be significant. The PTA 2003 BO, Pōhakuloa Implementation Plan (PIP), INRMP, IWFMP, and ITAM programs would diminish the overall significance of fire on the natural resources at PTA. However, because there is a risk that a wildfire could result in an irretrievable loss of individuals of a sensitive species, the Army has made a conservative determination that even though the mitigation and minimization efforts being employed will considerably reduce the impacts on sensitive terrestrial species and habitat, the impacts may not be reduced to a less than significant level.

Implementing this alternative would increase the presence of nonnative species in both the short term and long term on PTA, which would have a significant impact on sensitive species. In general, nonnative plant and animal species pose a threat to Hawaiian native ecosystems. An expansion in the amount of area available for training increases the potential for nonnative species to be introduced onto the installation. However, the mitigation measures identified in the SBCT EIS ROD and the 2003 PTA BO will greatly reduce the spread and impact of nonnative/invasive species caused by training and construction. Therefore, although the impacts of invasive species could be significant to sensitive species and habitats, the identified measures would minimize and/or mitigate the overall impact from spread of nonnative species to less than significant.

Other than travelling on established roads to and from the training site and the potential impacts of fire, the area that would be impacted by CALFEX training would be contained within the PTA impact area. Fountain grass, an invasive species, dominates the Twin Pu‘u area; therefore, the direct impacts of CALFEX training in this area would be less then significant to sensitive species.

Noise and aircraft have the potential to disturb the endangered Hawaiian hoary bat, however habitat loss, not noise or aircraft disturbance, is the major factor affecting bats on PTA. Although these activities may have significant impacts on bats, measures identified in previous ESA Section 7 consultations and implementation of installation conservation programs adequately minimize and/or mitigate the potential impacts on bats to a less than significant level. If Alternative 4 were selected, the Army would reinitiate ESA consultation with the USFWS.

Due to the distance of PTA from the marine environment, no impacts on marine mammals or organisms would be anticipated.

ES.7.10 Cultural Resources

There would be impacts on archeological sites, both prehistoric and historic, and on Areas of Traditional Importance (ATI). The term ATI was created as a broad category to refer to all cultural resources important to native, aboriginal, or local groups. These resources include, but are not limited to, landscapes, sacred sites, shrines and “property[ies] of traditional religious and cultural importance” (PTRCIs) whether or not they have been formally evaluated for listing in the National Register of Historic Places (NRHP). The fact that many ATI overlap, or are part of archeological sites or cultural landscapes makes defining boundaries problematic. Some ATI can derive traditional importance from oral histories that describe ancestral or mythical events, many of which explain how places or landscapes were named or created. These affiliations also

illustrate how Native Hawaiian spirituality and religion is intertwined with the natural environment and how it is woven into an intricate yet loosely defined relationship among the land, landforms, plants, water, ocean, sky (cosmology), mountains, and all things natural and supernatural. Native Hawaiian cultural landscapes may also be considered ATI because they share many of the same qualities and elements in nature and the environment that are significant and sacred to Native Hawaiians but that are generally not readily apparent or valued by non-Native Hawaiians.

ATI may include PTRCI to a Native Hawaiian group. Prehistoric and historic archeological sites may also be considered ATI; these include *heiau* (temple complexes) and burial sites, traditional gathering places and traditional use sites, and plants and animals used for subsistence and other cultural purposes. Archeological sites that are ATI may be evaluated as PTRCI, especially when their locations coincide with Land Commission Awards, religious sites, or other places known from Hawaiian traditions.

Other ATI may be specific landforms, such as a mountain peak or large stones, which are clearly mentioned in oral traditions. ATI can be associated with flora and fauna because it is believed that there are ancestral links to plant life, and much of Hawaiian religion and ceremony is centered around traditions regarding when to sow, fish, harvest, or process natural resources. Because of the interconnected nature of Native Hawaiian beliefs, ATI may also represent links in a chain of places. MMR, for example, fits in the area between Pōkaʻī Bay and Kaʻena Point, which is all considered sacred land, or *wahi pana*.

Beginning in 1998, the Army undertook consultation consistent with Section 106 of the National Historic Preservation Act (NHPA) with Native Hawaiian organizations, interested parties, the State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP) regarding the treatment measures the Army would implement for military training at MMR. After two years of consultation with these parties, a programmatic agreement (PA) that identified treatment measures for training was executed in 2000. Since execution of the PA, the Army has implemented these measures. While this PA expired by its own terms in 2005, the mitigation and treatment measures continue to be implemented through the Army's cultural resource management program. The Army has consulted under Section 106 of the NHPA to develop a new PA (Appendix L of the Final EIS) to address the effects of training activities on historic properties, to include modifications to training activities at MMR and current conditions. In addition, there is a separate PA that deals with use and cultural access of the Ukanipō *Heiau* complex.

The 2001 Settlement Agreement specified surface and subsurface archeological surveys within the CCAAC, which have been completed. Generally, public access is prohibited in impact areas due security and health and safety concerns related to unexploded ordnance and other hazards. However, the Settlement Agreement provided public access to cultural sites at MMR, subject to limitations determined by the Army in consultation with Native Hawaiian practitioners, based on requirements for training, safety, national security, and compliance with laws and regulations. To ensure safe public access at MMR, cultural access protocols were developed in consultation with Native Hawaiian organizations. Finally, the Army is required to comply with DoD Explosives Safety Board and US Army Technical Center for Explosives Safety policies and regulations, to include removal of unexploded ordnance where found and subsurface clearance to a depth of one foot of all areas where the public may have access.

No Action Alternative. Significant yet mitigable impacts are anticipated to archeological sites and ATI from the nonlive-fire training itself. The potentially reduced access to ATI may not be mitigable to less than significant. The use of UAVs and other aircraft during nonlive-fire training could result in crashes and fire may result from these crashes. The reduced staffing which may result from this alternative could also lead to untended vegetation at MMR may destroy or alter archeological sites. Vehicles could have an impact on cultural resources from tire or track depressions or from soil erosion, however, these vehicles will remain on roads whenever practicable to avoid impacts. Combined with other cumulative impacts, the cumulative impacts to cultural resources would be significant and unmitigable.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Significant and unmitigable impacts would result from decreased cultural access to ATI and archeological sites. Under Alternative 1, training would reduce the number of days when sites could be accessed. The Army may work with the community to facilitate access to other ATI.

There could be significant and unmitigable impacts on ATI and cultural resources from potential damage to landscapes, shrines, archeological sites, and burials. This damage could include Soldiers trampling some resources during training that may be considered ATI. Impacts on archeological sites include damage resulting from ground troop presence on the range. CALFEXs with ammunition rounds from guns, mortars, and artillery could damage historic properties, as could squad and platoon live-fire training, air assault, aviation support, and sniper training. In addition, unexploded ordnance clearance after training exercises could physically damage sites.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Significant and unmitigable impacts would occur as a result of implementing Alternative 2. This alternative would have impacts similar to those described under Alternative 1, with the primary difference being the increased number of CALFEXs and the use of tracers. Future access and cultural use by Native Hawaiian groups at MMR would be even more restricted under this alternative due to the greater number of CALFEXs. Additional CALFEXs also would create a greater risk of accidental damage.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). This alternative would have significant and unmitigable impacts similar to those described under Alternative 2, with greater magnitude from the additional use of illumination munitions, inert TOW missiles, and 2.75-inch rockets. While they would be used sparingly during CALFEXs, inert TOW missiles and 2.75-inch rockets have a greater potential for adversely affecting historic properties due to their greater destructive force and the potential for misfires and ricochets extending beyond specified target areas. Alternative 3 would also include use of C-Ridge. Access to ATI and archeological sites would result in the same significant impacts as under Alternative 2.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. This alternative would have significant and unmitigable impacts similar to those described under Alternative 2, with greater magnitude from the additional use of illumination munitions, inert TOW missiles, and 2.75-inch rockets. While they would be used sparingly during CALFEXs, inert TOW missiles and 2.75-inch rockets have a greater potential for adversely affecting historic properties due to their greater destructive force and the potential for misfires and ricochets extending beyond specified target areas. Future access and cultural use by Native Hawaiian groups at PTA would be restricted under this alternative due to the training activities. The Army does not normally provide cultural access in an existing impact area.

ES.7.11 Hazardous Materials and Waste

No Action Alternative. Less than significant impacts would be expected under No Action. Live-fire training at MMR would cease, and Army maintenance and stewardship programs would continue at a reduced level,. The improved conventional munitions areas would be expected to remain off limits to Army personnel and the public, and security fencing would be inspected and maintained to prevent unauthorized access.

There would be less than significant impacts from UXO. Due to historic live-fire training at MMR, UXO is buried throughout the installation and

could be unearthed by natural processes. UXO is a serious safety risk if encountered by members of the public or Army personnel. This is considered a less than significant impact because any members of the public accessing the installation would have authorized military escorts. All military escorts and security personnel would be trained to identify and avoid UXO. No other impacts were identified.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). No significant impacts associated with hazardous materials and wastes are anticipated under Alternative 1. Although new types of munitions would be used, SOPs would be updated and safety precautions would be followed for these new practices to specify target and firing limitations, storage and handling protocol, and fire prevention measures. The only other impacts under Alternative 1 regarding hazardous materials and waste would come from a slight increase in hazardous material and waste management due to new ammunition, UXO, lead from ammunition, pesticides, and general training activities. All impacts associated with hazardous materials and waste under Alternative 1 are considered less than significant, and existing mitigation and abatement measures are in place and followed to minimize these impacts.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). As with Alternative 1, no significant impacts are anticipated under Alternative 2. Although tracer ammunition would be reinstated into training under this alternative, there are no significant impacts related to hazardous materials or waste associated with this ammunition. SOPs would be updated and safety precautions would be highlighted as part of the introduction of new munitions and practices. All other impacts under Alternative 2 are essentially identical to those of Alternative 1. All impacts associated with hazardous materials and waste under Alternative 2 are considered less than significant, and existing mitigation and abatement measures are in place and followed in order to minimize these impacts.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). No significant impacts are predicted under Alternative 3. Although inert TOW missiles, 2.75-inch rockets, and illumination munitions would be introduced into training under this alternative, there are no significant impacts related to hazardous materials or waste associated with these munitions. SOPs would be updated and safety precautions would be followed as part of the introduction of new munitions and practices. All other impacts under Alternative 3 are essentially identical to those of Alternatives 1 and 2. All impacts associated with hazardous materials and waste under Alternative 3 are considered less than significant, and existing

mitigation and abatement measures are in place and followed in order to minimize these impacts.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Significant impacts mitigable to less than significant would result from increased firing of lead ammunition. Based on the results of a 2002 soil study at PTA, two samples exceeded the industrial soil PRG for lead. Less than significant impacts would result from UXO and ammunition since this alternative is located in an existing impact area that is in a very remote location and is closed to the public. Hazardous waste generated under Alternative 4 is the same as described under Alternative 1. PTA would continue as a small quantity generator and no new handling or disposal procedures would need to be adopted.

ES.7.12 Socioeconomics and Environmental Justice

No Action Alternative. Under this alternative, there would be less than significant impact to protection of children and environmental justice. The Army would continue to train at MMR, although it would be nonlive-fire training. Live ammunition would not be transported on Farrington Highway through Waiʻanae. There would be some military vehicular traffic on Farrington Highway associated with units utilizing MMR as a staging base for command and control functions, for road maintenance, and for limited training with blank ammunition upon authorization. Nonlive-fire training would impact the number of days when ATI and archeological sites could be accessed. Aircraft lasing and UAV training would probably be at a frequency well less than CALFEX exercises and CLF training. Combined with consultation discussions with the Waiʻanae community, impacts would be reduces to less than significant. There would be no substantial change to population, employment, or the economy.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Under this alternative, environmental justice impacts would be expected. Under Alternative 1, use of the training range would reduce the number of days when ATI and archeological sites could be accessed, which would be a significant unmitigable impact. In addition, transporting live ammunition along Farrington Highway would increase the risks to public safety, creating significant and mitigable impacts for environmental justice and protection of children. There would be no impacts on other socioeconomic resources.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Impacts would be similar to those described under Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Impacts would be similar to those described under Alternative 1.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Under this alternative, there would be temporary beneficial impacts to the economy, employment, and income in Hawai‘i County. These impacts would be less than significant, as the changes would mainly last for the duration of the range construction. There would be no impacts on environmental justice and protection of children.

ES.7.13 Public Services and Utilities

No Action Alternative. Less than significant impacts would be expected as a result of the current conditions at MMR. No impacts on public service and utilities would be expected because there would be no increase in the demand for service.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Less than significant impacts would be expected for public services, potable water, wastewater, and solid waste management. Continued support of training activities would be required of public services and potable water, wastewater, and solid waste management infrastructure; however, these demands can be accommodated by the respective existing utility systems.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Impacts would be similar to those described under Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). Impacts would be similar to those described under Alternative 1.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Less than significant impacts would be expected for public services, potable water, wastewater, stormwater, solid waste management, telephone, and electricity infrastructure. The installation could support the additional training activities and accommodate the minor additions to the existing utility systems.

ES.7.14 Wildfires

No Action Alternative. Mitigable to less than significant wildfire impacts would be expected under this alternative. Wildfire ignition could not be entirely avoided due to the unpredictable or uncontrollable nature of some of the nonmilitary ignition sources, such as unauthorized activities from trespassers. Because nonmilitary wildfire ignition sources (members of the public and nonmilitary activities) accounted for only five percent of the

historical wildfires at MMR, the potential for wildfire ignition would be mitigable to less than significant.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions). Significant and mitigable wildfire impacts would be expected under Alternative 1. Alternative 1 would include the use of ammunition that is explosive and flammable, that is new to training at MMR, and that is capable of landing outside the firebreak road. Alternative 1 would include other additional training activities, such as demolitions training, capable of starting wildfires. These types of weapons and ammunition have historical wildfire ignition records and are capable of igniting wildfires because of their explosive and flammable properties. The 120mm mortar, the 155mm high explosive howitzer, and the Javelin are the only proposed high explosive weapons that have not been previously used during training at MMR. Also, the 10 to 19 CALFEXs would involve both daytime and nighttime LFXs.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions). Significant and unmitigable wildfire impacts would be expected under Alternative 2. The impacts discussed under Alternative 1 would also occur under Alternative 2. Additionally, under Alternative 2, up to 50 CALFEXs would be conducted annually, which would result in at least 50 days of live-fire training. The Army would resume the use of tracers, which accounted for 49 percent of historical wildfire ignition sources. Live-fire training would occur during the daytime and nighttime, and it is more difficult to extinguish a fire at night at MMR. Live-fire training would occur approximately once per week, including during the most fire-prone months at MMR. Although potential mitigation is identified, it is not expected to reduce the impacts to less than significant because the IWFMP has been relied on only to a limited extent in the past to manage wildfire ignition, and this did not include training scenarios with the use of tracers.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions). The impacts under this alternative are similar to those described under Alternative 2. Tracer ammunition, inert TOW missiles, illumination munitions, and 2.75-inch rockets would be used under Alternative 3. These additional weapons and ammunition are capable of igniting a wildfire because of their explosive and flammable properties. The missile or rocket propellant or illumination munitions may not be fully consumed before reaching the ground, creating the potential for igniting a wildfire. The use of the 2.75-inch rocket would be a new addition to training at MMR, as well as the new weapons previously discussed. This would increase the amount and intensity of use of previously used and new weapons that have the potential for igniting a wildfire and landing outside the firebreak road. Because the 2.75-inch rocket is fired from a helicopter

rather than from a fixed position, this weapon has an increased risk of misfiring. Although potential mitigation is identified, it is not expected to reduce the impacts to less than significant.

Measures are being implemented that would minimize the risk of a significant wildfire. The Army is revising the SOPs section in the IWFMP to outline the Fire Danger Rating System, revised weapons restrictions, new National Wildfire Coordinating Group qualifications standards and helicopter staffing requirements, fire equipment requirements, new firebreak and fuelbreak installation and maintenance standards, fire reporting responsibilities, and fire prevention, detection and suppression standards, which would minimize the risk of resource damage due to training-related wildland fires.

Alternative 4 Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area. Anticipated impacts under this alternative would be similar to those addressed in Alternatives 1, 2, and 3. The weapon systems that would be used under this alternative would create a greater fire risk at PTA, especially since there are no other training activities of this intensity within the area of the proposed range footprint.

The IWFMP wildfire SOP for PTA establishes, amongst other things, procedures for fire prevention and suppression measures, as well as delineating responsibilities for implementing these actions. However, even with these measures in place, there would still be a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species or known or unknown cultural resources. Based on this fact, the Army has made a conservative determination that, although mitigation and minimization efforts would considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level.

ES.8 CUMULATIVE IMPACTS

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). Army NEPA regulations (32 CFR 651.51[a][1][ii]) also require that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, be discussed in the same impact statement. Direct and cumulative impacts should be viewed together to determine the full impacts from each alternative identified in this EIS. However, cumulative impacts are identified in a separate section of this EIS, due to different analytical methods for determining significance and because the region of influence is often larger than that of direct and indirect impacts (CEQ 1997). Also, this EIS may identify a level of direct impact for certain resources different from the cumulative impact level for the same

resource. This difference is normally due to the different geographical context used in determining direct and cumulative impacts.

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 include projects by the Army, other federal and state agencies, and private entities.

As presented in Table ES-3, at MMR adverse cumulative impacts from Alternatives 1, 2, 3, 4, would occur in all resource areas except airspace and socioeconomics. There would be significant and unmitigable cumulative impacts on land use and recreation, noise, water resources, geology and soils, biological resources, cultural resources, socioeconomics, and wildfires. There would be significant and mitigable cumulative impacts on air quality, traffic and transportation, and hazardous materials and waste.

The significant and unmitigable cumulative impacts result primarily from the noise generated by training activities and from the increased wildfire potential from training activities and prescribed burns. Island-wide developments contribute to the loss of access and damage to cultural resources. Because Native Hawaiian communities are the primary beneficiaries of access to these cultural resources, they would experience environmental justice impacts.

The significant and mitigable traffic and transportation impacts result from inconsistency between Army convoy and ammunition transport practices and state policies. Biological resources would experience impacts from the increasing encroachment of developments on areas of native species habitat. UXO safety hazards from development on previously used training areas constitute the significant hazardous materials and waste impacts.

As presented in Table ES-3, at PTA adverse cumulative impacts from Alternative 4 would occur in all resource areas except air space. There would be significant and unmitigable cumulative impacts on geology and soils, biological resources, cultural resources, and wildfires. There would be significant and mitigable cumulative impacts on visual resources, air quality, and hazardous materials and waste.

For the No Action alternative, there would be significant and unmitigable cumulative impacts on biological and cultural resources. Less than

significant impacts would be experienced by land use and recreation, visual, air quality, noise, traffic and transportation, water resources, geology and soils, hazardous materials and waste, and public services and utilities. Socioeconomics and environmental justice would experience less than significant impacts in addition to beneficial impacts. Wildfires would present significant and mitigable cumulative impacts.

Table ES-3
Summary of Potential Cumulative Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Land use and recreation	⊙	⊗	⊗	⊗	⊙
Airspace	○	○	○	○	○
Visual resources	⊙	⊙	⊙	⊙	⊙
Air quality	⊙	⊙	⊙	⊙	⊘
Noise	⊙	⊗	⊗	⊗	⊙
Traffic and transportation	⊙	⊘	⊘	⊘	⊙
Water resources	⊗	⊗	⊗	⊗	⊙
Geology and soils	⊙	⊗	⊗	⊗	⊗
Biological resources	⊗	⊗	⊗	⊗	⊗
Cultural resources	⊗	⊗	⊗	⊗	⊗
Hazardous materials and waste	⊙	⊘	⊘	⊘	⊘
Socioeconomics and environmental justice	⊙+	⊗	⊗	⊗	⊙+
Public services and utilities	⊙	⊙	⊙	⊙	⊙
Wildfires	⊗	⊗	⊗	⊗	⊗

LEGEND:
⊗ = Significant impact
⊘ = Significant impact mitigable to less than significant
⊙ = Less than significant impact

○ = No impact

\+ = Beneficial impact

ES.9 OTHER REQUIRED ANALYSES

ES.9.1 Significant Unavoidable Adverse Impacts

An EIS must describe any significant unavoidable impacts for which either no mitigation or only partial mitigation is feasible. Significant and unavoidable impacts from the proposed training activities occur in the following areas:

- Impacts on recreational resources due to training (Alternatives 1, 2, and 3);
- Conflicts with existing or planned land uses (Alternatives 1, 2, and 3);
- Noise impacts from ordnance use (Alternatives 1, 2, and 3);
- Soil erosion impacts (No Action and Alternatives 1, 2, and 3);
- Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species (No Action and Alternatives 1, 2, 3 and 4);
- Impacts from fire on sensitive terrestrial species and sensitive habitat (No Action and Alternatives 1, 2, 3, and 4);
- Impacts on archeological resources (Alternatives 1, 2, 3, and 4);
- Access to ATI and archeological sites (No Action and Alternatives 1, 2, and 3);
- Impacts on ATI (Alternatives 1, 2, and 3);
- Increased impacts / Environmental Justice (Alternatives 1, 2, and 3);
- Increased wildfire ignition (Alternatives 2, 3, and 4);
- Cumulative impacts for land use and recreation (Alternatives 1, 2, and 3);
- Cumulative impacts for noise (Alternatives 1, 2, and 3);
- Cumulative impacts for water resources (Alternatives 1, 2, and 3);
- Cumulative impacts for geology and soils (Alternatives 1, 2, 3, and 4);

- Cumulative impacts for biological resources (No Action and Alternatives 1, 2, 3, and 4);
- Cumulative impacts for cultural resources (No Action and Alternatives 1, 2, 3, and 4);
- Cumulative impacts for socioeconomics and environmental justice (Alternatives 1, 2, and 3); and
- Cumulative impacts for wildfires (Alternatives 1, 2, 3, and 4).

Significant unavoidable adverse impacts on recreational resources would occur under Alternatives 1, 2, and 3. Military training involving helicopter activity and ordnance detonation would create a substantial level of noise and visual disturbance for Mākua Beach users. Helicopters cross Mākua Beach and Farrington Highway at low altitudes when arriving at or departing from MMR and during training activities. Ordnance detonations from mortars, artillery, and demolition charges would generate high peak noise levels at Mākua Beach. There would be significant cumulative impacts on land use and recreation for Alternatives 1, 2, 3, and 4 for land use change from agricultural/cattle grazing to military training at WPAA.

Training would result in a significant land use conflict for Alternatives 1, 2, and 3 because projected noise levels from CALFEXs exceed those levels considered compatible with adjacent recreational land use. Disturbance would result from the helicopter activity, ordnance use, and demolitions training.

Noise from ordnance use would have a significant adverse and cumulative impact under Alternatives 1, 2, and 3 because projected noise levels from CALFEXs exceed those levels considered compatible with the adjacent recreational land use.

Potential wildfires under No Action and Alternatives 1, 2, 3, and 4 could cause significant soil erosion as a result of disturbance of soils and vegetation. Severe erosion can create gulleys, reduce vegetation growth, and slow land recovery. At MMR, it also moves sediments from ridges and hill slopes to toes of slopes and channels and can affect drainage or create landslide hazards. There would be similar cumulative impacts for Alternatives 1, 2, 3, and 4.

Implementing No Action and Alternatives 1, 2, 3, and 4 would increase the potential for major wildfires. Increased fires would increase the spread of nonnative species, which threaten Hawaiian native ecosystems, including sensitive species. There would be similar cumulative impacts by

major wildfires for the spread of nonnative species for No Action and Alternatives 1, 2, 3, and 4.

No Action and Alternatives 1, 2, 3, and 4 would increase the threat of wildfire, which could lead to the irretrievable loss of individual members of sensitive terrestrial species, including federally listed species confirmed within the ROI, critical habitat, and biologically sensitive areas (BSAs). There would be similar cumulative impacts by wildfire for No Action and Alternatives 1, 2, 3, and 4.

Implementing No Action and Alternatives 1, 2, 3, and 4 would reduce the number of days that ATI and archeological sites could be visited by Native Hawaiian groups for religious purposes. Ground troops and stray ammunition associated with these alternatives may cause damage to ATI and archeological sites. There would be similar cumulative impacts on ATI and archeological sites for No Action and Alternatives 1, 2, 3, and 4.

Use of weapons with a high potential to cause wildfires under Alternatives 2, 3, and 4 would increase the potential for wildfire ignition beyond the Army's ability to adequately manage these sources of ignition. There would be significant cumulative impacts by wildfires for Alternatives 1, 2, 3, and 4.

There would be significant cumulative impacts on water resources and environmental justice for Alternatives 1, 2, and 3.

ES.9.2 Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

NEPA requires that an EIS consider the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

Short-term damage to the environment relating to training activities includes direct and indirect damage to sensitive species, emissions impacts on air quality, and surface water quality impacts. Long-term environmental damage includes impacts on soil and water quality; impacts on habitat and wildlife from training activities, erosion, and wildfires; impacts on air quality from wind erosion due to training activities; and potential future damage to cultural resources.

The long-term productivity of the proposed training activities is based on the Army's mission. Any measurement of long-term productivity in this context must recognize the importance of national defense and the Army's obligation to adapt to changing national security needs. While the Army will take whatever actions are reasonable and practicable to preserve and

protect the resources under its stewardship, the necessity of national defense requires the Army to provide the nation with capabilities that meet current and evolving national defense requirements. The proposed military training is designed to meet these goals and further the security and welfare of the United States, its residents, and the environment.

ES.9.3 Irreversible and Irretrievable Commitments of Resources

NEPA requires that an EIS analyze the extent to which the proposed project's primary and secondary effects would commit nonrenewable resources to uses that future generations would be unable to reverse.

Implementing Alternatives 1, 2, 3, and 4 would require commitments of both renewable and nonrenewable energy and material resources for production of ammunition, weapons, and munitions. Implementing all the Alternatives, to include No Action, would require material resources that include metals, chemicals, and other petroleum products. Other nonrenewable resources that would be used during training activities include fuel used by vehicles in training maneuvers and troop convoys and water, power, and other resources necessary to maintain and operate the range facilities.

ES.9.4 Federal Permits, Licenses, and Other Entitlements that must be Obtained Prior to Proposal Implementation

For preparation of this EIS, the Army has coordinated with other military services in Hawai‘i relative to their proposed use of MMR. Key government consultations identified during the development of this document are identified in Table ES-4. This table provides a quick reference and is not meant to be a comprehensive listing of all consultations and permits that may eventually be required. If alternative 4 were selected, additional consultations would be required prior to construction of the proposed range at PTA.

The Army has obtained all of the required operating permits necessary to proceed with the proposed activities at MMR (Alternatives 1-3). If there is a future training requirement, the Army may obtain permits from the State Department of Land and Natural Resources (DLNR) to conduct future troop marches on lands other than federal lands.

ES.10 MITIGATION MEASURES

Mitigation actions would be expected to reduce, avoid, or compensate for most adverse effects. Table ES-6 summarizes the mitigation measures that

Table ES-4
Summary of Government Consultations

Consultation or Concurrence	Regulatory Agencies and Organizations
Concurrence with Consistency Determination under the Coastal Zone Management Act (CZMA), CZM Program, State Department of Business, Economic Development, and Tourism (State DBEDT)	CZM Program, State DBEDT
Consultation in accordance with Section 7 of the ESA and the Marine Mammal Protection Act (MMPA)	USFWS, National Marine Fisheries Service (National Oceanic and Atmospheric Administration [NOAA] Fisheries)
Consultation in accordance with Section 106 of the National Historic Preservation Act (NHPA)	State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), and native Hawaiian organizations

could be implemented to minimize effects on affected resources. The Army would also adopt for PTA mitigation measures discussed in the mitigation measures sections of the 2008 ROD for the Permanent Stationing mitigation measures sections of the 2008 ROD for the Permanent Stationing of the 2/25th SBCT and the 2004 ROD for the Transformation of the 2/25th to a SBCT. Many of these mitigation and monitoring measures are listed in the Executive Summary (Table ES-22) of the 2004 Final EIS.

Mitigation measures in this EIS are divided into two categories, as follows:

- Regulatory and administrative mitigation, which is required in compliance with federal environmental laws and regulations, that are existing SOPs or BMPs or that are part of an ongoing program; and
- Additional mitigation, which is proposed by the Army, other agencies, or the public and which may be implemented. 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 should be implemented. The Army will identify, in the ROD, which of these mitigations it will implement. Because the Army has determined that mitigation measures that modify its training exercises would not be feasible because they would affect its ability to adequately train its Soldiers, those types of measures have not been identified and would not be implemented.

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Land Use and Recreation					
Conflicts or incompatibilities with the objectives, policies, or guidance of state and local plans	⊙	⊙	⊙	⊙	⊙
Conflicts with existing or planned land uses	⊙	⊗	⊗	⊗	⊙
Impacts on recreational resources due to training	⊙	⊗	⊗	⊗	○
Airspace					
Reduction in navigable airspace	○	○	○	○	○
Creation of an air navigation obstruction	○	○	○	○	○
New/modified special use airspace	○	○	○	○	○
Change to a military training route	○	○	○	○	○
Change in en route airway or IFR procedure	○	○	○	○	○
Restriction of access to airports/airfields	○	○	○	○	○

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Change in airport/airfield approach or departure patterns	○	○	○	○	○
Reduction in public health and safety due to change in aviation safety risk	○	○	○	○	○
Visual Resources					
Modification of existing view, to include the presence/use of training assets	⊙	⊙	⊙	⊙	⊙
Consistency with visual resource policies	⊙	⊙	⊙	⊙	⊙
Alteration of the landscape character, to include construction	⊙	⊙	⊙	⊙	⊙
Impairment of view from visible fugitive dusk	⊙	⊙	⊙	⊙	⊙
Air Quality					
Emissions from aircraft use	⊙	⊙	⊙	⊙	⊙
Emissions from ordnance use	○	⊙	⊙	⊙	⊙
Emissions from military vehicle use	⊙	⊙	⊙	⊙	⊙
Fugitive dust from military vehicle use	⊙	⊙	⊙	⊙	⊙

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Fugitive dust from range construction activities	○	○	○	○	⊘
Wind erosion from disturbed areas	○	⊙	⊙	⊙	⊘
Emissions from wildfires	○	⊙	⊙	⊙	⊙
Noise					
Noise from rotary-wing aircraft	⊙	⊙	⊙	⊙	⊙
Noise from fixed-wing aircraft	⊙	⊙	⊙	⊙	⊙
Noise from military vehicle use	⊙	⊙	⊙	⊙	⊙
Noise from ordnance use	○	⊗	⊗	⊗	⊙
Noise from demolitions training	○	⊙	⊙	⊙	⊙
Noise from construction activities	○	○	○	○	⊙
Traffic and Transportation					
Consistency with state regulations and policies	⊙	⊘	⊘	⊘	⊙
Intersection operations	⊙	⊙	⊙	⊙	⊙
Roadway/highway segment operations	⊙	⊙	⊙	⊙	⊙
Water Resources					
Flooding	⊙	⊘	⊘	⊘	⊙

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Impacts on surface water quality from chemical contaminants	⊙	⊙	⊙	⊙	⊙
Impacts on surface water quality from soil erosion	⊙	⊙	⊘	⊘	⊙
Alter stream channel or groundwater flow patterns	⊙	○	○	○	○
Groundwater quality	○	⊙	⊙	⊙	⊙
Reduce water supply	○	○	○	○	○
Geology and Soils					
Soil erosion	⊗	⊗	⊗	⊗	⊙
Soil contamination	○	⊙	⊙	⊙	⊙
Geologic hazards	○	⊙	⊙	⊙	⊙
Biological Resources					
Impacts from fire on sensitive terrestrial species and sensitive habitat	⊗	⊗	⊗	⊗	⊗
Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species	⊗	⊗	⊗	⊗	⊗

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Impacts on marine wildlife and coral ecosystems from runoff	⊙	⊙	⊙	⊙	○
Disturbance to marine wildlife from aircraft	⊙	⊙	⊙	⊙	⊙
Disturbance to marine wildlife from ground training	○	⊙	⊙	⊙	○
Disturbance to sensitive terrestrial species and habitat from ground training	○	⊘	⊘	⊘	⊘
Disturbance to sensitive terrestrial species and habitat from aircraft	○	⊙	⊙	⊙	⊙
Cultural Resources					
Impacts on archeological resources	⊘	⊗	⊗	⊗	⊗
Impacts on cultural resources from vehicles	⊙	⊙	⊙	⊙	⊙
Impacts on paleontological resources	○	○	○	○	○
Impacts on Areas of Traditional Importance	⊘	⊗	⊗	⊗	⊗

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Access to Areas of Traditional Importance and archeological sites	⊗	⊗	⊗	⊗	⊗
Hazardous Materials and Waste					
Unexploded ordnance	⊙	⊙	⊙	⊙	⊙
Ammunition	○	⊙	⊙	⊙	⊙
General training	○	⊙	⊙	⊙	⊙
Lead from ammunition	○	⊙	⊙	⊙	⊘
Pesticides	○	⊙	⊙	⊙	⊙
Hazardous waste management	○	⊙	⊙	⊙	⊙
Polychlorinated biphenyls	○	○	○	○	○
Electromagnetic fields	○	○	○	○	○
Petroleum, oils, and lubricants	⊙	○	○	○	⊙
Depleted Uranium	○	○	○	○	⊙
Socioeconomics and Environmental Justice					
Economic development	○	○	○	○	⊙+
Protection of children	⊙	⊘	⊘	⊘	○
Environmental justice	⊙	⊗	⊗	⊗	○
Public Services and Utilities					
Police, fire, and emergency medical service	○	⊙	⊙	⊙	⊙
Potable water	○	⊙	⊙	⊙	⊙
Wastewater	○	⊙	⊙	⊙	⊙

Table ES-5
Summary of Potential Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Solid waste management	⊙	⊙	⊙	⊙	⊙
Stormwater	○	○	○	○	⊙
Telephone	○	○	○	○	⊙
Electricity	○	○	○	○	⊙
Wildfires					
Wildfire ignition	⊗	⊘	⊗	⊗	⊗

LEGEND:
⊗ = Significant impact
⊘ = Significant impact mitigable to less than significant
⊙ = Less than significant impact
○ = No impact
\+ = Beneficial impact

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Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
	Land Use and Recreation				
1	Impacts on recreational resources due to training (Mākua Beach) (Alternatives 1-3)	Mitigation measures considered would include notifying the public of planned CALFEXs and other training exercises involving aircraft operations by posting a Web site notice and publishing newspaper notices at least one week in advance of those activities.	None identified.	No Impact.	The impact would be reduced by allowing the public to plan recreational activities around the hours that the Army would conduct CALFEXs and other exercises involving aircraft operations.
2	Impacts on recreational resources due to training in the Mokulēʻia Forest Reserve and Waiʻanae Kai Forest Preserve (Alternatives 1-3)	Mitigation measures considered would include notifying the Mokulēʻia Forest Reserve and Waiʻanae Kai Forest Preserve users regarding live-fire training by posting a Web site notice and publishing newspaper notices at least one week in advance of those activities.	None identified.	No Impact.	The less than significant effect would be reduced by allowing the public to plan recreational activities around the hours that the Army would conduct CALFEXs and other exercises involving aircraft operations.
	Air Quality				
1	Impacts on air quality as a result of range construction at PTA and wind erosion from disturbed areas (Alternative 4)	Mitigation measures considered would include development and implementation of a Dust and Soils Mitigation Monitoring Plan (DuSMMoP) covering the affected training areas. The Garrison's ITAM program would substantially mitigate potential wind erosion problems by providing management tools that would help limit damage to vegetation as a result of training activities.	None identified.	No Impact.	Would reduce the amount of fugitive dust generated by range construction and operation activities.
	Traffic and Transportation				
1	Convoy and ammunition transportation consistency with state regulations and policies (Alternatives 1-4)	Mitigation measures considered includes limiting convoys containing oversize or overweight vehicles to two vehicles. The Army would coordinate with the Hawaiʻi Department of Transportation to establish the number of allowable vehicles in each convoy.	None identified.	No Impact.	Would reduce significant impacts to less than significant by avoiding traffic hazards.
2	Convoy and ammunition transportation consistency with state regulations and policies (Alternatives 1-4)	Mitigation measures considered includes providing 48-hour advance written notice to police and fire departments of the transport of ammunition.	None identified.	No Impact.	Would reduce significant impacts to less than significant by aiding response to potential accidents during ammunition transportation.
	Water Resources				
1	Chemical contaminant effects on surface water quality (No Action Alternative and Alternatives 1-3)	Mitigation measures considered include conducting remedial actions at the OB/OD area. These actions could include soil removal and phytoremediation. Continue to monitor surface water and groundwater quality for selected contaminants of concern. Be consistent with SA	None identified.	No Impact.	Would reduce impacts on water quality by decreasing the risk of chemical contamination.
2	Flooding (Alternatives 1-3)	Mitigation measures considered include preparing a flood contingency plan to identify and address potential hazards associated with training activities and permanent facilities; developing a flood alert procedure along with evacuation procedures for materials and equipment staged in the bivouac area; and modifying hazardous materials storage procedures to address risks from flooding.	None identified.	No Impact.	Would reduce impacts from flooding to less than significant by decreasing the risk of property damage and chemical contamination that could result in water impacts.
3	Soil erosion effects on surface water quality (Alternatives 1- 4)	None identified.	USAG-HI would continue to evaluate and implement land management practices through the ITAM program to reduce erosion impacts. ITAM practices for soil erosion include reseeding slopes or planting vegetation buffers, redirecting run-on and runoff, and avoiding damaged areas.	No Impact.	Would reduce significant impacts on water quality from live-fire training to less than significant by providing an ongoing program to minimize erosion.

Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
	Geology and Soils				
1	Soil erosion (No Action Alternative)	Mitigation measures considered include Army implementation of post-wildfire erosion control measures that may include native plant reseeding and selective planting of burned areas or engineering controls to redirect or control runoff.	None identified.	No Impact.	Would reduce significant impacts to less than significant by reducing the amount of post-wildfire erosion.
2	Soil Erosion (Alternatives 1-3)	Mitigation measures considered include preparing and implementing an erosion control plan. This plan would include provisions for periodic monitoring, methods for identifying erosion problems, and management practices for addressing erosion problems.	None identified.	No Impact.	Would reduce significant impacts on training area soils by ensuring that erosion problems are identified and addressed.
3	Soil Erosion (Alternatives 1-3)	Mitigation measures considered include obtaining a permit from the state prior to using trails within state-owned lands. The state would issue the permit only if it determined that the trail was in good condition. The state would maintain the trail to prevent significant erosion and would improve the trail to address any effects from erosion.	None identified.	No Impact.	Would reduce significant impacts on soils from trail marches by ensuring that the trails are kept in good condition.
	Biological Resources				
1	Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species (No Action Alternative)	Mitigation measures considered include undertaking revegetation and continue weeding and monitoring for five years; continuing trapping efforts and fence maintenance; providing funding and staffing to assist Hawai‘i DLNR weeding and revegetation activities.	None identified.	No Impact.	Would reduce significant impact to less than significant by controlling the spread of nonnative species.
2	Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species (Alternatives 1, 2, 3)	Mitigation measures considered include instructing Soldiers to clean boots and equipment directly prior to marches to eliminate nonnative species.	INRMP activities would continue to be implemented. The Army would implement the MIP to control, minimize, and mitigate the spread and impact of nonnative species.	No Impact.	Would reduce significant impacts on the ecosystem from changes in plant populations resulting from the spread of nonnative species to less than significant.
3	Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species (Alternatives 1, 2 and 3)	Potential mitigation measures considered include pursuing acquisition and transfer of title to a public or private conservation organization, of the Puulu to Ala‘ihe‘ihe Gulch and Haili to Kawaiu areas to better ensure access for long-term Army stabilization actions.	Conservation recommendation identified by USFWS in the 2008 MMR supplemental Biological Opinion.	No Impact	Would promote conservation of listed plant species.
5	Impacts from fire on sensitive terrestrial species and sensitive habitat (No Action Alternative)	Mitigation measures considered include undertaking revegetation and continue weeding and monitoring for five years; employing Army fire fighting resources to support state and local firefighters; provide funding and staffing to assist Hawai‘i DLNR weeding and revegetation activities.	None identified.	No Impact.	Would minimize significant impacts by minimizing fire damage and protecting native vegetation.
6	Impacts from fire on sensitive terrestrial species and sensitive habitat (Alternatives 1 and 2)	Mitigation measures considered include revegetation efforts in any sensitive habitat areas affected by fires, especially along edges of sensitive habitat to ensure no net loss of habitat or species. The Army could replace the 5,577 feet (1,700 meters) of fencing that have been burned. Replacing this fencing, which had been constructed to keep out feral pigs and goats, would reduce impacts on native plants.	The INRMP and the IWFMP would be implemented. USFWS-approved conservation actions would continue until the MIP is initiated. Stewardship actions could include controlling large feral mammals, selected weeds, predators, insect pests, and diseases and managing habitat levels. The Army would also monitor for introduced species and eradicate any newly introduced ones. The Army would implement the MIP to control, minimize, and mitigate the risk and impact of fire.	No Impact.	Would minimize significant impacts by minimizing fire damage and protecting and restoring native vegetation.

Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
7	Impacts from fire on sensitive terrestrial species and sensitive habitat (Alternatives 1, 2 and 3)	Mitigation measures considered include installing a new radio repeater within range of Mākua Valley to facilitate communications between Mākua and wildland firefighters and cooperators stationed outside Mākua valley.	Conservation recommendation identified by USFWS in the 2007 and 2008 MMR Biological Opinions.	No Impact	Would minimize impacts by minimizing fire threat and protecting native vegetation.
8	Impacts from fire on sensitive terrestrial species and sensitive habitat (Alternatives 1, 2 and 3)	Potential mitigation measures considered include adding GPS locations of individual plants to USAG-HI's GIS database to facilitate reintroduction and fire suppression planning.	Conservation recommendation identified by USFWS in the 2007 and 2008 MMR Biological Opinions.	No Impact	Would minimize significant impacts by minimizing fire damage and protecting native vegetation.
9	Impacts from fire on sensitive terrestrial species and sensitive habitat (Alternatives 1, 2 and 3)	Potential mitigation measures considered include establishing protocols for hydro-mulching or other large-scale native plant seeding to be used in native habitat restoration efforts.	Conservation recommendation identified by USFWS in the 2007 and 2008 MMR Biological Opinions.	No Impact	Would minimize impacts of fire and promote native vegetation.
10	Impacts from fire on sensitive terrestrial species and sensitive habitat (Alternative 3)	Mitigation measures considered include revegetation efforts in any sensitive habitat areas affected by fires, especially along edges of sensitive habitat to ensure no net loss of habitat or species. The Army could replace the 5,577 feet (1,700 meters) of fencing that have been burned. Replacing this fencing, which had been constructed to keep out feral pigs and goats, would reduce impacts on native plants.	Mitigation measures described under Alternatives 1 and 2 would be implemented. The Army would reinitiate Section 7 consultation with the USFWS for use of illumination munitions and additional training acreage. The Army would implement this alternative only after receiving a no jeopardy biological opinion from the USFWS.	No Impact.	Would lessen significant impact by minimizing fire damage and protecting and restoring native vegetation.
11	Disturbance to sensitive terrestrial species and habitat from ground training (Alternatives 1-3)	Mitigation measures that could be considered include the Army limiting marches at Ka'ena Point during the Laysan albatross breeding season (November to July) to at most one march per month and conducting monitoring at the beginning of the wedge-tailed shearwater breeding season (April to June) to determine whether burrows are present along the trail. Additional measures may be taken pending results of monitoring and consultation with USFWS.	The INRMP and the IWFMP would continue to be implemented. Programs in the INRMP that would help to mitigate this impact include managing, protecting, and monitoring existing sensitive species communities (both flora and fauna) and surveying potential habitat for new occurrences of sensitive species. USAG-HI would continue its strict adherence to its special use permit. Permit conditions may change depending on management issues, time of proposed training, and frequency of use. The Army would reinitiate Section 7 consultation with the USFWS for training activities on the Ka'ena Point Trail. The Army would implement this alternative only after receiving a no jeopardy biological opinion from the USFWS.	Limits marches at Ka'ena Point during parts of the year.	Would reduce significant impacts on the Laysan albatross and wedge-tailed shearwater to less than significant.

Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
12	Disturbance to sensitive terrestrial species and habitat from ground training (Alternatives 1-3)	Mitigation measures considered include implementing such BMPs as no lights, cadence, or smoking and limiting noise within marked areas within the marked areas of the trails. In addition, Soldiers would be briefed on the state permit regulations before the march and instructed to avoid off-trail activities in sensitive areas.	None identified.	No Impact.	Would reduce impacts on endangered plants, trails, and behavior modification in birds to less than significant.
13	Disturbance to sensitive terrestrial species and habitat from ground training (Alternative 2)	None identified.	The Army would consult again with USFWS on the use of tracers.	No Impact.	Would reduce impacts on the Laysan albatross and wedge-tailed shearwater to less than significant.
14	Disturbance to marine wildlife from aircraft (Alternatives 1-3)	Mitigation measures considered include emphasizing to all personnel that the mobile nature of marine wildlife mandates constant observation vigilance; limiting low-altitude flying for aircraft over areas likely to harbor marine mammals and performing a pass-by flight before training; avoiding flying over seals and sea turtles when present on Mākua Beach; limiting low flying when visibility is limited; using night vision goggles and thermal scanning during nighttime flights; maintaining a 1,000-foot (300-meter) separation from observed humpback whales; developing and implementing a comprehensive reporting and monitoring program; and continuing informal consultation with NOAA Fisheries.	The Army would continue to use a command and control aircraft to observe the water for signs of marine mammals and would continue to follow SOPs, such as the local flying rules, to protect marine wildlife when the animals are observed by pilots.	No Impact.	Would reduce impacts on marine species and would ensure compliance with the Marine Mammal Protection Act and the Endangered Species Act.
15	Impacts on marine wildlife and coral ecosystems from runoff (Alternatives 1-3)	None identified.	USAG-HI would continue to implement land management practices and procedures in the ITAM work plan to reduce erosion impacts on soils.	No Impact.	Would reduce impacts on marine species.
16	Disturbance to marine wildlife from ground training (Alternatives 1-3)	Mitigation measures considered include emphasizing to all personnel that the mobile nature of marine wildlife mandates constant observation vigilance; stopping training when seals and sea turtles are present on Mākua Beach; and continuing informal consultation with NOAA Fisheries.	The Army would continue to use a command and control aircraft to observe the water for signs of marine mammals. As required per consultation with NOAA Fisheries, the Army plans to complete a hydrophonic noise study in Mākua Bay during the first full CALFEX exercise to validate the noise model. The study would allow the Army to collect empirical data for analysis of noise levels above and below the water surface. Monitoring data are to be collected at two locations offshore of Mākua Beach in marine mammal habitat areas, and at one beach location that also serves as marine mammal and sea turtle habitat.	No Impact.	Would reduce impacts on marine species and would ensure compliance with the Endangered Species Act.
17	Impacts from fire on sensitive terrestrial species and sensitive habitat (Alternative 4)	Mitigation for activities at the proposed Twin Pu'u training range area would include establishing the maximum fire break (30 feet [9 meters]) and fuel break (82 feet [25 meters] through grass fuels and 148 feet [45 meters] through shrub or forest fuels) dimensions; restoring and revegetating habitat following a fire, with specific focus on the native forest edges to ensure that the area does not recede after each fire; and eradicating fountain grass in and around the fire break and fuel break areas and within the Kīpuka Kālawamauna area.	Implementation of PTA's IWFMP SOP would avoid and minimize the potential for fire ignition by limiting training to times of lower fire risk. Army personnel would continue to use BMPs during operations. PTA would ensure that sensitive species and conservation and restoration projects are monitored as long as training occurs at PTA. The Army would also follow measures outlined in the 2003 BO to monitor for introduced species and to eradicate any newly introduced ones.	No Impact.	Would minimize significant impacts by minimizing fire damage and protecting native vegetation.

Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
18	Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species (Alternative 4)	Mitigation considered would be to require soldiers to clean their boots and equipment directly after ground training exercises to eliminate the potential to spread nonnative species in the Kīpuka Kālawamauna area adjacent to the range.	Implement the mitigation measures identified in the SBCT EIS ROD and the 2003 PTA BO to reduce the spread and impact of nonnative/invasive species caused by training and construction.	No Impact.	Would minimize significant impacts on the ecosystem from changes in plant populations resulting from the spread of nonnative species
19	Disturbance to sensitive terrestrial species and habitat from construction and ground training (Alternative 4)	Mitigation could include conducting limited surveys of the range footprint area, if safe and practicable, for listed plant species. If listed species are found, conservation measures such as collecting seeds, propagating plants, translocating plants would be considered. Mitigation measures to reduce impacts on migratory birds would include avoiding activities near active nest sites of native bird species until birds have fledged, or transferring active nests to permitted migratory bird rehabilitator if nests cannot be avoided.	Implement the conservation measures identified in the 2003 PTA BO for SBCT activities as potential mitigation to minimize and avoid impacts of construction and maintenance projects associated with this alternative. Initiate ESA Section 7 consultation with USFWS if listed plants are found during surveys.	No Impact.	Would reduce impacts on endangered plants and migratory birds.
20	Impacts on marine wildlife and coral ecosystems from runoff (Alternative 4)	None identified.	Continue to implement land management practices and procedures in the ITAM work plan to reduce erosion impacts on soils from live-fire training.	No Impact.	Would reduce impacts on marine species and environment.
21	Disturbance to marine wildlife from aircraft (Alternative 4)	None identified.	The Army would continue to implement SOP flying rules.	No Impact.	Would reduce impacts on marine species.
22	Disturbance to sensitive terrestrial species and habitat from aircraft. (Alternative 4)	None identified.	PTA would implement a Bird/Animal Strike Hazard (BASH) program and record all bird/bat/wildlife related strike data. Continue to implement provisions of the PTA INRMP.	No Impact.	Would reduce impacts on migratory birds and bats.
	Hazardous Materials and Waste				
1	Soil contamination as a result of lead from ammunition (Alternative 4)	Mitigation measures considered include the use of berms 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.	None identified.	No Impact	Would reduce impacts from soil and groundwater contamination.
	Cultural Resources				
1	Impacts on Areas of Traditional Importance (No Action Alternative)	Mitigation measures considered include Army monitoring of cultural resources, clearing of vegetation from resources, and documenting and repairing any damage.	None identified.	No Impact.	Would reduce impacts by continuing to manage cultural resources.
2	Impacts on Areas of Traditional Importance (No Action and Alternatives 1-3)	Mitigation measures considered include avoidance training, site protective measures, relocating any targets or training activities that could disturb or damage known cultural resources, and conducting inspections following training to ensure that resources were not harmed.	The Army would continue to avoid all recorded cultural resources during training, align firing points and paths to avoid shooting over cultural resources, and conduct demolitions training in the designated ordnance impact area. The Army will implement the requirements of the recently agreed upon programmatic agreement (PA) for training. The signed and agreed upon PA is found as Appendix L of this EIS.	No Impact.	Would reduce impacts on ATI.

Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
3	Impacts on Areas of Traditional Importance (Alternative 3)	Mitigation measures considered include surveying and evaluating the additional area used for training.	None identified.	No Impact.	Would reduce impacts on ATI.
4	Impacts on archeological resources (No Action Alternative)	Mitigation measures considered include Army monitoring of cultural resources, clearing of vegetation from resources, and documenting and repairing any damage.	None identified.	No Impact.	Would reduce impacts by continuing to manage cultural resources.
5	Impacts on archeological resources (No Action and Alternative 1-3)	Mitigation measures considered include relocating any targets or training activities that could disturb or damage known cultural resources, aligning firing points and paths to avoid shooting over cultural resources, conducting inspections following training to ensure that resources were not harmed. In addition, communication between the cultural resource and fire managers would continue in order to develop acceptable strategies for fire containment and control and protection of cultural resources.	The Army would continue to avoid all recorded cultural resources during training, align firing points and paths to avoid shooting over cultural resources, and conduct demolitions training in the designated ordnance impact area. The Army will implement the requirements of the recently agreed upon programmatic agreement (PA) for training. The signed and agreed upon PA is found as Appendix L of this EIS.	No Impact.	Would reduce impacts on archeological sites.
6	Impacts on archeological resources (Alternative 3)	Mitigation measures considered include surveying and evaluating the additional area used for training.	None identified.	No Impact.	Would reduce impacts on archeological resources.
7	Access to Areas of Traditional Importance and archeological sites (No Action and Alternatives 1-3)	None identified.	The Army would continue to provide cultural access to ATI and archeological resources, in accordance with the Ukanipō *Heiau* programmatic agreement.	No Impact.	Would reduce impacts on access by facilitating access to additional ATI and archeological sites.
	Wildfires				
1	Wildfire Ignition (Alternatives 1-4)	Mitigation measures considered include enforcing fire-related procedures and policies and taking disciplinary action when they are violated. The Army would update the IWFMP to address nighttime training and fire suppression. The Army would provide funding and a funding mechanism to better support the IWFMP.	The Army would provide a dedicated fire manager at MMR to implement the IWFMP. Additional data sections would be added to the fire incident report. USAG-HI would continue to inform troops before training about methods for preventing and responding to wildfires. The Army would implement the wildland fire prevention and suppression measures contained within the 2007 MMR BO and 2003 PTA BO.	No Impact.	Would reduce the significant impact to less than significant by reducing the fire potential and increasing the likelihood of containing fires that occur.
2	Wildfire Ignition (Alternatives 2 and 3)	Mitigation measures considered include increasing staff to assist the program manager of the WFMP. For example, a contracted or full-time 10-man strike team that is wildland trained and red carded could be used to respond to fires and assist daily in managing other pre-fire suppression areas of the program. Fire fighting infrastructure improvements could include installing an additional larger capacity (60,000-gallon) water storage tank and upgrading the existing water distribution system to increase flow capacity from the city's water meter to support the new storage tank, fire hydrant, or overhead filling systems.	As necessary, the Army would incorporate additional range use restrictions into the IWFMP to maximize safe use of tracers. The Army would implement the wildland fire prevention and suppression measures contained within the 2007 Biological Opinion.	No Impact.	Would reduce significant impacts by increasing the likelihood of containing any fires that occur.

Table ES-6
Summary of Key Mitigation Measures

	Direct Effect	Additional Mitigation	Regulatory/Administrative Mitigation	Training Duration Restrictions	Benefit of Mitigation
3	Wildfire Ignition (Alternative 1, 2, 3)	A water distribution line could be installed to the upper dip pond to improve water resupply capability.	None identified. The Army would implement the wildland fire prevention and suppression measures contained within the 2007 Biological Opinion.	No Impact.	Would reduce significant impacts by increasing the likelihood of containing any fires that occur.
4	Wildfire Ignition (Alternative 4)	Mitigation measures considered include increasing the number of available helicopters to ensure enough resources are available to respond to fires that may occur from concurrent training activities. Other mitigation measures considered include using ITAM geographic information systems to monitor the effectiveness of wildfire management activities and assigning appropriate personnel and equipment to water resources for responding to a wildfire.	The Army would update the IWFMP to address proposed activities within the Twin Pu‘u range.	No Impact.	Would reduce significant impacts by increasing the likelihood of containing any fires that occur.