

CHAPTER 5

CUMULATIVE PROJECTS AND IMPACTS

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). A cumulative impact is an “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions” (40 CFR § 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 CFR § 1508.7). The Army NEPA regulations (32 CFR 651.51[a][1][ii]) also require that cumulative actions, those that have cumulatively significant impacts, be discussed in the same impact statement. CEQ’s guidance for considering cumulative effects states that NEPA documents “should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant” (CEQ 1997).

Section 5.1 presents the methodology used to evaluate cumulative impacts. Section 5.2 discusses other projects on O‘ahu and Hawai‘i that may have cumulative effects when combined with the impacts from the alternatives discussed in this EIS. Section 5.3 identifies and describes the cumulative impacts on each of the resources discussed in Chapters 3 and 4.

5.1 CUMULATIVE EFFECTS ANALYSIS METHODOLOGY

CEQ’s cumulative effects guidance sets out several different methods to determine the significance of cumulative effects, such as checklists, modeling, forecasting, and economic impact assessment, where changes in employment, income, and population are assessed (CEQ 1997). This EIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. In general, past,

present, and reasonably foreseeable future projects are assessed by resource area. Cumulative effects may arise from single or multiple actions and may result in additive or interactive effects. Interactive effects may be countervailing, where the adverse cumulative effect is less than the sum of the individual effects, or synergistic, where the net adverse cumulative effect is greater than the sum of the individual effects (CEQ 1997). For individual resources, the ROI for cumulative impacts is often larger than the ROI for direct and indirect impacts. The factors considered in determining the significance of cumulative impacts are the same as those presented in Chapter 4.

An integral part of the cumulative impacts analysis involves determining whether impacts from the project alternatives would contribute to ongoing or foreseeable resource trends. Where impacts from the alternatives contribute to regional resource trends within specified ROIs, there is a potential for a cumulative impact. The cumulative impacts analyses do not assess all expected environmental impacts from regional projects within the ROIs, but only those impacts resulting from both a project alternative and other past, present, and reasonably foreseeable future actions.

5.2 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE PROJECTS

This section presents a general discussion of historical development in the vicinity of MMR and PTA, identifies numerous projects on O‘ahu and Hawai‘i that could potentially contribute to cumulative impacts (Table 5-1), and provides specific descriptions, where available, for the projects listed in Table 5-1. The development plan areas for local public and private projects are shown on Figure 5-1.

The projects listed in Table 5-1 were compiled from a number of sources, including the Army DPW Master Planning Division and the Honolulu Planning and Permitting Department (Bow 2003, City and County of Honolulu 2003, 2004). The initial list of identified projects was reviewed and revised to include only those with some potential to contribute to cumulative impacts. Next, the list was divided into projects that are expected to contribute to cumulative impacts and those that may contribute to cumulative impacts, as identified in Table 5-1. The projects expected to contribute to cumulative impacts are similar to the proposed military training activities, relate to military training activities and ranges, have similar types of impacts within the ROI for a particular resource, affect similar resources within the ROI that are affected by the proposed military training activities, or are large enough to have far-reaching effects on a resource. This approach was taken to include both projects for which detailed descriptions and expected impacts are known as well as projects

that have less defined impacts, but, as development projects, may contribute to regional construction-related impacts.

**Table 5-1
Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
<u>Projects Expected to Contribute to Cumulative Impacts</u>				
USFWS Plant Critical Habitat	O'ahu	USFWS	Protection of habitat for federally designated threatened and endangered plants.	Ongoing
Prescribed Burns at MMR	MMR	Army	Prescribed burns are conducted to reduce fuel load at MMR and to facilitate UXO clearance and surveys for cultural resources.	2002, 2003, and ongoing
.50-caliber Firing Range at MMR	MMR	Army	Construction of a two-lane .50-caliber machine gun firing range.	2005
Stryker Brigade Combat Team Transformation	O'ahu and Hawai'i	Army	Multiple range/facility construction projects and land acquisitions for converting the 2nd Brigade of the 25th ID into a Stryker Brigade Combat Team.	Construction start pending completion of supplemental EIS
Transformation to a modular force structure	O'ahu and Hawai'i	Army	Enhance the Army's capabilities by restructuring the 25th ID forces into modular units of action by providing temporary facilities and infrastructure to facilitate the restructured units.	2007
<u>Development and Use of Military Training Facilities on PTA</u>	<u>Hawai'i</u>	<u>USMC</u>	<u>Marine Corps Base, Hawai'i would develop training facilities at PTA including a modular military operation on urban training (MOUT) facility; convoy live-fire range (CLF); enhancement of three forward operating base (FOB) sites by developing modular perimeter walls and improving trail access; and development of a live-fire grenade/shoot house facility.</u>	<u>To be determined</u>
Saddle Road Realignment	Hawai'i	Army	Project to straighten, repave and separate military training from motorists.	To be determined
Kawaihae/Waimea Road	Hawai'i	State of Hawai'i	The Kawaihae Road Bypass is planned to start at the Waimea-Kohala Airport on Māmalahoa Highway and extend to the coastline exiting at the Queen Ka'ahumanu Highway or at Kawaihae Harbor.	To be determined

**Table 5-1
Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Former Waikoloa Maneuver area and Nansay sites	Hawai'i	DoD	UXO clearance on the 135,000-acre (54,633-hectare) Waikoloa Maneuver area.	Ongoing
Kawaihae Deep Draft Harbor	Kawaihae Harbor on the Island of Hawai'i.	State of Hawai'i	Deepen harbor to allow for increased drafts.	Ongoing
Prescribed Burns at Army Installations on O'ahu (other than MMR)	O'ahu	Army	Prescribed burn to reduce fuel load at ranges. This also facilitates UXO clearance and surveys for cultural resources.	2003 and ongoing
Whole Barracks Renewal Program	SBMR	Army	Upgrade barracks facilities.	2010
Kahuku Windmill and Hook Parcels Land Acquisition	KTA	Army	Purchase adjacent lands for Current Forces training.	2003
Turtle Bay Resort Improvements	KTA	Turtle Bay Resort	Hotel expansion and renovations.	2004
Residential Communities Initiative	Army Bases on O'ahu	Army	The Army plans to turn over approximately 8,300 units of housing on O'ahu to a private developer for redevelopment and operation for 50 years.	2004-2054
Waimea Falls Park	O'ahu	Office of Hawaiian Affairs	Property acquisition and operation of an environmental visitor center.	2007
Farrington Highway Improvements	Mākaha (near MMR)	State of Hawai'i	Construct safety and operation improvements for Farrington Highway, including sidewalks, signalized pedestrian crosswalk or bridges, and continuous left turn fences.	Funded through 2004
Farrington Highway, Replacement of Mākaha Bridges 3 and 3A	Mākaha (near MMR)	State of Hawai'i	Replace two timber bridges in the vicinity of Mākaha Beach Park.	Funded through 2004
Integrated Training Area Management (ITAM)	All O'ahu ranges	Army	The intent of the ITAM program is to systematically provide uniform training land management capability across USARHAW and to ensure that the carrying capacity of the training lands is maintained over time.	Ongoing

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Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Implementation of the Integrated Natural Resources Management Plan (INRMP)	O‘ahu	Army	The INRMP “preserves, protects and enhances natural and cultural resources and complies with all applicable laws and regulations, while improving the Army’s capability to conduct training and maintain military readiness.”	Not all projects funded. Plan covers 2002-2006
Integrated Cultural Resource Management Plan (ICRMP)	O‘ahu	Army	The intent of the ICRMP is to preserve, protect, and enhance cultural resources; it complies with all applicable laws and regulations, while improving the Army’s capability to conduct training and maintain military readiness.	Ongoing
Implementation of Proposed Range and Training Land Program Development Plan Actions	O‘ahu	Army	A planning document for managing range facilities and training areas based on Army training doctrine and resource guidance.	Ongoing
Installation Information Infrastructure Architecture (I3A)	SBMR - Main Post; WAAF	Army	Install fiber optics cables from the cantonment area to the ranges, motor pool, and other facilities within the installation.	2004
Drum Road Upgrade	HMR to KTA	Army	Align, widen, and harden approximately 23 miles (37 kilometers) of the dirt and gravel road that runs from the end of the paved road at HMR to the end of the paved road at KTA. Project phases 1 & 2 are ongoing.	Ongoing
Residential Development	Wai‘anae	N/A	Constructed 7 housing units.	2001/2002
Residential Development	Wai‘anae	N/A	Construct 1,504 housing units.	2002 and beyond
Residential Development	‘Ewa	N/A	Constructed 636 housing units.	2000/2001
Residential Development	‘Ewa	N/A	Constructed 900 housing units.	2001/2002
Residential Development	‘Ewa	N/A	Construct 22,049 housing units.	Unknown
Kapolei Parkway	‘Ewa	DTS	Construct a new four-lane (six lanes, if needed) boulevard across much of the ‘Ewa plain, from Ko Olina to Ocean Pointe.	Unknown
North-South Road	‘Ewa	State DOT	Construct a new four-lane boulevard <i>makai</i> from a future H-1 interchange to near ‘Ewa Villages.	Underway

**Table 5-1
Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
<u>Projects That May Contribute to Cumulative Impacts</u>				
Land Transfer – DMR	DMR	Army	The Army will be returning the portion of the beach land in front of DMR to the state.	Unknown
Advanced Wastewater Treatment Upgrade	SBMR	Army	Upgrade current sewage treatment to an advanced treatment and effluent system.	2005
Army Facility Strategy Program	SBMR/ WAAF	Army	Projects include an aviation motor pool complex at WAAF, two physical fitness centers (SBMR, WAAF), a general instruction building, and upgrades to the range at SBMR.	Unknown
<u>Grow the Army Construction Projects</u>	<u>O'ahu</u>	<u>Army</u>	<u>This action includes the stationing of Combat Support (CS) and Combat Service Support (CSS) Soldiers at Schofield Barracks and additional Soldiers at Fort Shafter. This action involves construction of garrison facilities within the existing cantonment areas of Schofield Barracks and Wheeler Army Airfield (WAAF), and previously disturbed agricultural lands on Schofield Barracks South Range.</u>	<u>2013</u>
<u>Future Combat Systems Fielding</u>	<u>O'ahu</u>	<u>Army</u>	The Army intends to conduct limited fielding of Future Combat Systems (FCS) to all Brigade Combat Teams. For the past several years the Army has been developing and testing a set of cutting edge technologies to improve the operating capabilities of its forces. FCS will provide existing combat brigades with better technologies to optimize defense capabilities and achieve success in the current and future operating environments.	<u>2015 and beyond</u>

**Table 5-1
Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
<u>Past Live-fire Training Activities, Pesticide and Herbicide Use, and the Detonation of Munitions Items at MMR</u>	<u>O'ahu</u>	<u>Army</u>	<u>There are potential chemical migration pathways between MMR and the <i>muliwai</i> and nearshore areas; and, past activities at MMR has contributed to the levels of substances detected in the marine resources there. These activities may include live-fire training, detonation of munitions items (such as in the former OB/OD area), and use of pesticides and herbicides to control invasive species and in fuels management to reduce the risk of wildfires that may threaten endangered species found at MMR.</u>	<u>2004</u>
<u>Multi Purpose Range Complex</u>	<u>Hawai'i</u>	<u>Army</u>	<u>While the MPRC was being built, the Army was sued by an environmental group. There was an out of court settlement agreement, and that agreement required the Army to complete an EIS before training on the range.</u> <u>The MPRC is located in Kipuka `Alalā, a biologically rich and important area for native vegetation and wildlife.</u> <u>Features of the range include an elaborate network of access roads, moving and stationary armor and personnel targets, administration area, control tower, water towers, storage building, 18 miles of power line, 495 power poles and softened sites, which were graded, cleared of vegetation, and covered with gravel or cinder.</u>	<u>Unknown</u>
Hot Cargo Pad	HAFB	Air Force	Construct facilities to simultaneously load three C-5/C-17 aircraft.	Unknown
Undersea Warfare Exercise (USWEX)	Hawai'i	Navy	Submarine Warfare Exercise proposed to be conducted by the U.S. Navy's Carrier Strike Groups and Expeditionary Strike Groups while in transit from the west coast of the United States to the western Pacific Ocean.	2007
FY09 MCON P-422 Advanced Radar Detection Laboratory	PMRF	Navy	Construction of Advanced Radar Facility.	2009 and beyond

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Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Construct Missile Magazines, NAVMAG WL	NAVMAG PH, West Loch	Navy	Construction of five earth-covered box magazines.	To be determined
Construct Communication Center, Naval Computer and Telecommunications Area Master Station	Wahiawa	Navy	Construction of a communication center.	2009
Joint Forces Deployment Staging Area	NS Pearl Harbor, HI	Navy	Creation of a deployment staging area to support deployment of Joint Forces.	2009
Pacific Fleet Submarine Drive-In	Beckoning Point, Pearl Harbor, HI	Navy	Construction of a concrete slip to support a drive-in Magnetic Silencing Facility.	2009
Renovate Facilities for Naval Undersea Warfare Center Detachment Hawai'i	Ford Island	Navy	Renovate five buildings and construct underwater test facility.	To be determined
P-8A Multi-Mission Maritime Aircraft	HAFB	Navy	Introduction of P-8A Multi-Mission Maritime Aircraft to the Navy Fleet. Proposed action includes transition from existing P-3C aircraft to P-8A Multi-Mission Maritime Aircraft. Hickam AFB has been identified as one of several potential receiving sites.	2011-2019
Replacement of F-15 Aircraft with F-22A Aircraft	HAFB	Air Force	The Air Force and Air National Guard proposes to replace the Hawai'i Air National Guard F-15 aircraft with F-22A aircraft at Hickam AFB.	2011
Long range missile tests	HRC Temporary Operating Area, DoD Test Ranges	Missile Defense Agency	Between 2003-2007, 68 different DoD target and interceptor missiles were launched from either Kodiak Launch Complex, Alaska; Vandenberg Air Force Base, California; Pacific Missile Range Facility (PMRF), Hawai'i; Ronald Reagan Ballistic Missile Test Site, Marshall Islands, Wake Island, or mobile platforms in to or near the Hawai'i Temporary Operating Area.	Ongoing
Lā'ie Wastewater Collection System Expansion Phase II – Lā'ie	Lā'ie (adjacent to KTA)	Town of Lā'ie	Upgrade the sewage collection system in Lā'ie.	2004

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Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Overseas Environmental Assessment (OEA) for MK 48 Advanced Capability Torpedo Service Weapons Tests in Hawai'i	Hawai'i	Navy	The Navy's Undersea Weapons Program Office (PMS 404) proposes to conduct three Service Weapons Tests using the MK 48 Advanced Capability (ADCAP) torpedo in 2008.	2008
Outrigger Telescopes Project	<u>Hawai'i/Mauna Kea</u>	<u>NASA</u>	<u>NASA proposes to fund the construction and operation of six outrigger telescopes in the W. M. Keck Observatory site at the Mauna Kea Summit.</u>	<u>2004-2007</u>
PanSTARRS	Hawai'i	Air Force	Construction of the proposed Panoramic Survey Telescope and Rapid Response System 4 telescope at Mauna Kea.	Unknown
Drydock 2 Waterfront Support Facility	Pearl Harbor (near HAFB)	Navy	Construct two-story metal buildings, renovate latrine, demolish several buildings.	2003
Kamehameha Highway Bridge Replacements	Kawela, Kaukonahua Road (near SBMR)	State of Hawai'i	Replace bridges. Kawela Stream bridge is near Kawela Camp Road, and Upper Poamoho Stream Bridge is in the vicinity of Helemanō Plantation, near Kaukonahua Road.	Funded through 2004
Kamehameha Highway Traffic Improvements	Kahalu'u to Waimea Bay (near KTA)	State of Hawai'i	Construct passing lanes and turning lanes at intersections, modify traffic signals, and install signs, flashers, and other warning devices.	Funded through 2004
<u>Light Rail Transit project</u>	<u>O'ahu</u>	<u>State of Hawai'i</u>	<u>The \$2.6 billion light-rail project will stretch from Kapolei to Iwilei along an elevated line on a 22-mile route that will primarily follow Farrington Highway, then Kamehameha and finally Nimitz highways. It is projected to take about four years to update previous environmental impact studies on the project and another 10 years to complete construction. The design is still to be determined, but light-rail systems generally are powered by electricity and use fewer cars than traditional train systems.</u>	<u>To be determined</u>
Wai'anāe Sustainable Communities Plan	Wai'anāe	Honolulu Dept. of Planning and Permitting	A 20-year land use plan for the Wai'anāe planning area.	Ongoing

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Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Central O'ahu Sustainable Communities Plan	Central O'ahu	Honolulu Dept. of Planning and Permitting	A 25-year plan guiding land use planning for central O'ahu.	Ongoing
25th ID & USARHAW Revitalization Program	O'ahu	Army	Construct and renovate water tanks and central ID Lab.	2006-2008
Proposal to base eight C-17 aircraft at HAFB and the departure of four C-130 aircraft from HAFB.	HAFB	USAF	The USAF proposes to base eight C-17 aircraft at HAFB; four C-130 aircraft would depart from HAFB. A notice of intent has been issued for the preparation of an environmental assessment.	Unknown
Department of Hawaiian Homelands Residential and Agricultural Development	Nānākuli-Wai'anae	DHHL	Development of 16 parcels to provide up to 3,684 single family homes and farm lots.	Unknown
Maluohai Phase III	Kapolei	Unknown	Construct 45 homes.	August 2004
Golf Course Development	'Ewa, Central O'ahu, and Wai'anae ¹	N/A	Develop 171 golf holes on 1,798 acres (728 hectares) at nine golf courses.	2002 and beyond
Mākaha 242-foot Reservoir No. 2	Wai'anae	BWS	Construct a new water reservoir in Mākaha Valley, adjacent to the first reservoir.	Completed
Nānākuli 242-foot Reservoir	Wai'anae	BWS	Construct a new reservoir on Pu'u Haleakala in Nānākuli.	Unknown
Wai'anae Regional Park	Wai'anae	DDC	Expand the existing regional park and add other improvements, such as an ocean recreation center and additional fields.	Underway
Wai'anae Wastewater Treatment Plant Modification	Wai'anae	DDC	Construct wastewater improvements to the existing treatment plant.	Completed
Wai'anae Coast Emergency Alternate Route	Wai'anae	DTS	Develop a second through-road (for emergencies only) <i>mauka</i> of Farrington Highway from Mākaha to Nānākuli, by constructing new road links between existing sections of public or private road.	Unknown
Honouliuli WWTP Effluent Reuse	'Ewa	DDC	Modify transmission system to distribute 13 MGD of reclaimed wastewater, as required by consent decree.	Completed

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Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Honouliuli WWTP Handling Upgrades	‘Ewa	DDC	Modify solids handling facilities and odor control to improve operations within current 38 MGD capacity.	Underway
Honouliuli WWTP Expansion	‘Ewa	DDC	Increase the primary liquid treatment capacity (an increase of 13 MGD).	Unknown
Kamokila (Honokai Hale) Community Park	‘Ewa	DDC	Acquire the land under an existing city park, including land needed for access.	Underway
‘Ewa Mahiko District Park	‘Ewa	DDC	Develop a new park at the old mill site in ‘Ewa Villages.	Underway
Honouliuli WWTP site Expansion (<i>Mauka</i>)	‘Ewa	DDC	Add 27 acres (10.9 hectares) to the existing WWTP site so that ultimate capacity can be raised above 51 MGD.	Underway
Asing Community Park	‘Ewa	DDC	Develop a new 24-acre (9.7-hectare) park to serve West Loch Estates and Fairways.	Underway
Farrington Highway Improvement	‘Ewa	DDC	Increase the right-of-way and widen highway from two lanes to six lanes along 12 miles (19.3 kilometers) from Fort Weaver Road to the proposed North-South Road.	Unknown
One‘ula Beach Park Expansion	‘Ewa	DDC	Add 6 acres (2.4 hectares) in conjunction with the development of the Ocean Pointe community.	Underway
Kalaeloa Regional Park	‘Ewa	DDC	Develop a new regional park on approximately 456 acres (185 hectares) of the former Barbers Point Naval Air Station.	Underway
Makakilo Neighborhood Park	‘Ewa	DDC	Develop a new neighborhood park in the Makakilo area <i>mauka</i> of the water park.	Underway
Renton Road Improvements (‘Ewa Town)	‘Ewa	DTS	Widening the road from two to four lanes within ‘Ewa Villages.	Underway
Kaloi Gulch Channel	‘Ewa	N/A	Drainage improvements in the Varona Village area of ‘Ewa Villages.	Underway
Kalaeloa Desalination Plant	‘Ewa	BWS	Construct a new, high-technology 15 MGD water production facility in Campbell Industrial Park.	Underway
‘Ewa Shaft Renovation	‘Ewa	BWS	Convert an existing private irrigation source into a municipal water production facility.	Underway
Park Row Road	‘Ewa	DTS	Construct a short extension of Park Row Road <i>makai</i> from Renton Road to the future Kapolei Parkway.	Underway

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Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Residential Development	Central O'ahu	N/A	Constructed 644 housing units.	2000/2001
Residential Development	Central O'ahu	N/A	Constructed 811 housing units.	2001/2002
Residential Development	Central O'ahu	N/A	Construct 8,710 housing units.	2002 and beyond
Pearl Harbor Historic Trail (Middle Loch Park)	Central O'ahu	DDC	'Aiea and Pearl City communities interested in enhancing a walking trail from 'Ewa to Ko Olina Resort along old OR&L railroad corridor. Trail is intended to preserve land and open space and offer viewscapes of Pearl Harbor and nearby wetlands.	2001 and beyond
Waipahu Wells III	Central O'ahu	BWS	Potable well installation along with 5 pumps to produce 2-3 MGD for the surrounding area.	Underway
Waipio Peninsula Recreation Complex	Central O'ahu	DDC	Public soccer complex and park includes soccer fields, stadium, parking lot, and park.	Completed
Central O'ahu Regional Park (Waiola Sports Complex)	Central O'ahu	DDC	Public sports complex includes a park, baseball fields, and tennis courts.	Underway; Park is completed
Waipahu Wells II Addition (two projects)	Central O'ahu	BWS	Construction of pump and reservoir improvements including a 1.5 MGD well.	Underway
Waipahu Wells IV	Central O'ahu	BWS	Installation of four 1.5 MGD wells, and GAC treatment facility.	Underway
Hale'iwa Drainage Improvements	North Shore	DDC	Upgrades to the existing drainage ditch along Hale'iwa Road (<i>mauka</i> side).	Underway
Banzai Rock Beach Support Park	North Shore	DDC	Develop a new parking area (and possibly bath house) <i>mauka</i> of Kamehameha Highway.	Underway
Kaunala Beach Park	North Shore	DDC	Create a new beach park at the Velzyland surf site, including a comfort station and a pavilion.	Underway
Kahawai Beach Support Park (including Sunset Beach Recreation Center)	North Shore	DDC	Create a new 2.6-acre (1.1-hectare) park <i>mauka</i> of Kamehameha Highway near Pupukea Beach Park, to include a recreation center, comfort station, additional parking, and an area for an open market.	Underway

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Waimea Valley Park	North Shore	DDC	Purchase the Waimea Falls Park, a private recreational area and botanical garden, in order to preserve the scenic valley and the botanical collection and keep the tourist attraction running.	Land acquisition underway
Residential Development	Primary Urban Center	N/A	Constructed 74 housing units.	2000/2001
Residential Development	Primary Urban Center	N/A	Constructed 91 housing units.	2001/2002
Residential Development	Primary Urban Center	N/A	Construct 1,667 housing units.	2002 and beyond
Nimitz Highway Reconstructed Sewer (Fort Street Mall to Alakea Street)	Primary Urban Center	N/A	Install 30-inch- (76.2-centimeter-) diameter, 800-foot- (244-meter-) long subsurface water line between Fort Street Mall and Alakea Street.	2000/2001
Moanalua Road Widening	Primary Urban Center	DDC	Widening one lane of a 1,000-foot- (305-meter-) long corridor. No design to date. Construction funding pending.	2001 and beyond
Pele Street Mini-Park	Primary Urban Center	DDC	Small community park.	2004
Residential Development	East Honolulu	N/A	Constructed 204 housing units.	2000/2001
Residential Development	East Honolulu	N/A	Constructed 165 housing units.	2001/2002
Residential Development	East Honolulu	N/A	Construct 1,177 housing units.	2002 and beyond
Wai'alaie Nui Well	East Honolulu	BWS	Construct a new potable well near the Wai'alaie Nui residential subdivision.	Completed
Kalama Valley Community Park	East Honolulu	DDC	Construct a new recreation building and related site improvements.	Underway
Koko Crater Botanical Garden	East Honolulu	DDC	Construct a new visitor center and related site improvements.	Underway
Koko Head Regional Park and Nature Preserve	East Honolulu	DDC	Modifications include education and visitor centers, parking, roadways, comfort stations, an enhanced trail system, and a people mover system.	Underway

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Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Aina Haina Nature Preserve	East Honolulu	DDC	Develop a new nature park, complete with a trail system, parking, and related improvements.	Unknown
Queen's Beach Park (Wawamalu)	East Honolulu	DDC	Construct a new beach park in the Queen's Beach area, east of the Hawai'i Kai Golf Course.	Completed
Hana'uma Bay Modification	East Honolulu	DDC	Modifications included parking, food concessions, and information/education centers.	Completed
Kamilo Iki Community Park Modifications	East Honolulu	DDC	Develop new athletic fields and courts at an existing park.	Underway
Ka Iwi Shoreline Park	East Honolulu	DDC	Construct limited park improvements along Ka Iwi Coast, in conjunction with the state.	Land acquisition completed
Wailupe Stream Flood Control	East Honolulu	DDC	Plan to channelize Wailupe Stream in Aina Haina and expand the existing upland drainage basin.	Underway
Aina Haina Slide Remediation, Zone B	East Honolulu	DDC	Plan to create a passive park by compacting, regrading, and landscaping to stabilize a slide area.	Underway
Koko Crater Access Road	East Honolulu	DDC	Construct a boulevard to replace and relocate the existing private road into Koko Crater.	Underway
Koko Crater Entrance Park	East Honolulu	DDC	Construct a new passive park between Queens Gate and the proposed Koko Villas subdivision.	Underway
Residential Development	Ko'olaupoko	N/A	Constructed 75 housing units.	2000/2001
Residential Development	Ko'olaupoko	N/A	Constructed 86 housing units.	2001/2002
Residential Development	Ko'olaupoko	N/A	Construct 1,381 housing units.	2002 and beyond
Kamehameha Highway Scenic Enhancement	Ko'olaupoko	DDC	Acquiring and preserving the Waihe'e Marsh along the shoreline in the Kahalu'u area.	Unknown
Haiku Valley Nature Preserve	Ko'olaupoko	DDC	Plans to purchase and improve the former US Coast Guard Omega Station and the Haiku Stairs as a park and nature preserve.	Underway
Wai'ahole Beach Park	Ko'olaupoko	DDC	Plans to expand and improve the existing Wai'ahole Beach Park.	Underway
Waimanalo Well III	Ko'olaupoko	BWS	Construct a new potable water well <i>mauka</i> of the former Meadow Gold Dairies pasture land.	Unknown

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Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Kahalu‘u Regional Park	Ko‘olaupoko	DDC	Plans to expand the existing regional park <i>mauka</i> toward the Kahalu‘u Elementary School and adjacent park.	Underway
Kailua 272 Reservoir	Ko‘olaupoko	BWS	Construct a new reservoir at Kalae O Kaiwa Ridge in Kailua.	Underway
Kāne‘ohe Stream Green Belt Park	Ko‘olaupoko	DDC	Plans to establish a greenbelt park along the lower reaches of Kāne‘ohe Stream.	Underway
Kawa Stream Improvements	Ko‘olaupoko	DDC	Channelize Kawa Stream within the Piloiloa Subdivision behind Castle High School in Kaneohe.	Underway
Kailua Beach Park Improvements	Ko‘olaupoko	DDC	Construct a new pavilion, canoe halau, relocated comfort station, and various grounds improvements.	Unknown
Waimanalo Treatment and Disposal System	Ko‘olaupoko	DDC	Expand the existing Waimanalo Wastewater Treatment Plant to accommodate increasing demand and to provide service to areas currently using cesspools.	Underway
Kawai Nui Gateway Park	Ko‘olaupoko	DDC	Plans to create a nature walk, dog park, and additional landscaping at various places along the northern and eastern borders of Kawai Nui Marsh.	Underway
Kawai Nui Community Park	Ko‘olaupoko	DDC	Improve an existing park by adding a recreation building, comfort station, and play courts.	Completed
Kailua Park	Ko‘olaupoko	DDC	Develop a new nature park in Maunawili Valley, surrounding and including the existing Luana Hills Golf Course.	Land acquisition underway
Pali Golf Course Improvements	Ko‘olaupoko	DDC	Modifications include replacing the clubhouse and improving all areas of the golf course.	Underway
Kāne‘ohe Bayside Park (Kahua O Waikalua Neighborhood Park)	Ko‘olaupoko	DDC	Create a new park on the site of the soon-to-be-phased-out Kāne‘ohe Sewage Treatment Plant, to include ballfields and open spaces.	Underway
Waikane Nature Preserve	Ko‘olaupoko	DDC	Establish a nature preserve in Waikane Valley, with improvements limited to walking trails.	Underway
Kuou Well III	Ko‘olaupoko	BWS	Construct a new potable water well next to Ho‘omaluhia Botanical Garden in Kāne‘ohe.	Completed

**Table 5-1
Cumulative Projects**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Kualoa Regional Park	Ko'olaupoko	DDC	Upgrade an existing park by constructing a sewage system and improving buildings and roads.	Underway
Kailua Sewage Treatment Plant Modification	Ko'olaupoko	DDC	Upgrade the existing plant to increase storage capacity and improve odor control.	Underway
Kāne'ōhe Sewage Treatment Plant Modification	Ko'olaupoko	DDC	Convert the existing treatment plant to a pretreatment facility that has additional capacity to handle wet-weather flows, and demolish the existing structures and tanks so that the land can be used as a park.	Completed
He'eia Kea Park	Ko'olaupoko	DDC	Create a nature park and passive recreational area within He'eia Kea Valley.	Underway
Kaluanui Well Addition	Ko'olauloa	BWS	Construct a new potable water well within He'eia Kea Valley.	Underway
Hau'ula Community Park Building Expansion	Ko'olauloa	DDC	Expand the existing multi-purpose building and construct related improvements.	Underway
Opana Wells	Ko'olauloa	BWS	Construct a new potable water well in the Kawela area <i>mauka</i> of the proposed Kuilima Resort.	Completed
Kahuku District Park Improvements	Ko'olauloa	DDC	Construct a new multi-purpose building, play courts, and related improvements.	Underway
Lā'ie Beach Park (Bluff)	Ko'olauloa	DDC	Expand the existing beach park and construct related park improvements.	Underway
Hau'ula Fire Station Relocation	Ko'olauloa	DDC	Construct a new fire station (possibly including an ambulance facility) outside of the flood plain area.	Underway

Source: City and County of Honolulu 2003; Bow 2003.

Notes:

¹ For local public and private projects (this project and below), the Regional Project Locations listed refer to the development plan areas shown on Figure 5-1.

AMR – Āliamanu Military Reservation
 BWS – Board of Water Supply, City and County of Honolulu
 DDC – Department of Design and Construction, City and County of Honolulu
 DHHL – Department of Hawaiian Homelands, State of Hawai'i
 DOT – Department of Transportation, State of Hawai'i
 DTS – Department of Transportation Services, City and County of Honolulu

FS – Fort Shafter; HAFB – Hickam Air Force Base
 HMR – Helemanō Military Reservation
 KTA – Kahuku Training Area
 MMR – Mākua Military Reservation
 N/A – not available
 SBMR – Schofield Barracks Military Reservation
 TAMC – Tripler Army Medical Center
 WAAF – Wheeler Army Airfield
 WWTP – Waste Water Treatment Plant

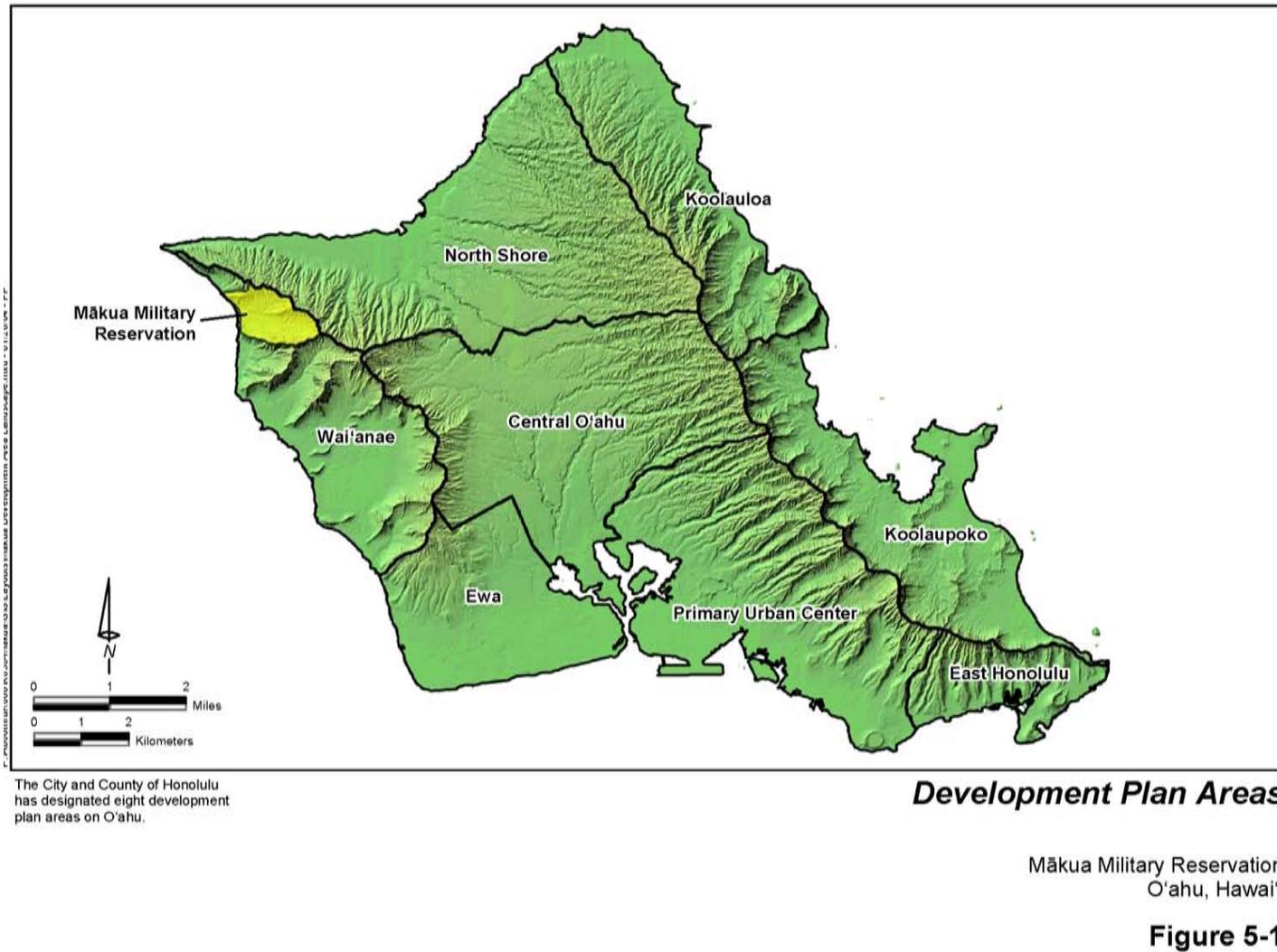


Figure 5-1 Development Plan Areas

Growth and Development of Mākua Military Reservation and Vicinity

Early Native Hawaiian inhabitants of Mākua Valley likely settled near the shore with agriculture and habitation further inland using freshwater springs. The remains of these activities are found in archaeological sites and in Native Hawaiian folklore depicting the earliest inhabitants, both human and spiritual. Native plants were plentiful and were used for numerous traditional purposes. Kaiahi Gulch (on the south edge of Mākua Valley) was at one time renowned for its *maile lau li'i*, a variety of *Alyxia olivaeformis* with small leaves whose fragrance reportedly could be smelled by anyone walking along the beach.

Prior to military use, ranching and cattle altered much of the indigenous vegetation. Instead of native crops, ranchers in the 1800s reportedly grew watermelon, pumpkin, cucumber, tobacco, and cotton (Kelly and Quintal 1977).

Today, the vegetation communities in the Mākua and Kahanahāiki valleys are composed mostly of secondary growth species, typical of areas disturbed by human activities. Ground cover consists of a mix of grasses (*Gramminae* spp.). Various shrubs and low trees, including *kiawe* (mesquite, or *Prosopis pallida*) and *koa haole* (*Leucaena glauca*), are also present in some areas.

Prior to 1941, US military use of the Mākua and Kahanahāiki valleys was limited to war games at Mākua Beach as well as the takeover of one *kuleana* parcel (LCA 9052) and two parcels registered to the Territory of Hawai'i for the installation of gun emplacements (Kelly and Quintal 1977). In 1941, the US military relocated residents and began to use MMR as an active training area.

In 1930 and 1931, the Navy acquired approximately 7,940 acres (3,213 hectares) 5 miles (8 kilometers) south of MMR in Lualualei Valley for the Lualualei Naval Magazine. The installation currently occupies 7,498 acres (3,216 hectares) and provides ordnance storage and support for the Navy, Air Force, and Army (US Navy 2004b). In 1936, the Navy activated the Lualualei Radio Transmitter Facility, which occupies 1,700 acres (688 hectares) adjacent to the Lualualei Naval Magazine (US Navy 2004b).

In 1963, the Hawaiian Electric Company began operating the Kahe Power Plant approximately 12 miles (19.3 kilometers) south of MMR (Hawaiian Electric Company 2004). It was the state's first reheat turbine generator. The current Kahe facility contains six units that generate 650,000 kilowatts of electricity.

The Campbell Industrial Park opened in the early 1960s in Kapolei, approximately 15 miles (24.1 kilometers) south of MMR. Tenants at the industrial park include HPower, Hawai'i Metal Recycling, and Tesoro Hawai'i Corporation. HPower is a waste-to-energy incinerator that began operating in 1990. Situated on 28 acres (11.3 hectares), it can process up to 2,160 tons per day of municipal solid waste, while generating up to 57 megawatts of electricity (HPower 2003). Hawai'i Metal Recycling began operating in 1991 and recycles 120,000 tons of scrap metal annually (Partnership for the Environment 2000). Tesoro Hawai'i Corporation operates a refinery that can process up to 95,000 barrels of crude oil per day (Tesoro Petroleum Corporation 2004).

In 1989, Waimanalo Gulch Landfill opened on 66 acres (26.7 hectares) approximately 12 miles (19.3 kilometers) south of MMR (HDOH 2000a). This is the only municipal solid waste landfill serving the island. It is owned by the City and County of Honolulu and is operated under contract by Waste Management of Hawai'i. It accepts commercial and nonhazardous industrial solid wastes, municipal solid waste, and ash. In May 2003, the Hawai'i Department of Health approved a 15-acre (6.1-hectare) expansion (Toth 2003).

The Wai'anae Wastewater Treatment Plant was constructed along the Wai'anae Coast and can treat up to 25 million gallons of wastewater per day (R.M. Towill Corporation 2004).

Between 1980 and 2000, the population of O'ahu increased 15 percent, from 762,565 to 876,156 (City and County of Honolulu 2003). During this same period the Wai'anae population increased 34 percent, from 31,487 to 42,259. In 2000, 4.8 percent of the population of O'ahu resided in Wai'anae. Between 2000 and 2025, the populations of O'ahu and Wai'anae are projected to increase 17 and 10 percent, respectively, to 1,029,800 and 46,400 (City and County of Honolulu 2003).

US Fish and Wildlife Service Plant Critical Habitat

USFWS has designated 2,128 acres (861 hectares) as critical habitat on O'ahu for 99 threatened and endangered species. Much of the acreage is in the Ko'olau and Wai'anae Mountains. Fifty-two of the plant species exist nowhere else in the world. In general, the lands set aside are unsuitable for development because they are rugged and lack suitable access.

Prescribed Burns at Mākuā Military Reservation

The WFMP identifies prescribed burns as a preventative action used to reduce the risk of wildfire ignition. Prescribed fires are intentionally set to manage fuels in specific areas. They are also set to clear away vegetation to provide safer conditions for UXO removal. Each prescribed burn must

have an approved prescribed burn plan. The Army is preparing an EA for its IWFMP, which addresses its prescribed burn program at MMR. Described below are recent prescribed burns conducted at MMR.

Approximately 800 to 900 acres (324 to 364 hectares) at MMR were the subject of a prescribed burn program implemented in compliance with the Settlement Agreement between Mālama Mākua and the Army. The burn took place between the north and south firebreak roads and on small parcels outside the firebreak roads for four days between October 29 and November 1, 2002. The burn allowed for UXO cleanup and archaeological surveys. The EA for this prescribed burn was available for public and agency comment until October 8, 2002, and an FNSI was signed on October 28, 2002 (Miura 2002).

To address areas that had not been adequately cleared during the October and November prescribed burns, a prescribed burn was conducted on July 22, 2003. During the prescribed burn, changes in wind speed and direction caused the fire to spread out of control. Approximately 2,100 acres (850 hectares) in the northern portion of MMR were burned, including small areas outside the MMR boundary. The fire was under control by July 24, 2003. This fire resulted in the loss of a number of endangered plants (*Chamaesyce celastroides* var. *kaenana*, *Lipochaeta tenuifolia*, and *Nototrichium humile*) and approximately 150 acres (61 hectares) of O‘ahu ‘elepaio critical habitat.

.50-Caliber Firing Range at Mākua Military Reservation

In 2005, the Army constructed a two-lane firing range at MMR for .50-caliber machine gun training. The range was constructed within the CCAAC with targets placed every 330 feet (100 meters) to a distance of 3,280 feet (1,000 meters) from the firing positions. No digging was required because the targets were placed behind 10-foot by 10-foot (3-meter by 3-meter) coffins, and the firing positions were placed on 10-foot by 10-foot (3-meter by 3-meter) platforms. A Record of Environmental Consideration for this project was completed on March 8, 2005.

Stryker Brigade Combat Team Transformation

The Army prepared an EIS on its proposal to transform the 2nd Brigade of the 25th ID into a SBCT. The SBCT EIS evaluated the environmental impacts of the transformation of changes to infrastructure and construction, and to training in Hawai‘i. Information on the SBCT EIS can be accessed at www.sbcteis.com.

The SBCT Transformation includes a number of different components. The Army would field new and modernized vehicles, weapons systems, and equipment for Stryker forces. Some existing buildings and facilities

would be demolished. The Army would complete 28 construction projects to build, modernize, and remodel buildings, training facilities, and infrastructure. Two areas would be acquired for training, and three easements would be acquired for military vehicle trails. The affected Army installations on the Island of O'ahu include SBMR (including East Range), WAAF, DMR, Kahuku Training Area, and Kawaihoa Training Area, as well as PTA on the Island of Hawai'i.

SBCT training requirements are not dependent upon the use of MMR. While MMR is an integral part of training capabilities in Hawai'i, and was historically used by other services, SBCT units could perform dismounted CALFEX training at other ranges. If the range was available, SBCT forces would use MMR. This EIS evaluates the potential use of MMR by SBCT forces by analyzing SBCT training components, including use of Stryker vehicles and use of the 120mm mortar (see Chapter 4, Environmental Consequences). Potential use of MMR by SBCT forces are discussed as part of Alternatives 2 and 3 of this EIS.

The principal differences between the Current Forces (i.e., the Army units and structure currently in place) and the SBCT would be an increase in the number of personnel, introduction of the Stryker with off-road maneuver training, and modification of the training requirements to guide the unit's readiness training.

The EIS for this project was completed in May 2004 and the ROD was signed on November 7, 2004. Subsequently, the Army completed a supplemental EIS in February 2008 to examine a fuller range of home stationing alternatives for the proposed actions associated with this SBCT transformation.

Transformation to a Modular Force Structure

The Army is transforming all active and reserve component units to a modular force structure that is larger, more powerful, more flexible, and more rapidly deployable. As part of this effort, the 25th ID will restructure forces assigned to SBMR and WAAF into modular units. The following actions are components of that restructuring:

- Sixteen temporary company operations facilities would be constructed. The 11 facilities at SBMR would occupy 6.7 acres (2.7 hectares), and the five facilities at WAAF would occupy 2.5 acres (1 hectare) at WAAF. A total of 450,000 square feet (41,800 square meters) of gravel hardstand foundation would be created to support those temporary structures;

- The Army's aircraft inventory would decrease by 10 OH58D Kiowa helicopters and would increase by 11 UH60 Blackhawk helicopters, 3 CH47 Chinook helicopters, and one UAV; and
- The military population would increase by 806 Soldiers, 499 spouses, and 1,048 children.

The transformation of these units would occur concurrently beginning in early FY06, with units staffed, trained, and ready for deployment by FY07. The EA for this project was completed in September 2005, and the FNSI was signed on November 7, 2005.

Development and Use of Military Training Facilities on PTA

Marine Corps Base, Hawai'i would develop training facilities at PTA including a modular military operation on urban training (MOUT) facility; convoy live-fire range (CLF); enhancement of three forward operating base (FOB) sites by developing modular perimeter walls and improving trail access; and development of a live-fire grenade/shoot house facility.

Saddle Road Realignment

This is a long-term highway construction project that includes improvements and modifications to the portion of Saddle Road between the Hilo side and Kona side on the Island of Hawai'i (see <http://www.saddleroad.com> for more details on the project). Approximately 250 miles (402 kilometers) of road will be modernized to meet American Association State Highway and Transportation Officials standards. Constructed in 1942, Saddle Road does not meet design standards for roadways. It is the only road serving PTA and is subject to serious traffic congestion when military convoys are transporting ammunition or troops for training. It is also the only road serving the Mauna Kea astronomical observatory complex, Waiki'i Ranch, Kilohana Girl Scout Camp, Mauna Kea State Recreation Area, and major hunting areas. An EIS was completed in the fall of 1999.

The project would upgrade and modernize Saddle Road as a two-lane highway that would meet design standards for rural arterials and provide adequate capacity to handle anticipated traffic volumes through 2014 and beyond. This project will provide a safe and efficient route for access along Saddle Road and for cross-island traffic between East and West Hawai'i. The proposed improvements to Saddle Road would address five general types of needs: roadway deficiencies, conflicts with and hazards of military operations, capacity, safety, social demand, and economic development.

The portion of Saddle Road to be improved by this project is approximately 48.5 miles (78 kilometers) in length and extends from the

Māmalahoa Highway (SR 190) to Milepost (MP) 6, near Hilo, Hawai‘i. The Saddle Road project is included in the Island of Hawai‘i LRLTP as a Tier 1 Project and will be placed in the federally required State Transportation Improvement Program (STIP).

Kawaihae/Waimea Road

The Kawaihae Road Bypass is planned to start at the Waimea-Kohala Airport on Māmalahoa Highway and extend to the coastline exiting at the Queen Ka‘ahumanu Highway or at Kawaihae Harbor. It will be 12 to 15 miles (19.3 to 24 kilometers) in length and be a limited-access highway designed for a 55-mile- (88.5-kilometer-) per-hour speed limit. Constructing two roads at the western end is also a possibility; one to Kawaihae and another to serve the Kona-bound traffic on Queen Ka‘ahumanu Highway. Funding will be from FHWA and the State of Hawai‘i. The Kawaihae Bypass will cross the military tank road which goes from Kawaihae Harbor to PTA. Intersection issues have not yet been decided, but the intersection will not be signalized. The military needs to meet its own training schedules, thus will not pay for any of the bypass. Interim roadways for constructability may include the extension to the north of Waikoloa’s Paniolo Drive. A route through Hawaiian home lands *mauka* of Kawaihae Harbor could be involved. Time line: Review community input on alternate routes by late 2005. Draft EIS will start in 2006 and finish planning by late 2007.

Former Waikoloa Maneuver Area and Nansay Sites

The Former Waikoloa Maneuver Area and Nansay Sites are situated on the northwest side of the Island of Hawai‘i, approximately 30 miles (48.3 kilometers) north of the city of Kailua-Kona in the South Kohala District. This area served as a maneuver and live-fire training area beginning in 1943 and was used as an artillery firing range. Live OE and OE scrap have been found previously in this area. Today, land use in the former maneuver area is mostly cattle ranching/grazing by the Parker Ranch, with urban-residential, commercial, and industrial land uses found proximal to Waimea (Kamuela) and the Waikoloa Village area.

Kawaihae Deep Draft Harbor

The USACE and the State of Hawai‘i, Department of Transportation, Harbors Division are proposing to modify the existing Kawaihae Harbor. The federally constructed harbor project consists of an entrance channel, the harbor basin, and a “rubblemound” breakwater. Currently, the harbor provides maritime access for commerce on the western side of the Island of Hawai‘i. Growing demand for cargo to support the rapidly expanding economy and state plans to pursue a larger share of the North American passenger cruise market will also increase pressure on the current harbor. Presently there are numerous operating inefficiencies at the harbor. The

completed project would enable vessels of greater capacity to utilize the harbor and reduce surge problems currently being experienced within the harbor basin.

Prescribed Burns at Army Installations on O‘ahu

Prescribed burns have been conducted at Army installations on O‘ahu in the past on small areas (typically 4 to 5 acres [1.6 to 2.0 hectares]) at SBMR. Controlled burns have recently been conducted on larger areas and on a more regular basis. Approximately 1,200 to 1,500 acres (486 to 608 hectares) are burned at SBMR (BAX and Qualification Ranges) to reduce vegetation (fuel load) and to allow the Army to conduct UXO clearance and cultural survey activities. Aerial broadcast spraying of herbicide by helicopter is applied before some burns to reduce live vegetation prior to the prescribed burn. The first burn in this area was in May 2003 and may be conducted every year or two based on vegetation regrowth and fuel continuity. The Army may also conduct periodic controlled burns at DMR.

Approximately 1,200 to 1,500 acres (486 to 607 hectares) at SBMR were the subject of a prescribed burn EA. The burn took place in the West Range impact area for five to six days starting around June 7, 2003. The burn allowed for UXO cleanup, archaeological surveys, and reduction of vegetative fuel for wildfires. The EA for this prescribed burn was available for public and agency comment until May 15, 2003, and an FNSI was signed on May 16, 2003 (US Army 2003).

The Army is preparing an EA for its IWFMP, which addresses its prescribed burn program at MMR. These burns are described above under Prescribed Burns at MMR.

Whole Barracks Renewal Program – O‘ahu

This Army program would upgrade unaccompanied enlisted personnel housing in Hawai‘i. SBMR structures have an average age of 68 years. Over 50 percent of the barracks were built prior to 1922, and over 80 percent are eligible for the NRHP. Upgrade projects would take place on WAAF, SBMR, and Tripler Army Medical Center grounds. The program includes new guidelines for upgrading the barracks by increasing the square footage for housing soldiers. Closet space will replace the current “wardrobe locker” system, and two-person bathrooms will replace gang latrine systems. The Army intends to complete upgrades in this seven-phase plan by 2010. Based on current estimates of increased troops associated with SBCT and associated decreases in Current Force troops, no additional housing upgrades will occur outside of what is already planned.

Funding and timelines of this project are moving ahead. There is also a possibility of purchasing land currently included in the Residential Communities Initiative footprint for future barracks/HQ/motor pool sites (Bow 2002).

Kahuku Windmill and Hook Parcels Land Acquisition

The Army has acquired 71.5 acres (29 hectares), consisting of separate parcels within KTA. This property was previously owned by the James E. Campbell Estate. The purpose of the acquisition was to consolidate KTA land holdings. Originally, the windmill parcel was being used to generate electricity. The Army prepared an environmental assessment and signed the FNSI. The purchase was completed in 2003 (Lancott 2005).

Turtle Bay Resort Improvements

The owners of Turtle Bay Resort are proposing to expand and renovate their hotel and resort in Kahuku (State of Hawai'i 2002b). Hotel renovation started in 2001 and was completed in 2003. Construction for the Master Plan has begun and is scheduled to be completed in 2015 (Adleman 2005).

Residential Communities Initiative – Army Bases on O'ahu

The Army is proposing the full privatization of family housing at the following seven installations on O'ahu: SBMR, Helemanō Military Reservation, WAAF, Āliamanu Military Reservation, Fort Shafter, Tripler Army Medical Center, and Kia'i Kai Hale. This initiative is a program for the Army to turn over approximately 8,300 units of housing on O'ahu to a private developer for ownership and operation for a 50-year period. The land beneath these homes will be leased to the developer for the same term. This program is meant to eliminate inadequate housing and improve neighborhoods and communities. An EA has been prepared for this project.

Waimea Falls Park

A partnership, including the City and County of Honolulu, DLNR, Office of Hawaiian Affairs, the Army, and the Audubon Society, have negotiated to purchase the 1,875-acre (759-hectare) Waimea Valley. The Office of Hawaiian Affairs holds title to the property, and the Audubon Society will continue to operate the Waimea Valley Audubon Center on about 300 acres (121 hectares) of the valley.

Farrington Highway Improvements – Nānākuli to Mākaha

The State of Hawai'i is constructing safety and operation improvements to Farrington Highway, including sidewalks, signalized pedestrian crosswalks or bridges, and continuous left turn fences. The project is scheduled for completion in April 2005 (Chung 2005).

Farrington Highway, Replacement of Mākaha Bridge Numbers 3 & 3A – Mākaha

The State of Hawai‘i is planning to replace two timber bridges in the vicinity of Mākaha Beach Park. The project is under design and pending Section 106 consultation. There is no time frame for the completion of this project (Barroga 2005).

Integrated Training Area Management

The ITAM Program is the Army’s formal strategy for implementing the sustainable use of training and testing lands. The intent of the program is to systematically provide uniform training land management capability across USARHAW and to ensure that the carrying capacity of the training lands is maintained over time. The Army manages its lands to minimize loss of training capabilities in order to support current and future training and mission requirements. The integration of stewardship principles into training land and conservation management practices ensures that the Army’s lands remain viable to support future training and mission requirements. ITAM integrates elements of operational, environmental, master planning, and other programs that identify and assess land use alternatives. The following ITAM programs are being implemented at MMR:

- Combat trail maintenance, including drainage and erosion control repair;
- Culvert maintenance, embankment repair, hydroseeding of drainage swales;
- Installation of energy dissipaters in swales, sedimentation and detention basins, and erosion control blankets; and
- Archaeological site capping, which includes the use of sandbags to protect sites, and installation of concertina fencing.

Integrated Natural Resource Management Plan

This project outlines mandatory and optional natural resource stabilization and recovery methods for endangered, rare, and threatened species and communities on the islands of O‘ahu and Hawai‘i. Interagency consultation was initiated with USFWS, and public coordination efforts were made in compliance with the Sikes Act. The programs placed at a higher funding priority level include Section 7 consultation, some watershed and pest management programs, and some conservation and community outreach programs.

Army Integrated Cultural Resource Management Plan

This plan will outline stabilization and preservation strategies for protecting cultural and historical resources on Army installations on the islands of O‘ahu and Hawai‘i.

Implementation of Proposed Range and Training Land Program Development Plan Actions

Under this project, the Army would implement a planning document for managing range facilities and training areas based on Army training doctrine and resource guidance.

Installation Information Infrastructure Architecture (I3A) – Schofield Barracks Military Reservation and Wheeler Army Airfield

This is a proposal to install fiber optics cable from the cantonment area to the ranges, motor pool, and other facilities within the installation. The I3A is necessary for the Army’s mission essential requirements, as well as for connectivity to the transformation training locations within the SBCT on O‘ahu. These telecommunications requirements would furnish digital information necessary for interconnections among various ranges on SBMR, WAAF, Helemanō Military Reservation, Kahuku Training Area, and other locations on O‘ahu. The I3A project could consist of underground and aboveground cabling that would provide additional links to the facilities and to the range complexes by upgrading the e-mail system, the asset visibility system, the automated personnel processing system, and video teleconference capability. The project is scheduled to begin in 2005 and was completed in 2006 (Bautista 2005).

Drum Road Upgrade (Helemanō to Kahuku)

The proposal is to align, widen, and harden approximately 23 miles (37 kilometers) of the dirt and gravel road that runs from the end of the paved road at HMR to the end of the paved road at KTA. Work would include widening the road to 24 feet (7 meters) and providing 3-foot (1-meter) compacted gravel shoulders on both sides, realigning dangerous blind curves, regrading to correct steep slopes, providing drainage improvements, and installing guard rails at drop-offs and storm drainage structures and lines to preclude excessive amounts of stormwater runoff from sheet flowing over the road and endangering traffic. Site work includes clearing, grubbing, grading, and stockpiling material for embankments and installing telecommunications and electrical conduits alongside the upgraded roadway. The projects were funded through 2005-2006.

Land Transfer – Dillingham Military Reservation

The Army will return 19 acres (7.7 hectares) of the beach in front of DMR that the state ceded to them. This will include portions of Keālia Beach, Mokolē‘ia Beach Park, and Mokolē‘ia Army Beach (adjacent to Keālia beach), as well as the 30 acres (12.1 hectares) of the airport at DMR. The state then will lease the land back to the Army so that it can continue training there. The deed transferring the property will be signed in December 2005 (Lancott 2005).

Advanced Wastewater Treatment Upgrade – Schofield Barracks Military Reservation

SBMR needs to upgrade its current sewage treatment to an advanced treatment and effluent system. The Army plans to comply with Clean Water Act water quality regulations and to meet Hawai‘i and federal reuse guidelines and Hawai‘i water quality standards. The necessary upgrades are expected to be completed in 2004. Privatization of the system was completed on June 4, 2004. A contractor will upgrade the system, which is scheduled to be completed by September 27, 2006 (Stelter 2005).

Army Facility Strategy Program – Schofield Barracks Military Reservation, Schofield Barracks East Range, Fort Shafter, Wheeler Army Airfield

The Army Facility Strategy (AFS) program provides for construction of new facilities. Projects under this heading include construction of a consolidated motor pool at Fort Shafter, an aviation motor pool complex at WAAF, two physical fitness centers (SBMR, WAAF), a general instruction building, upgrades to the range at SBER, and a chapel at Fort Shafter.

The current fuel storage facility at SBMR has a 60,000-gallon (227,125-liter) capacity. The Army is proposing to increase this capacity to 120,000 gallons (454,250 liters). At WAAF, an increase in fuel storage capacity for petroleum, oil, and lubricants storage is needed for the Aviation Brigade Motor Pool expansion (Bow 2002).

Grow the Army Soldier Stationing and Cantonment Area Construction – Schofield Barracks Military Reservation, Wheeler Army Airfield.

This action includes the stationing of approximately 1,680 Combat Support (CS) and Combat Service Support (CSS) Soldiers at Schofield Barracks and 300 additional Soldiers at Fort Shafter. This action involves construction of garrison facilities within the existing cantonment areas of Schofield Barracks and Wheeler Army Airfield (WAAF), and previously disturbed agricultural lands on Schofield Barracks South Range. This action does not include or require the construction of additional live-fire

training infrastructure to support these units. Combat support units will be able to meet individual and crew served weapons qualification requirements on existing and previously planned ranges within USAG-HI. The total number of new Soldiers stationed in Hawai'i as a result of implementing this decision will be approximately 1,980. The following facilities are currently being considered in separate NEPA documentation.

Engineer Unit Facility

The scope of the proposed FY09 engineer unit operations and maintenance facility complex 68786 is to construct a Army standard design brigade complex to support the increase in engineer unit personnel at Schofield Barracks as a result of the Army growth stationing action. The primary facilities would include:

Brigade headquarters of approximately (31,400 square feet); Company operations facilities (23,188 square feet); Covered hardstand of approximately (3,342 square feet); Administrative facility (1,296 square feet); Vehicle maintenance shop (18,000 square feet); Oil storage building of (120 square feet); Hazardous material storage (120 square feet); Organizational unit storage (4,200 square feet); Organizational vehicle parking (17,224 square yards (155,016 square feet)); and Refrigeration/air-conditioning plant (3,000 square feet).

Explosive Ordnance Disposal Unit

The scope of the FY09 explosive ordnance disposal (EOD) facility 68822 is to construct an Army standard design unit operations facilities to support the increase in EOD personnel at Schofield Barracks as a result of the Army growth stationing action. The primary facilities would include:

Battalion headquarters (13,700 square feet); Company operations facilities (12,532 square feet); Covered hardstand (1,671 square feet); Deployment equipment storage (700 square feet); Organizational vehicle parking (4,639 square yards (41,751 square feet)); and Refrigeration/Air-conditioning building (3,000 square feet).

Military Police Unit Facility

The scope of the FY09 military police unit (MP) facility 68821 is to construct an Army standard design unit operations and maintenance facilities for MP units to support the increase in MP personnel at Schofield Barracks as a result of the Army growth stationing action. The primary facilities would include:

Battalion headquarters (11,985 square feet); Organizational classroom (4,115 square feet); Company operations facilities (18,867 square feet); Covered hardstand (2,985 square feet); Administrative facility (3,564

square feet); Two vehicle maintenance shops (18,000 square feet each); Two oil storage building (150 square feet each); Two hazardous material storage (120 square feet each); Two organizational unit storage (1580 square feet each); Organizational vehicle parking (21,456 square yards (193,104 square feet)); and Refrigeration/air-conditioning plant (3,000 square feet).

Infrastructure Project

The scope of the FY09 infrastructure project 69308 is to construct infrastructure to connect the Schofield Barracks main post and WAAF to the South Range proposed sites for the engineer unit, EOD unit, and MP unit facilities to support these and other potential future projects at South Range. The infrastructure project would include approximately:

Remote switching center building (4,000 square feet); Water Pump Station 6000 GPM; Sewage Lift Station 6000 GPM; 12" waterline (13,200 linear feet); Grading; Site Improvements and demolition; Information systems; Site electrical; Security fence (22,000 linear feet); Pavement (573 square yards); Bridge #1 (13,020 square feet); Bridge #2 (15,500 square feet); Sewer line (16,500 linear feet); Access Roads; and Drain lines (8,360 linear feet).

Barracks Facility

The scope of the FY09 barracks facility 68823 is to construct a standard-design unaccompanied enlisted personnel housing (UEPH) of approximately 74,500 square feet. Primary facilities include one standard design barracks for a maximum of 192 persons, building information systems and antiterrorism measures. Mass notification system and information systems would be included. Sustainable design and development (SDD) and Energy Policy Act of 2005 (EPA05) features would be provided.

Hot Cargo Pad – Hawai'i Air Force Base

This project involves constructing facilities to simultaneously load three C-5/C-17 aircrafts. A staging area and service roads would also be required (Shimabukuro 2002). The project is undergoing reappropriation (Uchita 2005).

Lā'ie Wastewater Collection System Expansion Phase II

This project will continue to upgrade the existing sewage collection system in Lā'ie (the town next to Kahuku). These upgrades will improve system reliability and will eliminate the potential for leaks and spills from aging cesspools, septic systems, and sewer lines. The proposed expansion is being developed to address existing concerns and to accommodate anticipated growth, as envisioned in the Ko'olauloa Sustainable

Communities Plan. The resulting sewage effluent will be of reusable quality. Construction will begin in April 2003 and will be finished in June 2005 (State of Hawai‘i 2002c).

Drydock 2 Waterfront Support Facility – Pearl Harbor

The US Navy proposes to construct two two-story metal buildings, to renovate a latrine, to demolish several buildings and portable structures, and to provide electrical modifications to a building. This project is not anticipated to generate significant controversy. The US Naval Facilities Engineering Command has prepared an EA/FNSI for the project.

Kamehameha Highway Bridge Replacements – Kawela, Kaukonahua Road

The State of Hawai‘i is planning to replace bridges on Kamehameha Highway with new bridges that meet current design standards. Kawela Stream Bridge is near Kawela Camp Road, and Upper Poamoho Stream Bridge is in the vicinity of Helemanō Plantation, near Kaukonahua Road.

Kamehameha Highway Traffic Improvements – Kahalu‘u to Waimea Bay

The State of Hawai‘i is planning to construct passing lanes and turning lanes at intersections, to modify existing traffic signals, and to install signs, flashers, and other warning devices on Kamehameha Highway.

Wai‘anae Sustainable Communities Plan

This report serves as a planning vision for the Wai‘anae planning area (shown in Figure 5-1). This planning area is to be maintained as a relatively stable region in which public programs focus on supporting existing populations. The plan’s vision statement and supporting provisions for the 20-year planning period are oriented to maintaining and enhancing the region’s ability to sustain its unique character, current population, growing families, rural lifestyle, and economic livelihood, all of which contribute to the region’s vitality and future potential (City and County of Honolulu 2000b).

The plan’s principal land use policies are: preserving open space, coastal lands, mountain forest land, streams and stream floodplains, historic and cultural resources, and agricultural lands; encouraging commercial and light industrial business that serve the community; establishing a phase program to develop commercial centers and gathering places; developing public parks; prohibiting development of golf courses; and recognizing the importance of continued military use of lands within the district (City and County of Honolulu 2000b).

Central O‘ahu Sustainable Communities Plan

This report serves as a planning vision for the central O‘ahu planning area (shown in Figure 5-1). The 25-year development plan for central O‘ahu takes into account sustainability, open space, transit corridors, parks, and natural and cultural resources. Elements essential to the community building plan include the revitalization of Waipahu and Wahiawā town centers, economic development for these communities, and the urban community boundary and open/green space network of parks and other areas.

25th Infantry Division and US Army Hawai‘i Revitalization Program

This compilation of projects includes constructing two 2,000,000-gallon (7,570,824-liter) water tanks to ensure continued sanitary and reliable water service. The current tanks exhibit considerable corrosion at the roof areas. The new tank project will include a booster pump station and emergency generators. Also under this project heading is construction of an additional facility for the Central Identification Laboratory Hawai‘i. Currently, the organization is housed in overcrowded and inadequate facilities, causing operations to be inefficient. The project will include a DNA lab and administrative space for command and support staff and search and recovery teams.

Basing of Eight C-17 Aircraft at Hawai‘i Air Force Base and Departure of Four C-130 Aircraft from Hawai‘i Air Force Base

The US Air Force proposes the basing of eight C-17 aircraft at HAFB and the departure of four C-130 aircraft from HAFB. The Proposed Action would include aircraft bed down and operations at HAFB; the construction of C-17 aircraft support facilities at HAFB; personnel requirements to support the C-17 aircraft bed down; aircrew training requirements at existing facilities; and the possible construction of a new assault runway or use of existing runways. The project is scheduled to begin in 2004 and to be completed in approximately four years. An EA was prepared for this project, and the FNSI was signed on December 12, 2003.

Department of Hawaiian Homelands

The Department of Hawaiian Homelands (DHHL) presently administers programs benefiting Native Hawaiians through the awarding of homestead leases to individual beneficiaries. Section 204, Hawaiian Homes Commission Act, provides that identified public lands provide homestead settlement for Native Hawaiians and provides revenue generation to aid in carrying out the homesteading program.

The DHHL is developing 16 parcels in the Nānākuli-Wai‘anae area to provide as many as 3,684 single family homes and farm lots. The status of

these developments is provided below. The proposed developments north of Maile include Freitas Dairy, Wai‘anae 2A, Paheehee Ridge, Agena Pine, Reservoir Farm lots, Maili‘ili‘i Road, Pu‘u Maili‘ili‘i Elderly, and Wai‘anae Kai.

Freitas Dairy Subdivision

This subdivision includes 32 single-family homes on lands formerly known as the Freitas and Carlos dairies. The residential lots average about 7,500 square feet (697 square meters). They are targeted for affordable housing “self-help” projects for families with incomes that are 80 percent or less for households in the Wai‘anae District. The Consuelo Alger Foundation was assisting needy families toward homeownership. A larger portion of the former dairy lands has been developed into agricultural homestead lots to relocate lessees who were along the east side of Paheehee Ridge, which was impractical to develop for farming. Construction of the first 14 homes began in early October 2003. All infrastructure construction was completed by March 2004. It may take a year for homesteaders to complete construction of their homes, under the “sweat-equity” self-help approach.

Nānākuli Valley Estates, Camp Andrews, Pu‘u Maili‘ili‘i Elderly, and Agena-Pine

The proposed Nānākuli Valley Estates, Camp Andrews, Pu‘u Maili‘ili‘i Elderly, and Agena-Pine projects will likely be developed within the next 10 years. There are 1,040 households (5,099 people per Census 2000) in Nānākuli. The upper valley (proposed Nānākuli Valley Estates) has sloping terrain and is difficult to access. It would require an expensive bridge to cross a major gulch. There are many significant archaeological/cultural sites and endangered species habitats. Water and sewer systems also would be very costly. The Camp Andrews site is in Nānākuli along the major highway. Only about 14 acres (5.7 hectares) are now planned for convenience commercial, economic development, and community uses. The balance of the former 30-acre (12.1-hectare) Army base is used for an elementary school and a lined drainage ditch. The DHHL is acquiring land for homestead residences at Kapolei, which offers more amenities and is closer to employment opportunities. In conjunction with the Master Plan Community for Kapolei, the DHHL has built one village of approximately 225 single family homes. It is in the process of trying to acquire land for another village of similar size. Ten of the 14 planned villages approved as part of the master plan have been constructed. The last two villages proposed are multi-family housing structures.

Nānākuli 5-3, Nānākuli Series 6, Nānākuli Series 7, Nānākuli Scattered Lots, Wai‘anae Kai, and Wai‘anae 2A-2

A total of 466 residential lots were constructed from 1982 to 2000. The majority of the lot sizes range from 7,000 to 10,000 square feet (650 to 929 square meters). Smaller lot sizes range from 5,600 to approximately 7,000 square feet (520 to 650 square meters) at Wai‘anae Kai.

In 1993, the DHHL conducted an infrastructure study to guide the planning for future infrastructure systems. The study reported that Farrington Highway is presently operating at an unacceptable level of service during peak hour periods. Management measures to increase the capacity of Farrington Highway will only mitigate traffic congestion for a short period of time. As the population of the area continues to grow, Farrington Highway may need to be widened.

Malu‘ohai Phase III

The Malu‘ohai Phase III project at the Villages of Kapolei is a master-planned community. The architectural design of the units will conform to guidelines and will be similar to earlier phases, even if tenants will use the rent-to-own approach.

5.3 CUMULATIVE IMPACTS

Summary of Cumulative Impacts

Adverse cumulative impacts from No Action and Alternatives 1, 2, 3, and 4 would occur in all resource areas except airspace. Significant and unmitigable cumulative impacts would occur in the following resource areas: land use and recreation, noise, water resources, geology and soils, biological resources, cultural resources, socioeconomics, and wildfires. Significant and mitigable cumulative impacts would occur in the following resource areas: 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.

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

5.3.1 Land Use and Recreation *Introduction*

This section discusses cumulative effects on land use and recreation. Land use relates to existing land uses or designated land uses, such as those identified in general plans or in state or federal resource planning

documents. Recreational resources relate to those areas that are designated as recreation areas or any areas where people seek out and gather for recreation. Recreation areas can be urban and highly planned or can be open spaces or other natural areas.

For the evaluation of cumulative impacts relative to land use and recreation, the ROI spans the entire Island of O‘ahu for Alternatives 1 through 3 and the entire Island of Hawai‘i for Alternative 4. Land use policy in Hawai‘i is developed at the state and local level. However, land use planning and land use regulation decisions are normally made at the county level. Certain cumulative land use impacts are analyzed using the geographical context of areas similar to or surrounding MMR and PTA. For instance, coastal trends are taken into account regarding coastal resources near MMR, and coastal areas on O‘ahu may be an appropriate context for analysis of certain cumulative land use impacts. In this section, cumulative land use impacts have been assessed at the island-wide level but are discussed relative to similar or surrounding areas where appropriate.

As described in the introduction to this chapter, cumulative impacts for land use are assessed based on the existing land use trends in Hawai‘i. These trends are important because they are used as the context for determining whether the project alternatives would contribute to adverse trends occurring in the ROI. The impacts of the project alternatives are then added to the past, present, and reasonably foreseeable future project impacts to determine if the incremental impacts of all the projects would add to the historical or existing trends in land use and recreation.

There would be significant unmitigable cumulative impacts on land use and recreation for Alternatives 1, 2, and 3 due to the noise produced by training activities. There would be less than significant impacts on recreation and conservation plans due to potential impacts caused by training and related activities that may produce increased fire danger.

Historical Cumulative Effects

Future land use and recreation trends for O‘ahu are reflected in the sustainable community plans prepared by the City and County of Honolulu. Population and urban growth trends show that population and development is greatest in coastal areas. Also, decreases in funding and competition for coastal land use has reduced the capability of public agencies to purchase and maintain coastal parks (Juvik and Juvik 1998). Access to the coast is insured in the Hawai‘i Coastal Management Plan, but coastal development has affected use of recreation areas for nature-oriented activities. Much of the housing, tourism, and commercial development in Hawai‘i in recent years has occurred in areas near the

shore. Resulting traffic and congestion from these developments have adversely affected coastal recreation areas (Juvik and Juvik 1998; State of Hawai‘i 2003). The State of Hawai‘i is addressing this trend by improving beach park facilities at certain beach parks, such as Lā‘ie Beach Park, Banzai Rock Beach Support Park, and Kahawai Beach Support Park. In general, the amount of land devoted to conservation areas in northwest O‘ahu has remained fairly steady in recent years, and management plans have been completed for many of the forest reserves adjacent to MMR.

The land acquisition projects at Kahuku Windmill and Hook Parcels and at the various SBCT installation areas may reduce land used for conservation areas in northern O‘ahu and on the Island of Hawai‘i. None of the alternatives proposes the conversion of any land currently used for conservation to another land use. There are limited land use changes related to housing replacement within several Army installations as part of the Residential Communities Initiative, SBCT Transformation, and the Whole Barracks Renewal Program. Because none of the project alternatives proposes any land use conversions to housing or property acquisitions, they would not contribute to the cumulative effects resulting from land acquisition and conversion projects.

In regard to land use planning for fire management, the Army has developed the IWFMP to prevent and control wildfires on MMR, PTA, and other Army installations. This plan would greatly reduce fire damage but may not prevent and contain all wildfires in and immediately around Army training ranges.

No Action Alternative

The No Action Alternative would not accelerate land use trends (e.g., conversion of agricultural land to military) in O‘ahu, nor would No Action contribute to those adverse impacts caused by other past, present, or future projects that adversely affect land use on O‘ahu. The beneficial impacts from No Action could include expanded use of Mākua Beach due to the elimination of live-fire. Use of this resource would probably expand due to the increase in the quality of the recreational experience and possible perceived improved access to Mākua Beach.

While expanded use of this resource by the public would probably not work to slow down trends of diminishing quality of recreational areas in O‘ahu coastal areas due to development and congestion, the potential expanded use would be beneficial in that it would counteract an adverse trend regarding recreation in natural shoreline areas on O‘ahu. Eliminating live-fire training would reduce the level of noise and visual disturbance at Mākua Beach, increasing the value of this recreational resource, as compared to other projects that are reducing the value of recreational

resources, including limiting or eliminating beach access. No Action, therefore, would not contribute to the overall trend of coastal recreational facilities being underfunded and subject to adverse impacts due to congestion and would slightly mitigate it by providing a more natural coastal environment at Mākua Beach.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Under Alternative 1, noise from training events would have significant unmitigable direct impacts on land use and recreational uses due to the combined noise impacts caused by helicopter overflights and ordnance explosions. Live-fire training under Alternative 1 would have significant unmitigable cumulative impacts on land use and recreation by contributing to the trend of impeded access to coastal resources and disturbance of beach goers seeking natural beach areas. Projects that would contribute to this trend include residential and commercial construction and development. For example, 1,504 residential units are proposed for construction in the Wai‘anae area, and 1,381 residential units would be built in Ko‘olaupoko. While not all of these units are along the shore, all are near coastal areas and within the coastal zone. While the impacts from some of individual projects may not be significant, combined with other development projects and projects that restrict or affect shore access, the cumulative impacts are expected to be significant. By adversely affecting recreation at Mākua Beach, Alternative 1 would make a minor contribution to the overall trend of loss of coastal recreation value caused by regional development projects.

Forest Reserve and NAR trails in the areas adjacent to MMR have been closed in the past due to wildfires, including wildfires caused by prescribed burns that escaped control. An MMR prescribed burn in July 2003 caused a wildfire that burned a large portion of MMR and portions of the adjacent trail areas. Because live-fire training would increase the wildfire potential, Alternative 1 could combine with other projects to increase the potential for wildfires that affect recreational resources. Two of the planned programs, prescribed burns at MMR and prescribed burns at Army installations on O‘ahu, are intended to reduce the fuel loads and scale of wildfires on Army installations on O‘ahu. However, these prescribed burn programs also present a risk of wildfire ignition. Live-fire training at MMR and other training areas also increases the risk of wildfires. Wildfires from the prescribed burn programs and those that could be caused by Alternative 1 could significantly increase the number of closures of wild areas and trails in the northern part of O‘ahu. These activities may combine to cause multiple closures during a limited time span. Alternative 1, therefore, could have a significant cumulative effect on recreational resources. In addition, the increased use of roads that

would result from road improvement could lead to a higher probability of fire starting from a catalytic converter or from a cigarette smoking-related ignition.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Cumulative impacts under Alternative 2 would be similar to those described for Alternative 1. Training at MMR under this alternative would have slightly more adverse impacts than Alternative 1 due to the higher number of CALFEXs conducted. The use of tracer ammunition also would increase the potential for wildfires and their effects on recreational resources. Cumulative impacts are expected to be significant and unmitigable.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Under Alternative 3, cumulative impacts would be similar to those described for Alternative 2. Compared to Alternative 2, Alternative 3 would add the use of inert TOW missiles, 2.75-inch rockets, and illumination munitions, increasing the potential for wildfires and their effects on recreational resources. Alternative 3 would have a significant unmitigable cumulative effect on recreational resources.

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

Alternative 4 would have less than significant cumulative impacts to land use and recreation. Basic land use would not be changed under this alternative. The area considered for a range replacement would continue to be used for ongoing military training operations. Land acquisition would not be required for this alternative and there would be no expansion of current impact areas. However, the cumulative impacts as a result of other projects in the ROI, which include conversion of agricultural land at the WPAA (approximately 23,000 acres [9,308 hectares]) to training land, would be significant. The SBCT and other units require use of this former cattle grazing area to provide for maneuver training. Development on the Island of Hawai'i has resulted in an ongoing loss of agricultural land. In light of historic, ongoing, and reasonably foreseeable future actions, cumulative impacts would be significant.

Increased noise, dust, or other indirect effects associated with this alternative would not be expected to affect off-post land uses because areas surrounding PTA are largely uninhabited, thus no residential areas, schools, hospitals, or businesses would be affected.

5.3.2 Airspace

Introduction

This section discusses the cumulative effects on airspace, which generally encompasses those areas used by aircraft.

The ROI for cumulative impacts is the same as that described in Section 3.2 for project impacts.

The cumulative impact criteria for airspace are the same criteria used in Section 4.2.2. In assessing the potential for incremental effects, particular attention was paid to the following: whether the proposed action is one of several similar actions in the same geographic area; whether other activities in the area have similar effects on airspace use; whether these effects have been historically significant for airspace; and whether other analyses in the area have identified a cumulative effects concern. Because of the well-developed nature of the national airspace, and the air traffic control system that makes it work, with all of the rules, regulations, procedures, requirements and limitations, airspace is not especially vulnerable to adverse, incremental, cumulative effects.

No cumulative impacts on airspace have been identified because none of the project alternatives would have airspace impacts, thus they would not contribute to any regional impacts.

Historical Cumulative Effects

Over the last ten years, civilian general aviation traffic in the airspace ROI has stayed fairly constant (Akana 2003; Tamanaha 2004), while military flight activity has dropped by 75 percent since 1994 (Andera 2003b; Dohmen 2004).

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. No other projects in the airspace ROI have been identified that would have the potential for incremental, additive cumulative impacts on controlled or uncontrolled airspace, special use airspace, military training routes, en route airways, or airports/airfields.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

No other projects in the airspace ROI have been identified that would have the potential for incremental, additive cumulative impacts on controlled or uncontrolled airspace, special use airspace, military training routes, en route airways, or airports/airfields.

In terms of aviation safety and thus public health and safety in the ROI, basing eight C-17 aircraft at HAFB, the departure of four C-130 aircraft from HAFB, and the SBCT Transformation would not involve any increased aircraft activity over either MMR or DMR, although UAV flights would increase over the R-3109/R-3110 restricted area complex, and C-130 and C-17 operations in support of SBCT Transformation would increase at WAAF. However, while the airspace over SBMR and WAAF is considered congested for general aviation aircraft and is likely to become more congested over time, procedures are in place, although not mandatory, allow general aviation to function satisfactorily. Moreover, the WAAF tower provides traffic advisories to general aviation pilots. On weekends, when the tower is closed, pilots tune into the Common Advisory Frequency to monitor other traffic and to broadcast their position (Bruckner 2003), thus minimizing the likelihood of adverse cumulative impacts on airspace.

While civilian general aviation traffic in the airspace ROI has stayed fairly constant over the last ten years (Akana 2003; Tamanaha 2004), military flight activity has dropped by 75 percent since 1994 (Andera 2003b; Dohmen 2004). Thus, the potential for military flights to cause adverse cumulative impacts has decreased over the last decade. The one potential exception would be the introduction of additional C-17 and C-130 flights into and out of WAAF. Concerns have been expressed that these aircraft, much faster than most general aviation aircraft, could pose an issue for the northbound general aviation traffic, which is constrained by topography and clouds, particularly when the C-17s and C-130s approach WAAF from the north. However, if normal flight procedures are followed, adverse cumulative impacts on aviation safety, and thus public health and safety in the ROI, would be avoided.

In addition, the required consultation and review process with the FAA on all matters affecting airspace use, including UAV flights, would obviate the possibility of direct adverse impacts on airspace use. All aircraft operations at WAAF are subject to air traffic control clearances and instructions. The required scheduling process for the use of special use airspace by the military would eliminate the potential for adverse cumulative impacts. Military pilots operating outside special use airspace would still follow FAA regulations, thus minimizing the potential for adverse cumulative airspace use impacts.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

As described under Alternative 1, there would be no adverse cumulative impacts on airspace use.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

As described under Alternative 1, there would be no adverse cumulative impacts on airspace use.

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. Additionally, no other projects in the airspace ROI have been identified to have a potential for additive cumulative impacts on controlled or uncontrolled airspace, special use airspace, military training routes, en route airways, or airfields.

The required consultation and review process with the FAA on all matters affecting airspace use would eliminate the possibility of direct adverse impacts on airspace use in the various ROIs. All aircraft operations at BAAF are subject to air traffic control clearances and instructions. There would be a runway extension and shift in the instrument approach path to BAAF on PTA as a result of runway upgrades described in the 2004 SBCT EIS. This would have no airspace use cumulative impact (US Army and USACE 2004). In addition, for those UAV flights that could not be contained wholly within restricted areas or warning areas, operations would be conducted in accordance with well-defined FAA procedures for remotely operated aircraft. The required scheduling process for the special use airspace by the military would eliminate the potential for adverse cumulative impacts. Military pilots operating outside special use airspace would still follow FAA regulations, minimizing the potential for adverse cumulative airspace use impacts. Individually, the Proposed Action would have no impact on airspace. In light of historic, ongoing, and reasonably foreseeable future actions, cumulative impacts on airspace would not be significant.

5.3.3 Visual Resources

Introduction

Visual resources include land forms, water surfaces, vegetation, and cultural modifications or human-made features. These elements make up the aspects of an area that determine its visual character and the manner in which it is viewed by people.

For the evaluation of cumulative impacts relative to visual resources, the cumulative ROI for MMR includes all areas within the line of sight of proposed training activities. Because high ridges surround most of MMR, the ROI is largely limited to views from the adjacent beach area, Farrington Highway, and areas of near-shore ocean. Very limited or

intermittent views from adjacent publicly accessible trails or forest reserves are also considered to be part of the ROI. The PTA ROI encompasses PTA, Keamuku Parcel (also referred to as the West PTA Acquisition Area – WPAA), and PTA Trail.

Impacts are assessed after considering whether there would be a noticeable increase in visual contrast and reduction of the scenic quality from any sensitive viewpoint, whether existing views would be blocked or disrupted or the opportunities to view scenic resources would be reduced, and whether resulting visual resource conditions would conflict with policies and regulations governing aesthetics.

The overall cumulative impact on visual resources would be less than significant under the No Action Alternative and Alternatives 1, 2, 3, and 4. The Alternatives would be in general consistent with visual resource policies.

Historical Cumulative Effects

Past cumulative effects on visual resources at MMR have resulted from highway construction and improvement projects and prescribed burns at MMR. Past construction activities introduced such short-term cumulative impacts as the temporary presence of construction equipment and road crews within the viewshed boundaries of MMR. Prescribed burns and wildfires at MMR have left landscape parcels blackened and charred. All areas affected by previous prescribed burns and wildfires have recovered through revegetation.

No Action Alternative

Projects that could affect visual resources around MMR include the improvements on Farrington Highway. These improvements would be limited in duration and would be spatially separated from MMR. Also, it is assumed that future construction projects on Farrington Highway would comply with any transportation design requirements. For these reasons, there would be less than significant cumulative impacts on visual resources. Because no live-fire training activities and non-live fire aircraft lasing and UAV training would occur at MMR, No Action would not substantially contribute to cumulative effects on visual resources.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Under this alternative, prescribed burns, Farrington Highway improvements, and project activities could have a less than significant cumulative impact on visual resources. The prescribed burns would not occur during training at MMR and would be limited in duration. In the event of a wildfire, areas burned would temporarily detract from views,

depending on the extent of the area burned, until vegetation was reestablished. Improvements on Farrington Highway would also be limited in duration and would be spatially separated from training activities on MMR. It is expected that future construction projects on Farrington Highway would comply with any transportation design requirements. For these reasons, there would be less than significant impacts on visual resources. Because of the limited nature of visual impacts from training and training-related wildfires from Alternative 1 activities, this alternative would be a minor contributor to cumulative effects.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Potential cumulative impacts on visual resources would be similar to those described for Alternative 1. Due to the higher wildfire risk from tracers under this alternative, MMR training would be a major contributor to cumulative effects.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Potential cumulative impacts on visual resources would be similar to those described for Alternative 1. Due to the higher wildfire risk from tracers, inert TOW missiles, illumination munitions, and 2.75-inch rockets under this alternative, MMR training would be a major contributor to cumulative effects.

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

The PTA Trail and Saddle Road realignments, as well as installation of Army fixed tactical internet antenna and support structures, could have significant impacts mitigable to less than significant on existing views. Mitigation for the PTA Trail and antenna would include designing to conserve existing natural features, following natural contours of the land, and blending in with the vegetation and terrain to the extent practicable.

There would be less than significant cumulative impacts on modification of existing views or alteration of the landscape character under this alternative. Many of the projects and activities in the PTA ROI, except for the PTA Trail and antenna structures, would be obscured by vegetation or terrain or at such a distance as to be indiscernible. It is assumed that the projects and activities for PTA would be developed in a manner that is consistent with the installation master plan to ensure compatibility with surrounding uses, which could be negatively affected by visually incompatible development.

In the PTA, Saddle Road, Kawaihae, and Waimea areas, construction activities could include the CALFEX and convoy ranges, the PTA Trail, other SBCT projects, Kawaihae Harbor project, and Saddle Road realignment. It is unlikely that these construction projects would result in a cumulative significant impact on visual resources because construction impacts would be localized and temporary, and would occur over different spatial and temporal scales.

Under this alternative, training and the use of vehicles and helicopters would result in limited visible fugitive dust. Soil erosion and compaction mitigation measures would be implemented, thereby minimizing visible fugitive dust. It is reasonable to assume that other construction and operation projects would implement similar soil control practices, resulting in less than significant cumulative impacts to visual resources. Also most of the training activities and resulting fugitive dust at PTA and WPAA would not be visible from potentially sensitive viewing locations due to topography or current access restrictions.

5.3.4 Air Quality Introduction

This section discusses cumulative effects on air quality, including emissions of pollutants and the resulting pollutant concentrations in ambient air.

As noted in Section 3.4, the ROI for air quality issues depends on the specific pollutant and emission sources. The ROI for a regional secondary pollutant, such as ozone (which is not emitted directly but is formed by chemical reactions among precursor compounds), is generally island-wide. The ROI for directly emitted primary pollutants is much more localized because dispersion processes reduce pollutant concentrations as emissions are transported away from the emission source.

Cumulative air quality impacts would occur when multiple emission sources affect the same geographic areas simultaneously or when sequential projects extend the duration of air quality impacts on a given area over a longer period of time. Because the geographic scale of the ROI differs for regional secondary pollutants and directly emitted primary pollutants, it is convenient to separate the discussion of cumulative air quality impacts by type of pollutant. The major emissions associated with the alternatives include ozone precursors (reactive organic compounds and nitrogen oxides) and directly emitted PM₁₀. Emission quantities of other pollutants are too low to pose air quality concerns.

In general, as a result of the analysis methodology described in Section 4.4.1 and as discussed below, the anticipated effects of the Proposed

Action on air quality are expected to be minor, and their regional influence so localized that their incremental effects on the air quality or condition within the ROI would also be minor.

Historical Cumulative Effects

Army training over the past decades has resulted in short-term, minor, and localized effects on air quality. There are no measurable remaining effects on air quality resulting from these past actions.

As noted in Section 3.4, air pollution levels in Hawai'i generally are low due to the small size and isolation of the state. Historic air quality monitoring data do not show any recent upward or downward trends in average air quality conditions on O'ahu or Hawai'i. As discussed in Section 3.4, the state 1-hour ozone standard was rescinded in September 2001 and replaced with an 8-hour ozone standard. Data for maximum 8-hour average ozone levels have not been published, but maximum 1-hour ozone level data show that the 8-hour standard has not been exceeded. Maximum 8-hour ozone concentrations probably have been about 55 to 60 percent of the 8-hour standard in recent years. Federal ozone standards have not been exceeded in Hawai'i during the past decade, despite the cumulative emissions from highway traffic, commercial and military aircraft operations, commercial and industrial facility operations, agricultural operations, and construction projects in both urban and rural areas.

No Action Alternative

There would be less than significant cumulative impacts on air quality under No Action. Because there would be no use of munitions and ordnance, and much less use of military vehicles under the No Action alternative, there would be a minimal increase in air emissions or degradation to air quality above and beyond the existing ambient conditions. This is not expected to affect regional air quality.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

There would be no significant cumulative impacts on air quality under Alternative 1. Under Alternative 1, minor impacts on air quality would occur from foot traffic, aircraft operations, and military vehicles. These impacts would not violate the federal or state ambient air quality standards or any other federal or state air standards, rules, or regulations, nor would they cause any visual impairment to the surrounding communities.

The contribution from Alternative 1 to cumulative impacts would be less than significant. At MMR, no training would be conducted during prescribed burning periods. As discussed in Section 3.4, air monitoring

stations showed that the observed criteria pollutant concentrations during a previous burn were all below the federal and state ambient air quality standards; therefore, the combined effects from prescribed burning and Army training on air quality in the ROI would be less than significant. Table 5-1 includes several construction projects that would at least partially overlap the time frame for Alternative 1 activities. However, spatial separation among these various construction projects would minimize or preclude cumulative air quality impacts from those projects with overlapping time frames because most of the activities listed in Table 5-1 are far removed from the MMR. Some of the road construction activity on Farrington Highway near MMR would contribute less than significant air pollutant concentrations and thus result in less than significant cumulative impacts. Additionally, the winds in the MMR area would cause pollutants to dissipate quickly, resulting in less than significant effects to air quality in the ROI.

While agricultural burning, wildfires, and prescribed burns could create temporary localized areas of high PM₁₀ concentrations, such events in the past have not violated federal PM₁₀ standards. There may be localized, direct significant impacts from PM₁₀ emissions. However, given historical air quality conditions, the cumulative impact of emissions associated with this alternative, in combination with other construction projects and the continuing emissions from other emission sources in the ROI, is not expected to violate state or federal ozone standards. Consequently, cumulative air quality impacts from primary air pollutants, such as PM₁₀, would be less than significant under Alternative 1.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Cumulative air quality impacts would be less than significant and similar to those described for Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Cumulative air quality impacts would be less than significant and similar to those described for Alternative 1.

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

Air pollution levels in Hawai‘i are generally low due to the small size and isolation of the State. Historic air quality monitoring data do not show any recent upward or downward trends in average air quality conditions on Hawai‘i. Emissions from vehicles, aircraft, and ordnance under this alternative and other projects in the air quality ROI would result in minor increases in air pollution, a less than significant impact.

Kilauea volcano on the Island of Hawai‘i produces a statewide atmospheric phenomenon known as volcanic smog. VOG produces emissions of sulfur dioxide gas and other toxic constituents. The gas forms a strong acid, hydrogen sulfide, when it reacts with moisture in the atmosphere or in peoples’ lungs. The particulates and gases form a mixture called “vog,” meaning volcanic smog that can range from a dispersed atmospheric haze resembling smog to a ground-hugging cloud resembling fog (USGS 2000b).

Fugitive dust would result in cumulative significant impacts mitigable to less than significant. Although Hawai‘i is in a PM₁₀ attainment area under the CAA, the Island of Hawai‘i and the surrounding land at PTA have experienced discrete events in which dust impacts have had adverse effects. PTA soil substrates primarily consist of fine, volcanic ash prone to wind erosion and dust generation. Unlike MMR, which has partial or full vegetative cover, PTA is considerably less vegetated and, thus, more susceptible to fugitive dust from range construction and wind erosion. Other range construction projects primarily in support of the new SBCT mission at PTA, or range construction projects approved for Marine Corps Base Hawai‘i, would contribute to the cumulative impacts from dust. Construction contractors would comply with the provisions of Hawai‘i Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of construction contracts. Consequently, impacts from range construction at PTA would be significant but mitigable to less than significant.

Additional training activities as a result of Alternative 4 and other range projects may reduce or eliminate vegetative cover in some sections of the training area, resulting in increased susceptibility to emissions from vehicle travel and wind erosion. PM₁₀ would be generated by these actions from the affected area. These emissions could be significant if not mitigated.

5.3.5 Noise Introduction

This section discusses cumulative effects on noise, which is generally defined as unwanted sound, often made up of different frequency components.

Because of the limited spatial range of noise effects, the cumulative ROI is the same as that identified in Section 3.5. The anticipated cumulative effects of the project alternatives on noise levels and annoyance are expected to be minor, and their regional influence is so localized that their incremental effect on noise within the cumulative ROI would also be minor.

Noise impacts are inherently localized because sound levels decrease relatively quickly with increasing distance from the source. Cumulative noise impacts occur when multiple projects affect the same geographic areas simultaneously or when sequential projects extend the duration of noise impacts on a given area over a longer period of time.

Army training over the past decades has resulted in minor effects on noise levels. Effects from the past activities on noise levels were short-term, minor, and localized. There are no measurable remaining effects from the noise generated from any past MMR activities. Noise impacts under the alternatives would stem primarily from helicopter activities, military vehicle training, and ordnance impulse noise. Table 5-1 includes several construction projects that could coincide with MMR training activities. However, spatial separation among these cumulative projects would minimize or preclude cumulative noise impacts within the ROI. Near MMR, projects along Farrington Highway could contribute to the noise effects resulting from the project alternatives.

Historical Cumulative Effects

Army training over the past decades has resulted in minor effects on noise levels due to similar activities as proposed in the alternatives. Effects from the past activities on noise were short-term, minor, and localized impulse noise. There are no measurable remaining effects on noise resulting from past actions.

While there is no documentation of historic noise levels within the ROI, it is probable that increasing development and population growth have contributed to gradually rising ambient noise levels.

No Action Alternative

There would be less than significant cumulative impacts from noise under No Action because there would be no live-fire training at MMR. Noise impacts would result primarily from aircraft, but noise from aircraft flyovers would not violate the Army planning guidelines. Noise generated from military vehicles would be significantly reduced and would be less than significant as they would not generally affect regional noise levels.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

The cumulative effect on noise levels resulting from Alternative 1 combined with the noise levels from cumulative activities would be significant and unmitigable. Increased noise levels from training activities under Alternative 1 would exceed the Army land use planning guidelines in DA PAM 200-1. While some highway construction activity on Farrington Highway would occur near MMR, this construction activity

would not result in any significant contribution to the noise generated during MMR training. Most of the other activities listed in Table 5-1 are far removed from the MMR, such that they would not contribute to the cumulative impacts.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Under Alternative 2, cumulative noise impacts would be significant and unmitigable, similar to those impacts described for Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Under Alternative 3, cumulative noise impacts would be significant and unmitigable, similar to those impacts described for Alternative 1.

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

Impacts under this alternative would be less than significant due to the remote setting of PTA and the range location. Since this range would be located in an existing impact area, implementing Alternative 4 on its own would not be expected to shift noise contours beyond their present location (US Army and USACE 2004). Additionally, no other projects in the noise ROI have been identified to have a potential for additive cumulative impacts.

5.3.6 Traffic and Transportation

Introduction

This section discusses cumulative effects on traffic and transportation analysis. The MMR ROI for this traffic study is Farrington Highway, specifically those portions adjacent to MMR and within the Wai‘anae town area. The PTA ROI for traffic and transportation resources is the travel corridor between Kawaihae Harbor and PTA.

For the evaluation of cumulative impacts relative to traffic and transportation, the MMR ROI includes the roadways from SBMR to MMR following the route used by training convoys. However, the specific roadway and intersection locations selected for detailed analysis along this corridor were considered to be the same as those analyzed for direct and indirect impacts, which covered Farrington Highway between MMR and the town of Wai‘anae and three key intersections, as described in Section 3.6, Traffic and Transportation.

The contribution of the proposed alternatives to traffic volumes along Farrington Highway south of Mākaha was determined to be less than the normal fluctuations in traffic volumes. Projects along Farrington Highway

between MMR and Mākaha, as well as future development projects in Wai‘anae, would generate traffic along this section of highway and would contribute to cumulative traffic volumes. Projects at SBMR, Hickam Air Force Base, WAAF, Pearl Harbor, and other areas across O‘ahu that would not generate traffic along Farrington Highway are not considered contributors to the cumulative impacts. In addition to MMR training, cumulative traffic volumes are attributable to future development projects, particularly large residential developments in Wai‘anae and ‘Ewa.

Because detailed project descriptions are not available for all cumulative projects, the traffic analysis was conducted by applying a growth factor to the existing traffic counts to estimate the future traffic conditions. Assuming that the cumulative growth pattern would continue at 1.64 percent per year over the next ten years, the cumulative projects would not result in a change to existing LOS at the key analysis intersections. The existing volumes would need to more than double along this section of Farrington Highway before the LOS would change from B to C at the intersection of Farrington Highway and Mākaha Valley Road.

Roadway projects that may have an impact are limited to improvements to and along Farrington Highway. Construction activity along Farrington Highway may have a short-term impact on traffic circulation under cumulative conditions as construction traffic control measures, such as lane closures and detours, are instituted. With the safety and operations improvements along Farrington Highway, which include sidewalks, signalized pedestrian crosswalks or bridges, and continuous left turn fences, some of the safety concerns, particularly with ammunition transport and children walking along the highway, would be addressed.

Historical Cumulative Effects

Traffic volume trends along Farrington Highway over the past 20 years indicate an annual average growth of 1.64 percent. This growth was calculated using Hawai‘i DOT data for the section of Farrington Highway between Ka‘ena Point State Park to Hakimo Road south of Mākaha (Hawai‘i DOT No date). During this 20-year period, the growth rates fluctuated, with the 10-year average growth rate lower than the 5-year rate. At the location closest to MMR, between Lawaoia Street and Ka‘ena Point State Park, the annual growth over the past five years has been about one percent per year.

On the Island of Hawai‘i, comparisons of historical and current traffic counts along Māmalahoa Highway and Kawaihae Road provide an indication of past growth. Between 1996 and 2000, daily traffic along Māmalahoa Highway increased approximately 0.1 percent per year, which implies minimal growth along this roadway. For the same period, traffic

along Kawaihae Road, between Māmalahoa Highway and Queen Kaʻahumanu Highway, has increased an average of 4.5 percent per year. This growth is considered robust and is comparable to calculated growth rates for traffic in the Kailua-Kona area, which is on the same side of the island as the project. Tourist traffic in the more popular destinations has overloaded local roads, mainly on weekends. Military traffic has remained relatively stable over the years, although there would be increased traffic from Kawaihae Harbor to PTA with SBCT Transformation.

No Action Alternative

This alternative would generate at most modest increases in traffic to MMR. Therefore, cumulative traffic and transportation impacts would be less than significant.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Cumulative impacts under Alternative 1 are expected to be significant because Army convoy policies and practices would not be consistent with state policies, resulting in a significant impact. Also, there would be inconsistencies with the state policies regarding ammunition transport. This could be mitigated by revising Army convoy and ammunition transport practices to be consistent with state policies.

Alternative 1 would generate additional traffic along Farrington Highway, contributing to cumulative traffic volumes. Because the additional vehicles along Farrington Highway would not result in a change in LOS at the key intersections analyzed, the cumulative increase in traffic volumes would not be significant. As the traffic volumes from regional projects increase, the percentage attributable to this alternative would decrease, as the MMR volumes would remain constant with time.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Cumulative impacts under this alternative would be similar to those described under Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Cumulative impacts under this alternative would be similar to those described under Alternative 1.

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

There would be less than significant cumulative impacts on traffic and transportation under this alternative.

The Army's military convoys and ammunition procedures may not be entirely consistent with state policies. Appropriate revisions by the Army would bring the policies and practices more in line with Hawai'i DOT regulations, maintaining the less than significant impact determination.

With the construction and use of the PTA Trail, Alternative 4 would generate additional SBCT traffic along the PTA Trail with increased use of PTA, contributing to cumulative traffic volumes. The cumulative increase in traffic would not be significant. There could be increased traffic and development caused by the Saddle Road realignment project, including indirect impacts on cultural, socioeconomic, and biological resources. Further, expanded use of PTA and related local land acquisition and development projects could conflict with right-of-way acquisition needs for Saddle Road.

Military traffic would be separated from civilian traffic to the extent possible. The hourly volume of convoy traffic is limited by operational considerations (no more than 30 vehicles per convoy and intervals of 15 to 30 minutes between convoys). The convoy traffic would basically remain the same and not exceed critical peak traffic volume. The impact from Army use of military vehicle routes would be less than significant.

Convoy traffic would yield to public traffic at the PTA Trail crossings along the public highway and roadways. Thus, the operation of traffic along the military vehicle trail would have a minimal or no impact on traffic operations along the public roadways. The Army would coordinate with DOT to minimize impacts at traffic crossings, including at new Saddle Road and PTA Trail crossings.

Any future improvement of the highways may result in the trail crossing a four-lane, and not a two-lane, highway. In other areas where trails have crossed highways greater than two lanes wide, either traffic signals have been installed or a grade crossing has been constructed. The resulting cumulative impacts of the highway improvement projects (widening plus military vehicle trail crossings) would have to be assessed on a case-by-case basis. This would have to be performed as part of the environmental documentation for the highway project. Design year traffic volumes are typically not available until the environmental analysis is performed for the highway improvement project. At this time, cumulative traffic impacts are predicted to be less than significant.

The Saddle Road project could have two additional impacts on the Proposed Action. The first is that traffic operating conditions, and therefore the level of service, would improve because the deficiencies in the road would be corrected by the improved alignment and higher and

newer design standards. These higher standards would include improved sight distances, sufficient lane widths, and adequate shoulders. The higher design standards would also result in higher operating speeds, with a projected 2014 ADT of 14,000 vehicles per day along Saddle Road. The incremental impact of increased military traffic on Saddle Road would be negligible with completion of the Saddle Road project.

The Saddle Road realignment could also hinder right-of-way acquisition for the expansion of PTA. While the road project may affect PTA expansion, SBCT project actions at PTA would not contribute to right-of-way impacts on Saddle Road.

5.3.7 Water Resources

Introduction

The MMR ROI for the cumulative effects on water resources includes all areas of overlap between the Project Alternatives 1, 2, and 3 and other projects. The ROI for surface water and groundwater resources includes the Mākua watershed on the Island of O‘ahu, the aquifers underlying this watershed and any aquifers downgradient (in the direction of groundwater flow) of past or present military activities in the Mākua Valley, and the downstream and downgradient near-shore areas along the coast where surface water and groundwater, respectively, discharge to the sea.

In theory, a reduction in groundwater quality in Mākua Valley could have a cumulative impact on water supply on O‘ahu. For this reason, the ROI for groundwater supply could be considered to be all of the groundwater aquifers on O‘ahu. In a practical sense, it would be very costly to build the infrastructure necessary to transfer water from Mākua Valley to other parts of the island where water may be in short supply in the future, and there is relatively little groundwater available in Mākua Valley to meet demand elsewhere. For this reason, and because the groundwater aquifer system beneath Mākua Valley probably lies almost entirely within the boundaries of the watershed, the ROI for groundwater impacts is considered to be limited to the groundwater within the boundary of Mākua Valley.

The ROI for surface water quality could extend to all of the coastal waters surrounding O‘ahu, because conceptually, nearly any construction projects could have an impact on coastal water quality, and each incremental contribution to the degradation of coastal water quality has the potential to affect economic and environmental benefits provided by the water.

The list of projects in Table 5-1 was reviewed to determine whether the effects of any combination of the projects and the effects of the project alternatives would overlap in space or in time in such a way that their

combined impacts would be greater or more apparent than their individual impacts on water resources.

In general, based on the information presented in Section 3.8, water quality in the coastal waters near Mākua Valley are of high quality, with little or no evidence of permanent impacts from current or past uses. Given the remoteness of Mākua Valley from areas impacted by urban nonpoint source pollution or by nonpoint source pollution from construction projects, it is unlikely that the coastal waters offshore of Mākua Valley would be immediately or directly impacted by any of the projects identified in Table 5-1, except those in Mākua Valley itself. However, given the ability of substances in the marine environment to be transported by wind, ocean currents, and rain flow, the projects in Table 5-1 that are outside the Mākua Valley have the potential to contribute such substances to the waters around MMR. Based on this fact, the Marine Resources Report (Tetra Tech 2009), also discussed in Chapters 2, identified that a number of substances detected in marine resources (fish, shellfish, and limu) were at levels that exceed the EPA's acceptable risk level for human health. This risk is based upon very conservative assumptions regarding the amount, frequency, and length of time these resources are consumed from the Mākua area. Nonetheless, the collective contribution of substances into the marine environment by anthropogenic (including activities at MMR) and natural sources is a significant cumulative impact on the water sources.

The other significant cumulative impact on water resources identified through evaluation of the projects and activities in Table 5-1 is soil erosion associated with the prescribed burn program at MMR, which would be significant in combination with each of the alternatives, including No Action. While the potential for a prescribed burn to cause widespread damage sufficient to have a significant effect on coastal water quality is small, the impact, should it occur, could be large and therefore is considered to be significant. Because the impacts of the prescribed burn program would affect the same local coastal waters as the impacts from wildfires due to resumption of live fire training at MMR, the cumulative impacts are also considered to be significant.

Based on data collected during field investigations at MMR, concentrations of chemical contaminants that migrate to the ocean via the intermittent streamflows from Mākua Valley do not significantly contribute to the waters offshore of MMR and are not likely to do so in the future, and no other proposed projects are likely to contribute to degradation of waters offshore of MMR. Therefore, no cumulative surface water quality impacts are expected.

Designation of USFWS plant critical habitat and implementation of the MIP are expected to result in beneficial cumulative impacts on water resources, as described below under each alternative, because these projects would focus attention on the need to protect habit and to prevent damage to vegetation, including damage from wildfires, which would reduce the erosion potential.

The PTA ROI for surface water and groundwater resources includes the Northwest Mauna Loa and the West Mauna Kea watersheds on the Island of Hawai'i, the aquifers underlying these watersheds and any aquifers downgradient (in the direction of groundwater flow) from the training and deployment areas, and the downstream and downgradient near-shore areas along the coast where surface water and groundwater, respectively, discharge to the sea.

Historical Cumulative Effects

For MMR, there are insufficient data available to quantify historical trends in water quality. Therefore, any discussion of historical effects involves some degree of speculation. Groundwater pumping for domestic purposes prior to Army use of MMR may have resulted in some saltwater intrusion near the coast, as indicated from reports that domestic water was somewhat brackish. However, since the Army has been using MMR for training, there has been no groundwater pumping for domestic use. Water in wells near the coast continues to show effects of either mixing with saltwater from the ocean or salts dissolved from minerals in the rock and sediments upgradient. Detections of trace levels of pesticides and dioxins in groundwater and surface water during the recent hydrogeologic investigations at MMR may be the result of past practices at MMR, or, as in the case of dioxins, ubiquitous atmospheric deposition of these compounds from unknown sources. It is unlikely that Army activities have contributed to these concentrations, although past disposal practices, such as disposal of waste in the OB/OD area, cannot be ruled out as a potential source. The presence of trace concentrations of explosives in groundwater or surface water suggests that Army training activities, or past military training activities in general, are the source of these compounds. However, no data are available to indicate trends in concentration levels.

There are no surface streams, lakes, or other bodies of water within PTA boundaries due to low rainfall, porous soils, and lava substrates. Intermittent stream channels quickly dry after rainfall stops. Rainfall, fog drip, and occasional frost are the main sources of water that sustain plants and animals in the dryland habitat of PTA and WPAA. Few data on surface water quality are available for the PTA watersheds.

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

Groundwater occurrence and quality on the Island of Hawai‘i and at PTA are not well studied. It is believed that groundwater beneath PTA is at great depths.

No Action Alternative

Construction projects and other projects that disturb soils contribute to the total amount of soil that is eroded and carried to streams and ultimately to the coastal waters surrounding O‘ahu. Chemical contaminants and nutrients from these projects are also carried with runoff to surface waters. In general, under No Action no live-fire training activities would occur at MMR. Structures for lasing training would be semi-permanent and more placed than constructed on target locations. This alternative would not contribute to the overall impact on the quality of ocean water surrounding O‘ahu. However, as described in Section 4.7, the risk of a wildfire burning uncontrolled for a long period of time may be increased under No Action because of the reduced level of installation management that would occur. Although they would have potentially significant effects on water quality if they occurred, such events are expected to be rare. Due to their rarity, the effects of wildfires are not, in themselves, considered to significantly contribute to cumulative effects. As identified, however, the Marine Resources Study (US Army 2009) shows that there are potential chemical migration pathways between MMR and the *muliwai* and nearshore areas; and, past activities at MMR has contributed to the levels of substances detected in the Mākua Beach and *muliwai* nearshore environments. Even under the No Action Alternative, it is possible that substances from past military activities could continue to contribute (migrate) from MMR, and thus, may contribute to significant cumulative impacts. To better understand possible pathways and the nature of these substances, the Army will undertake a long-term monitoring program that will be developed with input from the public.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Impacts under Alternative 1 would increase the potential for erosion impacts, in combination with the prescribed burn program, which could increase the potential for impacts on surface water quality. The prescribed burn program has already demonstrated a relatively high potential to result in uncontrolled fires. Live-fire training, in combination with substances

currently found in soils and water resources at MMR, would further increase the potential to degrade water quality on- and off MMR. Therefore, the cumulative impact is considered to be significant.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Cumulative impacts under Alternative 2 would be similar to those described for Alternative 1, except that the erosion impacts of the alternative would be greater than under Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Cumulative impacts under Alternative 3 would be similar to those described for Alternative 2 but would be slightly greater due to the greater potential for erosion impacts under Alternative 3.

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

Under this alternative, cumulative impacts would be less than significant to surface water at Kawaihae Harbor and the PTA Trail, as well as surface water and groundwater quality at PTA and WPAA. Water resources impacts are considered less than significant because of the lack of permanent surface water resources and the great depth to the groundwater at PTA, implementation of construction BMPs, adherence to spill prevention and response procedures, and facility designs to account for flooding and runoff potentials. The Army would evaluate the need for and appropriately obtain permits under Section 404 of the CWA to minimize any dredge or fill impacts, especially at PTA Trail crossings of Waikoloa Stream. There would be greater training and new facilities at PTA, with increasing demand for potable water. There would be no impact to the groundwater supply at PTA because the drinking water is trucked in from areas with abundant freshwater.

**5.3.8 Geology and Soils
*Introduction***

The MMR ROI for geology and soils includes the Mākua Valley, the adjacent attached valleys in which live-fire training and associated activities would occur, the adjacent beach, and the nearshore area. Because of the interrelationship between geology and hydrology, the ROI for geology incorporates the ROI for water resources.

In general, geologic impacts in watersheds outside of MMR, are not likely to have synergistic effects with impacts on geologic resources at MMR. Construction projects in Mākaha, for example, are not likely to involve

any overlap in geologic effects with resumption of live-fire training at MMR.

As described for water resources, the MMR prescribed burn program could result in increased soil erosion. The impacts would be similar to those resulting from wildfires that may be caused by live-fire exercises as described in Section 4.8, except that prescribed burns present a greater potential for uncontrolled fires. The cumulative impact on geology would be a loss of surface soil, loss of soil fertility, slope instability, and possibly excessive sediment deposition on lower slopes or in stream channels.

The USFWS Plant Critical Habitat and the MIP are expected to result in beneficial impacts that would reduce the potential for soil erosion under the project alternatives because of the increased attention afforded to the protection of critical habitat. The effect of critical habitat designation has already been seen in the efforts made in planning for the prevention and rapid suppression of fires at MMR, and these benefits are expected to continue.

The PTA ROI for geology and soils includes all areas in which project-related activities may occur, including the footprint of each training range and the corridors of the military vehicle roads. It also includes adjacent areas that may be affected by geologic processes in the project area (e.g., downslope areas adjacent to a roadcut or embankment that might be affected by slope failure).

Historical Cumulative Effects

There are insufficient data available to quantify historical trends in geological impacts from human use of Mākua Valley, although the types of activities that have occurred there are likely to have produced effects related to rates of erosion and concentrations of introduced chemical residues in soils. Prior to Army use for training, the valley was used for livestock grazing. Grazing intensity is not well documented, but one of the typical effects of intense grazing can be to reduce grass cover during periods of low rainfall and low plant growth. Animals also tend to congregate in moist or shady areas, create trails that can conduct runoff and lead to rill formation, and generally disturb soils, making them more vulnerable to erosion. Anecdotal evidence suggests that grass cover was much more sparse in the lower portions of the valley prior to Army use of MMR, and that runoff-producing events may have been more frequent than in recent years. The two may have been related, in that grass cover retains and slows runoff, allowing rainfall more time to infiltrate surface soils, while less grass cover would have allowed runoff to reach streams faster. As a result, streams would flow more frequently, at higher levels and for shorter durations. These conditions would produce more erosion.

When the military began using MMR for training, the intensity and nature of the training activity varied. During the transition from civilian to military use, following the impacts of grazing, erosion rates would probably have been higher than under existing conditions. Training activities would have contributed to erosion. There is historical evidence that erosion rates in the CCAAC were high, especially in roads, where runoff would have concentrated, and the Army addressed this problem by hardening the roads and improving drainage. Because chemical residues in soils may be mobilized by runoff and erosion, it is possible that explosives or other contaminants were carried to stream channels. Anecdotal evidence indicates that in recent years, grass cover has increased in Mākuā Valley, wildfire prevention and control programs have been implemented, and the frequency of runoff-producing events has decreased. This suggests that soil erosion has also decreased.

The frequency of live-fire training exercises has decreased in recent years as well. The range of training activities and the area in which the training activities take place have become more restricted than in the past. Waste disposal activities in the OB/OD area have stopped. As a result, the size of the area in which contaminants are released, the number of different chemical compounds released, and the amounts of contaminants released to the environment have been reduced relative to past years. The combination of these factors suggests that both erosion and amount of migration of chemicals in soils have probably declined in recent years.

No Action Alternative

Many projects in areas throughout O‘ahu may result in enhanced soil erosion or loss of valuable farmland or wildlife habitat through grading, filling, covering, or otherwise altering the terrain. As discussed in Section 4.8, reduced fuel management and wildfire response under No Action could result in increased potential for soil erosion compared to existing conditions, which in turn could lead to significant soil erosion if heavy rainfall were to occur after a large fire and before vegetative cover was reestablished. However, this alternative is not expected to decrease soil productivity or result in productive soil being taken out of production. Therefore, these erosion effects are considered locally significant rather than cumulatively significant, and the cumulative impact would be less than significant.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Increased protection of critical habitat for threatened and endangered species could help to reduce the potential for soil erosion, mainly by providing additional assurance of protection against wildfires. The

contribution of Alternative 1 to this overall effect would probably be small.

As described above, impacts of the prescribed burn program at MMR could have significant and unmitigable impacts on soil erosion and loss, mainly due to the risk that the prescribed burns could escalate to uncontrolled wildfires. This impact would result in a significant cumulative effect in combination with the potential for wildfire-related soil erosion due to live-fire training activities under Alternative 1.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Cumulative impacts under this alternative are expected to be similar to those described for Alternative 1, except that the potential for wildfire-related soil erosion would be greater under Alternative 2.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Cumulative impacts under this alternative are expected to be similar to those described for Alternative 2, except that the potential for wildfire-related soil erosion would be somewhat greater under Alternative 3.

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

Under this alternative, training at PTA and Ke'amuku Parcel (also referred to as the West PTA Acquisition Area – WPAA) would include dismounted maneuver training, with vehicle use generally limited to existing trails or roads. However, other maneuver training, especially by SBCT units and Marine Corps units using PTA, would be dismounted and mounted. 2/25th SBCT actions will result in substantial off-road vehicle (Stryker) use. Introducing either different land use activities, such as mounted maneuver training at WPAA, or increasing the level of disturbance activities would increase the potential for erosion and soil loss. In areas of PTA where soils are thin and fragile, the effects of soil loss may be irreversible. Impacts on water quality by proposed projects or activities could be mitigated with stormwater management and runoff controls. However, maintaining a persistent vegetative cover in areas of intensive use or development would not be possible because of the nature of the proposed use.

There would be significant soil loss and compaction at PTA and WPAA from maneuver training. Mitigation measures would substantially reduce the impact, but not to less than significant.

Similarly, construction of the PTA Trail would cause significant soil loss, with mitigation substantially reducing the impact but not to less than significant. Construction activities would remove existing vegetation and disturb soils. Erosion by both wind and water could occur. The greatest impacts are likely to be in steep slope areas containing fine loam soils, such as Waikalua and Pu'u Pā sandy silt loams. After construction, the trail could affect surface drainage. Large runoff events could result in soil accumulation in culverts at gulch crossings, resulting in flooding and possible washouts of the roadway. Severe soil erosion or sedimentation could occur on lands adjacent to the road.

Seismic or volcanic eruption hazards could result in cumulative effects. However, the Army would implement standard emergency procedures and engineering and design BMPs to reduce volcanic and seismic hazards to not cause significant impacts, although these measures would not eliminate the hazards.

5.3.9 Biological Resources

Introduction

Biological resources include plant and animal species and the habitats and communities in which they occur. The biological resources in the ROI for cumulative impacts range from nearshore waters and the coastline to mountain ridges. The habitats range from exclusively nonnative to protected and recovering areas and high quality native forests.

The MMR ROI for cumulative impacts on biological resources is the Island of O'ahu. Undeveloped land is increasingly rare on O'ahu and supports many native species of plants and wildlife, including those species and resources considered sensitive. O'ahu supports the highest population of any of the Hawaiian Islands, and this places pressure on the island's biological resources. Loss of habitat areas affect the survival of native species. The ROI also includes the coastal and nearshore areas of O'ahu because of the variety of listed or protected marine mammals and wildlife that occur in these waters.

Impacts are assessed after considering a variety of factors, such as overall abundance of the resource in question, percentage of the population impacted, and state or federal status of the resource. Other factors listed in the impact methodology discussion in Section 4.9.1 also apply as they are the same for both Army actions and cumulative actions. In this section, the impact issue categories from Section 4.9 are used to address cumulative projects with similar impacts; this sometimes results in cumulative projects being grouped into categories that don't precisely align with the nature of those projects.

The PTA ROI for cumulative impacts on biological resources includes the Twin Pu‘u range footprint and extends out to the boundaries of PTA. The ROI does not include near shore habitat around the Kawaihae Harbor area. There would be no additional LSVs needed to transport troops and equipment from O‘ahu to the Island of Hawai‘i for the proposed CALFEX and convoy live-fire training on PTA. The proposed training would be combined with SBCT training; therefore, there would be no net increase in LSVs above and beyond what is already required for SBCT. Implementation of this alternative would facilitate the spread of fire and invasive species, as well as impact sensitive species and their habitats throughout the installation.

Various activities in the coastal zone adjacent to the marine habitat, in the beach areas, and in nearshore waters all could contribute to impacts on marine wildlife. The overall cumulative impact on biological resources would be significant and unmitigable, particularly for sensitive species and habitats. The proposed development and heightened human activities on O‘ahu and Island of Hawai‘i could reduce the population of a sensitive species, as designated by federal and state agencies, or of a species with regional and local significance. They also could alter or destroy high quality to moderate quality habitat and would introduce or increase the prevalence of undesirable nonnative species. Army training and construction activities are likely to cause the incidental take of highly sensitive resources, such as threatened and endangered species. Existing and proposed mitigation measures would greatly reduce the likelihood of initial loss of species and habitat that could occur due to a wildfire. Measures to mitigate cumulative impacts would be similar to those discussed in Section 4.9, including habitat restoration and reestablishment of native species, and could reduce the ongoing problem of invasive species replacing native species occurring throughout O‘ahu and the Island of Hawai‘i.

Historical Cumulative Effects

O‘ahu historically has been the center of commerce in the Hawaiian Islands and is subject to the greatest influx of people and goods of any other island. Consequently, O‘ahu has lost several species of birds and an unknown number of plant species due to the effects of humans and human-induced change. The continuous urbanization of O‘ahu has pushed many more species of native plants and wildlife to the edge of extinction. Development along O‘ahu’s coastline has increased the activities in the associated coastal waters. The noise produced in this coastal ocean environment can deter marine life (National Research Council of the National Academies 2003), and coastal development can increase runoff and pollution in marine environments. The results of the increase in human occupation of coastal lands and waters, along with advances in

fishing technology (specifically longline fishing) have increased the pressure on ocean resources in Hawai‘i (Juvik and Juvik 1998), causing closures of certain fishing areas in the early 1990s. The cumulative effect of these impacts is still under debate.

Military landholdings in Hawai‘i are vast and encompass a great deal of sensitive habitat. Mākua Valley specifically was disturbed by community development, agriculture, and grazing activities prior to the military occupation of the land. Military activities have historically caused wildfires at MMR on what were once agricultural and pasture lands. These fires also burned into native forests and shrublands. Subsequently, nonnative grasses and trees (such as molasses grass, kiawe, and koa haole) were provided noncompetitive access into native forests. Since 1997, USFWS has been consulting with the Army on routine military training activities that take place at installations on O‘ahu to sustain the remaining sensitive species and habitats through the implementation of environmental programs.

On PTA, military construction and training activities, fire, and the introduction of nonnative species have been the main causes of habitat degradation and loss of native species.

No Action Alternative

Impacts from fire on sensitive terrestrial species and sensitive habitat

There would be a significant cumulative increase in the potential for fire-related impacts on sensitive species on O‘ahu as a result of No Action and the projects listed in Table 5-1. This cumulative impact would be unmitigable because wildfires could result in an irretrievable loss of individuals of a sensitive species. Road construction and modification projects, residential development, and SBCT Transformation-related live-fire training and activities would increase vehicle access into fire-prone areas of non-urban land. Projects that could contribute to this impact are Drum Road and the increased development of Central O‘ahu because of their close proximity to areas of sensitive species and habitat. The increased use of new and improved roads could lead to a higher probability of fire starting from a catalytic converter or cigarette smoking-related ignition. The Army has developed an IWFMP to prevent and suppress wildfires on Army installations. This plan would greatly reduce fire damage but is not expected to fully prevent and contain fires in and immediately around Army training areas. The potential loss to sensitive species, species of concern, and sensitive habitat is considered to be cumulatively significant and unmitigable.

The Army has conducted Section 7 consultations with the USFWS as part of the O‘ahu training areas BA and would implement an island-wide management and stabilization plan (the OIP) for certain threatened and endangered species and habitats.

Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species

Impacts on the spread of nonnative species as noted under No Action, combined with the impacts from projects in Table 5-1, would have a significant impact on sensitive species. Construction and increased use of roads associated with SBCT Transformation and the proposed Drum Road construction could introduce additional nonnative species and further spread those that already occur on O‘ahu. The disturbance caused by the numerous construction, demolition, road upgrades, and development projects (e.g., in Central O‘ahu) would leave the surrounding habitats vulnerable to nonnative species that can thrive in conditions where native species cannot. Drum Road and SBCT Transformation roads would transect every watershed on the north shore of O‘ahu. This area is among the least urbanized on the island and is home to important freshwater resources. The status of freshwater resources is of consequence to terrestrial species because many depend on these areas for water and prey.

Constructing Kapolei Parkway and a north-south road that would bisect much of the ‘Ewa Plain would have impacts as well. The land would be further stressed by the displacement of land and removal of vegetation that would occur as a result of Combined-Arms Collective Training Facility (CACTF) construction (part of SBCT Transformation) and development of Central O‘ahu.

Mitigation and conservation measures associated with the Army O‘ahu INRMP that would limit the spread of nonnative species include washing construction and military vehicles and equipment coming into O‘ahu and moving between installations. Nonnative wildlife, such as ungulates, mongooses, ants, and rodents, that can adversely affect native plants and animals are being monitored, restricted, and eradicated when possible as part of the O‘ahu INRMP and yearly inventory of O‘ahu training installations. Section 7 consultation was conducted and a BO was issued that identified ways to minimize impacts from ongoing Army training at O‘ahu installations; mitigation measures will avoid jeopardizing sensitive species on Army-controlled lands and on other lands as well. Their mitigation actions are centered on development of an OIP, which details stabilization actions very similar in scope to the MIP discussed in Chapter 4.

The impacts from continued development of the limited remaining nonurbanized areas would increase the likelihood of nonnative species becoming established closer and closer to the remaining natural biological communities, but the development and implementation of the BO actions would help to limit this spread. Implementing No Action at MMR would contribute to this cumulative effect because reduced management of MMR resources would allow further spread of nonnative species. Although implementation of measures to support native species and control nonnative species would help mitigate impacts, it would not be to less than the significant level.

Disturbance to sensitive terrestrial species and habitat from ground training

Because there would be no live-fire training under this alternative, the impacts on sensitive terrestrial species would be minimal and would not contribute to this regional impact.

Disturbance to sensitive terrestrial species and habitat from aircraft

There would be a significant but mitigable cumulative impact on sensitive species from aircraft activity. Aircraft would be used as part of SBCT Transformation-related training and would contribute to the adverse impacts on terrestrial species. These impacts would be mitigated, as described in the Army's O'ahu INRMP, the MMR Endangered Species Stabilization Plan, Section 7 consultation, and other project-specific measures. These measures would mitigate these impacts to the less than significant level.

Impacts on marine wildlife and coral ecosystems from runoff

Because this alternative would not increase sediments or chemical contaminants in surface runoff, it would not contribute to this regional impact. Unsubstantiated pathways for substances migrating from MMR have the potential to exist, and may contribute substances from MMR to the Mākua Beach nearshore and muliwai environments. To better understand potential pathways and the nature of these substances, the Army will undertake a long-term monitoring program at MMR, which will be available for public review and comment. The Marine Resources Study, as discussed in Chapters 3.7 and 3.9 of this EIS, found that a number of substances detected in the marine resources were at concentration levels that potentially pose a human health risk to area residents who rely on marine resources for subsistence. This risk is based upon very conservative assumptions regarding the amount, frequency, and length of time these resources are consumed from the Mākua area. Nonetheless, the collective contribution of substances into the marine environment by anthropogenic (including activities at MMR) and natural

sources may have a significant cumulative impact if these resources are consumed 365 days per year over 30 years¹.

Based on the additive nature of substances being deposited into the marine environment around MMR and from other sources around O‘ahu, and the potential human health risk associated with these substances, it is determined that a significant and unmitigable cumulative impact would arise from the contribution of substances to the Mākua Beach nearshore and muliwai environments.

Impacts on marine wildlife from activities in the coastal area

Activities in the coastal areas around O‘ahu combined with the activities under Alternative 1 could significantly impact marine wildlife.

Several of the ongoing or planned projects would increase development in the coastal zone. This would increase beach use, recreational activity, noise, habitat disturbance, and garbage dispersal. As described in Section 3.9, the dolphins near MMR are currently stressed by human-swim interactions that impact their resting behavior. Continued development of the coastline would increase existing impacts if it increases dolphin-human interaction, which is considered likely. Also, beach habitat would be less available for sea turtles and monk seals due to human disturbance. The cumulative impact on marine wildlife that would result from project-related habitat encroachment and degradation combined with other projects on O‘ahu would be significant.

There are already several existing factors that contribute to stress in the marine environment in Hawaiian waters. Hawaiian waters have been identified as “acoustic hot spots” (NRDC 1999); the habitat is considered to be of ecological significance and is already considered to be exposed to high levels of human-made noise. Spinner dolphins, in particular, are known to be more sensitive than some other dolphin species to noise, aircraft, swimmers, and other anthropogenic disturbance (Richardson et al. 1995; MMPA Bulletin 1999). The habitat near Mākua Beach is a known resting place for this species, despite human disturbance in the area from the public, from commercial dolphin watching operators, and from military activities.

¹ This consumption rate is actually 7 times the average per capita fish and shellfish consumption frequency of 48 days per year in the US. These consumption rates are also considerably higher than the likely ingestion rate of the species collected in this study, and are over 50 times greater than the average ingestion rate for the general US population. Finally, while the nearshore environment at Mākua Beach may support subsistence, due to the general nature of the muliwai, and as a result of our findings, it is highly unlikely that sufficient resources exist at the Mākua muliwai to support even one (1) individual every day for 30 years (US Army 2009).

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Impacts from fire on sensitive terrestrial species and sensitive habitat

There would be a significant cumulative increase in the potential for wildfires to occur on O‘ahu as a result of Alternative 1 and the projects listed in Table 5-1. The potential for human-induced fires would increase through live-fire activities proposed at MMR; because of this, highly flammable nonnative species, such as guinea grass and molasses grass, would spread further. The potential irretrievable loss of individuals of a sensitive species makes this cumulative impact unmitigable. The Army completed Section 7 consultation with the USFWS on O‘ahu training areas. The consultation resulted in requirements for the Army to implement measures that would reduce impacts on sensitive species and critical habitat. The MIP, O‘ahu INRMP, and the Endangered Species Stabilization Plan would also aid the recovery of listed and sensitive species in the ROI. MMR activities would make a major contribution to the overall cumulative impact.

Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species

Impacts from Alternative 1 on the spread of nonnative species, combined with the impacts from projects in Table 5-1, would have a significant and unmitigable cumulative impact on sensitive species and habitat. These impacts would be similar to those described for No Action.

Development of Central O‘ahu/Mililani and the further development of the coastal plains in ‘Ewa, coupled with the activities at MMR under this alternative, greatly increases the opportunity for further spread and establishment of nonnative species, which further threatens the remaining native natural communities on O‘ahu. The impacts from continued development of the limited remaining nonurbanized areas would significantly increase the likelihood of nonnative species becoming established closer and closer to the remaining natural biological communities. Implementing Alternative 1 at MMR would contribute to this threat to native species. Developing and implementing the O‘ahu Implementation Plan, as set forth in the 2003 BO for Army training on O‘ahu, would help to reduce this cumulative impact to less than significant.

Disturbance to sensitive terrestrial species and habitat from ground training

The cumulative impact on sensitive species that would result from project-related habitat loss and degradation combined with other projects on O‘ahu would be significant. Development of land throughout the state has

led to a degradation of biological resources, though habitats throughout the state continue to support common and sensitive species of plants and wildlife.

Proposed and recent projects on O‘ahu, such as the Drum Road construction project and Kahuku Windmill and Hook Parcels Land Acquisition, would contribute to the increased erosion, noise, and general human-induced disturbance to sensitive species that would be caused by ground training as proposed in this alternative. These projects would involve development in some of these natural communities, which are extremely valuable to sensitive species. Soil erosion would result from increased and more extensive Army activities and from road projects, such as the Helemanō Trail (part of SBCT Transformation). This erosion results in stormwater runoff creating sedimentation of streams and other bodies of water. Although Drum Road construction would increase erosion in the short term, it would likely reduce localized erosion due to improved roadway conditions over the long term.

Training-related fires would also increase soil erosion. The destruction of plants that occurs from foot or vehicle trampling exacerbates the problem of eroded and windblown soils. Additional road construction projects create divisions in sensitive habitat that prevent migration between populations. These projects also would create dust that could settle on sensitive plant species and inhibit photosynthesis, though further study would be required to determine the magnitude of this effect. There also would be a loss of natural habitat and a greater degree of pressure on terrestrial resources through projects such as the Turtle Bay Resort expansion, golf course development, and an increase in residential development island-wide.

Dismounted maneuvers in or near sensitive habitat, such as activities in the Ko‘olau Mountains associated with SBCT Transformation, would result in elevated soil erosion, lowered water quality, continued habitat fragmentation, and lowered habitat value. Some of these impacts would be mitigated, as described in the Army’s O‘ahu INRMP, ITAM Section 7 consultation, and other project-specific measures under this alternative, such as the MIP. Implementing actions outlined in the 2003 BO for Army training areas on O‘ahu would reduce this impact to a less than significant level.

Disturbance to sensitive terrestrial species and habitat from aircraft

The cumulative noise and visual impacts on sensitive terrestrial species would be significant and mitigable, as described under the No Action Alternative.

Impacts on marine wildlife and coral ecosystems from runoff

Impacts from runoff from Alternative 1 combined with other projects are expected to be less than significant, and once upgrades to wastewater treatment plants are completed, effects would be beneficial. Wastewater treatment plant upgrades are expected to provide a beneficial impact on both marine wildlife and any coral systems adjacent to the area. This is due to the reduced chance of rain events overloading the system and the associated reduction in the release of untreated runoff. Heavy rains typically act to overload facilities and currently result in excessive runoff into the nearshore environment. Current treatment plants are frequently overloaded and often break down, resulting in a shut off, leaving millions of gallons of untreated sewage and runoff to flow downhill into the marine habitat and estuarine environments. Upgrades to wastewater treatment plant facilities would reduce the effects of heavy rainfall on these environments. Therefore, the long-term cumulative impact on marine wildlife and coral ecosystems from runoff would be beneficial.

Until these facilities are completed, cumulative adverse impacts on marine wildlife and coral ecosystems from runoff are possible. While surface water samples collected in February 2002 during storms did not show a significant sediment load to the ocean, more recent storms in 2003 had an apparent increase in erosion from runoff. In 2002 the sediment load to the ocean was not particularly high, and contaminant levels were very low. One explanation is that the waters offshore of MMR are only likely to be impacted by activities that take place in the Mākuā Valley watershed, so there would be no additional cumulative impacts on those offshore waters from activities in other watersheds where projects are identified. Therefore, cumulative impacts on ocean water quality would be the same as the project impacts. Cumulative impacts could be significant in the case of wildfires or if a project resulted in damage to vegetation or large-scale soil disturbance, followed by a large runoff-producing storm, such as could occur during the Turtle Bay Resort expansion. At MMR, vegetative regrowth of the nonnative grasses is rapid, and large storm events are infrequent. Potential impacts on coral are more likely from sedimentation than from contamination. Sedimentation effects on coral are considered less than significant because of the small geographic area of the corals in relation to the project and the number of factors required to occur for this to be a significant adverse effect. In addition, road construction and increased use that could result from projects listed in Table 5-1 that would contribute to runoff are not likely to exceed the typical fluctuations in erosion and sedimentation that result from wind, rain, and natural drainage.

Cumulative impacts are anticipated from substances associated with proposed live-fire activities at MMR when combined with substances

detected in marine resources there currently. These substances pose a potential human health risk to area residents who rely on marine resources for subsistence. Substances contributed from MMR, and substances contributed from other public, private, and natural sources, may accumulate in the nearshore and *muliwai* environments around O‘ahu. Cumulatively, the impact is considered significant.

Impacts on marine wildlife from activities in the coastal area

Alternative 1, combined with the other cumulative actions, would have effects similar to those described under the No Action Alternative..

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Impacts from fire on sensitive terrestrial species and sensitive habitat

Cumulative effects would be similar to those identified under Alternative 1. Because additional potential sources of wildfires would be used at MMR under this alternative, the relative magnitude of this impact would increase.

Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species

There would be an increase in the spread of nonnative species and displacement of natives by invasive species under Alternative 2. This would be caused by the increased wildfire threat and intensity of military training under this alternative. The heightened disturbance to sensitive species and habitats would intensify an ongoing trend and would result in a significant impact that could not be mitigated to the less than significant level.

Disturbance to sensitive terrestrial species and habitat from ground training

Cumulative effects would be similar to those identified under Alternative 1. Additionally, dismounted maneuvers in or near sensitive habitat would result in elevated soil erosion, lowered water quality, continued habitat fragmentation, and lowered habitat value. Some of these impacts would be mitigated, as described in the Army’s O‘ahu INRMP, ITAM, Section 7 consultation, and other project-specific measures. The OIP and additional measures described in the 2003 BO for Army training areas on O‘ahu also would mitigate this impact.

Disturbance to sensitive terrestrial species and habitat from aircraft

The cumulative noise and visual impacts on sensitive terrestrial species would be significant and mitigable, as described under the No Action Alternative.

Impacts on marine wildlife and coral ecosystems from runoff

Alternative 2 combined with the other cumulative actions would have effects similar to those described under Alternative 1.

Impacts on marine wildlife from activities in the coastal area

Alternative 2, combined with the other cumulative actions, would have effects similar to those described under the No Action Alternative.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)**Impacts from fire on sensitive terrestrial species and sensitive habitat**

There would be a cumulative increase in the fire impact as a result of Alternative 3 and the projects shown in Table 5-1. The cumulative impact would be significant and unmitigable because it could result in an irretrievable loss of individuals of a sensitive species.

Impact on sensitive terrestrial species resulting from the spread of nonnative species

This cumulative impact would be significant and unmitigable for reasons similar to those described for Alternative 2. The magnitude of this impact for Alternative 3 would be greater than all previous alternatives, due to the likely increase in the spread and establishment of nonnative species due to fire.

Disturbance to sensitive terrestrial species and habitat from ground training

There would be a cumulative increase in the number of nonnative species as a result of Alternative 3 and the projects shown in Table 5-1. The cumulative impact would be significant and unmitigable. The additional disturbance to sensitive species that could result from construction projects, such as SBCT Transformation, Turtle Bay Resort expansion, and Drum Road, along with SBCT training activities, could exacerbate the disturbance to sensitive species from ground training. Mitigation identified in Alternative 2 would apply to this impact but would not reduce the impact to less than significant.

Disturbance to sensitive terrestrial species and habitat from aircraft

The cumulative noise and visual impacts on sensitive terrestrial species would be significant and mitigable, as described under the No Action Alternative.

Runoff impacts on marine wildlife and coral ecosystems

Alternative 3, combined with the other cumulative actions, would have effects similar to those described under Alternative 1.

Impacts on marine wildlife from activities in the coastal area

Alternative 3, combined with the other cumulative actions, would have effects similar to those described under the No Action Alternative.

Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area**Impacts from fire on sensitive terrestrial species and sensitive habitat**

There would be a cumulative increase in the potential for fire within the ROI as a result of CALFEX training and the projects listed in Table 5-1. Human-induced fires would increase through live-fire and mission support activities proposed at PTA, as well as the spread of nonnative species such as the highly flammable fountain grass. The increased use of improved roads would heighten the probability of a fire igniting from a catalytic converter or discarded cigarette. Implementation of the IWFMP would greatly reduce fire potential and damage but is unlikely to fully prevent and contain fires in and immediately around Army training ranges. The USFWS would be notified if a fire were to occur outside of the fuel and firebreaks. The PIP would substantially mitigate the potential loss of listed species, species of concern, and sensitive habitat. The PIP, which is near completion, outlines the management actions necessary to ensure the long-term survival of endangered species at PTA and is designed to assure proper conservation of species as construction and use of ranges and facilities occur.

The Army has completed ESA Section 7 consultation with the USFWS for both Legacy and SBCT training on the Island of Hawai‘i. In compliance with the BO of “no jeopardy” issued by the USFWS, the Army would abide by all the terms and conditions and the conservation measures identified in the BO. If Alternative 4 were selected by the Army, the Army would reinitiate ESA consultation with the USFWS to address the impacts of the action on listed species found within the ROI.

Over time, it is believed that implementation of the IWFMP, PIP, and BO would reduce impacts on biological resources. While these efforts would considerably reduce the impacts on biological resources, the impacts may not be reduced to a less than significant level. Non-Army projects with potential fire-producing activities (such as road construction and development), coupled with the fact that 91 percent of all acres burned on PTA were caused by lightning, arson, or carelessly discarded cigarettes off Army lands, are outside of Army control. The Army cannot mitigate for

all potential scenarios. Thus, the cumulative impacts of this alternative would be significant and unmitigable if it would result in an irretrievable loss of sensitive species and their habitat.

Impact on sensitive terrestrial species resulting from the spread of nonnative species

There would be a cumulative increase in the number of nonnative species as a result of the CALFEX alternative on PTA and the projects listed in Table 5-1. Disturbance from CALFEX and SBCT training, construction, and increased use of roads would leave surrounding habitats vulnerable to the spread of nonnative species (including the potential introduction of nonnative species that do not presently occur on PTA) that can outcompete native species. Mitigation and conservation measures associated with SBCT, the Saddle Road Realignment, and PTA's INRMP would limit the spread of nonnative species by washing construction and military vehicles and incoming equipment onto PTA. Nonnative wildlife (i.e., ungulates, ants, and rodents) and plants (particularly fountain grass), which compete with native plants and animals for resources, are being monitored, restricted, and eradicated when possible, as required by the SBCT ESA Section 7 consultation BO and PTA's INRMP. In light of historic, ongoing, and reasonably foreseeable future actions, although identified measures would mitigate the overall impact from spread of nonnative species to less than significant, the overall cumulative impact from the spread of nonnative species from the proposed action and those listed in Table 5-1 would be significant.

Disturbance to sensitive terrestrial species and habitat from ground training

Other than impacts from travel to and from the training site, ground training impacts would be contained within the PTA impact area. Because surveys have been limited due to UXO hazards, the occurrence of sensitive terrestrial species within the impact area is unknown. However, ground training could disturb sensitive terrestrial species and habitats if they occur within the Twin Pu'u range footprint. Ground training would introduce noise into the terrestrial environment and increase erosion, vehicle disturbance, and foot trampling. Fountain grass, an invasive species, dominates the Twin Pu'u area; therefore, the direct impacts of ground training in this area to sensitive species would be less than significant. The loss of habitat and sensitive species within the impact area have been mitigated and/or minimized through NEPA and ESA consultation for the SBCT and other actions.

Noise associated with ground training has the potential to disturb the endangered Hawaiian hoary bat that is known to occur near the Twin Pu'u range footprint. In the 2003 PTA BO for SBCT, the USFWS stated that

the noise may startle bats from roosts and disrupt their sleep patterns or torpor. Research indicates that bats habituate to noise from anthropogenic sources, such as airports and traffic. The USFWS also stated that habitat loss, not noise, is the major factor affecting bats on PTA.

The ground training that would occur under this alternative could create dust or soil erosion that would settle on sensitive plant species outside the range footprint and possibly inhibit photosynthesis or cause other damage to the plant. Increased dust would also degrade available water and generally lower habitat value to sensitive species such as the nēnē. The PTA INRMP, PIP, and measures identified in previous ESA Section 7 consultation adequately minimize and/or mitigate the potential impact of dust or soil erosion that may occur from ground training within the proposed Twin Pu‘u range footprint.

While Alternative 4 would have a less than significant impact on the loss and degradation of sensitive species and habitat, the overall cumulative impact from the loss and degradation of sensitive species and habitat from projects listed in Table 5-1 would be significant. Mounted and dismounted maneuvers associated with the SBCT actions would result in elevated soil erosion and disturbance, continued habitat fragmentation, and decreased water quality and habitat value. Other ground disturbing activities associated with road and range construction cause habitat loss and destruction of sensitive plants by foot or vehicles, and exacerbate the problem of eroding and windblown soils. While no threatened and endangered faunal species issues are associated with the USMC grenade/shoothouse, FOB, or MOUT projects; the endangered nēnē have been observed at several locations on PTA, including Range 1 near the proposed USMC CLF project. Known nēnē sites are currently being monitored and the Army will begin studying the impacts of noise and disturbance on nēnē (2009) in addition to implementing nene-related training restrictions and other conservation measures. The Army will continue to implement the required measures from the 2003 Biological Opinion as well as new requirements from the 2008 BO. The nēnē portion of the 2008 BO will be valid through July 1, 2010, at which point it is anticipated that new data regarding impacts of the actions will be available to enable the Army to develop conservation measures to avoid, minimize, and off-set impacts from training actions occurring on PTA through formal Section 7 consultation. As a result, the impacts to wildlife associated with the proposed USMC CLF project are considered potentially significant but mitigable; however, cumulative impacts are expected to remain significant.

Military readiness activities are exempt from take of migratory birds under the MBTA, unless the Army determines that such take may have a

significant adverse impact on a population of migratory bird species (see Section 3.9.5 for further information). A number of birds are known to occur within the proposed Twin Pu‘u range area, but the numbers of native migratory birds in the area have not been assessed. However, it is not anticipated that ground training activities within the proposed Twin Pu‘u range would take many birds, especially not to the degree of significant impact on a population level.

Non-readiness activities to support CALFEX training within Alternative 4 could lessen reproductive success and result in impacts to migratory birds. Based on the migratory bird species that may occur within the range footprint, the unintentional take that could result from such activities would have minimal impacts on bird populations. The most significant impact of training to migratory birds would be the ignition and spread of fire that would alter or destroy preferred habitats.

Disturbance to sensitive terrestrial species and habitat from aircraft

Aircraft activity would result in a significant but mitigable cumulative impact on sensitive species. Aircraft would be used as part of CALFEX training and would contribute to adverse impacts on terrestrial species. These impacts would be mitigated, as described in the PTA INRMP and SBCT BO, to the less than significant level.

Fixed-wing aircraft and helicopter activity would occur in and around the proposed Twin Pu‘u range site. This would include nighttime training, which would involve about 45 percent of the ongoing basic training of new pilots. Such activities could have an impact on foraging and commuting bats, the Hawaiian Dark-rumped Petrel, and other birds.

Increased noise and visual disturbance from the aircraft could affect bird species and the Hawaiian hoary bat. However, under Alternative 4, aircraft activity would be anticipated to have a less than significant impact on sensitive terrestrial species and habitat. The impacts associated with noise from aircraft would be similar to those from ground training.

The USFWS stated that the efforts identified by the Army to minimize impacts of aircraft on listed species during SBCT training were the only practical measures available to avoid or minimize the incidence of aircraft strikes on Hawaiian hoary bats (PTA 2003 BO). These measures include using dedicated landing and pickup zones at pre-approved firing points and ranges or requesting alternate sites from the Army Natural Resources Office (no helicopter insertion points in the Kīpuka Kālawamauna), reporting all bird or bat strikes to the Natural Resources Office, and reinitiating consultation for any unauthorized take.

A number of birds are known to occur within the proposed Twin Pu‘u range area, but the numbers of native migratory birds in the area have not been assessed. However, it is not anticipated that any military readiness aircraft training within the proposed Twin Pu‘u range would take many birds, especially not to the degree of significant impact on a population level.

Runoff impacts on marine wildlife and coral ecosystems

Runoff would not be expected to cause significant cumulative impacts to marine wildlife resources or coral ecosystems. The proposed Twin Pu‘u range is located quite a distance from the coastline. Because PTA does not contain any permanent streams or water bodies, impacts from soil erosion caused by construction and training activities could only occur during periods of high runoff. However, periods of high runoff on surface water are usually short in duration and infrequent and would not be expected to be significant. Due to the depth of the groundwater beneath PTA, activities within the proposed range site would not be expected to impact the groundwater. Therefore, the potential for soil and contaminant runoff to impact marine wildlife and coral ecosystems would be minimal and less than significant.

Road construction and increased use that could result from projects would contribute to runoff but would not be likely to exceed the fluctuations in erosion and sedimentation that results from wind, rain, and natural drainage.

The Army and the operator of the harbor would be responsible for preventing spills and for cleaning them up, if they occur, in accordance with standard spill prevention and response procedures. The Army concludes that the cumulative impact of runoff on marine and coral ecosystems would not be significant.

Impacts on marine wildlife from activities in the coastal area

The use of LSVs and barges could have a potential impact on marine wildlife and habitat. This impact would predominantly be due to the potential for collisions between vessels and marine wildlife, contaminants and their effect on the overall marine ecosystem, and wave impacts on coral. As LSVs may be routed near some of the Hawaiian Islands Humpback Whale National Marine Sanctuary waters, there would be a potential for impacts during the humpback whale calving and mating season (January 1 to April 30).

PTA addressed the potential impacts from LSVs in the 2004 SBCT EIS and through informal consultation with NOAA Fisheries. As stated in Section 4.9.1 of this document, NOAA Fisheries concurred with the Army

that slow speeds (less than 11 knots) of the LSV would make collisions with protected species unlikely, and therefore, not likely to adversely impact such species. There would be no increase in LSVs to accommodate the proposed training at PTA. The Army would also prohibit vessels from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs.

There are also some measures in place that address fuel spills and ballast discharge. The US Coast Guard requires SOPs to address these impacts. In light of historic, ongoing, and reasonably foreseeable future actions, the cumulative impact on marine wildlife, especially whales and habitat, would be significant, but mitigable to less than significant.

5.3.10 Cultural Resources

Introduction

This section discusses the cumulative impacts for cultural resources. Cultural resources can include historic properties, landscapes, cultural items, archaeological resources, sacred sites, or collections subject to protection under the NHPA, ARPA, NAGPRA, Executive Order 13007, and the guidelines on Curation of Federally Owned and Administered Collections (36 CFR Part 79). In addition to formally evaluated cultural properties, MMR and PTA contain resources that have value to Native Hawaiian groups and other members of the general public. These resources are identified as ATIs.

The cumulative ROI for cultural resources is the Island of O‘ahu for Alternatives 1 through 3 and the Island of Hawai‘i for Alternative 4. While the most directly connected resources to those at MMR and PTA are within the surrounding communities, archaeological sites and ATIs throughout the islands would be affected by the continued development and military training included in the cumulative projects.

Many factors were considered for this analysis, including issues identified during public review of projects listed above. The majority of these comments related to access to traditional areas and the potential destruction of cultural sites and landscapes from training. Significant impacts on cultural resources can include destruction of the properties or elements of the resource that qualify it for inclusion on the National Register of Historic Places. Other impacts can occur from changing the setting and character of the resource. For places important for traditional reasons, significant impacts can include reducing or eliminating public access to these areas, altering the landscape or setting, or destroying or altering the natural setting by prescribed burns.

Under No Action, there would be significant but mitigable adverse impacts to archaeological sites and ATIs due to nonlive-fire training itself. However, the use of UAVs and other aircraft during nonlive-fire training could result in crashes with the potential for fire resulting from these crashes. The impact to access to ATIs would be significant and unmitigable. Cumulative impacts on ATIs and archaeological sites under the project alternatives combined with the cumulative projects listed above would result in significant and unmitigable cumulative impacts on cultural resources. Although specific actions at MMR and PTA can be mitigated on a case-by-case basis, the overall effect of increased training, reduced access, and continued development throughout O‘ahu and Hawai‘i will result in substantial alteration and restriction of native use of traditional areas and the potential destruction of numerous archaeological sites.

Historical Cumulative Effects

Past cumulative effects on cultural resources have resulted from Euro-American settlement and over 80 years of military activity at MMR and 50 years at PTA. Prior to military use, ranching and cattle altered much of the indigenous vegetation in the 1800s. The ranching period likely caused the destruction or alteration of many of the prehistoric and historic period archaeological sites in the valley due to cattle trampling and landscape alteration. Reports from the 1930s, however, found that the upper portion of Mākua Valley was still a good place to find rare and endangered Hawaiian plants (Judd 1932).

Today, the vegetation communities in the Mākua and Kahanahāiki valleys are composed mostly of secondary growth species, typical of areas disturbed by human activities. Ground cover consists of a mix of grasses (*Gramminae* spp.). Various shrubs and low trees are also present in some areas, including *kiawe* (mesquite, or *Prosopis pallida*) and *koa haole* (*Leucaena glauca*).

It is likely that early military use of MMR and PTA, prior to cultural resource legislation and current management efforts, resulted in the loss, destruction, or alteration of numerous cultural sites and ATIs from training exercises. Because access to MMR and PTA has been restricted for over 60 years and over 50 years, respectively, it is difficult to find community members with specific knowledge of the historic use of these areas. This loss of knowledge is an additional effect of the prolonged military use of these areas.

No Action Alternative

No Action, with limited Army use and no further live-fire training, but which would include the use of UAVs and air lasing, would result in

significant but mitigable impacts to archaeological sites and ATIs. The potential for limitations to access to archaeological sites and ATIs would present a significant and unmitigable impact. These impacts combined with other cumulative impacts would present an unmitigable impact.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

The combined effect of Alternative 1 with projects such as SBCT Transformation may create significant and unmitigable cumulative impacts on cultural resources. Cumulative effects on ATIs at MMR may be more severe than those on archaeological sites. Prescribed burns at MMR and other installations would result in the increased risk of accidental wildfire damage that may destroy native vegetation that is considered part of the cultural heritage.

The number and nature of cumulative projects would constitute a fair degree of landscape alteration in many cases, as well as placing additional restrictions on traditional site access. An increase in nonnative species following future wildfires could also affect the native cultural landscape. Additionally, training activities at MMR involving high explosive ordnance could destroy or damage archaeological sites and Native Hawaiian ATIs, including landscapes, shrines, archaeological sites, or burials. Access to archaeological sites and ATIs would be decreased due to training and public safety concerns.

Although the Army's continuing policy to avoid sensitive areas, the implementation of preservation measures, and continuing compliance with federal legislation reduce project-specific impacts, cumulative impacts on cultural resources within the ROI are considered significant and unmitigable. Projects such as SBCT Transformation would increase the direct impacts associated with training and, combined with MMR activities, may result in a greater overall or cumulative effect on these resources. Access to ATIs would be reduced overall, further restricting use of these sites by Native Hawaiians for religious or ceremonial purposes. Increased frequency of training and the completion and implementation of projects throughout O'ahu would result in an overall significant and unmitigable cumulative impact.

Alternative 2 (Full Capacity Use with Some Weapon Restrictions)

Alternative 2, combined with the other cumulative actions, would have effects similar to those described for Alternative 1, although impacts would be greater due to the use of tracers and the increased number of CALFEXs.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Alternative 3, combined with the other cumulative actions, would have similar effects to Alternative 2. Impacts would be greater due to the use of additional weapons posing a greater risk to resources through direct damage and increased potential for wildfires. As described above, although project-specific impacts may be reduced by mitigation measures described in Section 4.10, the combined cumulative effects would be considered significant and unmitigable.

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

Alternative 4, combined with the other cumulative actions, would have impacts similar to those under Alternative 3. Impacts would be greater because the use of additional weapons would pose a greater risk to resources through direct damage and increase the potential for wildfires. As described above, although project-specific impacts may be reduced by mitigation measures described in Section 4.10, the combined cumulative effects would be considered significant and unmitigable.

**5.3.11 Hazardous Materials and Waste
Introduction**

The hazardous materials and waste cumulative impact section provides an analysis of the human health and safety hazards in and associated with the cumulative ROI. The hazardous materials and waste resource encompasses ammunition, UXO, training activities, general hazardous materials and wastes, asbestos, lead contamination, pesticides, PCBs, petroleum, oils, and lubricants, and EMF.

Cumulative impacts on hazardous materials and waste may occur for various environmental issues. The ROI for the cumulative effects on hazardous materials and waste is the sum of the regions of influence of the combined projects and is generally the Island of O‘ahu for Alternatives 1 through 3 and the Island of Hawai‘i for Alternative 4. The ROIs of the cumulative projects vary in size and may not be well defined. Due to the nature of the hazardous materials and waste analyzed in this document, impacts are usually confined to the boundaries of the individual project areas and construction transportation routes. In general, the cumulative impact assessment for the hazardous material and waste analysis is intended to be descriptive rather than quantitative.

The assessment of potential cumulative hazardous material and waste impacts considered the following:

- Potential contamination from cumulative projects;

- Handling and transport of hazardous materials and waste associated with cumulative projects;
- Potential accidental release of hazardous materials and waste associated with cumulative projects; and
- Exposure to EMF from cumulative projects.

Most cumulative impacts concerning hazardous materials and waste are localized and would not spread far from the individual project site. The cumulative analysis considered the impacts of the project alternatives and cumulative projects on conditions within the cumulative ROI.

Given the ability of substances in the marine environment to be transported by wind, ocean currents, and rain flow, projects occurring within and outside the Mākua Valley have the potential to contribute hazardous substances to the waters around MMR. The Marine Resources Report (Tetra Tech 2009), also discussed in Chapters 3.8 and 3.9, found that a number of substances detected in the marine resources were at concentration levels that pose a human health risk to area residents who rely on marine resources for subsistence. This risk is based upon very conservative assumptions regarding the amount, frequency, and length of time these resources are consumed from the Mākua area. Nonetheless, the collective contribution of substances into the marine environment by anthropogenic (including activities at MMR) and natural sources potentially pose a human health risk, and therefore, a significant cumulative impact associated with Hazardous Waste and Materials.

Based on the additive nature of substances being deposited into the marine environment around MMR and the potential human health risk associated with these substances, it is determined that a significant unmitigable cumulative impacts would arise regarding hazardous materials and wastes. This significant impact is mainly influenced by the contribution of these substances from non-military activities.

Lead-based paint, asbestos, radon, and biomedical waste are not included in the cumulative analysis because these materials are not affected by the project alternatives. Individual impacts were considered separately for each cumulative project as well as cumulatively in order to determine the significance level of impact from hazardous materials and waste.

Historical Cumulative Effects

Past actions resulting in hazardous material and waste impacts on the ROI include military training, beginning in the 1920s, construction and improvements to Farrington Highway, and development on the Wai‘anae coast of O‘ahu. Each of these components used hazardous materials,

increased equipment and vehicle use, and generated hazardous waste during construction. Furthermore, development in the area increased visitors, residents, and businesses, thereby increasing fuel consumption, vehicle use, and accidents in the area.

Past training cumulatively added several hazardous material and waste impacts over the years. Live-fire training on the range proved adverse to neighboring communities due to wildfire outbreak and misfired rounds landing in residential and nature preserve areas. Many of these safety hazards due to the introduction and continuance of military training at MMR have been eliminated over the years through the Army's effort to minimize adverse impacts on the public.

Continued live-fire training, ranging back to the 1920s, has been a persistent source of lead and other metals to the soils within MMR. Hydrogeologic investigations conducted in conjunction with this EIS, however, found only isolated lead concentrations above PRGs. This past cumulative impact is not considered significant.

The use of ICMs in demilitarization has rendered a large region of the southern valley and hillside off-limits to the public and military personnel, due to the high risk of encountering unstable UXO. Unlike general UXO, which has been periodically swept and cleared, allowing continued use of these areas, a proven safe and effective means of identifying and clearing ICMs has not been developed for an open range. While MMR is still in use, the ICM area would remain inaccessible and would not be cleared.

Through use of the OB/OD area as a hazardous waste and ammunition disposal landfill, hazardous substances of unknown profile, content, and specific extent have been introduced to the soils of MMR. Although a cap layer of soil covers the OB/OD area to prevent surface exposure to the materials, adverse impacts on the environment have resulted from this activity.

Each of these activities and impacts have been monitored by the Army. SOPs have been established for each specific activity on the range and have been modified as practices change. BMPs have been followed in order to minimize the impact on public welfare or the environment. The state and EPA have similarly monitored activities along the Wai'anāe coast to minimize effects to the environment.

No Action Alternative

Under No Action, no live-fire training would occur at MMR. 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.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Ammunition

Most of the cumulative projects do not involve the storage, use, and transport of ammunition. For these projects, there would be no contribution to the cumulative impact. However, SBCT training would include increased use of ammunition on O'ahu. An EIS was prepared that addressed SBCT training at SBMR, DMR, and the Kahuku Training Area. That document also addressed activities involving ammunition storage, use, and transportation, and it identified appropriate mitigation measures. For any project using ammunition, the storage, use, or transport of ammunition requires strict adherence to established regulations. No new regulations or policies would need to be established; it is standard practice, when methods or equipment is changed, to update SOPs to include proper handling and safe storage methods. SOPs used for MMR would be updated to incorporate new munitions. Although new munitions would be incorporated into military training from cumulative projects, because it is standard practice to update safety procedures and SOPs, this impact is considered less than significant.

Unexploded ordnance

The presence of UXO could affect the proposed MMR training activities and some projects listed in Table 5-1, such as the Kahuku Windmill and Hook Parcels Land Acquisition and the prescribed annual burn at MMR. Construction or other activities could take place in areas that contain UXO, which could create a significant safety hazard. Live-fire training could contaminate ranges with UXO, creating a safety risk to personnel. As a precautionary mitigation measure, visitors to MMR should be made aware of this risk, and proper preventative measures should be taken. Although UXO presents a potentially significant impact, proper abatement and removal techniques under EPA and USARHAW guidelines would further mitigate the impact. Because UXO abatement procedures on MMR under Alternative 1 are currently enforced, the individual impact contribution from UXO on MMR to the overall cumulative impact from UXO is considered less than significant. The Army follows strict UXO clearance protocol. The past prescribed burns at MMR and SBMR, listed in Table 5-1, have resulted in the identification and detonation of residual UXO.

General training

Most of the projects identified on Table 5-1 do not involve training, so for these projects there would be no contribution to the cumulative impact.

However, a few of the projects do occur on or near installation training areas, including MMR. Training-related hazardous materials and waste impacts are usually localized and maintained within the boundaries of the designated training areas. In addition, the Army would coordinate training and construction projects to minimize risks.

The land acquisition area proposed for the Kahuku Training Area would introduce elevated levels of training on this land. Cumulative impacts with respect to general training are considered less than significant because adverse impacts would be minimal.

Lead from ammunition

Most of the cumulative projects do not involve the potential to encounter residual lead contamination from current or past live-fire training and would not increase lead deposition, so for these projects there would be no additional impacts. However, training would increase lead deposition and could expose military personnel or the public to lead-contaminated soils and water. Remedial investigations would continue on military training grounds to continue awareness of the environmental status of the land and to contain soils contaminated with lead to the training area. BMPs would be implemented to protect workers, as per Occupational Safety and Health Administration guidelines, and impacts resulting from lead from ammunition would be less than significant.

Pesticides

The only increased cumulative use of pesticides would be for pest management on the Kahuku Windmill and Hook Parcels Land Acquisition area and the proposed golf courses. Pesticides would be used for their intended purpose of pest management and would follow the strictly enforced federal and state regulations. Army regulations mandated in the USAG-HI Installation Pest Management Plan would also be followed for the Kahuku Windmill and Hook Parcels Land Acquisition area project. The relevant installation-specific pest management plans would be updated following any proposed land acquisition activities to include these areas. In addition, pesticides would continue to be stored in designated storage sites. For these reasons, the impact is considered less than significant.

Hazardous waste management

The proposed training activities and the cumulative projects, with the exception of the land acquisition, training, and planning document projects, would generate hazardous wastes from construction and renovation. All of the projects would be required to comply with state and federal hazardous waste transportation and disposal regulations, such as disposing of hazardous waste in a RCRA-approved landfill by a RCRA-

approved hazardous waste transporter. Therefore, as no new regulations would need to be implemented and waste management would continue to follow existing protocol, cumulative impacts on hazardous waste management would be less than significant.

Polychlorinated biphenyls

None of the cumulative projects are suspected to be affected by PCB-containing devices or PCB-contaminated soils. An isolated area of MMR has been identified as containing PCB-contaminated soils. This remote location would not be accessible to the public. Cumulative project sites would be surveyed for PCB contamination and managed according to EPA and USARHAW guidelines to reduce the impact. There would be no cumulative impacts from this alternative.

Electromagnetic fields

Because electricity and communications equipment would be used at some projects described above, such as the Information System Facility, the Mission Support Training Facility, or Installation Information Infrastructure Architecture, EMF would be produced. Assuming the public is not allowed unsupervised access to areas where these structures and equipment would be located, there would be less than significant cumulative impacts involving public exposure to EMF. Signs would be posted around the perimeter of potentially harmful EMF sources, and the Army would continue to follow guidelines and regulations pertaining to EMF exposure. There would be no significant cumulative impacts resulting from EMF.

Petroleum, oils, and lubricants

The proposed training and the cumulative projects could expose workers to POLs during construction and operation. BMPs and EPA, USARHAW, and state protocols are expected to be followed during the use and handling of POLs under each cumulative project. Use of Drum Road by military vehicles would increase the potential for contamination from accidental fuel spills.

Each installation maintains strict standard operating procedures and spill contingency plans for hazardous materials and waste identifying specific operating responsibilities and procedures. The cumulative impact is considered less than significant.

Alternative 2 (Full Capacity Use with Some Weapon Restrictions)

The cumulative impacts under Alternative 2 would be similar to those described for Alternative 1, but at a higher magnitude because of the heightened frequency of training and the addition of tracer ammunition at

MMR. More UXO and lead from ammunition would be potentially introduced to the MMR environment. The individual project contribution of UXO impact on the overall cumulative impact would not be significant, however, because ongoing UXO abatement measures under Alternative 2 would minimize the potential for exposure. As discussed under Alternative 1, the UXO hazard remains significant due to the possibility for exposure within new acquisition areas and unabated project areas. As described for Alternative 1, hazardous materials and waste impacts would occur, but there would be no significant cumulative impacts, with the exception of UXO.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

The cumulative impacts under Alternative 3 would be similar to those identified for Alternatives 1 and 2. This alternative includes the elevated frequency of training discussed under Alternative 2 with additional types of munitions (inert TOW missiles, 2.75-inch rockets, and illumination munitions) and a slightly larger training area. The added munitions types and increased land area would not increase or lessen the cumulative impacts. There would be no significant cumulative impacts involving hazardous materials and waste under Alternative 3, with the exception of UXO.

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

SBCT and USMC training at PTA would increase the use of ammunition. The mitigation measures described under Alternative 1 would also be implemented under this alternative. As new munitions are incorporated into military training from cumulative projects, safety procedures and SOPs would be updated. This would result in a less than significant impact.

Unexploded ordnance

Construction or other activities could take place in areas that contain UXO, which could lead to a significant, short-term adverse safety impact. Training could contaminate ranges with UXO, creating a safety risk to personnel. UXO presents a significant impact, and proper abatement and removal techniques under EPA and USAG-HI guidelines would mitigate the impact, but not to a less than significant level.

Lead from ammunition

The main project that provides cumulative impacts for lead from ammunition is the new training associated with SBCT transformation and additional training by the USMC. Additional training would increase the

amount of lead deposition at PTA and could expose military personnel or the public to lead-contaminated soils and water. Remedial investigations would continue on military training grounds to continue awareness of the environmental status of the land and to contain soils contaminated with lead to the training area. BMPs would be implemented to protect workers, as per Occupational Safety and Health Administration guidelines, and impacts resulting from lead from ammunition would be less than significant.

Pesticides

There would be an increased use of pesticides/herbicides by the Army for pest management on the PTA areas associated with SBCT transformation and range projects planned by the USMC. This increase would be a less than significant impact, as pesticides/herbicides would be used for their intended purpose of pest management, and their usage would follow the strictly enforced federal, state, and Army regulations mandated in the USAG-HI IPMP.

Hazardous waste management

The proposed training activities and the cumulative projects, with the exception of the land acquisition, training, and planning document projects, would generate hazardous wastes from construction and renovation. All projects would be required to comply with state and federal hazardous waste transportation and disposal regulations, such as disposing of hazardous waste in a RCRA-approved landfill by a RCRA-approved hazardous waste transporter. Therefore, as no new regulations would need to be implemented and waste management would continue to follow existing protocol, cumulative impacts on hazardous waste management would be less than significant.

Polychlorinated biphenyls

None of the cumulative projects are suspected to be affected by PCB-containing devices or PCB-contaminated soils. There would be no cumulative impacts from this alternative.

Electromagnetic fields

Because electricity and communications equipment would be used in some SBCT transformation projects described in this chapter, EMF would be produced. Assuming the public is not allowed unsupervised access to areas where these structures and equipment would be located, there would be less than significant impacts from exposure of EMF to the public. Signs would be posted around the perimeter of potentially harmful EMF sources, and the Army would continue to follow guidelines and regulations pertaining to EMF exposure. There would be no significant impact expected from EMF.

Petroleum, oils, and lubricants

Alternative 4 and other projects identified in Table 5-1 could expose workers to POLs during construction and operation. BMPs and EPA and USARHAW protocols would be expected to be followed during the use and handling of POLs under each cumulative project. Saddle Road would be traveled by military vehicles. Alternative 4 would increase the use of highways, thus increasing the potential for accidental spill or vehicle breakdown. BMPs would be used to prevent accidents during transportation activities. Beneficially, these roadways would reduce military traffic on public highways, thus minimizing potential releases to the public environment.

Each installation maintains strict SOPs and spill contingency plans for hazardous materials and waste identifying specific operating responsibilities and procedures. In light of historic, ongoing, and reasonably foreseeable future actions, the cumulative impact from increased exposure to POLs would be less than significant.

Depleted Uranium

In August 2007, The Army conducted a survey for DU at the ranges at SBMR, MMR, and PTA. The survey confirmed that DU is present at PTA and includes components of the Davy Crockett weapons system, which was fired between 1961 and 1968. Follow-on characterization surveys conducted in December 2008 at PTA indicated that DU is not present at the twin Pu'u range site considered under Alternative 4 of this EIS. The Army considers the presence of DU in the impact area at PTA to contribute to cumulative impacts, as discussed below.

The potential for DU to move or migrate from the impact areas is very unlikely because of its heavy density. Results of sampling (e.g., soil, air, water) at the PTA and SBMR impact areas where DU has been found indicate that it is extremely unlikely to cause possible adverse impacts to the surrounding environment.

AR 385-63, *Range Safety*, prohibits the use of DU ammunition for training worldwide. This policy has been in effect for over 20 years. Thus, no additional DU containing ammunition would be introduced under Alternative 4 or any other projects at PTA.

5.3.12 Socioeconomics***Introduction***

Socioeconomics encompasses economic indicators, including regional employment, income, and population; social or quality of life issues such as housing; and environmental justice and protection of children (per EOs 12898 and 13045, respectively). The socioeconomic analysis discusses the

potential impacts of the proposed alternatives on the economy and sociological environments of the MMR and PTA ROIs.

The ROI for cumulative effects on socioeconomics for the No Action Alternative and Alternatives 1, 2, and 3 is defined as Honolulu County. Although Honolulu County encompasses the entire Island of O‘ahu and contains several different distinct districts in terms of demographic makeup and level of development, most economic activities on O‘ahu can be tracked only at the county level because data are not collected and compiled to allow analysis at a more local level. However, where possible, evaluations are made at the CCD level to more accurately depict impacts. MMR is within the Wai‘anae CCD.

The ROI for cumulative effects on socioeconomics for Alternative 4 is defined as Hawai‘i County. PTA occupies mainly Pā‘auhau-Pa‘auilo CCD and small portions of the North Kona, South Kohala, and North Hilo CCDs.

The cumulative impact analysis considered the net effects of the cumulative projects on the socioeconomic conditions within the ROIs. Factors considered in determining whether an alternative would have a significant impact on socioeconomics include the extent or degree to which the implementation of an alternative would adversely affect the unemployment rate for the County; change total income; change business volume; change any social, economic, physical, environmental, or health conditions in such a way as to disproportionately affect any particular low-income or minority group; or disproportionately endanger children in areas on or near the project site. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis.

As discussed below, for MMR significant adverse impacts on environmental justice and protection of children, as well as long-term beneficial cumulative impacts on the ROI economy, are expected. For PTA, there would be temporary beneficial impacts for the economy and less than significant impact for the protection of children.

Historical Cumulative Effects

Past actions in the ROIs affecting socioeconomic conditions include establishing and operating Army installations on the Islands of O‘ahu and Hawai‘i and constructing and operating training ranges (including MMR and PTA). Other past actions affecting socioeconomic conditions include private actions, such as developing residential communities or commercial areas (e.g., restaurants, hotels, resorts). These past actions stimulated the local economy, generating beneficial economic impacts on ROI

employment, income, and business volume. Some of these impacts, such as construction projects, were short-term in nature and are now removed in time from present economic conditions. However, other past actions, such as the establishment and continued operation of SBMR, continue to have positive impacts on the local economy.

No Action Alternative

No Action would have no impact on the MMR ROI economy. Federal expenditures in the local economy would be basically the same. Other proposed actions, such as the SBCT Transformation, Residential Communities Initiative, the Soldier and Family Readiness Center, and Farrington Highway improvements, would have beneficial impacts on the local economy due to increased expenditures and employment. The beneficial economic effects of these actions are expected to last for the duration of the projects but could extend beyond that time, resulting in net cumulative beneficial impacts on the local economy.

There would be less than significant impacts on protection of children with limited military vehicular traffic along Farrington Highway and on environmental justice from possibly reduced access to ATIs and cultural sites. However, aircraft lasing and UAV training would not be as frequent or intense as CALFEX exercises and CLF training. Community discussions would foster resolution of these concerns.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Long-term beneficial cumulative impacts on the MMR ROI economy would be expected. Under Alternative 1, the Army would continue to purchase basic supplies needed for MMR training and maintenance from local businesses. In addition, other actions, such as SBCT Transformation, Residential Communities Initiative, the Soldier and Family Readiness Center, and Farrington Highway improvements, would also have beneficial impacts on the local economy (i.e., increased employment, income, and spending), resulting in cumulative beneficial economic impacts on the ROI economy. The beneficial economic effects of these actions are expected to last for the duration of the projects but could extend beyond that time.

Long-term significant and unmitigable impacts on environmental justice are expected. Cumulative projects could further contribute to the environmental justice impacts identified under Alternative 1 regarding reduced access to ATIs and archaeological sites. Implementing cumulative projects, such as SBCT Transformation, would result in further access restrictions on areas and sites of cultural importance. Because Native Hawaiian communities are the primary beneficiaries of access to these

cultural sites, they would be disproportionately affected by reduced access to those sites.

Long-term significant and mitigable impacts on environmental justice and protection of children are expected. Under Alternative 1, ground transport of ammunition would be inconsistent with Hawai'i DOT policies. This would increase the potential public health and safety risk from any accidental explosions, disproportionately affecting children and low-income or minority residents living in the Wai'anae CCD. While the state of Hawai'i's improvements to Farrington Highway would increase safety and reduce the magnitude of this effect, it would still be considered significant.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

The cumulative impacts are the same as those described for Alternative 1.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

The cumulative impacts are the same as those described for Alternative 1.

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

Under this alternative, beneficial cumulative impacts on the PTA ROI economy would be expected. There would be increased employment, income, and business volume, especially resulting from range construction and training at PTA. The economic benefits would mainly last for the duration of construction and would, therefore, be temporary in nature and less than significant. Further, construction projects would occur over several years, lessening the potential shortages and price increases for certain high demand goods and services.

There would be no impacts on population, housing, schools, and environmental justice. No new staff would be added to PTA. Proposed PTA construction projects would take place in areas that would be off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Risks to the general public would be minimized by strictly adhering to applicable safety regulations and procedures.

There would be less than significant impacts on the protection of children. A number of projects, such as the PTA Trail project, would be fairly close to nearby populations (particularly children). There would be risks, although minor, inherent to increased project construction and activities. To minimize impacts, applicable safety regulations and procedures would

be followed. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Construction and training activities would, for the most part, take place in areas that are off-limits to the general public.

5.3.13 Public Services and Utilities

Introduction

Public services consist of police, fire, and emergency medical services. Public utilities include water, sewer, solid waste management, stormwater drainage, electrical, and telephone services. The services and utilities are owned and operated by various county, federal, and private organizations for the welfare of the Wai‘anae and island community.

The cumulative ROI encompasses a geographic area in which a public service or utility used at MMR or PTA is indirectly or directly affected by a cumulative project. Any impact caused by the project alternatives and those listed on Table 5-1 would directly affect the agencies responsible for providing public services to the community. The cumulative ROI for water, electrical, solid waste management, and telephone services is the Island of O‘ahu for Alternatives 1 through 3, and the Island of Hawai‘i for Alternative 4. Changes in demands for these services affect the capacity of the island community.

The cumulative impact analysis considered the net effects of the cumulative projects on the capability of local public service and utility providers to meet the cumulative demand for service. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis.

Historical Cumulative Effects

Urban growth in the Wai‘anae area has had a historical cumulative effect on public services and utility infrastructure. Wai‘anae has evolved from plantation estates in the early 1800s to an urban community starting in the 1940s. Public services and utilities were made available and expanded to meet the demands of the growing community. Because the facilities and activities at MMR date back to the 1940s and represent a small fraction of the entire Wai‘anae community, MMR has not made a significant impact on public services and utilities.

Much of the land directly surrounding PTA is designated as a conservation district, which includes both state and privately owned land. Grazing is the primary use of the surrounding conservation district. This area has experienced relatively little growth compared to other portions of the island. However, the demand for utilities and public services across the larger Island of Hawai‘i has grown along with the general population.

In addition to population increases, per capita use has increased for utilities such as water, electricity, and fuel.

No Action Alternative

The effect of No Action and the Wai‘anae urban development projects would have a less than significant cumulative impact on public services. Under No Action, the military presence at MMR would be greatly reduced. This lack of presence may require additional monitoring of the area by county police, fire, and emergency medical services.

No cumulative impacts are expected to the water, electrical, sewer, solid waste management, and telephone services under No Action. The utility demands are expected to decline due to the reduced presence at MMR. This reduction may be seen as a beneficial impact as new and developing urban areas as well as the SBMR expansions increase demand on utility systems.

No cumulative impact is expected to the stormwater drainage system serving MMR because cumulative projects do not contribute runoff to the MMR drain system.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

The cumulative impacts on public services due to Alternative 1 and the Wai‘anae projects are expected to be less than significant. No increase in demand for public services at MMR is expected under Alternative 1. The military’s presence at MMR ensures continued federal police and fire services, supplemented by county services.

The cumulative impact on water, electrical, sewer, solid waste management, and telephone services under Alternative 1 is expected to be less than significant. MMR water, sewer, electrical, and solid waste management demands are not expected to exceed historic levels. MMR telephone service would be converted to a dedicated DoD system, freeing resources on the public phone system.

No cumulative impact is expected to the stormwater drainage system serving MMR because cumulative projects do not contribute to the MMR drainage system.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

The cumulative impacts under Alternative 2 are expected to be similar to Alternative 1 as demand for public services and utilities would be similar.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

The cumulative impacts under Alternative 3 are expected to be similar to Alternative 1 as demand for public services and utilities would be similar.

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

In light of historic, ongoing, and reasonably foreseeable future actions, the cumulative impacts on public services due to Alternative 4 would be expected to be less than significant. The military's presence at PTA ensures that federal police, fire, and emergency presence will continue. In addition, no significant increases in demand for these services for other projects in the ROI would be expected.

The cumulative impacts on utilities such as water, wastewater, stormwater, electrical, sewer, solid waste management, and telephone services would be less than significant.

Electricity demand would be expected to increase as a result of cumulative construction projects and would place an additional demand on these utility systems. While Alternative 4 and other proposed Army projects include construction of new buildings, much of this construction, such as that for RCI Housing, would result in more energy-efficient buildings. Construction for the Proposed Action would use modern, energy efficient materials and would comply with EO 13123. Therefore, new delivery lines would have to be installed to supply new facilities with electricity (US Army and USACE 2004).

Cumulative construction activities from Alternative 4, as well as other Army and regional construction projects, such as highway construction, would place an increased demand on the solid waste disposal system from construction/demolition debris. This increase would be temporary and would be minimized through recycling efforts.

5.3.14 Wildfires

Introduction

This section discusses the cumulative effects on wildfires, primarily the ability of cumulative projects to increase the potential for wildfire ignition.

The MMR ROI for cumulative wildfire impacts is the ROI described in Section 3.14, plus the Wai'anae and western north shore areas due to their proximity to MMR. In this part of O'ahu, forested hillsides occupy undeveloped areas, and towns, roadways, and agricultural fields occupy developed areas in the valleys and along the shoreline. Cumulative

projects that are potential sources of wildfire ignitions are construction projects, such as for roadways or structures, in the Wai‘anae and north shore areas.

The ROI for cumulative wildfire impacts is the ROI for Alternative 4 and the regions affected by the cumulative projects listed in Table 5-1. Some cumulative projects listed in the table would occur in or adjacent to areas where wildland fires could occur. As with Alternative 4, the cumulative projects would be expected to contain mitigation measures and SOPs to minimize potential environmental impacts involving wildfires.

Various factors were considered in assessing the level of cumulative impacts with respect to potential wildfire ignition. The nature of a cumulative project affects whether the project is capable of igniting a wildfire. The quantity and timing of projects within the cumulative ROI affects the concentration of activities capable of igniting a wildfire. The likelihood for the cumulative projects to conform to existing regulations and codes governing material and activities with the potential to ignite a fire is also considered.

The overall cumulative impact involving wildfire ignition is considered to be significant but mitigable to less than significant for No Action and significant for Alternatives 1, 2, 3, and 4. Cumulative impacts pertaining to wildfires would be similar to the types of impacts identified in Section 4.14, Wildfires. A wildfire could damage animal and plant communities, damage cultural resources, contribute to soil erosion by removing vegetation, and diminish air quality.

Historical Cumulative Effects

Wildfires on O‘ahu typically occur in undeveloped areas where vegetation (especially exotic species) is present to support ignition and spread of a fire. The mission of the State Division of Forestry and Wildlife’s Fire Management Program is to provide fire protection to forest reserves, natural area reserves, wildlife and plant sanctuaries, and public hunting areas (DLNR 2004a). Combined with cooperative zones that are also protected by other fire management service providers, the Division of Forestry and Wildlife is involved with approximately 81 percent of the state’s land area. Between fiscal years 1997 and 2002, between 7 and 20 fires on O‘ahu were reported annually to the Division of Forestry and Wildlife’s Fire Management Program, with a fluctuating number of fires each year. Based on limited historical wildfire data for MMR and varying historical training schedules, the number of fires between 1987 and 2002 at MMR also fluctuated from one year to the next (USARHAW and 25th ID(L) 2003). Between 1970 and 1998, 276 fires occurred at MMR, with approximately 20 fires (each greater than 100 acres [40 hectares] in size)

causing most of the damage to natural resources. Most fires occurred during February (which is during the wet season), July, August, and September.

The historical fluctuations in yearly wildfire occurrence on O‘ahu and at MMR, combined with limited historical wildfire data for MMR and varying historical training schedules, make it difficult to establish historical wildfire trends to compare against potential cumulative impacts.

A small number of large fires are responsible for most of the acreage burned at PTA; eight individual fires of 100 acres (40.5 hectares) or more burned over 97 percent of the acres damaged by fire from 1987 to 1999. Although military use for live-fire exercises and target practice has increased ignition frequency dramatically and resulted in numerous small fires, it appears that much of the fire threat to PTA is a result of off-post ignitions. Fires originating from non-military sources have caused the overwhelming majority of the acres burned at PTA (USARHAW and 25th ID[L] 2003). Since July 1990, over 8,000 acres (3,237 hectares) have been recorded as burned. Of these, over 7,700 acres (3,116 hectares), or 91 percent, of all acres burned were burned by fires caused by lightning, arson, or carelessly discarded cigarettes, and the largest of these ignited off Army lands and later burned onto PTA. Between fiscal years 1997 and 2002, between 42 and 80 fires yearly on Hawai‘i were reported to the Division of Forestry and Wildlife’s Fire Management Program. Based on limited historical wildfire data for the installations and the fluctuating numbers of fires reported to the Division of Forestry and Wildlife, it is not possible to predict future wildfire trends.

No Action Alternative

From the list of cumulative projects, other sources of wildfire ignition would be construction projects, such as for roadways or structures, in the Wai‘anae and north shore areas. It is assumed that these projects would properly manage materials, equipment, and activities to prevent the ignition of a wildfire. Nonmilitary wildfire ignition sources (civilians or nonmilitary activities) accounted for five percent of the causes of historical wildfires at MMR. This is expected to continue under No Action and cannot be entirely prevented due to the unpredictable or uncontrollable nature of some of the nonmilitary ignition sources. Although training activities occurring under the No Action would minimally contribute to potential wildfire ignition within the cumulative ROI, the lack of fire suppression resources may result in wildfires that could ignite, to rage out of control. Therefore, the potential cumulative impacts under the No Action alternative is expected to be significant.

Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)

Cumulative projects that are potential sources of wildfire ignitions are be construction projects, such as for roadways or structures, in the Wai‘anae and north shore areas. It is assumed that project developers would properly manage materials, equipment, and activities to avoid ignition of a wildfire.

Prescribed burns at MMR could have adverse and beneficial impacts. Beneficial impacts could occur by reducing the presence of highly flammable exotic plant species. Adverse impacts could occur if prescribed burns result in uncontrolled wildfires that damage biological and cultural resources, contribute to poor air quality, and promote erosion and degradation of water resources. Between August 1970 and July 2003, three prescribed fires escaped control. These occurred in August 1987, June 1995, and July 2003 (Beavers et al. 1999; NRS no date). The number of acres burned in 1987 is not available. In 1995, 2,400 acres (971 hectares) were burned, and 2,100 acres (850 hectares) were burned in 2003. The fire in 1995 led to the decision to restrict prescribed burns to the areas inside the firebreak roads.

Cumulative projects that may reduce the potential for wildfire ignition include the USFWS Plant Critical Habitat project and INRMP. These projects protect native plant populations, which are less susceptible to the ignition and spread of a wildfire.

Alternative 1 would include live-fire training, which is a source of historical wildfires. Alternative 1 would include live-fire training, and it would be confined to a limited portion of the cumulative ROI. However, the IWFMP has yet to be relied upon to successfully control the ignition and spread of prescribed burns, which are intended to burn large areas of land. In the past, prescribed burns have been responsible for igniting large-scale wildfires. Therefore, cumulative impacts from Alternative 1 would be significant. It is assumed that the cumulative construction projects would properly manage materials, equipment, and activities to prevent the ignition of a wildfire.

Alternative 2 (Full Capacity Use with Some Weapons Restrictions)

Alternative 2 would include live-fire training, which is a source of historical wildfires. The cumulative projects described under Alternative 1 would also occur under Alternative 2. Alternative 2 would include the use of both tracers and munitions that are new to training at MMR, such as the 120mm HE mortar, and their use would be confined to a limited portion of the cumulative ROI. However, the IWFMP has yet to be relied upon to successfully control the ignition and spread of wildfires from tracers and

prescribed burns. Prescribed burns are intended to burn large areas of land. In the past, prescribed burns have been responsible for igniting large-scale wildfires. Therefore, cumulative impacts from Alternative 2 would be significant. It is assumed that the cumulative construction projects would properly manage materials, equipment, and activities to prevent the ignition of a wildfire.

Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)

Alternative 3 would include live-fire training, which is a source of historical wildfires. The cumulative projects described under Alternative 1 would also occur under Alternative 3. The wildfire threat would increase due to the addition of new weapon systems and prescribed burning. The cumulative impacts on wildfire ignition under Alternative 3 would be similar to those described under Alternative 2.

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

Other than the significant threat of wildland fire associated with military training on PTA, roadway improvement projects could involve activities and materials capable of starting a wildfire. The projects would be required to adhere to Hawai'i DOT safety requirements to protect the public and environment. Similar to the roadway construction projects, construction projects on the installations could involve activities and materials capable of starting a wildfire, and therefore, Army BMPs and SOPs would be required to reduce the potential for starting a wildfire.

The IWFMP that has been developed for all installations on the Islands of O'ahu and Hawai'i establishes specific guidance, procedures, and protocols for managing and preventing wildfires. 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 (USARHAW and 25th ID[L] 2003). However, even with these measures in place, there would still be a risk that a wildfire could result in an irretrievable loss 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 will considerably reduce wildfire risk, the impacts may not be reduced to a less than significant level. In light of historic, ongoing, and reasonably foreseeable future actions, the cumulative impacts involving wildfires would be expected to be significant.

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