
CHAPTER 9

CUMULATIVE IMPACTS

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CHAPTER 9

CUMULATIVE 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). AR 200-2 (32 CFR 651.39[a][2][ii]) also requires that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, should 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 9.2 discusses other projects on the islands of O’ahu and Hawai’i that may have cumulative effects when combined with impacts from the alternatives discussed in this EIS. Cumulative projects considered below are similar to the Proposed Action, large enough to have far-reaching effects, or are in proximity to the Proposed Action with similar types of impacts.

9.1 CUMULATIVE 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. Methods for gathering and assessing data on cumulative impacts include interviews, use of checklists, trends analysis, and forecasting. In general, past, present, and future foreseeable 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 either 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). Where applicable, the resource sections below include a discussion of whether project

impacts will accelerate any ongoing trends of resource degradation. The ROI for cumulative impacts is often larger than the ROI for direct and indirect impacts and the ROI for each specific resource is defined in Section 9.5. A summary of cumulative impacts in table form is provided in Section 9.5.

9.2 PROJECTS ON BOTH O'AHU AND HAWAI'I

USFWS Proposed Critical Habitat in O'ahu and Hawai'i (Project 1)

The USFWS has proposed designating 111,364 acres (45,068 hectares) as critical habitat on O'ahu for 99 threatened and endangered species. This acreage is about 29 percent of the island, and much of it is in the Ko'olau and Wai'anae Mountains. Fifty-two of the plant species exist nowhere else in the world. Six percent of the proposed land area is under federal management or jurisdiction, and 59 percent is privately owned; the remainder is held by the state. In general, the lands set aside are unsuitable for development because they are rugged and lack suitable access. The USFWS is preparing a draft economic analysis for the proposed habitat on O'ahu.

The USFWS has proposed designating 437,285 acres (176,964 hectares) of land as critical habitat on the island of Hawai'i for 47 threatened and endangered plant species. This acreage is about 17 percent of the island. Twenty-seven of the plants listed exist nowhere else in the world. Of the designated land, 33 percent is under federal ownership or jurisdiction, 51 percent is state land, and 16 percent is privately owned. Eighty-four percent of the designated land is already state conservation land and is unsuitable for development because much of it is remote and rugged. The USFWS is developing a draft economic analysis. The draft plan for both islands will be released in 2002, and the final rule is to be decided by May 2003 (USFWS 2002a, 2002c).

Open Burning Permit Program (Project 2)

Open burning is allowed in Hawai'i, per Department of Health regulations (Hawai'i Administrative Rules, Air Pollution Control, Title 11, Section 11-60.1-51 to -57). Most such permits are granted for agricultural burning, although open burning on Army installations is also permitted. Permits are granted year-round, except for no burn periods, which normally fall during winter trade wind season. The state does not keep records on emissions from open burns (Young 2003).

9.3 PROJECTS ON O'AHU

Ongoing and proposed projects on O'ahu that could reasonably contribute to cumulative impacts are identified in Table 9-1 and their locations are shown on Figure 9-1.

Whole Barracks Renewal Program—O'ahu (Project 1)

The Army proposes to 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. Upgrades would take place on WAAF, SBMR, and Tripler Army Medical Center grounds. The program includes new

**Table 9-1
Cumulative Projects on O‘ahu**

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
1. Whole Barracks Renewal Program	SBMR	US Army	Upgrade barracks facilities.	2010
2. Advanced Wastewater Treatment Upgrade	SBMR	US Army	Upgrade sewage treatment to an advanced treatment and effluent system.	2005
3. Fire Station-SBMR	SBMR	US Army	Build a new fire station. Old fire station is historic and will be preserved.	2005
4. Soldier and Family Readiness Center	SBMR	US Army	Build a new facility to house several services.	2007
5. Information Systems Facility	SBMR Main Post	US Army	Construct a 38,138-square-foot (11,624-square-meter) building. Special electromagnetic field shielding precautions are compulsory.	2005
6. Mission Support Training Facility	SBMR Main Post	US Army	Construct an 89,803-square-foot (27,372-square-meter) building to house war-fighting and digital classroom training.	2005
7. Installation Information Infrastructure Architecture	SBMR Main Post	US Army	Install fiber optics cabling from the cantonment area to the ranges, motor pool, and other facilities within the installation.	2004
8. Gate Alignments	SBMR/WAAF	US Army	Three gate alignments at SBMR and two at WAAF.	2007-2008
9. Army Facility Strategy Program	SBMR/WAAF	US Army	Projects include an aviation motor pool complex at WAAF, 2 physical fitness centers (SBMR, WAAF), a general instruction building, and upgrades to SBMR.	Unknown
10. Kamehameha Highway Bridge Replacements	Kawela, Kaukonahua Road (near SBMR/SBER)	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
11. Mākua Implementation Plan (Draft)	MMR	US Army	Cooperative program with local landowners to stabilize endangered plants and animals with habitat at MMR.	2036
12. Live-Fire Training	MMR	US Army	Resume routine live fire military training at MMR.	2004
13. Controlled Burns at Army Installations in Hawai‘i	MMR, SBMR (McCarthy Flats), PTA, DMR	US Army	Controlled burn of dangerous vegetation to reduce fuel load at ranges. This also facilitates UXO clearance and surveys for cultural sites.	Ongoing, seasonal
14. Farrington Highway Improvements	Makaha (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
15. Farrington Highway, Replacement of Makaha Bridges 3 and 3A	Makaha (near MMR)	State of Hawai‘i	Replace two timber bridges in the vicinity of Mākaha Beach Park.	Funded through 2004
16. Kahuku Windmill and Hook Parcels Land Acquisition	KTA	US Army	Purchase 71.5 acres at KTA.	2003
17. Turtle Bay Resort Improvements	KTA	Turtle Bay Resort	Expand and renovate hotel.	2004
18. Lā‘ie Wastewater Collection System Expansion Phase II – Lā‘ie	Lā‘ie (adjacent to KTA)	Town of Lā‘ie	Upgrade the existing sewage collection system.	2004

Table 9-1
Cumulative Projects on O‘ahu *(continued)*

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
19. Drum Road Upgrade	Helemanō to Kahuku (near KTA)	US 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. Road upgrade done to accommodate Legacy Force training.	2004/5
20. Waikāne Valley Training	Waikāne/Kane‘ohe (near KTA)	US Marines	The US Marines are planning jungle warfare training for up to 100 troops in the Waikāne Valley near Kane‘ohe.	Unknown
21. Kamehameha Highway Traffic Improvements	Kahaluu to Waimea Bay (near KTA)	State of Hawai‘i	Construct passing lanes, construct turning lanes at intersections, modify existing traffic signals, and install signs, flashers, and other warning devices.	Funded through 2004
22. Hot Cargo Pad	HAFB	US Air Force	Construct facilities to simultaneously load 3 C-5/C-17 aircraft.	Unknown
23. Troop Rigger Facility	HAFB	US Air Force	Construct a 10,872-square-foot (3,314-square-meter), two-story troop rigging facility as part of the Army/Air Force Joint Mobility Complex.	2002
24. Ship Operations Building	Bishop Point near Pearl Harbor (near HAFB)	US Army	Construct a one-story ship operations building.	2004
25. Dry-dock Waterfront Support Facility	Pearl Harbor (near HAFB)	US Navy	Construct two-story metal buildings, renovate an existing latrine, demolish several buildings.	2003
26. Fire Management Areas and Standing Operating Procedures	All O‘ahu Ranges	US Army	Prepare fire management areas and standing operating procedures for ongoing training.	2003
27. Residential Communities Initiative	Army Installations on O‘ahu	US Army	Turn over approximately 7,700 units of housing on O‘ahu to private developer or consortium of developers for renovation and operation for a 50-year period.	Construction starts 2004. Lease/management period 2004-2053
28. 25 th ID(L) & USARHAW Revitalization Program	O‘ahu	US Army	Construct or renovate water tanks and central ID Lab.	2006-2008
29. Implementation of the Integrated Natural Resources Management Plan	O‘ahu	US Army	The Hawai‘i area INRMP establishes a management program to preserve, protect, and enhance natural and cultural resources while improving the Army’s capability to conduct training and maintain military readiness.	Not all projects funded. Plan 2002-2006
30. Implementation of the Integrated Cultural Resource Management Plan	O‘ahu	US Army	This project outlines stabilization and preservation strategies for protecting cultural and historical resources on US Army installations on O‘ahu.	Ongoing
31. Implementation of Proposed Range and Training Land Program Development Plan actions	O‘ahu	US Army	A planning document for managing range facilities and training areas based on Army training doctrine and resource guidance.	Ongoing
32. Implementation of the Central O‘ahu Sustainable Communities Plan	O‘ahu	City and County of Honolulu	A guideline for developing central O‘ahu.	Ongoing
33. Basing of eight C-17 aircraft at HAFB and the departure of four C-130 aircraft from HAFB.	HAFB	USAF	The USAF proposes basing eight C-17 aircraft at HAFB and four C-130 aircraft leaving HAFB. A notice of intent has been issued for the preparation of an environmental assessment.	Unknown

Table 9-1
Cumulative Projects on O‘ahu *(continued)*

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
34. Land Transfer at DMR	O‘ahu	US Army	The Army will be returning the portion of the beach land in front of DMR to the State.	Spring 2003

guidelines for upgrading the barracks by increasing the housing square footage for 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 SBCI troop increases and associated decreases in Legacy Force troops, no additional housing upgrades will occur outside of what is already planned.

Funding and scheduling 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, headquarters, and motor pool sites (Bow 2002).

Advanced Wastewater Treatment Upgrade—Schofield Barracks (Project 2)

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 studies are underway, and a decision will be made in April 2003 for funding (Shimabukuro 2002).

Fire Station SBMR—Schofield Barracks (Project 3)

SBMR is planning to construct a new fire station, which will support SBMR, WAAF, Camp Stover, and HMR. The current station is considered undersized and termite damaged. The old station is a historic building and will be preserved. This project is funded through fiscal year 2005 (Shimabukuro 2002).

Soldier and Family Readiness Center—Schofield Barracks (Project 4)

This project would construct facilities for the following services: Red Cross, Aloha Furniture, housing referral, passport and ID, retirement services, vehicle registration, and others. This project is funded for fiscal year 2007 (Shimabukuro 2002).

Information Systems Facility—SBMR Main Post (Project 5)

The proposal is to construct a 38,138-square-foot (11,624-square-meter) information systems facility (ISF) with a ground floor and basement. The ISF would be constructed at the corner of Trimble and Beaver Roads on a site previously used for Army family housing. The ISF would support information data communication systems of telecommunication cables, conduit, fiber optics, relays, and junctions. Additionally, the ISF would provide connectivity to essential constructive, virtual, and real information systems now and in any future upgrades. Twenty-four hours per day, seven days a week, the ISF operations would support the tactical Internet management location, the local communications control center, secure

Figure 9-1
Cumulative Projects on O'ahu

and nonsecure main communications node of the network switching systems, the secure information vault, and the special compartmentalized information facility rooms. Special electromagnetic field shielding precautions are compulsory in portions of the facility. A 25-person situation readiness center, with a video teleconferencing center, would be included. Anti-terrorism/force protection measures are essential to protect this critical communication node. SBCT would use these training facilities as well. This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Mission Support Training Facility—SBMR Main Post (Project 6)

The proposal is to construct an 89,803-square-foot (27,153-square-meter) state-of-the-art mission support training facility to house war-fighting and digital classroom training for medium brigade, joint, and combined arms simulation training. The facility would include the following components:

- Reconfigurable tactical operations centers;
- Simulation work cells to support the Joint Army Navy Uniform Simulation/Force XXI Battle Command Brigade and Below;
- Exercise control;
- Simulation control;
- Corps battle simulation/opposing forces;
- Digital classrooms;
- Virtual leader effects trainer;
- Fire effects training;
- Reachback sensitive compartmented information facility;
- Technical shop;
- Conference room; and
- Office support facilities.

Additional facilities include paved walks, curbs and gutters, parking, information systems, state-of-the-art intracommunications and intercommunications systems, and site improvements. This project is required to provide a consolidated training facility for the training requirements of the 2nd Brigade, 25th ID(L). The proposed mission support training facility would be sited on SBMR next to the proposed ISF, on a previously disturbed area that accommodated government housing. This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Installation Information Infrastructure Architecture (I3A)—Schofield Barracks and Wheeler Army Airfield (Project 7)

The Army proposes to install fiber optics cabling from the cantonment area to the ranges, motor pool, and other facilities within the installation. The I3A is required for current

mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation. These telecommunications requirements would furnish digital information necessary for interconnections between various ranges on SBMR, WAAF, HMR, KTA, and other locations on O‘ahu. The I3A project could consist of underground and aboveground cable that would provide additional links to the facilities and to the range complexes by upgrading the e-mail system, asset visibility system, automated personnel processing system, and video teleconference capability. The project is funded through 2004.

Gate Alignments—Schofield Barracks/Wheeler Army Airfield (Project 8)

Foot Gate, SBMR

This project will realign the road to allow “vehicle stacking” and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2007.

Macomb Gate, SBMR

This project will realign the road to allow vehicle stacking and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2007.

Lyman Gate, SBMR

This project will realign the road to allow vehicle stacking and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2008.

WAAF Gate Connections with SBMR

This project will create a direct link between SBMR and WAAF. Signal lights and crosswalks should improve traffic safety for pedestrians and motorists. Tentative funding is for fiscal year 2008.

Kawamura Gate, WAAF

This project will realign the road to allow vehicle stacking and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2007 (Shimabukuro 2002).

Army Facility Strategy Program (AFS)—SBMR, Fort Shafter, WAAF (Project 9)

The AFS program provides for construction of new facilities, including 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 and 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 (454,249-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).

Kamehameha Highway Bridge Replacements—Kawela, Kaukaonahua Road (Project 10)

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 Kaukaonahua Road. The projects are funded through 2004 (OMPO 2002).

Mākua Implementation Plan—Mākua Military Reservation (Project 11)

The US Army's Mākua Implementation Plan (MIP) is a 33-year plan to work with local landowners to stabilize endangered plant and animal species on Army training land at MMR. The land needed for stabilizing these plants and animals is divided into 32 management units (MUs) on O'ahu and sites on Kaua'i, wherever the most important wild populations occur. Under the MIP, landowners enter into an agreement to implement species stabilization actions on their property, as determined by the Mākua Implementation Team of experts. Stabilization is the goal of the program, and recovery is not the responsibility of the private participants or the Army. The MIP states, "Successful implementation of the MIP assures that the Army will be in compliance with the Endangered Species Act and still accomplish its training mission." (Mākua Implementation Team et al. 2002). The MIP was approved in May 2003 by the USFWS and work on urgent actions has been initiated.

Live-Fire Training—Mākua Military Reservation (Project 12)

Under the Proposed Action, the Army would conduct routine company-level CALFEX training for the combat units assigned to the 25th ID(L) and would allow other military units to conduct similar training. CALFEX is a combat training exercise where the Army unit deploys several forces, such as infantry, aviation, artillery, and engineers, all at once to have a greater effect on an enemy. While all maneuver training areas and impact areas are within the 457-acre (185-hectare) CCAAC, the training area used at MMR for CALFEXs totals 1,034 acres (419 hectares). MMR would also incorporate wildland fire management, endangered species and cultural resources protection measures, and the ITAM program. There would be no disposal of hazardous wastes at MMR. This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and SBCT training requirements are not dependent upon its use. SBCT forces may use MMR for dismounted CALFEX training only after completion of the MMR EIS and ROD. SBCT dismounted CALFEX training would be substantially similar to CALFEXs conducted by other forces.

In compliance with the settlement agreement and stipulated order between Mālama Mākua and USARHAW, the Army is preparing an EIS to evaluate conducting CALFEXs at MMR. The EIS is scheduled to be completed by October 2004. Numerous studies and surveys are associated with this project, along with general NEPA compliance.

Ongoing Prescribed Burns at Army Installations in Hawai'i (Project 13)

Prescribed burns have been conducted at Army installations in Hawai'i in the past on small areas (typically 4 to 5 acres) at SBMR and about 800 to 900 acres at MMR. 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 (Battle Area Complex 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 would be conducted every year or two based on vegetation regrowth and fuel continuity. The Army is likely to also conduct controlled burns at DMR, MMR and PTA. At this time, it is not anticipated that burns will be needed in the SRAA at SBMR or at KTA or KLOA.

Approximately 800 to 900 acres (324 to 364 hectares) at MMR were burned under the program to prevent large-scale wildfires, in compliance with the settlement agreement and stipulated order between Mālama Mākua and the US Army (USARHAW). 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 was available for public and agency comment until October 8, 2002, and a FONSI was signed on October 28, 2002 (Miura 2002).

Farrington Highway Improvements—Nanakuli to Makaha (Project 14)

The State of Hawai'i is constructing safety and operation improvements to Farrington Highway, including sidewalks, signalized pedestrian crosswalk or bridges, and continuous left-turn fences. The project is funded through 2004 (OMPO 2002).

Farrington Highway, Replacement of Makaha Bridge Numbers 3 & 3A—Makaha (Project 15)

The State of Hawai'i is planning to replace two timber bridges in the vicinity of Mākaha Beach Park. The project is funded through 2004 (OMPO 2002).

Kahuku Windmill and Hook Parcels Land Acquisition—Kahuku Training Area (Project 16)

The US Army plans to acquire 71.5 acres (29 hectares) of land adjacent to KTA. This property is presently owned by the James E. Campbell Estate. The purpose of the acquisition is to consolidate KTA land holdings. Originally, the windmill parcel was being used to generate electricity. An environmental assessment was prepared by the Army. Completion of the purchase is expected in 2003 (Shimabukuro 2002).

Turtle Bay Resort Improvements—Kahuku (Project 17)

Turtle Bay resort is proposing to expand and renovate its hotel and resort in Kahuku. Construction is planned to begin in 2004 (State of Hawai'i 2002c).

Lā'ie Wastewater Collection System Expansion Phase II—Lā'ie (Project 18)

This project will continue to upgrade the 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 concerns and to accommodate anticipated growth 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 October 2004. The draft EA is available for review and comment (State of Hawai'i 2002d).

Drum Road Upgrade— Helemanō MR to Kahuku TA (Project 19)

The proposal is to align, widen, and harden approximately 24 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 three-foot (one-meter) compacted gravel shoulders on both sides, realigning dangerous blind curves, regrading to correct steep slopes, providing drainage improvements, and installing guardrails 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 conduits alongside the upgraded roadway. The projects are funded through 2004/2005. This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Waikāne Valley Training—Waikāne/Kaneʻohe (Project 20)

The US Marines are planning jungle warfare training for up to 100 troops in the Waikāne Valley near Kaneʻohe. The Marines have recently purchased 187 acres (76 hectares) of land for this training and have fenced it off for training. An EA is being prepared, and training will begin upon completion of environmental review (Honolulu Advertiser 2002).

Kamehameha Highway Traffic Improvements—Kahaluʻu to Waimea Bay (Project 21)

The State of Hawaiʻi is planning to construct passing lanes, to construct turning lanes at intersections, to modify traffic signals, and to install signs, flashers, and other warning devices on Kamehameha Highway. The projects are funded through 2004. (OMPO 2002).

Hot Cargo Pad—Hickam AFB (Project 22)

This project involves constructing facilities to simultaneously load three C-5/C-17 aircraft. A staging area and service roads would also be required (Shimabukuro 2002). This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Troop Rigger Facility—Hickam AFB (Project 23)

The proposal is to construct a 10,872-square-foot (3,314-square-meter), two-story troop rigging facility as part of the Army/Air Force Joint Mobility Complex. The proposed action would include facilities for parachute packing and repair, rig supply and equipment, a drying tower, administration, and a storage room. This proposed facility would be sited on Hickam AFB, between the taxiway and a football field along Moffet Street. The project is funded through July 2006. This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Ship Operations Building—Bishop Point, Hickam AFB (Project 24)

The US Army plans to construct a one-story ship operations building at Bishop Point near Pearl Harbor. The 545th Transportation Detachment and 548th Transportation Corps Detachment, 9th Regional Support Command, would use this building for support vessels. Construction would begin in 2003, with occupancy in 2004 (Shimabukuro 2002).

Dry-dock 2 Waterfront Support Facility—Pearl Harbor (Project 25)

The US Navy proposes to construct 2 two-story metal buildings, to renovate a latrine, to demolish several buildings and portable structures, and to provide electrical modifications to a building. The US Naval Facilities Engineering Command has prepared an EA/FONSI for the project.

Fire Management Areas and Standing Operating Procedures—All O'ahu Army Ranges (Project 26)

FMA and standing operating procedures are to be established for training areas on Army ranges for ongoing/Legacy Force training. The Army Range Control Program currently calls for a 90 percent solution in place for managing fire threats on all of its training areas by August 2003. The ranges with existing FMAs and standing operating procedures are MMR and SBMR (in progress); the ranges without FMAs and standing operating procedures are PTA, KTA, KLOA, SBER, and DMR (Lai 2002).

Residential Communities Initiative—Army Installations on O'ahu (Project 27)

The US Army is proposing the full privatization of family housing at the following six installations in O'ahu: SBMR, HMR, WAAF, Aliamanu Military Reservation, Fort Shafter, and Tripler Army Medical Center. This initiative is a program for the Army to turn over approximately 7,700 units of housing on O'ahu to a private developer or consortium of developers 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. Partner selection is projected for May 2003, with assets to be transferred in May 2004. An EA is being prepared for this project (Yuh 2002).

25th ID(L) and USARHAW Revitalization Program (Project 28)

This compilation of projects includes construction of 2 two-million-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 includes a booster pump station and emergency generators. Also under this project 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.

Implementation of the Army Integrated Natural Resource Management Plan—O'ahu (Project 29)

This project outlines mandatory and optional natural resource stabilization and recovery methods for endangered, rare, and threatened species and communities existing on Army installations on O'ahu. Interagency consultation was initiated with USFWS, and public coordination efforts were made in compliance with the Sikes Act. The programs guaranteed funding are those that involve ESA Section 7 consultation, some watershed and pest management programs, and some conservation and community outreach programs.

Implementation of the Army Integrated Cultural Resource Management Plan—O‘ahu (Project 30)

This project outlines stabilization and preservation strategies for protecting cultural and historical resources on US Army installations on O‘ahu. Interagency consultation was initiated with the Hawai‘i State Historic Preservation Office.

Implementation of Proposed Range and Training Land Program Development Plan Actions (Project 31)

This project would involve the implementation by the US Army of a planning document for managing range facilities and training areas based on Army training doctrine and resource guidance.

Central O‘ahu Sustainable Communities Plan—O‘ahu (Project 32)

This report serves as a vision for Central O‘ahu. 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 Wahiawa town centers, economic development for these communities, the urban community boundary and open/green space network of parks and other areas.

Basing of eight C-17 Aircraft at HAFB and Departure of four C-130 Aircraft from HAFB (Project 33)

The USAF proposes to base eight C-17 aircraft at HAFB and to see the departure of four C-130 aircraft from HAFB. The proposed action would include aircraft beddown and operations at Hickam AFB, the construction of C-17 aircraft support facilities at Hickam AFB, personnel requirements to support the C-17 aircraft beddown, aircrew training requirements at existing facilities, and the possible construction of a new assault runway or use of existing runways. A notice of intent has been issued for the preparation of an EA. This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Land Transfer —Dillingham Military Reservation (Project 34)

The Army will be returning the portion of the beach in front of DMR that was ceded to it by the state. This will include portions of Kealia Beach, Mokuleia Beach Park, and Mokuleia Army Beach (adjacent to Kealia beach), as well as the airport at DMR. The beach property that will be transferred is 19 acres (8 hectares), and approximately 30 acres (12 hectares) of the airport property will go back to the state. The state then will lease this land back to the Army for continued training operations. The deed transferring the property will be signed in spring 2003.

9.4 PROJECTS ON HAWAI‘I

Concurrent ongoing and proposed projects on the island of Hawai‘i that could reasonably contribute to cumulative impacts are identified in Table 9-2, and their locations are shown on Figure 9-2.

**Table 9-2
Cumulative Projects on Hawai'i**

Project	Location	Sponsor	Description	Projected Completion Date
1. Kawaihae Deep Draft Harbor	Kawaihae Harbor	The US Army Corps of Engineers and the State of Hawai'i	Deepening and expanding the Kawaihae Harbor. The project consists of an entrance channel, the harbor basin, and a breakwater.	2008
2. TSV Pier Use	Kawaihae Harbor	The US Army Corps of Engineers	Using existing piers at Kawaihae Harbor for TSV landings.	Unknown
3. PTA 1010 Land Acquisition	PTA	US Army	The US Army is negotiating with a private landowner to acquire an area to be used for ongoing training.	Unknown
4. Consolidated command and range control building	PTA	US Army	Constructing a consolidated command center at PTA for ongoing training.	2004
5. Saddle Road realignment	Across island of Hawai'i, near PTA	Federal Highways Administration (FHWA), State of Hawai'i	Long-term highway construction project that includes improving and modifying Saddle Road between Hilo side and Kona side of the island of Hawai'i.	Unknown
6. Kawaihae/Waimea Road	Waimea Park to Merriman's (near Kawaihae Harbor)	State of Hawai'i	State right-of-way and possible construction to replace road for the Kawaihae/Waimea Road.	Unknown
7. Waimea to Kawaihae Highway	South Kohala	FHWA	A 14-mile (23-kilometer) improved highway between Waimea town and Kawaihae Harbor in central and west Hawai'i.	Unknown
8. Former Waikoloa Maneuver Area and Nansay Sites UXO Cleanup	Hawai'i	The US Army Corps of Engineers	Clean up unexploded ordnance on lands used by US Navy and Marines as an artillery and naval gun firing range, troop maneuvers, and weapons practice.	2015
9. Theater Support Vessel (TSV)	O'ahu to the island of Hawai'i (Pearl Harbor to Kawaihae and waters in between)	US Army	High-speed marine troop transport vessel may be used between O'ahu and Hawai'i. Design specifics and operating characteristics are not known at this time.	Unknown

Source: Tetra Tech 2002

Figure 9-2
Cumulative Projects on Hawai'i

Kawaihae Deep Draft Harbor—Kawaihae Harbor (Project 1)

The US Army Corps of Engineers and the State of Hawai'i are proposing to deepen and expand the Kawaihae Harbor. The 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. Wave surge enters the harbor and damages vessels and piers and causes cargo-handling delays. The current harbor basin is approximately 35 feet (11 meters) deep, and accommodating the new vessels would require a harbor basin of at least 40 feet (12 meters). Modifications are proposed to the west breakwater, and wave absorbers or breakwaters on the north side would reduce surge problems. The southwest part of the harbor is the primary port for military equipment, supplies and personnel destined for PTA. The harbor was first completed in 1962 and was enlarged in 1973. An environmental assessment will be prepared by spring 2005, with construction to begin by 2008 (USACE 2001c). This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

TSV Pier Use—Kawaihae Harbor (Project 2)

As described in Chapter 2, the Army could replace the LSV landing craft with a TSV. The TSV would need to dock at a pier and to have cargo offloaded by either a ship-mounted or shore crane. Kawaihae Harbor is the main seaport for the Army to access PTA and would probably be the site of any TSV landings. The existing entrance channel, harbor depths and piers structures in Kawaihae Harbor could accommodate the TSV, but some modifications may need to be done to existing piers. Specific sites, plans, and specifications for pier modification are not available, so any impact analysis at this stage would be speculative. Such a project, whether within Legacy Force or SBCT operations, would be subject to later NEPA documentation.

Land Acquisition—Pōhakuloa Training Area (Project 3)

In addition to the land that the Army is planning to acquire for SBCT, it has been leasing between 990 and 1,010 acres (401 hectares and 409 hectares) on the northwest of PTA from Parker Ranch. This lease ran out in 1998, and negotiations have been underway for the Army to acquire this land. The Army Real Estate Planning Report prepared for this acquisition states that the neighborhood of the acquisition is dominated by military training and pasture land use, though the report also says that "the land to be acquired has no significant impact on the local community." The State of Hawai'i DOT has proposed a new alignment of Saddle Road that would cross the boundary of the proposed acquisition and PTA. Restrictions have been placed on 70 acres (28 hectares) after the discovery of the endangered Hawaiian mint on the parcel. (These plants are currently fenced and restricted from training activities.) ESA Section 7 consultation is underway, and the Army is finalizing the EA for the purchase (Shimabukuro 2002; US Army Corps of Engineers 2002). This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

Consolidated Command and Range Control Building—Pōhakuloa Training Area (Project 4)

The US Army plans to construct a consolidated command center for the camp commander and others at PTA for ongoing training. Quonset hut buildings that would be vacated would be used for officer and NCO barracks and a task force HQ. Construction is to begin in January of 2003 for occupancy in January of 2004. An EA was completed in April 2002 (Shimabukuro 2002).

Saddle Road Realignment—Island of Hawai'i (Project 5)

This is a long-term highway construction project that includes improvements and modifications to the Saddle Road between the Hilo side and Kona side of the island of Hawai'i (see 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 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 (County of Hawai'i 2002b).

Kawaihae/Waimea Road—Island of Hawai'i (Project 6)

Hawai'i County Public Works Department is investigating traffic mitigation measures along Kawaihae Road from Waimea Park to Merriman's. The intent is to use the existing road corridor and, after minor paving and other improvements, to re-mark the roads with through lanes and turning pockets. The county is also studying a project to provide for a state right-of-way for a road to replace the Kawaihae/Waimea Road (County of Hawai'i 2002b). There are no other County of Hawai'i road projects in the areas of Pōhakuloa, Kawaihae, or Waimea (Kuba 2002).

New Highway—Waimea to Kawaihae Harbor (Project 7)

The FHWA has proposed constructing an improved 14-mile (23-kilometer) stretch of upgraded highway between the central and west Hawai'i town of Waimea to Kawaihae Harbor near the district of South Kohala. A notice of intent to prepare an EIS for the proposed project has been issued.

UXO Cleanup—Former Waikoloa Maneuver Area and Nansay Sites (Project 8)

The Department of Defense has begun investigating and cleaning up UXO on lands formerly used by the US Navy and Marines. Starting in 1943, the Navy and the Marines acquired State of Hawai'i and private lands (Parker Ranch) through license agreements and used them for artillery and naval gun firing ranges, live-fire exercises, troop maneuvers, and weapons practice. Ordnance recently used or identified within the entire former maneuver area includes shells, rockets, grenades, mortars, cannons, and small arms. While use of most of the area for training and weapons practice ended in 1946 and 1953, the Pu'u Pa Maneuver Area is still used occasionally as an active US military training area. The Pu'u Pa area is leased to the Department of Defense by Parker Ranch. Current use of the former maneuver land on the Parker Ranch property is mainly cattle ranching and grazing and, in the areas near

Waimea and Waiaka Village, residential, commercial, and industrial. UXO continues to be found in the former maneuver area, and preliminary investigations show that approximately 48,000 acres (19,440 hectares) could hold ordnance and explosives waste hazards. Units from SBMR have disposed of UXO, and the Corps of Engineers has prepared a Phase II site assessment document discussing possible investigation and cleanup alternatives (USACE 2001d). This report recommends cleanup in various areas in the former Maneuver Area. The Maneuver Area includes the Ke‘āmuku area (the WPAA) that may be acquired under the Proposed Action. The Phase II report did not identify ordnance in the Ke‘āmuku area because it is still considered an active military training area and entry is limited. However, the Phase II report included an initial visual screening investigation in the Ke‘āmuku Parcel and identified three areas within that parcel as needing further geophysical study (see Figure 9-3).

Theater Support Vessel (Project 9)

In the future, the Army is considering the use of TSVs to transport troops and supplies between O‘ahu and the island of Hawai‘i. TSVs would launch from Pearl Harbor with troops and equipment and would land at Kawaihae Harbor. The 25th ID(L) units would offload and transit from Kawaihae Harbor to PTA. Some of the transit areas for the vessels between the two islands are within or in close proximity to the Hawaiian Islands Humpback Whale National Marine Sanctuary waters. If and when this project would be implemented, the Army plans to comply with all appropriate environmental regulations including NEPA, the ESA and the Marine Mammal Protection Act.

9.5 ANALYSIS OF CUMULATIVE IMPACTS

The cumulative impacts of these developments are discussed by resource area below. Relevant significant and not mitigable, significant and mitigable to less than significant, and less than significant cumulative impacts also are described. Table 9-3 provides an overview of cumulative impacts by resource area.

9.5.1 Summary of Cumulative Impacts

Cumulative impacts from the Proposed Action and the Reduced Land Acquisition Alternative, and the No Action alternative would occur in all resource areas. Significant cumulative impacts would occur in the following resource areas: land use, and water, biological, cultural and socioeconomic resources.

There would be significant and unmitigable impacts from the Proposed Action and the Reduced Land Acquisition Alternative on land use from the acquisition and conversion of agricultural land for Army use as training areas.

There would be significant but mitigable long term cumulative impacts on surface water quality from suspended sediment resulting from training activities at SBMR and KTA, from the potential for chemical residues or spills at SBMR, and from sediment loading following wildfires at SBMR, KTA, and PTA.

There would be significant but mitigable impacts to biological resources due to: a cumulative increase in the potential for fire to occur on O‘ahu and the island of Hawai‘i as a result of SBCT and the projects listed in tables 9-1 and 9-2; the construction, demolition, and

Figure 9-3
Waikoloa Maneuver Area

**Table 9-3
Summary of Potential Cumulative Impacts**

Resource Area	Proposed Action	Reduced Land	
		Acquisition	No Action
Land use and recreation	⊗	⊗	○
Visual	⊙	⊙	○
Airspace	⊙	⊙	○
Air quality	⊙	⊙	○
Noise	⊙	⊙	○
Traffic	⊙	⊙	○
Water	⊗	⊗	○
Geologic	⊙	⊙	○
Biologic	⊗	⊗	⊗
Cultural	⊗	⊗	○
Human Health and Safety Hazards	⊗	⊗	⊗
Socioeconomic	⊗	⊗	○
Utilities	+	+	○

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

- ⊗ = Significant
- ⊗ = Significant but mitigable to less than significant
- ⊙ = Less than significant
- = No impact
- +
- N/A = Not applicable

associated increased use of roads and areas around where listed plant species grow or where listed wildlife nest or forage; the increase in training, especially live-fire training at SBMR and PTA which could threaten designated and proposed critical habitat and result in the direct loss or “take” of species through fire; the construction of large towers in important breeding or flying corridors that would obstruct the flying patterns of migratory birds; potential cumulative loss of suitable habitat; the production of fugitive dust or other such habitat degradation; and the introduction and spread of nonnative species.

Construction projects on the islands of O‘ahu and Hawai‘i could result in significant and mitigable cumulative impacts on cultural resources. Scoping comments indicate that there are significant Native Hawaiian resources in the area in and around MMR and some historical buildings that would be altered by the Residential Communities Initiative that could combine with the project activities on O‘ahu to cause significant but mitigable cumulative impacts. On Hawai‘i, there are cultural and archeological resources at Kawaihae Harbor, including an underwater heiau; the harbor deepening and the new highway from Waimea to Kawaihae Harbor could significantly affect these resources. Construction of the new range control building at PTA could have significant impacts on cultural resources, depending on its location. Impacts from the Reduced Land Acquisition Alternative would be similar to the Proposed Action. These impacts would be significant but mitigable to less than significant by compliance with federal and state cultural resources laws.

9.5.2 Cumulative Impacts by Resource Category

Land Use and Recreation

For the evaluation of cumulative impacts relative to land use and recreation, the ROIs are as follows:

- For acquisition of land for military use and conversion from agricultural to nonagricultural use, the ROI is statewide or island-wide;
- For reduction in the amount of land available for hunting, the ROI is island-wide.

Future land use and recreation trends for the O‘ahu sites are reflected in the sustainable community plans prepared by the City and County of Honolulu for those regions; future trends for the island of Hawai‘i sites are reflected in the General Plan for Hawai‘i County and the proposed draft revision to the General Plan for Hawai‘i County. The above documents recognize the statewide decline in large-scale plantation agriculture for various economic reasons but express the desire to preserve existing agricultural land, particularly prime agricultural land, for current and future agricultural businesses. Since 1978, there has been a one percent decline in total agricultural lands of importance to the state. Trends associated with recreational resources include providing continued, and where possible, increased access to recreational resources.

Proposed Action (Preferred Alternative)

Cumulative impacts from converting agricultural land to training land. The Proposed Action includes the Army’s acquisition of land on O‘ahu and the island of Hawai‘i. Proposed O‘ahu acquisitions include 1,400 acres (567 hectares) for the SRAA, 17 acres (7 hectares) for the Helemanō Trail easement, and 55 acres (22 hectares) for the Dillingham Trail easement. Proposed acquisitions on the island of Hawai‘i include the 23,000-acre (9,308-hectare) WPAA and a 132-acre (53-hectare) easement for the PTA Trail. These acquisitions total 24,581 acres (9,948 hectares) statewide. When combined with the acquisition of 71.5 acres (29 hectares) for the Kahuku Windmill and Hook parcels, adjacent to KTA, and the 1,010 acres (409 hectares) northwest of PTA, the total area to be acquired by the Army statewide is 25,663 acres (10,386 hectares). These acquisitions would increase the state-wide decline in farmland since 1978 from one percent to 2.7 percent and would contribute to the diminishing amount of agricultural land in the state. The acquisitions would also increase the state-wide amount of land owned or leased by the military from 10.8 percent to 11.4 percent. From a cumulative, state-wide perspective, this is a relatively small increase, especially in the context of the planned release of military land to civilian use. The Army is returning approximately 50 acres (20 hectares) of land at DMR to the State of Hawai‘i. Other planned transfers to civilian ownership include the Barbers Point and Waikele parcels as part of the Navy’s proposed Ford Island development.

The cumulative impacts of agricultural land acquisition for nonagricultural use would be less than significant. In addition, on the island of Hawai‘i the Army is considering establishing a cooperative relationship with the landowner to allow continued grazing at WPAA in conjunction with training. This would further reduce the cumulative impact of the land acquisitions.

Cumulative impacts on natural resources management and recreational land use. Training and operation of the proposed QTR2 on the SRAA could affect land use within a portion of the Honouliuli Preserve. Approximately 100 acres (41 hectares) within the SRAA are part of the TNC-managed lands that are available for intensive natural resources management and hiking. During training and operation of QTR2, natural resources management and recreational activities would not be permitted within certain portions of the SRAA. This would not have a significant cumulative impact because it would affect approximately three percent of the entire Honouliuli Preserve, which is 0.06 percent of the Conservation District land on O‘ahu and is a fraction of a percent of the total Conservation District land in the state.

Operation of the CACTF at KTA would prohibit any traffic (on foot or in unprotected vehicles) within the SDZ. Presently, traffic – such as unauthorized public access - is not strictly controlled at KTA. The addition of fencing and signs restricting unauthorized access when the range is in use would be a less than significant cumulative impact because it would affect existing military training land within an installation. Existing public recreation areas would not be affected. Recreation opportunities at Army installations on Oah‘u have declined in the past few years due to increased security and decreased personnel available to manage check-in stations.

Under the Proposed Action, recreational land use would be increased because approximately 23,000 acres (9,308 hectares) of private hunting land would be opened to the public for hunting game birds and game mammals when the land is not used for training.

Given the cumulative impacts described above, the military’s acquisition of agricultural land for training, the Proposed Action, and other projects listed in this chapter may be inconsistent with the agricultural land use policies in the state. Trends associated with recreational resources should not be affected by the cumulative impacts of these projects.

Reduced Land Acquisition Alternative

Cumulative impacts from converting agricultural land to training land. Land acquisitions associated with the Reduced Land Acquisition Alternative are similar to the Proposed Action, except that the SRAA would be reduced to 100 acres (41 hectares). The statewide land acquisitions would total 24,363 acres (9,860 hectares). These acquisitions would increase the state-wide decline in farmland since 1978 from one percent to 2.6 percent and would contribute to the diminishing amount of agricultural land in the state.

The cumulative impacts of land acquisition and conversion to nonagricultural use on O‘ahu would not be significant. Cumulative impacts on the island of Hawai‘i would be significant but mitigable to less than significant because the Army is considering establishing a cooperative relationship with the landowner to allow continued grazing at the WPAA in conjunction with training. In accordance with the Farmland Protection Policy Act, the Army has requested a determination from the NRCS, which evaluates the impacts of converting farmland to nonagricultural use.

Impacts on natural resources management and recreational land use. Under the Reduced Land Acquisition, the cumulative impacts on the access to natural resources management and

recreation resources would not change. Under Reduced Land Acquisition, cumulative impacts on the island of Hawai'i relative to hunting would be the same as those for the Proposed Action.

No Action Alternative

Under No Action, there would be no cumulative impacts on land use or natural resources management and recreational land use because the land acquisitions and the proposed construction and training described in Chapter 2 would not occur. The acquisition of 72 acres (29 hectares) for the Kahuku Windmill and Hook parcels, adjacent to KTA, and the 1,010 acres (409 hectares) northwest of PTA would be addressed under their respective NEPA documents. Access to natural resources management areas and recreational land use would not change.

Visual Resources

Increasing activities and building new structures on O'ahu and Hawai'i will continue to reduce the quantity and quality of visual resources over time. This is because the developments would be on islands with finite land resources that are incapable of supporting increasing population. These impacts on visual resources become more significant as the extent of developed land increases. Most of the cumulative projects listed above for O'ahu and Hawai'i would occur in previously disturbed areas, thereby limiting the level of disturbance to natural areas and views.

The ROI for cumulative visual impacts is the ROI for the Proposed Action and the regions affected by the cumulative projects listed above for O'ahu and Hawai'i. These regions include areas such as travel corridors or coastline areas where projects may occur that, although not within a single viewshed, may be viewed in succession or proximity and result in a cumulative visual impact.

Overall, cumulative impacts would be less than significant because the proposed project and the cumulative projects listed above would be spread out over a large area and would not be confined to one region in particular. Consequently, any impacts on visual resources are more likely to be localized. Also, the Proposed Action and the cumulative projects listed above would occur at different times, and some of the projects would replace existing infrastructure instead of constructing new infrastructure that would affect visual resources.

Proposed Action

Modification of existing view. Similar to the Proposed Action, many of the other projects that may have cumulative effects identified on or in the vicinity of SBMR and PTA would occur in areas of similar development and would be visually consistent with the existing facilities and SBCT-related projects. The assumption is that these other projects that may have cumulative effects would be developed in a manner that is consistent with installation master plans to ensure compatibility with surrounding uses, especially in the vicinity of historic districts or structures, which could be negatively affected by visually incompatible development.

Other cumulative actions would occur in the vicinity of SBCT installations but would be sufficiently removed from SBCT-related actions that there would be no visual relationship

between the actions. SBCT-related construction and training activities at KTA, in combination with other projects, would not result in cumulative impacts because many of these actions are of limited duration, the actions are dissimilar and unlikely to be visually perceived in combination, and the actions have negligible visual relationship because of separation.

Finally, other projects that may have cumulative effects would occur in the same location but at different times, and potential visual impacts would be such that they would not result in a sequential cumulative impact. For example, SBCT-related training and prescribed burning at MMR and other ranges may have similar visual impacts as a result of smoke; however, these impacts would be of limited duration and are expected to be substantially separated in time, such that there would not be a reasonable cumulative link between the visual impacts of the two actions. As a result, the Proposed Action, in combination with other projects that may have cumulative effects, would not result in any cumulatively significant impacts on existing views.

Impairment of view during the construction phase. No significant cumulative impacts as a result of visual impairment during construction are expected. Construction in the SRAA would result in a significant but mitigable impact on visual resources; however, other projects that may have cumulative effects in the SBMR viewshed would occur in developed areas and at different times from the South Range construction and are not expected to cumulatively add to this impact.

Construction of the Helemanō Trail, which is expected to occur between March 2006 and March 2007, could occur simultaneously with the Kamehameha Highway bridge replacement near the Helemanō Plantation, which is expected to occur at the end of 2004. It is unlikely that construction would result in a cumulatively significant impact on visual resources because of the limited nature of construction involved for each project, the transient nature of construction activities, and the active agricultural use of the area that is similar in kind to the anticipated construction activities. The Kamehameha Highway traffic and drainage improvements, in conjunction with construction of the Helemanō Trail, are not likely to result in a cumulatively significant impact because these actions would also be transient and would have a negligible visual relationship because of separation.

Similarly, construction of PTA Trail, which is expected to occur between March 2006 and March 2007, may occur simultaneously with other construction activities on Saddle Road and Kawaihae/Waimea Road, which are not currently scheduled. It is unlikely that construction activities would result in a cumulatively significant impact on visual resources because of the limited nature of construction involved for each project, the transient nature of construction, and the fact that most of these activities would have negligible visual relationship because of separation.

Alteration of landscape character. SBCT-related actions at SBMR under the Proposed Action would result in significant but mitigable impacts on the landscape character as a result of the SRAA acquisition. No other actions are in the vicinity of SBMR that, in combination with the SRAA acquisition, would alter the landscape.

As described above, other projects that may have cumulative effects would occur in areas of similar development or at different times such that there would be no visual link between the two actions. Therefore, no cumulative impacts from modifying the landscape character are expected.

Consistency with visual resource policies. SBCT-related actions would not be substantially inconsistent with any visual resource policies and, in combination with other cumulative actions, are not expected to have a cumulative impact on policy consistency.

Reduced Land Acquisition

The potential for cumulative impacts on visual resources would be similar to that described above for the Proposed Action.

No Action

No cumulative impacts on visual resources are expected under No Action.

Airspace

Proposed Action

Because the Proposed Action, with the possible exception of a shift in the instrument approach path to BAAF on PTA, would have no impact on airspace use in the ROI, there is no potential for incremental additive impact on airspace use. No other projects in the various airspace use ROIs 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 and jet routes, airports/airfields, or air traffic control in the ROI. The less than significant impacts from extending and reorienting the runway at BAAF would not lead to any airspace use cumulative impact.

Similarly, 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 that, although not mandatory, allow general aviation to function satisfactorily. Moreover, the WAAF tower provides traffic advisories to general aviation pilots when it is open. On weekends, when the tower is closed, pilots tune in to the common advisory frequency to monitor other traffic and to broadcast their position, thus minimizing the likelihood of adverse cumulative impacts on airspace.

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 WAAF and BAAF and Hickam AFB are subject to air traffic control clearances and instructions. 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, thus minimizing the potential for adverse cumulative airspace use impacts.

Reduced Land Acquisition

For the same reasons described for the Proposed Action, there would be no cumulative impacts on airspace under the RLA Alternative.

No Action

There would be no cumulative impacts on airspace under No Action.

Air Quality

As noted in Section 3.5, 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. The only identifiable trend is an apparent increase in the peak 24-hour average PM₁₀ concentrations on O'ahu attributed to fireworks use during New Year's celebrations (Hawai'i Department of Health 2000, 2001a, 2002). As discussed in Section 3.5, 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.

As noted in Section 3.5, the ROI for air quality issues depends on the pollutant and emission sources that are under consideration. The ROI for a regional secondary pollutant, such as ozone (which is not emitted directly but is formed by chemical reactions among precursor compounds), generally will be 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 point of emission. 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 Proposed Action and the RLA Alternative 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.

Proposed Action

Ozone precursor emissions. Combustion processes are the dominant source of ozone precursor emissions. Construction equipment, motor vehicle traffic, and aircraft flight activity are important sources of ozone precursor emissions. Tables 9-1 and 9-2 include several construction projects that would at least partially overlap the time frame of construction projects identified for the Proposed Action. In a cumulative perspective, the Proposed Action would do little to alter overall vehicle traffic or air traffic activity on O'ahu or Hawai'i. 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. Given historical air quality conditions, the cumulative impact of emissions associated with the Proposed Action in combination with other construction projects and the continuing emissions from highway traffic and other sources is not expected to violate any state or federal ozone standards. Consequently,

cumulative air quality impacts on ozone or other secondary pollutants would be less than significant under the Proposed Action.

PM₁₀ emissions. Fugitive dust sources and wildfires are the major contributors to PM₁₀ emissions. Fugitive dust sources include construction activity, vehicle traffic on unpaved roads or off-road areas, and wind erosion from areas with exposed soils. Tables 9-1 and 9-2 include several construction projects that would at least partially overlap the time frame of construction projects identified for the Proposed Action. However, spatial separation among these various construction projects would minimize or eliminate cumulative PM₁₀ impacts from those projects with overlapping construction time frames. Very few of the projects identified in the tables are in close proximity to training areas that would be affected by military vehicle traffic or wind erosion from military vehicle maneuver areas. While agricultural burning, wildfires, and controlled burns could create temporary localized areas of high PM₁₀ concentrations, such events in the past have not violated federal PM₁₀ standards. As discussed in Chapters 4 through 8, there may be localized, direct significant impacts from PM₁₀ emissions. However, given historical air quality conditions, the cumulative impact of emissions associated with the Proposed Action, in combination with other construction projects and the continuing emissions from other emission sources, 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 the Proposed Action.

Reduced Land Acquisition

The cumulative impact issues discussed above for the Proposed Action also would apply to the RLA Alternative; consequently, cumulative air quality impacts under the RLA Alternative would be less than significant.

No Action

Under No Action, there would be no cumulative impacts involving air quality.

Noise

There is no routine monitoring of ambient noise conditions, so data are not directly available for evaluating trends. In general, noise conditions in the vicinity of USARHAW installations are not likely to have significantly changed in recent years because activity levels for major noise sources have not grown or declined significantly.

Noise impacts are inherently localized because sound levels decrease relatively quickly with increasing distance from the source. Cumulative noise impacts would 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.

Proposed Action

Cumulative noise impacts under the Proposed Action would stem primarily from temporary construction activities and military training. Land acquisition or transfer projects and resource management plan activities listed in tables 9-1 and 9-2 would have no meaningful noise impacts and thus no potential for cumulative noise impacts under the Proposed Action. Private development construction projects, highway improvement projects, and

military construction projects at sites other than USARHAW installations would not produce cumulative noise impacts under the Proposed Action, due to distance or differences in construction timing.

Tables 9-1 and 9-2 include several construction projects at SBMR or PTA that would partially overlap the time frame of construction projects identified for the Proposed Action. Uncertainty in the timing of some highway construction projects near PTA precludes any meaningful evaluation of cumulative noise impacts related to those projects. However, spatial separation among these various construction projects would minimize or eliminate cumulative noise impacts or noise-sensitive land uses. Consequently, no cumulatively significant noise impacts would occur from planned construction projects at or adjacent to USARHAW installations.

Military training projects at MMR or Waikane Valley are too far removed from SBMR, SBER, KTA, KLOA, or DMR to have any cumulative noise impacts under the Proposed Action. Although noise impacts on a project level are significant, due to the type and location of projects identified in tables 9-1 and 9-2, cumulative noise impacts affecting the same geographic areas or extending the duration of noise impacts on a given area over a longer period of time would be unlikely to occur. Consequently, cumulative noise impacts under the Proposed Action would be less than significant.

Reduced Land Acquisition

The cumulative impact issues discussed above for the Proposed Action also would apply to the RLA Alternative. Consequently, cumulative noise impacts under the RLA Alternative would be less than significant.

No Action

Under No Action, there would be no cumulative impacts involving noise.

Traffic

Proposed Action

Traffic trends differ by region. Peak-hour traffic along the major roadways on O'ahu is expected to increase at an average growth rate of 1.6 percent per year until 2020 (Kaku Associates 1995). For the same period, peak-hour traffic along residential streets is expected to increase 0.4 percent per year. Comparable data for the roadway network on the island of Hawai'i is not provided in either the current or previous transportation plans. Comparing historical traffic counts along Mamalahoa Highway and Kawaihae Road provides an indication of past growth. Between 1996 and 2000, daily traffic increased approximately 0.1 percent per year, which implies minimal growth along this roadway. For the same period, traffic along Kawaihae Road, between Mamalahoa Highway and Queen Kaahumanu 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.

The Proposed Action has several traffic-related impacts. The first relates to the construction of the military vehicle trails and the second to the individual projects at SBMR.

The Proposed Action separates military traffic from civilian traffic as much as possible, so there would be a beneficial impact on traffic because the volume of military traffic on the state and county road system would not be greater than current hourly volumes. The hourly volume of convoy traffic is limited by operational considerations (no more than 24 vehicles per convoy and a minimum interval of 15 minutes between convoys). Unless this operational procedure is changed, the maximum hourly volumes of convoy traffic would remain the same. The threshold of 100 peak-hour trips in the peak direction would not be reached for existing or cumulative conditions, so the impact from Army use of military vehicle trails would be less than significant.

The second aspect of traffic impacts of the military vehicle trails relates to the trail crossings of public roadways. The traffic impact of these crossings was analyzed using the methodology for intersections without signals, with the convoy traffic yielding to public traffic along the highway. Thus, the operation of traffic along the military vehicle trail would have minimal or no impact on traffic operations along the public roadways as long as they are two lane and two way. Any future improvement of the highways may result in the trail crossing a four-lane highway. In other areas where trails (or plantation roads) have crossed highways greater than two lanes wide, either traffic signals have been installed or a grade crossing has been constructed. Because there are several highway improvement projects on the list of cumulative impacts, the resulting cumulative impacts of the widening plus military vehicle trail crossing would have to be assessed on a case-by-case basis. This would have to be performed as part of the environmental assessment of the highway project. Design year traffic volumes are typically not available until the EA is performed for the highway improvement project. At this time, cumulative traffic impacts are predicted to less than significant.

The individual projects on SBMR either have separate NEPA documents prepared or do not generate sufficient traffic to warrant a traffic impact analysis. With few exceptions, the projects have minimal traffic impacts in the immediate vicinity of the project because traffic is being redistributed within a confined area.

Potential traffic impacts could occur due to increased use of PTA, along with the increased traffic and development caused by the Saddle Road realignment. Increased traffic, as described in the Saddle Road EIS, could have indirect impacts on cultural, socioeconomic, and biological resources. Further, expanded use of PTA could combine with other local land acquisition and development projects to conflict with right-of-way acquisition needs for Saddle Road.

The Saddle Road project will have two impacts on the Proposed Action. The first is that traffic operating conditions, and therefore the level of service, will improve because the deficiencies will be corrected by the improved alignment and higher (and newer) design standards. These higher standards include improved sight distances, sufficient lane widths, and adequate shoulders. The higher design standards will also result in higher operating speeds. As stated in the EIS for the Saddle Road project, the projected 2014 ADT is 14,000 vehicles per day.

The project will have no impact on the proposed military trail element of the project because the trail would not cross Saddle Road. The incremental impact of the Proposed Action on future traffic conditions with the Saddle Road project completed would be negligible because traffic volumes along Saddle Road would increase insignificantly as a result of increased use of PTA.

The second impact of the Saddle Road project relates to the impact of right-of-way acquisition on 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.

On O'ahu, the traffic growth rates discussed above consider growth in the population, employment, and housing, including those related to increased military activity. The estimated projections are based on historical growth and specific projects that were known at the time the study was prepared. Therefore, it is reasonable to assume that a modest increase in military activity is included in the traffic forecasts. This also implies that the Proposed Action would not lead to a cumulative impact as long as the number of new personnel is consistent with past trends. Lastly, it should also be noted that traffic will be separated from the public when using the military vehicle trails. On the island of Hawai'i, traffic along the roadways within the study area should increase within the growth rates noted above.

Reduced Land Acquisition

No significantly cumulative impacts are expected for this alternative for the same reasons described in the Proposed Action. Other impacts of a cumulative nature are the same as those under the Proposed Action.

No Action

Under No Action, there would be no cumulative impacts involving traffic.

Water Resources

Cumulative impacts on water resources may occur in four categories: water supply, surface water quality, groundwater quality, and flooding. The ROI for the cumulative effects on water resources is the sum of the regions of influence of the combined projects. For the Proposed Action, the ROI is the same as that described in each of the preceding chapters and includes the region within the installation boundaries or easements where the Proposed Action will be implemented, the watershed downstream of the installation boundaries (for surface water impacts), or the aquifer(s) downgradient of the installation boundaries (for groundwater impacts). The ROI of the projects outside the Proposed Action vary in size and may not be well defined. In general, the cumulative impact assessment is intended to be descriptive rather than quantitative.

Among the trends that should be considered in the analysis of cumulative impacts on water resources in Hawai'i are increases in demand for potable water, due to an increasing population and expansion of urban areas, and an accompanying increase in sources of pollution. In the past, demand for water for agriculture spurred the development of a network of tunnels, pipelines, and canals to transfer water from areas of abundance (usually in mountainous areas with high level water) to the major agricultural areas. This did not

come without consequences in the form of lowered water levels in the high level aquifers. Potable water was also supplied through drilling wells to tap abundant groundwater resources. But drilling and pumping are expensive, and over pumping can lower groundwater levels, and cause salt water intrusion in coastal areas. To prevent overdrawing groundwater resources, the State of Hawai'i has attempted to estimate the long-term sustainable yield of the major aquifers and to issue permits for groundwater extraction so as not to exceed the sustainable yield. Groundwater quality has been affected by industrial chemical releases and by septic systems, as well as by pollutants infiltrating urban runoff. These pollutants can threaten the available water supplies and may require expensive treatment to make the water usable. Similarly, urban expansion and industrial and agricultural development have all had an effect on surface water quality. Nutrients, sediment, toxic chemicals, and debris from disbursed nonpoint sources are collected by runoff in streams and eventually discharge to lakes, estuaries, or the ocean. These pollutants can adversely affect aquatic species or they can affect the aesthetic qualities that make Hawai'i a desirable place to live. The State of Hawai'i has increasingly addressed efforts at reducing and preventing this type of pollution, through monitoring, setting water quality goals, and permitting and through public education and information campaigns. These trends are expected to continue.

Proposed Action

Water supply. The demand for freshwater on O'ahu is increasing, and in parts of O'ahu is nearing the available supply. For example, the Honolulu Board of Water Supply estimates that permits have been issued for over 95 percent of the estimated sustainable yield of the Central and Pearl Harbor aquifers. The board is considering plans to build new conveyances to link areas with surplus water (windward side of the island) to areas with inadequate supplies and plans for future growth in demand (for example, the Ewa area). The Proposed Action would increase the number of Army personnel and their families compared to No Action, and this would increase water demand. In addition, operating certain proposed new facilities, such as the vehicle wash facilities, would increase water use compared to No Action. These increases are not expected to be significant with respect to the overall demand for water in the hydrologic units in which the Proposed Action would occur. The greatest future growth in demand for water is likely to occur in the Pearl Harbor hydrologic unit due to urban development and expansion. A relatively minor increase in demand for groundwater from the Central Plateau aquifer at SBMR, which spills over to the Pearl Harbor aquifer, is not likely to significantly reduce available water supplies in the Pearl Harbor aquifer. Demand for water at PTA to support the tactical vehicle wash would require a large percentage increase in water deliveries to PTA, but the water would be supplied from areas with abundant freshwater, so the cumulative impact on water resources would be negligible.

Surface water quality. Nonpoint source pollution is recognized as one of the principal causes of surface water quality degradation. The State of Hawai'i is developing TMDLs for its impaired surface waters in response to requirements of the Clean Water Act. Enforcing stormwater management regulations will help reduce pollutant loadings to surface waters by requiring industrial facilities, municipalities, and military and other facilities to implement stormwater management practices to reduce their individual nonpoint source contributions of pollutants. Until TMDLs are developed for receiving waters, loadings from individual

sources identified, and maximum loads allocated to these sources, it will be difficult to quantify the relative contribution of Army training activities compared to other sources. Qualitatively, any contribution to pollutant loading from a source in the watershed of an impaired water body, if it is greater than natural background levels, can be regarded as significant. There would be significant but mitigable long term cumulative impacts on surface water quality from suspended sediment resulting from training activities at SBMR and KTA, and from sediment loading following wildfires at SBMR, KTA, and PTA. These water quality impacts would affect streams that have been identified by the State of Hawai'i as "impaired water bodies." Impairment is a cumulative effect resulting from contaminant contributions from multiple sources in a watershed. Therefore, the direct surface water impacts described in sections 5.8, 7.8 and 8.8, related to parameters on which the impairment is based (sediment, pathogens, nutrients, etc.), are also considered to be cumulative impacts. Explosive chemical concentrations present in soils on training ranges at SBMR are unlikely to be transported to receiving waters at concentrations high enough to degrade surface water quality. However, because the health and environmental effects of multiple chemicals can be cumulative, if future monitoring shows that explosives chemicals are present in receiving waters at significant concentrations, the impacts could be considered cumulative even if there are no other sources of these particular compounds elsewhere in the watershed.

Preliminary results of ATTACC modeling indicate that the Proposed Action will increase soil erosion in the training ranges. This impact probably cannot be fully mitigated through improved land management practices because of the limited land area available. Increased erosion will result in larger volumes of sediment being transported to streams by runoff. This erosion could adversely affect stream water quality by making the water more turbid.

Construction projects also generally result in soil disturbance and expose soils to erosion. Construction projects under the Proposed Action that involve disturbance of more than one acre (0.4 hectare) of land will be required to comply with stringent stormwater pollution prevention requirements, including use of best management practices identified prior to construction in stormwater pollution prevention plans, to minimize soil erosion. Other construction projects besides those identified under the Proposed Action could also contribute to sediment erosion and could have impacts on surface water quality. These projects would also be subject to the same stringent nonpoint source permitting requirements, requiring the use of BMPs to prevent water quality impacts. The cumulative effects of sediment loading from many sources would include an increase in the total load of sediment discharged into a stream, and either an increase in the amount of sediment transported to downstream waters (lakes, estuaries, or the ocean), or an accumulation of sediment deposits in the stream channel (if the sediment loading were greater than can be transported by the stream).

As with the impacts of sediment loading, the effects of chemical contaminant loading could also contribute to cumulative impacts on stream water quality. However, implementing construction BMPs for stormwater would also address the potential for contaminant transport. Complying with the regulatory requirements that would apply to construction projects and to federal facilities under the Phase 2 stormwater management regulations to be implemented would ensure that the contributions of sediments and pollutants from the Proposed Action would be kept at a minimum. In most cases, complying with these

regulations is expected to improve surface water quality compared to current conditions and to keep potential cumulative impacts from exceeding significant levels. Monitoring and the requirement to define and document progress toward meeting pollutant reduction goals would help to ensure that water quality is not degraded further.

Trace levels of explosives residues could be transported by runoff from training ranges to streams. The chemical constituents of explosives have various degrees of toxicity and represent different health risks. Most break down rapidly in the environment, but some are more resistant to degradation. Their ultimate chemical degradation products include nitrogen compounds, which stimulate plant or algal growth if present in sufficiently high concentrations. The trace concentrations that have been found to be present in soils and that may be transported by runoff into stream waters are not expected to be significant relative to background concentrations of natural organic compounds.

Toxic chemicals in explosives residues in soils on training ranges at SBMR are not expected to migrate to surface water in quantities that would result in measurable concentrations in stream water. The concentrations would be considered to contribute to a cumulative impact on surface water quality, which would be significant if the concentrations were subject to regulation under the State's antidegradation policy, or contributed to an impairment of surface water quality under Section 303(d) of the Clean Water Act. While there is a potential for this to be a significant cumulative impact, there are insufficient data to accurately predict whether the impact would occur.

Studies in some urban coastal areas have shown that the cumulative contribution of contaminants from many dispersed sources, rather than from any single point, is one of the major factors affecting coastal water quality. Among the causes of these impacts are increased loading of nutrients, toxic chemicals, and suspended sediments, but another important contributing factor is alteration of stream channels. Natural channels tend to widen out or meander on the coastal plain, and may contain abundant vegetation. This slows stream flows and traps sediments and nutrients before they enter the ocean. Unfortunately, these characteristics also can lead to the coastal plain flooding in high flow conditions. To prevent flooding and to increase the habitable land area, stream channels have been straightened, narrowed, and confined to permanent concrete channels or pipes and vegetation has been removed, preventing the streams from functioning to remove sediment and nutrients.

Each watershed differs in its size, shape, amount of runoff, nature and degree of development, and in the types of problems and solutions appropriate to address those problems. Increasingly, watershed managers recognize that an integrated approach is needed to address problems in watersheds, not only to eliminate sources but to restore watershed functions. In addition to reducing sources of surface water pollutants on lands managed by the Army, the Army would continue to cooperate with other entities, including state and local agencies, local land owners, scientists, and local organizations, to plan and implement new approaches to improve watersheds and coastal water quality. One such cooperative effort is the Ko'olau Mountains Watershed Partnership, sponsored by the Hawai'i Department of Land and Natural Resources and involving numerous stakeholders. One of

the products of this cooperative endeavor is a watershed management plan for most of the Ko'olau Mountains, including much of the East Range and KTA (Sumiye 2002).

Groundwater quality. The Army continues to address potential groundwater contaminants resulting from past practices through its Installation Restoration Program, which is discussed in more detail in the hazardous materials sections of this document. Infiltrating surface water containing nonpoint source pollutants is not likely to have a significant impact on groundwater quality because the pollutants are typically highly dilute and tend to be adsorbed or biodegraded during infiltration through soils.

Spills and other accidental releases may occur from time to time and could have more significant local impacts on groundwater quality. Their occurrence cannot be predicted, but standard operating procedures are in place to reduce the potential and impacts of accidental spills and releases. These include training spill response personnel and those who handle or manage hazardous materials or wastes, provide spill response equipment and supplies, reduce the use of hazardous chemicals and other waste minimization procedures, and use engineering controls (such as secondary containment) to reduce the potential for releases. If spills occur, the extent of the spill is expected to be fully investigated and characterized and then remediated, in compliance with regulatory requirements. The Proposed Action is not expected to significantly increase the cumulative potential for spills that could affect groundwater quality, relative to No Action, and if spills were to occur, they would be remediated immediately, as described under No Action. Because implementation of SOPs will address containment and remediation of spills, nonpoint source pollutants are not likely to interact with or accelerate any decreases in groundwater quality due to septic tank or industrial releases; therefore, the impact is expected to be less than significant.

Flooding. Construction projects involving paving, new structures, and other impermeable surfaces can increase flooding potential by reducing the retention time of runoff and concentrating runoff at selected discharge points, rather than dispersing it over a wide area. The Proposed Action is not expected to contribute significantly to an increase in the potential for flooding, relative to No Action. Impacts from construction projects under the Proposed Action are not expected to significantly decrease the amount of stormwater runoff retained by soils in the high-intensity short-duration storms that cause most flooding in Hawaiian watersheds. Each construction project would be designed to accommodate the additional runoff. Phase 2 stormwater management regulations would require MS4s, including federal facilities, to control runoff in new developments and prevent impacts such as flooding or high stream flows that increase erosion.

Reduced Land Acquisition

Water supply. The impacts of Reduced Land Acquisition on the water supply would be equivalent to the impacts from the Proposed Action and would be less than significant.

Surface water quality. Reduced Land Acquisition would result in minor differences in water quality impacts compared to the Proposed Action. Therefore, cumulative impacts would be approximately the same as those described for the Proposed Action and would be less than significant.

Groundwater quality. The cumulative impacts would not differ substantially from those for the Proposed Action and are not expected to be significant.

Flooding. The cumulative impacts on flooding of Reduced Land Acquisition would be approximately equivalent to those under the Proposed Action. This project would have less than significant cumulative impacts on flooding.

No Action

Water supply. Under No Action, Army demand for water is expected to remain approximately at current levels, but with cyclical or periodic fluctuations. In times of shortage, if significant additional growth in water demand occurs on the island, water shortages could occur. However, because Army demand is expected to remain at approximately current levels, its water use is not considered to contribute to this potential future impact. Therefore, the impact of No Action on regional water availability is expected to be less than significant.

Surface water quality. Continued activities under the No Action Alternative would contribute minor quantities of sediment and explosives residues to surface waters, via stormwater runoff that drains from ranges or future construction sites. Currently, the magnitude of the contribution of nonpoint source pollutants from the project Army installations on O'ahu is suspected to be small, compared to contributions from urban areas and from agricultural sources, although data are insufficient to fully quantify or confirm this conclusion. No impacts on surface water quality are expected from the PTA, so no cumulative impact is expected there either.

Groundwater quality. Activities under No Action would continue to contribute small quantities of chemical pollutants, including explosives residues, solvents, and petroleum hydrocarbons, to groundwater through the infiltration of surface water, accidental spills or releases of chemicals, or leaching of hazardous wastes resulting from past disposal practices. Because spill control and response programs address the potential for future releases, and compliance with regulatory requirements addresses past releases, the No Action Alternative is not expected to result in any additional significant impacts on groundwater quality. Continued implementation of these measures is expected to reduce the potential for impacts on groundwater quality in the future. When combined with other contributions to groundwater pollutants in the recharge areas of the aquifers in which the installations are located, the long-term cumulative impacts of No Action are not expected to be significant.

Flooding. New construction projects could increase the impermeable areas covered by pavement, structures, or other surfaces that are less permeable than the existing land surface. The projects could change the drainage pattern at a site, causing stormwater to run off more quickly than under current conditions or to direct larger volumes to a channel or conveyance than it has capacity to retain. Flows in excess of conveyance capacity can lead to flooding or erosion. Each of the construction projects listed in tables 9-1 and 9-2 would take drainage capacity into consideration in the design of the project. It is standard engineering practice to design for excess drainage capacity and to take into account existing and proposed drainage capacity requirements when designing new facilities. Standard engineering practice also requires that drainage system design be reviewed before building permits are approved. Similarly, regional projects may increase stormwater runoff volumes, and may route to

stream channels more quickly, as an area becomes more developed. In the past, urban development projects have modified stream channels to accommodate flood flows. While more rapid routing of storm drainage from areas of construction at Army installations such as SBMR could contribute to increased downstream flood flows, the increases are not likely to be significant relative to the effects of increased urban development overall.

If necessary, various engineering approaches are available to slow or retain runoff to reduce the potential for flooding. Also, in large intense storms of short-duration, which cause most flooding in Hawai'i, soil infiltration capacity has relatively little effect on flood magnitude because there is too little time for infiltration to occur, and the bulk of the water runs off quickly regardless of ground cover.

One of the best strategies for avoiding the effects of flooding under these circumstances is to avoid building in flood-prone areas. Army projects that would be constructed under No Action would be unlikely to contribute significantly to increased flood potential because of the relatively small amount of increased impermeable surface area and the relatively small effect of this increase on runoff volumes under peak runoff conditions. Several of the anticipated future civilian projects under No Action (bridge replacement and drainage improvement projects by the State of Hawai'i) are likely to reduce the potential adverse effects of flooding by increasing channel capacity and efficiency. Therefore, No Action is expected to result in less than significant cumulative impacts on flooding.

Geology and Soils

Three general categories of geologic impacts are identified as having the potential to contribute to cumulative impacts: loss of important farmland, soil erosion, and hazards associated with exposure of people and property to seismic or volcanic events. As with water resources, the ROI for the cumulative effects on geology and soils is the sum of the regions of influence of the combined projects. For the Proposed Action, the ROI is the same as those described in each of the preceding chapters and includes the region within the installation boundaries or easements where the Proposed Action would be implemented and some adjacent lands, such as upslope or downslope lands that could be affected by slope failure or erosion. The ROI of the projects outside the Proposed Action vary in size and may not be well defined. In general, the cumulative impact assessment is intended to be descriptive rather than quantitative.

The most important trend to consider for cumulative impacts is the effect of development on soil erosion and soil loss. Development can reduce the surface area over which runoff is able to infiltrate the soil. Pavement and other impermeable surfaces reduce infiltration and often route stormwater flows more quickly through an area. The result can be increased flows in channels. As development encroaches on natural drainages and estuaries or streams on the coastal plain, larger flood flows with higher flow velocities can occur, with the potential to erode channels or to carry more sediment than before. Soil loss from the uplands can result in sedimentation on the lowlands and in coastal areas. Soil loss can affect agricultural production, habitat, and aesthetic conditions. Sedimentation can affect water quality, clog stream channels, and increase flooding potential. Soils also can transport nutrients and chemical pollutants, resulting in additional water quality impacts, depending on the nature of the soils in the areas subject to erosion.

Proposed Action

Use of the training ranges is likely to result in continued enhanced soil erosion in some areas; these effects are expected to be locally significant. However, at the regional level, the effects are not expected to be significant, compared to natural rates of erosion. The contribution of soil erosion from training ranges at SBMR to cumulative soil loss or sedimentation in the Pearl Harbor or Kaukonahua watersheds, for example, is expected to be minor relative to the contributions from agricultural and urban lands. Short-term erosion from construction at other project sites would be reduced at each construction site through best management practices, and the effects would not be significant, either alone or in combination with other projects.

Seismic or volcanic eruption hazards could result in significant cumulative effects if, for example, evacuation of personnel or treatment of casualties were to overwhelm the capacity of the available infrastructure. The most likely site for severe seismic or volcanic impacts to occur is at PTA, where the seismic and volcanic hazards are greatest. However, the Army is expected to have internal capacity to evacuate its personnel and to support civilian emergency response efforts in a seismic or volcanic emergency. The presence of trained personnel and equipment resources at PTA would reduce the potential impacts of a natural disaster in the region.

No other cumulative geologic impacts are expected from the Proposed Action.

Reduced Land Acquisition

Impacts from the RLA Alternative would resemble impacts from the Proposed Action. Reduced Land Acquisition would have a lesser impact on conversion of important farmland than the Proposed Action (100 acres [41 hectares] bordering the south boundary of SBMR rather than 1,400 acres [567 hectares] extending south from the SBMR boundary). The impact is considered potentially significant but of much lower significance. No other cumulative impacts are expected as a result of the Reduced Land Acquisition.

No Action

Existing erosion conditions would remain, and no significant cumulative impact is anticipated from projects across Oʻahu and Hawaiʻi.

Biological Resources

Proposed Action

The ROI for cumulative impacts on biological resources corresponds with the SBCT ROI, Figure 3-12. The following describes impacts on biological resources that would result from SBCT actions in conjunction with those projects described in tables 9-1 and 9-2. The extensive disturbance and reduction of native habitats, as discussed in Section 3.10, has caused the extinction of many native Hawaiian species and has placed in peril most of those that remain. Development, heightened human activities, fire, and the introduction of nonnative species have been the main causes of habitat degradation and loss and the subsequent loss and endangerment of native species. During the last century the introduction of nonnative species has increased exponentially as a result of intentional and incidental introductions. Nonnative introductions are estimated to occur now at a million

times the natural rate (Juvik 1998). Nonnative species disrupt ecosystems by consuming or destroying native species and habitats, spreading diseases, and outcompeting native species for local resources. There have been human-induced flora and fauna extinctions dating back thousands of years ago to the beginning of human use of the Hawaiian Islands, but the extinction rate on O'ahu and the island of Hawai'i has accelerated over the past century. The hardest hit terrestrial species are birds, snails, and plants. Of the known Hawaiian species, approximately 70 percent of the land snails are extinct, 40 percent of the birds are extinct, with another 45 percent federally listed as endangered, and roughly 10 percent of the vascular plants are extinct, with an additional 20 percent considered at risk of becoming extinct in the near future (USGS 1999c). Marine species and habitats have also been degraded by human activity over the last century. Several factors contribute to stress in the marine environment in Hawaiian waters, including acoustic pressures and increasing interference with marine wildlife from tourism and recreation. Hawaiian waters have been identified as "acoustic hot spots" (NRDC 1999), i.e., ecologically significant and exposed to high levels of human-made noise. At various times, there may be military projects that emit low frequency sounds in Hawaiian waters (such as those from the North Pacific Acoustic Laboratory).

Impacts from fire on sensitive species and sensitive habitat. There would be a cumulative increase in the potential for fire on O'ahu and the island of Hawai'i as a result of SBCT and the projects listed in tables 9-1 and 9-2. Human-induced fires would increase through live-fire activities proposed at MMR, part of the reinstatement of Legacy Force activities, and the spread of nonnatives, such as the highly flammable fountain grass and molasses grass. The increased use of improved roads would lead to a higher probability of fire starting from a catalytic converter or discarded cigarette. The Army has developed an FMP for MMR to prevent and maintain fires. Additional FMPs are now being developed for PTA, SBMR, KLOA, KTA, and DMR. These plans would greatly reduce fire damage but are 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 MMR firebreak road, and ESA Section 7 consultation would begin again, as needed. The potential loss to listed species, species of concern, and sensitive habitat would be substantially mitigated by the Makua Implementation Plan, which is scheduled to be finalized in spring/summer 2003 and which would be in effect as long as routine training is resumed at MMR. The Makua Implementation Plan identifies listed species and important habitat in need of stabilization and identifies specific measures needed to recover these species, such as replanting, invasive plant eradication and predator removal. The Army is conducting ESA Section 7 consultations with the USFWS as part of O'ahu (excluding MMR) and PTA Legacy Force actions, as well as for the proposed SBCT action. The Army would adopt any reasonable and prudent measures that the USFWS determines necessary to avoid jeopardizing listed species and adversely modifying critical habitat. The cumulative impact of fire, assuming that the Makua Implementation Plan is put into effect, would be significant but mitigable.

Impact on sensitive 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 SBCT Proposed Action or RLA and the projects shown on tables 9-1 and 9-2. Construction and increased use of roads would introduce additional nonnative species and further spread those that already occur on O'ahu and the island of Hawai'i. The disturbance caused by construction and demolition and

the increased use of improved roads would leave the surrounding habitats vulnerable to nonnative species that can thrive in conditions where native species cannot. Further stress on the land would be caused by the displacement of land and removal of vegetation that would occur as a result of I3A construction. Mitigation and conservation measures associated with SBCT, the Saddle Road Realignment, and O'ahu and PTA INRMPs would limit the spread of nonnative species by washing construction and military vehicles, and incoming equipment into O'ahu and the island of Hawai'i. Nonnative wildlife, such as ungulates, mongeese, snakes, ants, and rodents, which cause problems to native plants and animals, are being monitored, restricted, and eradicated when possible, as part of O'ahu and PTA INRMPs and yearly inventory of O'ahu and the island of Hawai'i training installations. ESA Section 7 consultation is being conducted in order to identify ways to minimize impacts on ongoing Army training at PTA and O'ahu installations, and mitigation measures would be added into Legacy Force actions in order to avoid jeopardizing any listed species. This impact is considered significant but mitigable.

Impacts on marine wildlife and habitat The use of TSVs could have a potential impact on marine wildlife and habitat. This impact is predominantly due to the potential for collisions between high speed vessels and marine wildlife, contaminants and their effect on the overall marine ecosystem, and wave impacts on coral. As TSVs may be routed near some of the Hawaiian Islands Humpback Whale National Marine Sanctuary waters, potential impacts are expected during the humpback whale calving and mating season (January 1 to April 30). As described in Chapter 8, impacts to marine mammals from use of LSVs under the Proposed Action are less than significant due to the low speed and infrequent use of the LSVs. A temporal cumulative impact could occur, where combined traffic from LSVs and TSVs could, over time, cause harm to marine wildlife. However, it is too speculative to determine the extent of this potential impact because the Army has no plans or proposals for purchasing TSVs and therefore the number and timing of phase-in of TSVs is extremely uncertain. Cumulative impacts could be reduced with the implementation of specific standard operating procedures designed to reduce impacts from vessel operations on marine species. There are some measures in place that address fuel spills and ballast discharge. The US Coast Guard requires SOPs to address these impacts. In addition, regulations exist in Hawai'i to prohibit any boats from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs (NOAA 1997). A no-wake zone already exists within the harbor entrance area, which would reduce impacts from TSV wakes in that area. Because of the speculative nature of TSV implementation and the potential to implement existing regulations or SOPs to reduce impacts, the cumulative impact on marine wildlife and habitat is less than significant.

Impacts on federally listed species and their federally designated or proposed critical habitat. Projects listed in tables 9-1 and 9-2 would result in direct and indirect negative impacts on listed species and their federally designated or proposed critical habitat. The projects would involve construction, demolition, and associated increased use of roads and areas around listed plant species or where listed wildlife nest or forage. The increase in training, especially live-fire training at SBMR and PTA, could threaten designated and proposed critical habitat and result in the direct loss or take of species through fire. Other factors that would further decrease the success of listed species are the cumulative loss of suitable habitat, the production of fugitive dust or other such habitat degradation, the introduction and spread of

nonnative species that compete for prey and that prey on listed species and that are possible disease and parasite vectors. FMPs are being developed to cover PTA, SBMR, KTA, and DMR that would have avoidance and protective properties. The O'ahu INRMP, the Endangered Species Stabilization Plan, and the Makua Implementation Plan identify conservation measures that USARHAW would implement to help the recovery of some listed species in the ROI. ESA Section 7 consultation over USARHAW's routine training and SBCT actions on O'ahu and the island of Hawai'i would further protect and benefit listed species and habitat. The net effects of the projects on listed species and critical habitat is therefore considered significant but mitigable.

Loss and degradation of sensitive species and habitat. The cumulative impact on sensitive species that would result from project-related habitat loss and degradation would be significant. Development of land throughout the state has led to a degradation of biological resources, but habitats throughout the state continue to support common and sensitive species of plants and wildlife. A spread of invasive plants could cause landscape changes and thereby modify habitats important to sensitive species, such as the O'ahu tree snails. Elevated activity levels in and around wildlife areas provide conduits for alien species movement. The Kawaihae Harbor deepening project would temporarily degrade the quality of the water in the harbor and diminish its value to aquatic species, including protected marine mammals.

Proposed and recent projects on O'ahu and the island of Hawai'i would involve development in areas which are extremely valuable to sensitive species. Wind and soil erosion would result from increased and more extensive Army activities, and road projects such as the Saddle Road Realignment. Soil erosion results in water runoff and sedimentation. Training-related fires, described earlier, would also lead to an increase in soil erosion. Dismounted maneuvers, part of ongoing Legacy Force actions, as well as the proposed SBCT action would result in elevated soil erosion, lowered water quality, continued habitat fragmentation, and lowered habitat value. Mounted training or military vehicle use, part of SBCT and Legacy Force actions, and the expansion of training by the Army and Marines (Waikāne Valley) would disturb soils. The destruction of plants by foot or vehicle travel exacerbates the problem of eroding and windblown soils. Additional road construction projects on the highly erodible soils of the island of Hawai'i (Saddle Road and Kawaihae/Waimea Road) could create dust that would settle on sensitive plant species and may inhibit photosynthesis, though further study is required to determine how the rate of photosynthesis is altered. The increase in dust would degrade the water and generally lower value of habitat to sensitive species, such as the nene, Hawaiian hoary bat, and native snails. Increased use of vessels, helicopters, and general transportation would result from SBCT, the continuation of Legacy Force actions on O'ahu and the island of Hawai'i, and the potential increase in vehicles that would occur with the availability of better, less clogged roads. This would lead to the increased emission of contaminants, which could pollute the air and water and diminish the prevalence of natural resources. There also would be a loss of natural habitat through projects such as the Turtle Bay Resort expansion.

These impacts would be mitigated, as described in the Army's PTA and O'ahu INRMPs, the ESA Section 7 consultation for PTA routine training, the Mākua Endangered Species Stabilization Plan, the Mākua Implementation Plan (presently in draft), and other project-

specific measures. These impacts are sufficient to mitigate these to the less than significant level.

Threat to migratory birds. The towers that have been developed and that are projected to be developed in the near future as part of the project listed in tables 9-1 and 9-2 would be a significant impact on birds. Towers pose a threat to birds that inadvertently collide with them. The death of migratory bird species as a result of collision is considered a violation of the MBTA, which prohibits the taking or killing of migratory birds. The construction of large towers or any tower in important breeding or flying corridors would obstruct the flying patterns of migratory birds. Presently antenna construction is not restricted or strictly regulated, although there are suggested guidelines that have been designed by the USFWS to help avoid many of these impacts (Appendix I-3). Limiting the height of these towers, eliminating guy wires, and reducing the amount of lighting, particularly red lights (USFWS 2002), would greatly minimize the severity of these impacts on migratory birds. The extent of this cumulative impact is therefore considered significant but mitigable.

Noise and visual impacts on marine wildlife. The cumulative noise and visual impacts on marine wildlife would be less than significant. The US Army Corps of Engineers and the State of Hawai'i are proposing to deepen and expand the Kawaihae Harbor in the PTA ROI. This project would have some noise and construction-related impacts on marine wildlife that could pass through the waters. The relatively sparse distribution of marine mammals in the portion of the ROI that abuts the coastline and the seasonality of many species in the project area combine to make the probability of significant impacts on marine mammals extremely low and not adverse. Additionally, any spills would be mitigated by spill control procedures already in place. If it were deemed likely to affect a listed species, ESA Section 7 consultation would be undertaken to ensure that no species were jeopardized or its habitat adversely modified. Because SBCT project activities on PTA have a less than significant impact on marine wildlife, the addition of this project is not expected to result in any significant adverse impacts on marine wildlife.

Impacts on general vegetation and terrestrial wildlife. The cumulative noise and visual impacts on general vegetation and on terrestrial wildlife would be less than significant. Noise levels are not expected to increase to such a degree that it would be harmful to terrestrial wildlife. There is no additional aircraft use of O'ahu and the island of Hawai'i associated with the projects listed on tables 9-1 and 9-2. General vegetation and wildlife would be disturbed by vegetation removal. This would deter wildlife from foraging and would combine with other adverse effects from the projects listed in tables 9-1 and 9-2, such as live-fire training and building and highway construction projects.

Habitat within the ROI is for the most part disturbed natural and introduced landscapes. Activities limited to this area would mostly affect nonnative species adapted to stressed or nonnative environments. However, the further degradation of land and the loss of even small portions of land is problematic for native species, because of the great extent of habitat loss and disturbance that has altered native habitats. Projects such as the Turtle Bay Resort expansion, the construction of new roads, and the increase in use at MMR would have detrimental affects on habitat in their vicinity, and consequently on the species that have been supported by these habitats.

Increased energy use and pollution and their impact on biological resources. The construction activities and the use of additional facilities and their upkeep would lead to increased consumption of natural resources that would negatively affect wildlife and vegetation. The amount of natural resources is an important factor that shapes the carrying capacity and amount of vegetation and wildlife on a piece of land or water. More nonrenewable fossil fuels would be used to power construction and to maintain new facilities. Increased contamination would occur through the burning of fossil fuels and could lead to the need for further energy generation facilities.

Increased usage of large fuel inefficient vehicles such as the Stryker would lead to an increase in fuel usage. Road construction projects could encourage further use of vehicles but could result in better gas efficiency by alleviating traffic and improving road conditions. Although SBCT and the projects in tables 9-1 and 9-2 would not cause significant impacts on biological resources by themselves, in that no sensitive species or habitat would be directly threatened, there would be negative impacts that, when combined, would be significant. Solar and passive solar construction would help avoid the drain on natural resources that these projects might otherwise have. It is not possible to determine whether energy saving devices and strategies would be used, but there are many options of mitigating and minimizing these impacts, such as the use of renewable sources of energy to power these facilities. Attaching solar panels or wind turbines would allow units to generate their own energy, without creating toxic emissions or draining natural resources that are shared with vegetation and wildlife. The design and materials used in the facilities would also reduce the amount of energy needed to build and maintain the proposed facilities. Passive solar design techniques can significantly reduce the amount of energy necessary to light and regulate the temperature in buildings. This would help minimize nonrenewable energy consumption and the air and water pollution that results in burning or producing these resources.

Runoff impacts on marine wildlife and coral ecosystems. The cumulative impact of runoff on marine and coral ecosystems is likely to be less than significant. Road construction and increased use that could result from cumulative projects would contribute to runoff but are not likely to exceed the fluctuations in erosion and sedimentation that results from wind, rain and natural drainage.

Summary. Given the cumulative impacts described above, the Proposed Action, along with the projects listed in tables 9-1 and 9-2, would exacerbate the trend of habitat loss, habitat degradation, likelihood of fire, introduction of nonnative species and the subsequent endangerment and loss of endemic and native species. The conservation and recovery actions of federal and state agencies, such as those outlined in the MIP, would significantly reduce the impacts on native biological resources and would help to minimize or reverse the trend toward native habitat and species extinctions. Military projects add low frequency sounds in Hawaiian waters. SBCT actions are not expected to add to noise pollution in the marine environment and impacts from TSVs are too speculative to ascertain long-term effects for marine wildlife. The overall cumulative impact on biological resources would be significant, particularly on sensitive species and habitats. The proposed development and heightened human activities in O'ahu and the island of Hawai'i would reduce viable habitat and would reduce the population of sensitive species, as designated by federal and state agencies, or of a species with regional and local significance. It would alter or destroy high to

moderate value habitat, which would prevent native biological communities from reestablishing, and would introduce or increase the prevalence of undesirable nonnative species. Army training and construction activities are likely to cause the “take” of a highly sensitive resource, such as a threatened and endangered species.

Reduced Land Acquisition

Cumulative impacts would resemble impacts from the Proposed Action. The RLA Alternative would involve siting QTR2 at PTA and limiting the amount of land acquired as part of the SRLA. This would reduce the impacts on sensitive species and habitat on O‘ahu, but it could slightly increase the impacts on these same resources on the island of Hawai‘i.

As described under the Proposed Action, less than significant cumulative impacts on marine wildlife are expected.

No Action

Impacts from No Action would combine with impacts from the projects in tables 9-1 and 9-2 to continue habitat degradation and loss of habitat due to development and human activities. This would add to the decline of native species abundance and diversity. The impact on sensitive species and habitat would be significantly affected by No Action activities. The impact on general species and habitat would be less than significant. As described under the Proposed Action, less than significant cumulative impacts on marine wildlife are expected.

Cultural Resources

The ROI for cumulative cultural resources impacts is the sum of the ROIs of each SBCT installation but also includes broader geographic areas that are functionally or relationally linked.

Proposed Action

Since contact times, residential, commercial, and military development throughout the state has destroyed or damaged many cultural resources sites, but Hawai‘i’s rich history produced a dense collection of historic properties, many of which are as yet undiscovered. Military construction projects at MMR, SBMR, WAAF, and HAFB could result in a significant cumulative impact on cultural resources, including significant historic buildings, on military installations in O‘ahu. Barracks upgrades, the fire station, water tank, and laboratory construction, gate alignments, Marine training activities at Waikane Valley, and construction of the AFS, the ISF, the MSTF, and Drum Road could damage archaeological resources. Navy construction projects at Pearl Harbor and the RCI could affect archaeological resources and historic buildings. I3A construction at SBMR could have an adverse effect on a historic landscape as well, and local highway projects and bridge replacements could damage archaeological resources along the road alignments. The Residential Communities Initiative involves the transfer of historic family housing to private ownership, and this is considered an impact on historic properties. The proposed resumption of military training at MMR could result in significant cumulative impacts on cultural and historic sites in the valley, which is rich with archaeological sites and considered of vital significance to the native Hawaiian community.

Construction projects on the island of Hawai'i could result in significant cumulative impacts on cultural resources. Scoping comments indicate that there are significant Native Hawaiian resources in the area around Kawaihae Harbor, including an underwater heiau; the harbor deepening and the new highway from Waimea to Kawaihae Harbor could significantly affect these resources. Construction of the new range control building at PTA could have significant impacts on cultural resources, depending on its location.

The Army intends to implement an ICRMP for all its installations in the state. This plan would provide an inventory of cultural resources on Army properties and would provide management protocols for Army activities in order to protect and preserve cultural resources and comply with federal laws and regulations regarding cultural resources.

Although each of these civilian or military projects would be accompanied by an MOA or PA, in compliance with Section 106 of the NHPA, or documented and mitigated in compliance with state requirements, the cumulative impact on cultural resources on both O'ahu and Hawai'i could be significant because archaeological sites, TCPs, and historic buildings would be damaged or destroyed by these projects. These impacts could be limited to a greater or lesser extent, depending on the ability of project proponents to avoid or mitigate the damage.

Mitigation for these cumulative impacts would be to avoid archaeological sites and other cultural resources, to prohibit demolition of significant historic buildings and structures, to reuse these properties following the Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*, and to treat historic and prehistoric archaeological resources appropriately, should such resources be uncovered. In addition, Historic properties should be documented before being destroyed, in accordance with Department of Interior standards and Section 106 of the NHPA.

Given the damage or destruction of cultural resources from the cumulative impact of the Proposed Action and the other projects listed in this chapter, the Proposed Action would accelerate the trend of damage to cultural resources in Hawai'i. This cumulative impact would be significant but may be mitigable through compliance with federal and state cultural resources law.

Reduced Land Acquisition

The RLA Alternative would result in roughly the same cumulative impacts on cultural resources as the Proposed Action. The total impacts are likely to be fewer because the project-specific impacts under the RLA Alternative are fewer, but this would have a positive effect on O'ahu, and the change is not expected to greatly reduce the cumulative impact of the project.

No Action

No Action is not likely to contribute significantly to cumulative impacts on cultural resources.

Human Health and Safety Hazards

Cumulative impacts on human health and safety hazards may occur for various environmental issues. For the Proposed Action, the ROI is defined as the boundary of the installations, the military vehicle trail areas, and the lands immediately adjacent to the installations and military vehicle trail areas. The ROI for the cumulative effects on human health and safety hazards is the sum of the regions of influence of the Proposed Action and the areas affected by the cumulative projects listed above, with the exception of ammunition, UXO, and general training; the ROI for these military-specific impact issues would be the sum of the regions of influence of the Proposed Action and the areas affected by the cumulative projects listed above that would occur on military installations. The regions of influence for the cumulative projects listed above outside the Proposed Action vary in size and may not be well defined. In general, the cumulative impact assessment is intended to be descriptive rather than quantitative.

Proposed Action

Data from 1996 to 2000 show an overall declining trend in toxic releases to air, water, and land in Hawai'i. This declining trend is positive because air, water, and land are all environmentally connected (HDOH 2003). Specific trend information is provided under each subsection, as available.

Hazardous materials management. Chemical release data is reported yearly to the HDOH. No clear trend exists in the number of chemical releases from 1997 to 2001. Data from 1997 to 2001 shows that chemical releases on Hawai'i increased from 205 to 271. However, an increase in the number of releases does not necessarily correlate with an increase in damage to the environment because reporting does not include release volumes (HDOH 2003).

The Proposed Action and most of the projects identified in tables 9-1 and 9-2 (the only exceptions being the land acquisitions, training, and planning documents) would involve the transport, storage, and use of hazardous construction materials, such as diesel fuel or solvents. Because the transport, storage, and use of these hazardous construction materials would increase, cumulative impacts would include increasing the potential for these materials to be involved in an accidental release or an exposure. These projects would be required to transport, store, and use hazardous construction material according to material safety data sheet and label instructions, as well as applicable state and federal regulations. These impacts exist and are handled using best management practices and state and federal regulations, such as US DOT regulation 49 CFR 100-109, which ensures proper handling by shipping personnel and identification by emergency personnel if an accident involving hazardous materials should occur. No new regulations would need to be established to support the elevated level of hazardous material management from these cumulative projects. Cumulative hazardous material impacts would be less than significant. Based on limited historical chemical and hazardous material release data for the Hawaiian Islands, it is not possible to predict future hazardous material release trends.

Hazardous waste management. Hazardous waste generation is reported to the EPA by "large quantity generators" biennially in odd years. Overall, the quantity of hazardous waste generated in Hawai'i from 1991 to 1999 varied from 1,300 to 3,000 tons. From 1991 to 1999 the trend in hazardous waste generation has generally decreased after a slight increase

between 1993 and 1997. Waste generation data from small quantity generators were included in the survey in 1995 and could be responsible for the increased amount (HDOH 2003).

The Proposed Action and the projects identified in tables 9-1 and 9-2 (with the exception of the land acquisition, training, and planning document projects) would result in hazardous wastes from construction and renovation. All of the projects would be required to comply with state and federal hazardous waste disposal regulations, such as disposing of hazardous waste in an appropriate landfill. 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 during construction and renovation.

In addition, the upgrade to the advanced wastewater treatment facility would provide a beneficial impact in supporting the growth in personnel and preventing waste backup or system malfunction.

Based on limited historical hazardous waste accumulation data for the installations and the Hawaiian islands, it is likely that waste generation would decrease.

Ammunition. MMR training and Waikāne Valley training would include the continued or increased use of ammunition. There would be a significant increase in cumulative ammunition storage, use, transportation, and disposal among these projects because of the Proposed Action. An EIS is being prepared for training at MMR and an environmental assessment is being prepared for Waikāne Valley training. These environmental documents would address activities involving ammunition storage, use, and transportation and would recommend appropriate mitigation measures. In addition, the 120mm mortar would likely be used by future Legacy Forces not associated with the Proposed Action. For any project using ammunition, the storage, use, or transport of ammunition requires strict adherence to established regulations. Although no new regulations or policies would need to be established, this cumulative impact is considered significant due to the 25 percent increase in ammunition included in the Proposed Action.

Because future ammunition needs, such as those for wartime, or technology are unknown, it is not possible to predict future ammunition trends.

Unexploded ordnance. The presence of UXO could affect the Proposed Action projects and some projects listed on tables 9-1 and 9-2, such as the Kahuku Windmill and Hook Parcel and PTA 1010 Land Acquisitions, the Saddle Road Realignment Project, and the controlled burn projects at Army ranges. 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. In addition, the 120mm mortar, which could produce UXO, would likely be used by future Legacy Forces not associated with the Proposed Action. Although UXO presents a significant impact, proper abatement and removal techniques under EPA and USARHAW guidelines would mitigate the impact. With regard to the former Waikoloa Maneuver Area and Nansay Sites UXO Cleanup, the Saddle Road corridor was categorized as a medium risk, based on an engineering evaluation/cost analysis conducted for the area, which includes a risk-based

analysis for human and environmental health. A UXO clearance would be needed prior to Army maneuvers and trail alignment under the Proposed Action in order to avoid remnants of past live-fire training. Officials should check with Navy training schedules and the training area layout on the Pu'u Pa Maneuver Area to avoid affecting or being affected by ongoing training. There would be a significant cumulative impact regarding UXOs.

Beneficially, the controlled burn projects, listed on Table 9-1, specifically at MMR, identifies and removes UXO from the land. Plans to make the burn an annual event are under discussion. Based on historical data and increased technology, it is possible to predict a decrease in UXO casualties.

General training. Most of the projects identified in tables 9-1 and 9-2 do not involve training; for these projects, there would be no cumulative training impacts. However, a few of the projects occur on or near installation training areas, and, for them, both training and construction would be coordinated to prevent conflicts between the Proposed Action and the other projects identified in tables 9-1 and 9-2.

The land acquisition area proposed for KTA, listed on Table 9-1, would introduce elevated levels of training on this land. KTA is a nonlive-fire training area, with SRTA ammunition only used within the existing training area. The PTA land acquisition area, listed on Table 9-2, has supported training in the past under a lease agreement with the land owner, so no new impacts would be introduced to this area. Each of these parcels would be used for training regardless of the approval of the Proposed Action, so cumulative impacts with respect to general training is considered less than significant because adverse impacts would be minimal. Because future training needs are unknown, it is not possible to predict future training trends.

Installation Restoration Program sites. Although some of the cumulative projects listed on tables 9-1 and 9-2 are near IRP sites, no projects are known to overlay these sites and therefore are not expected to disrupt restoration progress of the sites. The Proposed Action includes one project overlaying an existing IRP site and one project overlaying an existing Superfund site. For this reason, there would be a significant cumulative impact on IRP sites.

Based on increased technology and government regulation it is possible to predict an increase in IRP site cleanup.

Lead. The Proposed Action and most projects identified in tables 9-1 and 9-2, with the exception of land acquisitions, training and planning document projects, could expose workers to lead at project sites. This impact would be relevant at any installation where structures would be renovated or demolished. The impact is considered significant but mitigable because lead surveys of facilities and structures included in the impact area would be updated before construction began, and best management practices are expected to be implemented to protect workers, as per USARHAW and OSHA guidelines. Beneficially, the new structures would not contain lead-based paint or construction materials, thus eliminating potential future exposure to the public or the environment. Based on increased technology and government regulation and because the use of lead-based paint has been discontinued, it is possible to predict a decrease in lead-based paint contamination.

Asbestos. The Proposed Action and most projects identified in tables 9-1 and 9-2, with the exception of land acquisitions, training, and planning document projects, could expose workers to asbestos at project sites. This impact would be relevant at any installation where renovation, demolition, or grading takes place. The impact is considered significant but mitigable because asbestos surveys of facilities and structures included in the impact area would be updated before construction began, and BMPs are expected to be implemented to protect workers, as per USARHAW and OSHA guidelines. Asbestos-containing construction materials would be avoided where possible to reduce future exposure to asbestos. Based on increased technology and government regulations and because the use of ACM in construction materials has decreased, it is possible to predict a decrease in ACM contamination.

Polychlorinated biphenyls. All projects listed on tables 9-1 and 9-2 are not suspected to be affected by PCB-containing devices or PCB-contaminated soils because the Army has been dedicated to retrofilling and upgrading all equipment suspected to contain PCBs. Cumulative project sites would be surveyed for PCB contamination and managed according to EPA and USARHAW guidelines to reduce the impact. Although the Proposed Action projects are locally effected by PCBs, within the cumulative ROI there would not be a significant cumulative impact as this isolated potential PCB exposure source would not affect the sum of the areas of influence of all the above projects. Based on increased technology and government regulations and because the use of PCBs has decreased, it is possible to predict a decrease in PCB contamination.

Electromagnetic fields. The ROI for cumulative EMF impacts is the ROI for the Proposed Action and the regions affected by the cumulative projects listed on tables 9-1 and 9-2. Because electricity and communications equipment would be used in 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 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. The cumulative projects listed on tables 9-1 and 9-2 do not indicate the presence of equipment capable of significantly increasing EMF exposure trends on the islands.

Petroleum, oils, and lubricants. Oil release data is reported yearly to the HDOH. No clear trend exists in the number of oil releases from 1997 to 2001, the data from which shows that oil releases on Hawai'i decreased from 295 to 171. However, a decrease in the number of releases does not necessarily correlate with a decrease in damage to the environment because reporting does not include volumes (HDOH 2003).

The EPA certified that there were 1,702 confirmed releases from USTs from 1987 to 2002. By 2002, 77 percent of the UST releases had been completely cleaned up, 17 percent had been partially cleaned up, and 6 percent had yet to be addressed. The overall trend shows that cleanups of LUSTs have increased, while the number of new releases has decreased (HDOH 2003).

The Proposed Action and the other projects identified in tables 9-1 and 9-2 could expose workers to POLs during construction and operation. Best management practices and EPA and USARHAW protocols are expected to be followed during the use and handling of POLs under each cumulative project. Two roadways, Saddle Road and Drum Road, included on tables 9-1 and 9-2 would be traveled by military vehicles. The Proposed Action would increase the use of these 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 these potential releases to the public environment.

Each installation maintains strict standard operating procedures and spill contingency plans for hazardous materials and waste identifying specific operating responsibilities and procedures. The impact is considered less than significant. Based on historical data, increased technology, and increased environmental regulation, it is possible to predict a decrease in POL releases and an increase in POL cleanups.

Pesticides/Herbicides. Pesticides, fertilizers, herbicides, and other chemicals that are applied to the ground eventually seep into the drinking water aquifers. Analysis of safe drinking water data gives an indicator of clean water management. Data from 1994 to 2001 show that the percentage of the Hawaiian population served water below maximum contaminant levels increased from 95 to 100 percent.

There would be an increased use of pesticides/herbicides by the Army for pest management on the land acquisition areas identified in the Proposed Action, the Kahuku Windmill Hook Parcel, and the PTA 1010 Land Purchase parcel adjacent to PTA. This application would be a less than significant impact because 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. In addition, in conjunction with the prescribed burn of training ranges in Hawai'i (Project 13) to control vegetative fuel load, pesticides would be applied by aerial broadcast spray prior to the burning activities to reduce live vegetation. This practice could present a significant but mitigable impact by following proper abatement procedures and Army protocol. The burn management plan is being finalized and highlights specific BMPs (such as postponing sprays during periods of high wind) and designates required spray safety distances from developed areas, in accordance with Army Regulation 200-5, Pesticide Management. The relevant installation-specific pest management plans would be updated following the proposed land acquisition activities to include these areas. Pesticides would continue to be stored in designated storage sites. Based on increased technology and stricter environmental regulations, it is possible to predict a decrease in pesticide/herbicide releases and an increase in pesticide/herbicide contamination remediation.

Biomedical waste. The Proposed Action presents an increase of 810 soldiers, 502 spouses, and 1,053 children to be stationed at SBMR, which could increase demand for medical care. The impact is considered less than significant, however, because the method of management and disposal would not change. In addition, most projects identified in tables 9-1 and 9-2 would involve upgrading and maintaining Army facilities and procedures and would not

significantly increase the need for medical care. There would be no significant cumulative impacts regarding medical waste.

Radon. Radon occurs in low concentration in the Hawaiian Islands below EPA's recommended action levels. Radon has not been identified at any of the Proposed Action sites and surrounding areas. The Proposed Action and projects listed in tables 9-1 and 9-2 are not expected to be affected by radon, so there would be no significant cumulative impacts. Based on historical radon data for the installations and the islands within the state of Hawai'i, it is possible to predict that future radon levels will not be an issue.

Wildfires. Based on available data, approximately 90, 110, and 130 fires were identified at SBMR in 1998, 1999, and 2000, respectively. 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. No wildfire trend data is available for DMR, KTA, and KLOA. Between fiscal years 1997 and 2002, between seven and 20 fires yearly on O'ahu and between 42 and 80 fires yearly on Hawai'i were reported to the Division of Forestry and Wildlife's Fire Management Program. The number of fires per year for both islands fluctuated. The mission of the 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. 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 (DLNR 2003e). 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.

The ROI for cumulative wildfire impacts is the ROI for the Proposed Action and the regions affected by the cumulative projects listed on tables 9-1 and 9-2. With respect to specified cumulative projects listed on the tables, some of the other projects would occur in or adjacent to areas where wildland fires could occur. As with the Proposed Action, the cumulative projects are expected to contain mitigation measures and SOPs to minimize potential environmental impacts involving wildfires. The EIS being prepared for MMR would address activities that could ignite wildfires and would include recommendations for mitigation measures. Roadway improvement projects could involve activities and materials capable of starting a wildfire and would be required to adhere to Hawai'i Department of Transportation 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. Once the FMAs and standing operating procedures for PTA, SBMR, SBER, KTA, KLOA, and DMR are completed, potential impacts involving wildfires are expected to diminish. Upgrading the SBMR fire station would also have a beneficial impact on wildfires at the installation. Cumulative impacts involving wildfires are expected to be less than significant because of the steps all project owners are expected to take to prevent wildfires.

Summary. The only significant unmitigable cumulative impacts to arise from the Proposed Action would be those from ammunition and IRP sites. Due to construction activities,

significant impacts may arise by encountering lead or asbestos in the existing building construction, UXO within the project areas, or pesticides during the aerial broadcast spraying of range areas. With proper abatement procedures following existing regulations, these impacts are mitigable resulting in less than significant effects. All other issues are considered less than significant as either no impacts would be encountered or the resulting impacts would be handled or addressed in accordance with existing BMPs and SOPs, thus introducing no new impacts on the public or environment.

Reduced Land Acquisition

All of the cumulative impacts identified above for the Proposed Action would be the same for Reduced Land Acquisition, which still involves the same overall impact issues as the Proposed Action. Therefore, the only significant unmitigable cumulative impacts from the Proposed Action would involve ammunition and IRP sites, while UXO, lead, asbestos, and pesticides would be significant yet mitigable cumulative impacts.

No Action

Under No Action impacts involving human health and safety hazards would still be possible under the identified development, planning, and training projects. All of the cumulative impacts identified in tables 9-1 and 9-2 for the Proposed Action would be the same for the No Action, with the exception of impacts resulting from implementing the Proposed Action, which includes ammunition, UXO, and IRPs. These impact issues would present less than significant cumulative impacts under No Action. Otherwise, No Action still involves the same overall impact issues as the Proposed Action. There would be no significant cumulative impacts involving human health and safety hazards, with the exception of lead, asbestos, and pesticides, which are significant yet mitigable.

Socioeconomics

Proposed Action

Long-term direct and indirect beneficial cumulative effects are expected as a result of the Proposed Action, which is expected to increase employment and sales volume in the ROI (the ROI includes Hawai'i and Honolulu Counties; see Section 4.13.1). Additional increases in employment, income, and sales could also occur from other actions, which include the Whole Barracks Renewal Program at SBMR, the RCI Program, construction of a new soldier and family readiness center at SBMR, the Kamehameha Highway bridge replacement, the Farrington Highway improvements, and the Turtle Bay Resort improvements. The beneficial economic effects (i.e., increased employment, income, and spending) of these actions are expected to last for the duration of the projects, but they could extend beyond that.

The increase in population from the SBCT Proposed Action would increase ROI population by less than one percent. This increase in population and the subsequent spending would be within historical limits and would not adversely affect the ROI economy (see Table 4-18 and Appendix L, EIFS Model). Other known actions are not expected to increase ROI population. Furthermore, population projections through 2020 generated by the State of Hawai'i indicate continued slow growth in Honolulu and Hawai'i Counties, as well as in the State of Hawai'i (DBEDT 2000, 2003). Projections for residential population growth, including and excluding armed forces, indicate a decrease in growth rates throughout the

forecast period. For example, the projections indicate the annual population growth decreases from a rate of one percent from 2000 to 2005 to 0.9 percent from 2005 to 2020.

Long-term minor adverse cumulative effects on schools could occur, but this cannot be definitively determined at this time. The proposed SBCT action addressed in this EIS would increase the primary and secondary school population by approximately 760 children. A separate proposed action, the RCI, could also affect school enrollments. RCI could result in more military families living at SBMR, which would increase the enrollment of Solomon and Hale-Kula Elementary Schools and the off-post schools serving SBMR, Wheeler Intermediate School and Leilehua High School. However, at this time it is not known how the number of on-post housing units would change under RCI. The proposed quantity and type of family housing on SBMR will not be determined until a private developer is selected, so the number of school children affected by RCI is also not known. One can assume that if RCI would increase the number of families living on SBMR, the number of school-age children would increase as well, resulting in cumulative adverse effects on schools serving SBMR. However, this is speculative at this time.

As noted above, the State of Hawai'i projects slowing population growth until 2020. This projection more specifically indicates a decrease in some school-age population during this period. For example, the population of school-age children 5 to 11 is projected to decrease at an annual rate of 1.2 percent from 2000 to 2005 (DBED'T 2000). The population of school-age children 12 to 13 is projected to decrease at an average annual rate of 2.6 percent from 2005 to 2010. While local school districts or individual schools may experience population pressures at variance from these averages, the overall demographic trends for Hawai'i indicate that the state's educational system will not face significant increases in student enrollment during the period of project implementation and may in fact experience declining enrollments in some schools.

ROI housing could be affected by several actions. The SBCT action is expected to increase demand for on- and off-post housing. However, the whole barracks renewal program and RCI would improve the quality of housing available to soldiers and their families, which could encourage families to relocate to base housing and reduce the demand for off-post housing in the ROI. It is not yet known what the exact net number of housing units on SBMR would be after the whole barracks renewal program and RCI are completed, but there would still not be enough housing units for every soldier stationed at SBMR and there still would be a demand for off-post housing. As noted above, because residential population growth for Hawai'i is projected to be slow from 2000 to 2020, overall population pressures on the housing market should have little or no cumulative effect.

No adverse cumulative effects on the protection of children would be expected. Noise sources associated with Proposed Action construction projects, or construction projects from other actions occurring in the ROI would not result in a significant change from No Action. Increases in traffic would result in a minor increase in the risk of adverse health affects on children. To minimize effects, strict adherence to applicable safety regulations and procedures would continue. Construction and training activities under the Proposed Action would, for the most part, take place in areas that are off-limits to the general public.

Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards.

Given the cumulative impacts described above for population, schools, and housing, the Proposed Action, along with other projects listed in this chapter, would not substantially alter the current and projected trends for these socioeconomic indicators.

Reduced Land Acquisition

Reduced Land Acquisition would result in similar impacts on socioeconomic resources as those described under the Proposed Action.

No Action

No Action would not contribute incremental impacts on the cumulative socioeconomic effects of ongoing and proposed projects on O'ahu and Hawai'i. This is because implementing No Action would not change the local economy, population, or housing, and it would not alter the existing health and safety, housing, or economic conditions of children, minority, or low-income populations in Hawai'i or Honolulu Counties.

Utilities and Public Services

Proposed Action

Public and private sectors in Hawai'i have reduced energy demand in recent decades. Between 1980 and 1995, growth in energy use lagged far behind population growth. Due to alternative energy sources and increased conservation, per capita energy demand is decreasing. Demand for water has been growing in the Ewa area of O'ahu, but the windward side of the island currently has sufficient supplies. Wastewater in Hawai'i is treated by wastewater treatment plants and by underground injection control (Juvik 1998, 2002). Also, as discussed in Chapter 3 and in this chapter under Socioeconomics, projections for residential population growth including and excluding armed forces indicate a decrease in growth rates throughout the forecast period. Trends regarding demand for utilities and public services normally reflect population growth, which is minimal.

The Proposed Action could contribute cumulative effects on public services and utilities. The ROI for the cumulative effects would include the islands of O'ahu and Hawai'i, since these would be the regions influenced by the Proposed Action in combination with the cumulative projects listed above. The additional population and the building space and facilities to be constructed at SBMR and PTA under the Proposed Action, as well as any increases in training at new and existing facilities, would increase demand on utilities and services. These demands would be in addition to the demands that ongoing and proposed construction and training would place on these services and systems.

The potentially increased demand placed on fire protection services at SBMR under the Proposed Action could be somewhat offset by the upgrade of the SBMR fire station and the development of fire management areas and SOPs.

The Proposed Action would increase the number of Army personnel and their families, and this would increase the demand for potable water at SBMR and on O'ahu, where the

demand for potable water is increasing in some areas almost to the capacity of the available supply. In addition, operation of the vehicle wash facilities would increase water use compared to No Action. These increases are not expected to be significant with respect to the overall demand for water. Increases in the overall demand for water on O‘ahu could be offset if the Honolulu Board of Water Supply undertakes plans that are now under consideration to link areas of surplus water to those with inadequate supplies.

Implementation of the advanced wastewater treatment upgrade at SBMR could offset the (less than significant) impacts caused by the increased Army personnel and their families at SBMR. Since wastewater is treated internally at SBMR, it would not contribute to any island or state-wide trends regarding any increased demand for treatment facilities. Proposed Action requirements for additional computer and server equipment, combined with information system and support training projects identified in tables 9-1 and 9-2, could increase demand for fiber optic lines. This increase in demand, however, is not significant and increases in capacity of fiber optic lines on Army installations and in the Hawai‘i area are expected to accommodate new demand.

Cumulative construction activities from the Proposed Action 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 to a less than significant level through recycling and converting waste to energy. SBCT activities would also contribute incrementally to the total area of impervious surfaces created by cumulative construction activities. The contribution of the Proposed Action to stormwater runoff impacts would be minimized to less than significant levels by implementing such standard construction practices as grading and installing curbs, drains, and gutters. Construction of new facilities at SBMR and PTA in combination with other construction projects, such as the fire station, soldier and family readiness center, mission support training facility, and physical fitness facility at SBMR, Farrington Highway improvements, Turtle Bay Resort improvements, Drum Road Upgrade, Kamehameha Highway improvements, troop rigger facility, the Saddle Road realignment, the Kawaihae/Waimea Road, and the Waimea to Kawaihae Highway, would increase impervious surfaces, would contribute incrementally to increased impervious surfaces and increased runoff. However, each construction project would be designed to accommodate additional runoff and facilities on SBMR and PTA would be designed to comply with Phase 2 stormwater management regulations (described in the Water Resources Sections) to control runoff.

Electricity demand is expected to increase as a result of cumulative construction projects and would place an additional demand on these utility systems. While the Proposed Action 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 - Greening the Government Through Efficient Energy Management (June 4, 1999). Therefore, new delivery lines would have to be installed to supply new facilities with electricity.

The Proposed Action, in combination with ongoing and proposed projects, would have beneficial cumulative effects on public services and utilities. New utility infrastructure constructed in support of the Proposed Action, in addition to the cumulative infrastructure and fire service improvement projects, would improve public services and utilities in the region. Given the cumulative impacts described above, the Proposed Action, along with other projects listed in this chapter, would contribute to the beneficial trends of decreased energy use in Hawai'i.

Reduced Land Acquisition

Reduced Land Acquisition would result in similar cumulative impacts on public services and utilities as those described in greater detail under the Proposed Action.

No Action

No Action would not contribute incremental impacts on the cumulative effects on public services and utilities of ongoing and proposed projects on O'ahu and the island of Hawai'i because implementing No Action would not change the provision of public services or utilities.