CHAPTER 5 CUMULATIVE IMPACTS

5.0 INTRODUCTION

CEQ regulations implementing NEPA requires assessment of cumulative impacts of a Proposed Action (40 CFR Parts 1500-1508). A cumulative impact is defined as 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 regardless of what agency (federal or non-federal) or person undertakes such actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 CFR §1508.7). The Army's NEPA regulations (32 CFR 651.51(a)(1)(ii)) also require that cumulative actions, those that have cumulatively significant impacts, be discussed in the same EIS. 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).

Chapter 5 addresses cumulative effects of the Proposed Action in the context of other actions within the ROI and during the planning horizon. Section 5.1 presents the methodology used to evaluate cumulative impacts. Section 5.2 discusses other projects on the island of Hawai'i that may have cumulative effects when combined with the impacts from the proposed project within this document. Section 5.3 identifies and describes the cumulative impacts for each of the resource areas discussed in Chapters 3 and 4. Each future project would undergo a NEPA review with more detailed information on potential specific resource area impacts.

5.1 METHODOLOGY FOR CONSIDERING AND ANALYZING CUMULATIVE EFFECTS

The Army first identified other projects and actions (military and public) that have or may occur in the past, present, or reasonably foreseeable future within the ROI. The Army selected projects using a number of different methods; some of these include:

- Reviewing actions recently proposed by the military, with some or all of the Proposed Action potentially influencing PTA (e.g., training the MV-22 Osprey at PTA, HAMET, and training facilities at PTA developed by the Marine Corps)
- Identifying current training requirements by the Army, Navy Marine Corps, and the Air Force at PTA (discussed in Chapter 1 of the EIS)
- Projects originally identified in the Draft PEIS that are still likely to be completed, including the projects in this Final EIS, the execution of which may extend beyond the five-year POM process (FYs 12-16), but for which the Army or other proponents have publicized for the preparation of planning documents
- Reviewing projects recently proposed or implemented by public entities (e.g., implementation of the State Highways Modernization Plan, Saddle Road Realignment, and implementation of the 'Āina Mauna Legacy Program). The Army identified some of these projects early in the EIS planning process through internet research and public scoping in January 2011
- For all of these categories the Army considered whether funding for them was still likely in the current fiscal situation
- Given the much smaller scope of the Proposed Action (IPBC only), the Army reviewed actions identified in the Draft PEIS to determine if the IPBC would conceivably add any incremental impact.

Cumulative impacts are generally best assessed by resource area (e.g., water resources, air quality, socioeconomic impacts), and impacts may arise from single or multiple actions, or may result in additive or interactive effects. Interactive effects may, in some cases, be countervailing, where the adverse cumulative effect is less than the sum of the individual effects; or they may be synergistic, where the net adverse cumulative effect is greater than the sum of the individual effects (CEQ, 1997). For individual resources, the ROI for cumulative impacts is often larger than the ROI for direct and indirect impacts (identified in Chapter 3 of this Final EIS within the sections covering each resource area). The factors considered in determining the significance of cumulative impacts are often the same as those presented in Chapter 4 of this EIS.

It should be noted that while the direct impacts of some individual projects (Table 5.2-1) were considered, there is very little quantitative data that was made available by project proponents for most projects listed in Table 5.2-1. An integral part of the cumulative impacts analysis involves determining whether impacts from the proposed projects would contribute to ongoing or foreseeable resource trends. The cumulative impacts analyses do not assess all expected environmental impacts from regional projects within the ROIs, but only those impacts resulting from both a project alternative and other past, present, and reasonably foreseeable future actions that influence a particular resource area. If a quantitative analysis cannot be formalized, the Army assesses qualitatively the potential cumulative impacts.

5.2 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE PROJECTS

This section summarizes past, present and reasonably foreseeable future actions in the applicable ROIs for the various resource areas. Table 5.2-1 lists the projects the Army identified that, when considering the Proposed Action in this Final EIS, could result in incremental impacts on a number of resource areas. These projects were identified through the review of recent NEPA documentation, identification of current training requirements by the military at PTA, long-term proposed projects, public scoping, and internet research.

5.2.1 Effect on MMR

For various reasons, live-fire training has not occurred at MMR since 2004. If the PTA IPBC were built, *some* of the 25th ID's live-fire training requirements could be met through its use. This would eliminate some training that would otherwise occur on O'ahu ranges, although the amount of this training cannot be calculated because so many factors are involved, including funding, future deployments, and availability of O'ahu ranges. Adding a further layer of complication, the Army could assume for the purposes of this analysis that live-fire training might someday resume at MMR. In that event, the required use of MMR could be reduced (although not eliminated) when units conduct required training at the PTA IPBC.

This would have the beneficial effect of reducing some of the negative impacts of Army training at MMR. The ROD for the 2009 MMR EIS found that there could be significant impacts in the following areas: land use and recreation, noise, geology and soils, biological resources, cultural resources, wildfires, and socioeconomic (USAEC, 2009b). MMR has not been used yet for live-fire training, so the Army does not have actual data on the impacts following the decision. It is assumed that any reduction in training at MMR would represent a reduction in risk in these areas of impact.

Table 5.2-1 identifies each project, its location (e.g., municipality or island), project proponent or sponsor, a brief description of the project, and an estimated year of project completion (based upon available information).

More descriptive information on each listed project is provided after Table 5.2-1.

Table 5.2-1. Projects on the Island of Hawai‘i Implemented in the Past, Present, and Reasonably Foreseeable Future

Project Name	Project Location	Project Sponsor	Project Description	Planned Project (Yr.)
Deepening of the Kawaihae Deep Draft Harbor	Kawaihae Harbor, Hawai‘i Island	Hawai‘i State	Deepened harbor to allow for increased drafts. The geographic scope was the Kawaihae Harbor located on the west side of the island in the Kohala region. Growing demand for cargo to support the rapidly expanding economy drove the need for the turning basin to be dredged and deepened to accommodate cargo vessel traffic.	2008
Air Force Drop Zones	PTA, Hawai‘i	Air Force	Several air drop corridors were reclassified with the FAA to enhance training and allow for flight operations below the minimum vectoring altitude over drop zones on the islands of O‘ahu and Hawai‘i.	2010
Construct Mock Airfield	PTA, Hawai‘i	Navy	Construction of a mock airfield in the PTA impact area; and installation and operation of technology to aid in simulated training exercises. The mock airfield provides realistic structural targets on simulated dense urban terrain at PTA to support carrier air wing with close air support and strike warfare training.	2010

Project Name	Project Location	Project Sponsor	Project Description	Planned Project (Yr.)
Develop and Use of Military Training Facilities on PTA	PTA, Hawai‘i	Marine Corps	Development of training facilities at PTA including a MOUT facility, CLF range, enhancement of three forward operating base sites, and construction of a live-fire grenade/shoot house facility. Facilities to meet current and future training requirements would be joint facilities with shared cost and usage between MCBH, Army units, and other users.	Ongoing
Current Army use of PTA	Hawai‘i	Army	Description of Army activities is found in Section 1.3.1.1	Ongoing
Current Marine Corps use of PTA	Hawai‘i	Marine Corps	Description of Marine Corps activities is found in Section 1.3.1.2	Ongoing
RIMPAC Exercises and current Navy use of PTA	Hawai‘i	Navy, Joint Forces	Description of Navy activities is found in Section 1.3.1.3	Ongoing
Current Air Force use of PTA	Hawai‘i	Air Force	Description of Air Force activities is found in Section 1.3.1.4	Ongoing
‘Āina Mauna Legacy Program	Hawai‘i	Department of Hawaiian Homelands (DHHL)	Homesteading program established to provide economic self-sufficiency of Native Hawaiians through the provision of land granted by the DHHL. This project would serve to preserve lands within the ‘Āina Mauna ecosystem, which is the upper region of the mountain lands that surround and include Mauna Kea.	TBD
Hydrologic Evaluation and Exploratory Drilling Program	Humu’ula Saddle Region, Hawai‘i	University of Hawai‘i’s Institute of Geophysics and Planetology	Proposed investigation of the subsurface geology and hydrology of the western Humu’ula Saddle region. The investigation involves the installation of two small-diameter, continuously cored, test bores to depths of approximately 1.2 mi (2,000 m) below ground surface.	2012

Project Name	Project Location	Project Sponsor	Project Description	Planned Project (Yr.)
Panoramic Survey Telescope & Rapid Response System (Pan-STARRS) – PS4 Telescope Suite	Area A, Hawai‘i	University of Hawai‘i’s Institute of Astronomy	While the project had planned to release a Draft EIS and reinitiate the NHPA Section 106 process in early 2010, the Institute of Astronomy and project leadership have decided to delay that action for 12-18 months to focus attention on utilizing FY2010 funding to bring Prototype Telescope (PS1) to full survey status and complete installation of PS2 in the existing Lunar Ranging Experiment Observatory on Haleakala.	TBD
Basing of the MV-22 and H-1 Aircraft in Support of III Marine Expeditionary Force Elements in Hawai‘i	O‘ahu and Hawai‘i	Navy	The Navy signed a ROD for the basing and operation of MV-22 Tiltrotor Osprey aircraft and H-1 helicopters in support of the 3rd Marine Expeditionary Force elements stationed in Hawai‘i. MCBH Kaneohe Bay was selected.	2012
Saddle Road Realignment	Hilo/Kona, Hawai‘i	FHWA, HDOT, Army	Project to straighten, repave, and separate military training from motorists. Approximately 250 mi (402 km) of road will be modernized to meet American Association State Highway and Transportation Officials standards.	2012
Former Waikoloa Maneuver area and Nansay sites	Waikoloa, Hawai‘i	Army	MEC/UXO clearance on the 135,000-ac (54,633 ha) former Waikoloa Maneuver area.	2015
BAAF Runway Realignment	PTA Cantonment Area, Hawai‘i	Marine Corps	Proposed realignment and extension of the BAAF runway, including construction of supporting infrastructure. The airfield operates under substandard conditions due to a relatively short runway, limitations imposed by mountainous terrain, presence of man-made obstructions to the east, winds from the east that increase throughout the day, and maximum tailwind landing restrictions, which impede mission requirements.	2018

Project Name	Project Location	Project Sponsor	Project Description	Planned Project (Yr.)
Rotary Wing Apron, Aircraft Control Tower, Aircraft Maintenance Facility, and other Airfield Improvements	PTA Cantonment Area, Hawai‘i	Marine Corps and Army	Proposed construction at BAAF to enhance PTA’s capability to provide air combat support and maintenance capability to aviation assets. Existing aircraft aprons and maintenance facilities at BAAF are aged and do not meet current requirements for the CAB to utilize the airfield fully at PTA.	2018
Multipurpose Storage Facility	PTA Cantonment Area, Hawai‘i	Marine Corps	Proposed construction of a permanent storage facility at PTA to gain efficiencies in meeting their training on mission essential and required pre-deployment tasks requirements at the installation.	2014
AGR (Aerial Gunnery Range)	PTA General Range Area, Hawai‘i	Army	Proposed construction, operation, and maintenance of an AGR on PTA. The AGR would meet critical collective unit training needs for both active and reserve component aviation units that train on the installation as well as for other military services who may use the range.	2022
Ammunition Storage Facility	PTA General Range Area, Hawai‘i	Army	Proposed construction of three concrete oval-arched, primary ammunition igloos at PTA, of standard design, that would be sited adjacent to the eight existing ammunition storage facilities at PTA.	2022
Ammunition Storage Facility	PTA General Range Area, Hawai‘i	Marine Corps	Proposed construction of several ammunition storage facilities that would be sited adjacent to existing ammunition storage facilities at PTA. This project is in the planning phase with the Marine Corps and has not been reviewed or approved by the Army.	2022

Project Name	Project Location	Project Sponsor	Project Description	Planned Project (Yr.)
Range Road Improvements-Charlie Circle Upgrade	PTA General Range Area, Hawai‘i	Army	Proposed project to increase the width of Charlie Circle Road to a size capable of handling military training and construction vehicle traffic. The existing Charlie Circle Road, a gravel road located west of the PTA impact area, provides access to the Western Range Area, conservation areas near that point, and range locations north of the Western Range Area.	2022
Urban Close Air Support (UCAS) Range	PTA, Hawai‘i	Marine Corps	Proposed construction of an UCAS range, located adjacent to the recently constructed Mock Runway and Range 22, in the southern portion of the PTA impact area to aid in training exercises for Marine Corps aviators.	TBD
Marine Corps Presence in the Pacific	Hawai‘i, Australia, and Guam	Marine Corps	DoD plans to redeploy 9,000 Marines currently based in Okinawa, Japan to bases in Hawai‘i, Australia, and Guam. A majority of the Marines are expected to move to Guam, with an estimated 2,700 Marines relocating to Hawai‘i. None of the Marines would be stationed at PTA; the Marines would continue to follow their training rotation schedules at PTA (as described in Section 1.3.1.2).	TBD
High Altitude Aviation Training (HAAT)	Hawai‘i	Hawai‘i Army National Guard (HIARNG)	The HIARNG requires training for helicopter pilots and crews in mountainous, high-altitude mission environments to satisfy compulsory aviation training doctrine. The HIARNG is preparing an EA to address the potential impacts from training and LZs at PTA or to lease private lands. HAAT training will also include the 25th CAB.	2013

Project Name	Project Location	Project Sponsor	Project Description	Planned Project (Yr.)
Thirty Meter Telescope (TMT) Project	Hilo, Hawai‘i	University of Hawai‘i	The project involves the construction, operation, and eventual decommissioning of an optical/infrared observatory on approximately 5 acres (2 ha) of presently undeveloped land on the northern plateau within the 525 acre (212 ha) Astronomy Precinct of the Mauna Kea Science Reserve near the top of Mauna Kea. The TMT Observatory’s main telescope will have a primary mirror 98 ft (30 m) in diameter and will be the most technically advanced telescope in the world.	Final EIS published May 2010; Completion of project TBD

5.2.2 Project Descriptions

5.2.2.1 Deepening of the Kawaihae Deep Draft Harbor

This project was undertaken on the island of Hawai‘i as a partnership between the USACE and Hawai‘i County, and Hawai**‘**i Department of Transportation (HDOT) Harbors Division (USACE and HDOT, 2003). The project began in 2003, and was completed in 2008. The geographic scope was the Kawaihae Harbor located on the west side of the island in the Kohala region. The harbor consists of an entrance channel, basin, and a “rubblemound” breakwater; and it provides maritime access for commerce and the military on the western side of the island. Growing demand for cargo to support the rapidly expanding economy drove the requirement for the turning basin to be dredged and deepened, resulting in a greater capability to accommodate cargo vessel traffic. An EIS reviewed a number of related impact studies (i.e., economic study, recreational resources, hazardous materials, disposal of dredged materials, cultural resources, impacts on flora and fauna and the marine environment, and sediment control). Adverse impacts of the greatest concern were associated with construction actions; specifically an increase in turbidity due to soil erosion (from on-shore activities), dredging, and driving piles into the harbor basin for piers. Several mitigation measures were identified to reduce the influence of siltation on the off shore coral reef and to avoid, to the extent practicable, impacts on the protected green sea turtle. Other significant impacts of concern included a permanent increase in noise from the upsurge in shipping vessel volume; and the introduction of non-native marine species from the ballast of foreign vessels. Land-based traffic volume surrounding the harbor also increased both in a temporary time period due to construction, and over the long-term to account for the transportation of shipping supplies.

5.2.2.2 Air Force Drop Zones

The Air Force currently uses drop zones at PTA to drop Air Force pallets and DUDs. The Air Force provided a Letter of Agreement for review to the FAA to reclassify the drop zones to allow for flight operations below the minimum vectoring altitude (under IFR conditions) over drop zones on the islands of O'ahu and Hawai'i (drops could occur below Honolulu airspace in poor weather conditions and at lower altitudes). Aircraft would continue to fly the same routes they presently fly at PTA and would not increase the number of air drops at PTA. The Air Force has better drop zones at Schofield Barracks and Turtle Bay; the drop zones at PTA would only be used as part of the Navy's RIMPAC exercise to enhance training and provide guidelines for all agencies, making these operations safer for all involved. The Air Force prepared an AF Form 813 identifying that the Proposed Action qualified under CATEX A2.3.36 to adopt an airfield approach, departure, and en route procedures that are less than 3,000 ft (914 m) above ground level, and that also do not route air traffic over noise-sensitive areas, including residential neighborhoods or cultural, historical, and outdoor recreational areas (Air Force, 2010).

5.2.2.3 Construct Mock Airfield

The Navy constructed an airfield mock-up in the PTA impact area; in addition, the Navy plans to install and operate a Mobile 2 Electronic Warfare (EW) System, time sensitive targets, and Identify Friend or Foe (IFF) Radar.

The mock airfield provides realistic structural targets on simulated dense urban terrain at PTA to support carrier air wing with close air support and strike warfare training. Close air support in a dense urban environment is recognized as one of the most complex and challenging missions an aircrew will perform because it requires precision weapon delivery. Target systems are unpowered plastic decoys that provide a realistic visual signature for identifying, targeting, and engaging mobile land-based targets. Decoys are deployed on trailers and towed behind standard full sized trucks. The targets are set at established locations on the mock airfield. Typically, these decoys are removed from the range and returned to the PTA Cantonment Area (or another developed area) nightly or upon completion of the event. The Navy sought a location within the impact area because the mock airfield and targets would be used in bombing training exercises (using inert bombs only).

The Navy additionally proposed Mobile EW System to support Strike Warfare and Electronic Combat training. EW training is essential to training friendly aircrews and surface systems operators to recognize threats in the RF spectrum.

This system provides EW emissions in support of Strike Warfare and Electronic Combat training. EW training is essential to training friendly aircrews and surface systems operators to recognize threats in the RF spectrum. For aircrews, EW training consists of flying within a known volume of airspace while shore-based EW assets illuminate the aircraft with preformatted Surface-to-Air Missile (SAM), anti-aircraft artillery (AAA), and RF jamming signals to stimulate the onboard threat warning systems and cockpit displays.

Time sensitive targets represent visual, infrared, acoustic, and radar signatures to train with ground-to-ground and air-to-ground weapons that employ intelligent seekers (munitions).

The Navy's EA (2007) concluded that the proposed action would not have any un-mitigable, significant direct, indirect, or cumulative adverse impacts on the environment. Impacts chiefly were related to temporary air quality impacts during the construction phase. No endangered or native species were present in the area and the terrain limited the number of native species.

5.2.2.4 Develop and Use Military Training Facilities on PTA

In March 2006, the 3rd Marines laid out a development concept to maximize the ground combat element use of PTA to support current and future training requirements. The Marine Corps plan involved the creation of a training complex at PTA to support combined arms live-fire and maneuver training, urban warfare training, convoy live-fire training, and weapons training.

Facilities to meet current and future training requirements would be joint facilities, with shared cost and usage between MCBH and Army units and other users. The Marine Corps prepared a 2009 EA covering construction and operation of a MOUT facility, CLF range, building a live-fire grenade/shoothouse, and enhancement of three FOB sites by developing modular perimeter walls and improving trail access (USAG-HI, 2009a).

5.2.2.5 ʻĀina Mauna Legacy Program

The DHHL proposes to homestead up to 56,200 ac (22,743 ha) of land located on the northeast slopes of Mauna Kea, known as the Humuʻula and Piʻihonua area. The Humuʻula parcel makes up about 49,100 ac (19,870 ha), and the Piʻihonua parcel makes up about 7,078 ac (2,864 ha) of land. According to the program Web site,[72] vegetation of the area is largely introduced pasture grasses with koa/ʻōhiʻa forest found in the lower portions of Piʻihonua, and in lands adjacent to the Hakalau Forest National Wildlife Refuge. Scattered koa and māmane are found over the northern portions of Humuʻula with scattered māmane found in the upper elevations, especially adjacent to the Mauna Kea Forest Reserve. The habitat there serves several threatened or endangered species, including the palila.

The program for the Humuʻula and Piʻihonua area has the multiple goals of ecosystem restoration, conserving wildlife habitat, reducing threats to the ecosystem, generation of revenue for reinvestment into property management, focus conservation management for the ʻĀina Mauna, and serve beneficiary needs (of Native Hawaiians). Land managers would implement a number of projects to further program goals, including:

- Recovering native forest through ungulate control, fencing, seed collection, site preparation and irrigation, access road maintenance and development
- Incorporate a sustainable forestry program through plant propagation, decreasing fire hazards, planting, and seed orchard development
- Develop facilities, including water catchment, photovoltaic system, wind generators, fog drip augmentation system, composting toilets, etc., to be managed by dedicated workers

[72] http://hawaiihouseblog.blogspot.com/2012/02/aina-mauna-legacy-project.html

- Conduct invasive species control measures through clearing and mulching, controlled burns, hand and aerial spraying, and use of biological controls
- Develop an administration base facility that includes living and dining space, office space, and laboratory space to promote full time land management and minimize traffic to- and from the property
- Develop a well and groundwater distribution system to facilitate land restoration operations and domestic use, including consumption
- Implement a timber planting and harvesting program over 10,000 ac (4,407 ha) to 15,000 ac (6,070 ha) that would dually work to eradicate introduced plant species
- Construct fencing and roads to protect seed propagation
- Construct 100 to 200 homesteads that would require site preparation (clearing and grubbing for home properties, install alternative energy systems, and construct unpaved access roads
- Restore historic facilities (i.e., Sheep Station) and develop remote accommodations and commercial facilities to promote site management and eco-tourism. Conduct research on natural and cultural resources to promote resource preservation and management.

In February 2012, the DHHL held an informational briefing update describing the initial phase of the Program and its three main goals: to restore and protect native forests, eradicate gorse (an invasive species of prickly brush), and eradicate ungulates, including cattle, goats, sheep, and pigs. Once the three goals are realized, homestead and commercial development will begin on parts of the ʻĀina Mauna lands.

5.2.2.6 Hydrologic Evaluation and Exploratory Drilling Program

The proposed project is being undertaken in an effort to develop a better understanding of the hydrologic processes and groundwater system within the Humu'ula Saddle region. Recent research on the island of Hawai'i demonstrated that the accumulation and storage of groundwater is substantially greater than prior models have indicated and that the residence time of water within the island is substantially greater than had been thought. The collection and analysis of core samples will: provide a detailed record of the geologic history and structure within the study area; and document the geologic structures responsible for retention and flow of groundwater through the area. The bores will enable access to one or more saturated aquifers within the stratigraphic column and allow sampling for chemical and isotopic analysis of groundwater. The source and residence time of groundwater within the region can then be determined. The bores will also enable long term monitoring of the aquifers within the Saddle to better assess the magnitude of the groundwater resource within the region and to track the impacts of global climate change on the island of Hawai'i groundwater resources. The need for the information provided by the project is that associated with long-term, sustainable management of Hawai'i's groundwater resources in a region for which almost no hydrologic data is currently available (Thomas, 2012).

5.2.2.7 Pan-STARRS

The University of Hawai‘i’s Institute of Astronomy’s Pan-STARRS PS4 Telescope Suite is proposed to be constructed on the site of the University of Hawai‘i 2.2-meter telescope on Mauna Kea. The geographic scope of this project is to remove the current 2.2-meter telescope and its building and to construct PS4 (a suite of four telescopes) inside a smaller building that has reduced visibility and a design that blends into the background compared to the current facility. In December 2010, a Notice of Intent to prepare an EIS was published in the **Federal Register**; the EIS is on hold in order to allow the program to utilize FY2010 funding to bring the PS1 telescope to full survey status and complete installation of the PS2 telescope in the existing Lunar Ranging Experiment Observatory on Haleakala.[73]

5.2.2.8 Basing of the MV-22 and H-1 Aircraft in Support of III Marine Expeditionary Force Elements in Hawai‘i

The Navy prepared a Final EIS to evaluate a proposal to introduce up to two VMM squadrons with a total of 24 MV-22 aircraft, and one Marine Light Attack Helicopter (HMLA) squadron composed of 15 AH-1 Cobra attack aircraft and 12 UH-1Huey utility helicopters (a total of 27 aircraft), construction of improvements to accommodate the new aviation squadrons, improvements to training facilities in Hawai‘i used by the Marine Corps, and use of DoD training areas statewide in Hawai’i (U.S. Navy, 2012b). Stationing and infrastructure improvements to accommodate the new mission would occur primarily on O‘ahu. Proficiency training would occur at PTA.

Public hearings were held in December 2011 on the Draft EIS and released the Final EIS in June 2012 (U.S. Navy, 2012b). Per the ROD for the Final EIS, the Navy selected Alternative A (the preferred alternative) which would base and operate up to two VMM squadrons and one HMLA squadron in Hawai‘i; accommodate all of the basing aviation facilities on the southeast side of the runway at Marine Corps Base Hawai‘i Kaneohe Bay; improve existing training areas at Marine Corps Training Area Bellows, PTA, and Molokai Training Support Facility; and conduct aviation training, readiness, and special exercise operations at training areas statewide. The projects at PTA focus on LZs considered either substandard or inadequate for use by the MV-22 aircraft and therefore involve enlarging the LZ and/or paving, along with associated clearing, grubbing, and grading. An LZ may be considered substandard or inadequate because it does not fully satisfy MV-22 support requirements as derived from the MV-22 Facilities Requirements Document or applicable UFCs. Substandard conditions could be mitigated through minor repairs or construction, while inadequate LZs may require major upgrades, repairs, or construction. Factors taken into account include the size of the LZ, condition of the surface, and presence of nearby obstructions (U.S. Navy, 2012b).

[73](https://www.federalregister.gov/articles/2010/12/08/2010-30760/environmental-impact-statement-eis-for-construction-and-operation-of-a-panoramic-survey-telescope).

5.2.2.9 Saddle Road Realignment

The Army constructed the original one-lane road in 1942 to provide access to its military training facilities located in the "saddle" between Mauna Loa and Mauna Kea. Over the intervening years, some widening and paving was done, but no significant improvements were made to horizontal and vertical alignments leaving many of the existing roadway deficiencies uncorrected. The Saddle Road Realignment is a long-term highway construction project that includes improvements and modifications to Saddle Road between the Hilo side and Kona side of the island of Hawai'i to improve safety and use, and promote commerce. Once complete, approximately 250 mi (402 km) of road will be modernized to meet American Association State Highway and Transportation Officials standards. Saddle Road does not meet current design standards for roadways. It is the only road serving PTA and is subject to serious traffic congestion when military convoys are transporting ammunition or troops for training. It is also the only road serving the Mauna Kea astronomical observatory complex, Waiki'i Ranch, Kilohana Girl Scout Camp, Mauna Kea State Recreation Area, and major hunting areas. The projects would upgrade and modernize Saddle Road as a two-lane highway that would meet design standards for rural arterials and provide adequate capacity to handle anticipated traffic volumes through 2014 and beyond. The roadway improvements would address five general types of needs: roadway deficiencies, conflicts with and hazards of military operations, capacity, safety, social demand, and economic development. Upgrades to Saddle Road (Mileposts 34 to 42) have been completed, and construction between mileposts 11 and 19 on the Upper East Side is complete and the road has been officially opened. For the West Side (Milepost 41 to Mamalahoa Highway), initial construction of the roadbed is about complete and paving is about to begin.

5.2.2.10 Former Waikoloa Maneuver Areas and Nansay Sites

The Army's Former Waikoloa Maneuver Areas and Nansay Sites are situated on the northwest side of the island of Hawai'i, approximately 30 mi (48.3 km) north of the city of Kailua-Kona in the South Kohala District. This area served as a maneuver and live-fire training area beginning in 1943 and was used as an artillery firing range. Live ordnance and MEC/UXO have been found previously in this area. Land use in the former maneuver area is mostly cattle ranching/grazing by the Parker Ranch, with urban-residential, commercial, and industrial land uses found proximal to Waimea (Kamuela) and the Waikoloa Village area. Clearance for MEC contamination on the Former Waikaloa Maneuver Area would include removal or destruction of artillery fragments, mortars, shells, fuzes, and hand grenades that are expected to be found at ground level and up to 6 1/2 ft (2 m) below ground level. ***BAAF Realignment***

The BAAF is used for deploying, redeploying, and resupplying all military units training on the island of Hawai'i. The airfield has one runway that is 3,700 ft (1,128 m) long from east to west, with a total of 1,100 ft (335.3 m) of overruns. The airfield's relatively high elevation of 6,200 ft (1,890 m) above mean sea level impedes aircraft performance and limits the weight of cargo aircraft can safely carry. The airfield operates under substandard conditions due to a relatively short runway, limitations imposed by mountainous terrain, presence of man-made obstructions to the east, winds from the east that increase throughout the day, and maximum tailwind landing restrictions for the C-130 (15 knots) aircraft impede mission accomplishment. Current operations are limited to VFR and approaches and departures only from the west. The pavement is deteriorated in many areas and is structurally inadequate for C-130 loading operations.

The Marine Corps is reviewing several options to either realign or extend the runway. The Marine Corps is considering a proposal to construct a 5,600 ft (1,707 m) long full strength paved runway with 300 ft (91.4 m) long full strength paved overruns on each end. Total length of full strength pavement would be 6,200 ft (1,890 m) long. The runway would be 100 ft (30.5 m) wide with 25 ft (7.6 m) wide paved shoulders, and realigned by a minimum of 5%, possibly to the south, to avoid conflicts and limitations posed by Cantonment Area construction.

A second option proposed by the Marine Corps would convert a portion of the existing runway into a LZ. This project would extend the usable end of the runway to 4,135 ft (1,260 m) by creating new turnarounds using the portions of overruns that exceed the 300 ft (91.4 m) required for a landing zone. In addition, the Marine Corps proposes to extend the LZ to accommodate aircraft for troop or equipment movements that does not conflict with PTA Cantonment Area facility requirements. Therefore, the usable length of the runway to the west would be extended from 4,135 ft (1,260 m) to 4,700 ft (1,433 m); the extension would be 805 ft (245 m) total to include 505 ft (154 m) of runway and 300 ft (91 m) of overrun. This project would also construct a new turnaround at the west end, modify runway lighting, and provide pavement marking.

Both configurations would create a Class A Army airfield with the capabilities to operate as a training assault runway.

Supporting facilities will include site preparation (clear/grubbing, excavation, grading, and storm drainage), a mobile asphalt concrete batching plant, water supply source, and extension of the primary electrical service line from the base camp.

5.2.2.11 Rotary Wing Apron and Aircraft Maintenance Facility

The BAAF currently serves 18 UH-60 Black Hawks/ OH-58 Kiowa helicopter aprons, 8 CH-47 Chinook / CH-53 Sikorsky helicopter aprons, and limited C-130 operations. Based upon current authorized units in Hawai‘i, BAAF has the potential to serve up to 32 AH-64 Apache/ UH-60/ OH-58 aprons for one Assault or Cav Aviation battalion, eight CH-47/ CH-53 aprons for Army General Support Aviation Battalion and Marine Corps requirements, and two MV-22 Osprey aprons as a Marine Corps/ Navy requirement. The Army and Marine Corps further propose to construct a 48,540 sf (45.1 m^2) aircraft maintenance facility to support added aviation maintenance requirements.

Existing aircraft aprons and maintenance facilities at BAAF are aged and to not meet current requirements for the CAB to utilize the airfield fully at PTA. Construction of a new maintenance facility includes maintenance shops and offices, parts and tool storage, aviation operations, and all support equipment and facilities, administrative operations, aviation operations area, a hazardous materials storage facility, information systems, fire protection and alarm systems, and Energy Monitoring Control Systems (EMCS) connection.

5.2.2.12 Multipurpose Storage Facilities

Each time a Marine Corps unit deploys to PTA for training, they are required to transport all of the equipment it plans on using during training, including large equipment, and then redeploy it back to their home station. The purpose of this storage facility would be to gain efficiencies in cost and time for transporting unit equipment to PTA. The Marine Corps has a need to reduce transportation costs and reduce their reliance on carriers.

This project would construct permanent Marine Corps storage facilities at PTA to store unit equipment for use during training exercises. Indoor storage of vehicles and equipment would provide protection from ultra violet (UV), wind, rain, and temperature fluctuations.

The following facilities (and facility category codes) with size requirements are proposed at PTA:

- Controlled Humidity Warehouse (CCN 441-20) at 3,600 ft^2 (335 m^2)
- Operational Vehicle Garage (CCN 143-11) at 8,300 ft^2 (771 m^2)
- Operational Vehicle Garage (CCN 143-11) at 4,500 ft^2 (418 m^2)
- General Storage Shed (CCN 441-35) at 9,100 ft^2 (845 m^2)
- Operational Storage Misc. (CCN 143-77) at 4,500 ft^2 (418 m^2)
- Air Combat Element Storage Facility with a total area of 42,000 ft^2 (3,902 m^2)
- Ground Combat Element Storage Facility at 36,900 ft^2 (3,428 m^2).

These permanent facilities would be capable of storing enough equipment for a company.

5.2.2.13 Aerial Gunnery Range

The Army anticipates a future need to construct, operate, and maintain an AGR on PTA. The AGR would meet critical collective unit training needs for both active and reserve component aviation units that train on the installation as well as for other military services who may use the range. An AGR is used to train and test aviation, unstabilized platforms and crews, teams, platoons, and companies/troops on skills necessary to detect, identify, and effectively engage stationary and moving infantry and/or armor targets in a tactical array. Company-level combined arms live-fire exercises (CALFEX) may be conducted on this facility. This complex also accommodates training with subcaliber and laser training devices. An AGR supports dismounted infantry platoon tactical live-fire operations either independently of, or simultaneously with, supporting vehicles. MOUT and CLF facilities are required to enable diving engagement to specified streets/intersections and engagements in close proximity on adjacent terrain. Additionally, the AGR enables critical air-ground integration TTP training to ensure the optimum teaming of Army ground and aerial platforms. Primary features include a Primary Area (threshold) and an Alternate Area (objective). An AAR facility, aviation forward arming and refueling point (FARP), tower, aerial firing points, and aircraft holding area are also required.

The AGR would include a large ROCA with an AAR facility, latrines, ammunition breakdown area, storage, forward aerial rearm and refuel point, ammunition holding area, instruction building, and a surfaced staging area. Supporting facilities would include electrical service, transformers, and lighting, surfaced roads and tank trails, parking, a drainage ditch, and a water storage tower. Supporting facility force protection includes security fencing and gates.

The range would be embedded with the necessary information and telecommunications technologies to safely manage all personnel undergoing crew live-fire training and qualification. All targets would be fully automated, utilizing event-specific, computer-driven target scenarios and scoring. Targets would receive and transmit digital data from the range operations center.

5.2.2.14 Ammunition Storage Facilities – Army

The Army anticipates a future need to construct three concrete oval-arched, primary ammunition igloos at PTA, of standard design, that would be sited adjacent to the eight existing ammunition storage facilities at PTA. There are currently not enough ammunition igloos at PTA to accommodate the storage requirements for multiple battalions to train at the installation simultaneously. An Army unit deploying to PTA transports its ammunition allotment for temporary storage at the existing igloos during the deployment; unused ammunition is transported back to O‘ahu. Each ammunition igloo would be 6,750 ft^2 (627 m^2) in size and earth-covered. Work would also include installing pole-mounted security lights, floodlights above each entrance, and telephone and computer systems. Supporting facilities would include utilities, electrical service, stormwater drainage, paving, and access roads. The Army would further construct an ammunition holding area for daily distribution of ammunition to safely hold loaded vehicles. Each igloo would be connected via an underground duct system to the administrative building of the main supply point.

5.2.2.15 Ammunition Storage Facilities – Marine Corps

The Marine Corps anticipates a future need to construct several ammunition storage facilities that would be sited adjacent to existing ammunition storage facilities at PTA. This project is only in the planning phase with the Marine Corps and has not been reviewed or approved by the Army. The Marine Corps propose to construct several buildings of various sizes to store or manage ammunition versus transporting ammunition to PTA with every training event. The following facilities (and facility category codes) with size requirements are proposed at PTA:

- High Explosive Magazine (earth covered) (CCN 421-22) at 25,336 ft^2 (2,354 m^2)
- High Explosive Magazine (above ground) (CCN 421-22) at 3,328 ft^2 (309 m^2)
- Artillery Storage Facility at 36,550 ft^2 (3,396 m^2)
- Interim Ammo Storage at 3,328 ft^2 (309 m^2)
- Ordnance Operations Building (CCN 143-20) at 1,265 ft^2 (118 m^2).

The Ordnance Operations Building would control ordnance operations and provide administrative space and storage for ordnance equipment; the building would be sited near the entrance to the ASP and adjacent to the Army's ordnance operations building. The ammunition storage facilities would likely be sited adjacent to existing ammunition storage facilities at PTA.

5.2.2.16 Range Road Improvements – Charlie Circle Upgrade

The Army anticipates a future need to increase the width of Charlie Circle Road to a size capable of handling military training and construction vehicle traffic. The existing Charlie Circle Road is a gravel road located west of the PTA impact area. The road provides access to the Western Range Area Alternative, conservation areas near that point, and range locations north of the Western Range Area Alternative. The road is currently 14 ft (4.3 m) wide. The Army intends to improve access to currently underutilized portions of the impact area at PTA.

5.2.2.17 UCAS Range

The proposed UCAS range would be used to train Marine Corps aviators in conducting precision support fire to ground-based troops, simulating combat in an urban environment. The UCAS range would employ use of unimproved roads capable of supporting tank and heavy wheeled vehicle traffic. The selected range area may require ground softening, grading, construction of firing pads/firing points, and placement of shipping containers (sea/land storage units) to simulate buildings. The selected site would further require EOD support for the survey and clearance of MEC/UXO to facilitate a safe construction and operation area.

The units would be stacked adjacent to and on top of each other (one to five levels/stories) and secured together to create buildings when completed. Each container would be approximately 8 ft (2.4 m) wide x 8 ft (2.4 m) high and 20 ft (6 m) long, stacked adjacent to and on top of each other. The proposed range would be approximately 19 ac (7.7 ha) in size with 119 buildings consisting of 921 shipping containers. Each structure would be painted in a single color with no two adjacent buildings being the same color. These structures would be laid out in a pattern to replicate an urban environment. This urban pattern would include the installation of mock road networks; roads would be approximately 20 ft (6 m) in width to support tactical vehicle movement throughout the range. No utilities would be installed.

These structures would provide one to five story structures capable of supporting aviation live-fire training. The range would incorporate targets, to include hard wired and remote controlled systems that are programmable (e.g., SITS, SATS, MITS, MATS, and full size replica targets of armor vehicles and infantry). Targets systems would be protected from damage by live-fire using dirt berms, steel or concrete coffins, and use steel plates to withstand .50 cal projectiles. Four hardened bunkers would be installed to support aviation live-fire training. Target emplacements include the following: 25 SITS, 25 SIT door targets, 50 SIT window targets, 10 SATS, 8 MITS, 8 MATS, 10 full size replica armor vehicle targets, and 50 full size replica infantry targets.

5.2.2.18 Marines Presence in the Pacific

In April 2012, the U.S. and Japan agreed to redeploy 9,000 U.S. Marines from Okinawa to Guam, Australia, and Hawaii due to the potential closure of Marine Corps Air Station Futenma in Japan. Approximately 5,000 of the 9,000 Marines will be deployed to Guam with an estimated 2,700 Marines to Hawai‘i. U.S. military presence in Australia would be on a rotational basis. Hawai‘i currently has more than 7,500 Marines and thousands of family members assigned to Marine Corps Base Hawai‘i Kaneohe Bay or Camp H.M. Smith on the island of O‘ahu. The Pentagon’s proposal to move Marines from Japan to Australia, Guam, and Hawai‘i must be approved by Congress; lawmakers may reject any plan until the DoD submits an independent assessment of its strategic posture in the Asia-Pacific region.

5.2.2.19 HAAT

As detailed in 5.2.1.16, in September 2011, the Army issued a FNSI based on careful review of the analysis and conservation measures in the EA as well as public comments that implementing the preferred alternative for HAMET LZs on Mauna Kea and Mauna Loa would result in no significant direct, indirect, or cumulative impacts on the resources analyzed; preparation of an EIS for the proposed action would not be undertaken (USAG-HI, 2011b). In November 2012, the HIARNG began to prepare an EA to allow aviation units, including the 25th CAB, to conduct High Altitude Aviation Training (HAAT) in the out years (FY12 and beyond). The proposed action in HAAT is similar to that in the HAMET EA but different locations are being evaluated. This EA, referred to as HAAT, would review the environmental concerns for HAAT training at LZs located at PTA (southern portion of the installation), or on private lands (leased for occasional use).

5.2.2.20 Final EIS for the Thirty Meter Telescope Observatory Project.

The project involves the construction, operation, and eventual decommissioning of an optical/infrared observatory on approximately 5 ac (2 ha) of presently undeveloped land on the northern plateau within the 525 ac (212 ha) Astronomy Precinct of the Mauna Kea Science Reserve near the top of Mauna Kea. The TMT Observatory has a primary mirror 98 ft (30 m) in diameter, and is the most technically advanced telescope in the world with observational powers many times greater than any available today. The Final EIS was published May 8, 2010; more information is available at the Internet Web sites.[74]

5.3 CUMULATIVE IMPACTS AND SUMMARY TABLE

The following analysis is organized by resource area in the same order presented in Chapters 3 and 4.

5.3.1 Cumulative Impacts Summary Table

Table 5.3-1 provides a summary of the potential cumulative impacts for projects at PTA and outside PTA’s boundary. Table 5.3-1 is followed by more descriptive information on each resource area.

Table 5.3-1. Summary of Potential Cumulative Impacts

Valued Environmental Resources Considered	Cumulative Impacts
Land Use/Recreation	⊙
Airspace	○
Visual Resources	⊙
Air Quality	⊙⊘
Noise	○⊙
Transportation/Traffic	⊙⊘
Water Resources	⊙
Geology/Soils	⊙⊘
Biological Resources	⊙⊘⊗+
Cultural Resources	⊗
HM/HW	⊙⊘
Depleted Uranium	○⊙
Socioeconomics/Env. Justice	○⊙+
Public Services/Utilities	⊙
Wildfires	⊙⊘⊗+
Sustainability	⊙+

LEGEND

⊗ = Significant impact

⊘ = Significant impact mitigable to less than significant

⊙ = Less than significant impact

○ = No impact

\+ = Beneficial impact

5.3.2 Resource Areas

Unless otherwise stated, the term IPBC in this section refers to both the Western Range Area Alternative and the Charlie Circle Alternative. For analysis of potential cumulative impacts, the incremental impacts of the projects are essentially the same. The No Action Alternative is not discussed because there would be no action that would add incremental impact.

5.3.2.1 Land Use and Recreation

This section discusses cumulative effects on land use and recreation. Existing land uses or designated land uses, such as those in general plans or in federal or state resource planning documents, comprise land use. Recreational resources are those areas that are designated as recreation areas or areas where people seek out and gather for recreation either in urban settings, open spaces or other natural areas.

For the evaluation of cumulative impacts relative to land use and recreation, the ROI spans the island of Hawai‘i. Land use policy in Hawai‘i is developed at the both the state and local level; however, land use planning and regulations are made at the county level. In this section, cumulative land use impacts have been assessed at the island-wide level but are discussed relative to similar or surrounding areas where appropriate.

Cumulative impacts for land use were assessed based on the existing land use trends in Hawai‘i. These trends provide the context for determining whether the projects would contribute to adverse trends occurring in the ROI. The impacts of the proposed project were added to the past, present, and reasonably foreseeable future project impacts to determine if the cumulative impacts of all the projects would contribute to the historical or existing trends in land use and recreation. Because project-specific data were not available for all of the cumulative projects, the cumulative analysis was conducted on a qualitative basis.

Cumulative Impacts on Land Use

Less than Significant

Basic land use designations would not be changed at PTA under the proposed action. Land acquisition at PTA would not be required for any of the projects identified in Table 5.2-1. The areas considered for range modernization or new ranges would continue to be used for ongoing military training operations with no expansion of current impact areas at PTA.

Cumulative Impacts on Recreation

Less than Significant

The impacts on the access to recreation resources would not change from current conditions. Impacts on the island of Hawai‘i relative to hunting would be the same as current conditions. Individually, the Proposed Action would not result in significant impacts on recreational lands. Cumulative impacts on recreational land use would not be significant.

5.3.2.2 Airspace

The ROI for cumulative impacts related to airspace would be the same as described under Affected Environment, Section 3.2. Because of the well-developed nature of the National Airspace System and air traffic control with its many rules and regulations, procedures, and limitations, airspace is not particularly vulnerable to adverse, incremental, cumulative effects.

Since 2000, civilian general aviation (GA) traffic at Hilo International Airport has dropped by 41% from 32,908 operations to 13,466 operations in 2008. Kona International Airport has seen an increase in GA traffic with 47,021 operations in 2000 to 70,064 operations in 2008 (County of Hawai‘i data book, 2009). However, military flight activity on the island of Hawai‘i has dropped by 75% since 1994 (Andera, 2003; Dohmen, 2004).

The Navy prepared a Final EIS to evaluate the introduction of up to two VMM squadrons (total of 24 MV-22 aircraft) and one HMLA squadron (18 AH-1Z and 9 UH-1Y helicopters) with construction or improvements to accommodate and maintain the new aviation squadrons, and the conduct of aviation training, readiness, and special exercise operations at training areas statewide (U.S. Navy, 2012b). As a result of a systematic analysis to identify possible basing locations, only MCBH Kaneohe Bay met all requirements including the facility siting alternatives. The Final EIS included a facility siting alternative for proficiency training at PTA, whereas, stationing and infrastructure improvements to accommodate the new mission would occur primarily on O'ahu. Military aircraft would continue to be flown in accordance with FAA regulations and within recommended altitudes established by the FAA, the state of Hawai'i, and restricted airspace (R-3103) over PTA.

Cumulative Impacts on Airspace

No Impact

Military pilots operating outside SUA would follow these regulations, minimizing the potential for adverse cumulative airspace use impacts. The required scheduling process for SUA by the military would eliminate the potential for adverse cumulative impacts. There would be minimal impacts on airspace associated with activities at PTA or the island of Hawai'i. Flights in support of training activities would not reduce the amount of navigable airspace in the ROI. The Proposed Action would have no impact on airspace outside the SUA and therefore, no cumulative impact on airspace.

5.3.2.3 Visual Resources

Visual resources are usually defined as the visual quality or character of an area, consisting of both the landscape features and the social environment from which they are viewed. The landscape features that define an area of high visual quality may be natural (e.g., mountain views) or manmade (e.g., city skyline).

For the evaluation of cumulative impacts relative to visual resources, the cumulative ROI for visual resources encompasses PTA and all areas within line-of-sight of PTA. Factors considered in determining significance of cumulative impacts on visual resources include the extent or degree to which these impacts would do the following:

- Introduce physical features that are substantially out of character with adjacent developed areas
- Alter a site so that a sensitive viewing point or vista is obstructed or adversely affected, or if the scale or degree of change appears as a substantial, obvious, or disharmonious modification of the overall view
- Be inconsistent with the visual resource policies of the County of Hawai'i General Plan (County of Hawai'i 2005).

Major projects that have or could impact visual resources within the cumulative ROI include the Saddle Road Realignment and the proposed HAAT training.

For the Saddle Road Realignment, Hawai‘i State and County assessed in 2010 that improved sections of Saddle Road, are, and would be more visually compatible with the surrounding environment than was originally assessed in the 1999 Final EIS, and the Supplemental EIS and ROD completed in 2010 (County of Hawai‘i and State of Hawai‘i, 2010; U.S. DOT, 2010). The new Saddle Road Realignment along the east and north sides of the Cantonment Area and the north side of most of the training areas at PTA, excluding KMA, has provided motorists with a new visual vista across the Saddle Region to Mauna Loa.

The HAMET exercises on the slope of Mauna Kea will not be repeated. A new study reviewing the proposed HAAT training is looking at different areas in the southern part of PTA, within the PTA boundary or adjacent lands.

Cumulative Impacts on Visual Resources

Less than Significant

The proposed IPBC would not be visible except at a very great distance. From the top of Mauna Kea and Mauna Loa, the IPBC would be indistinguishable from surrounding land features. One would not be able to discern the IPBC while in the PTA Cantonment Area.

It is generally accepted that the most significant view plane is from the ocean looking towards Mauna Kea. Given that one cannot see any of PTA's distinguishing features (such as the Cantonment Area or training ranges in the impact area) from the base of Mauna Kea, the IPBC would not have a significant impact on the visual character of the PTA ROI.

5.3.2.4 Air Quality

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

As discussed in Section 3.4, the ROI for air quality issues depends on the pollutant and emissions sources being considered. Secondary pollutants such as ozone are those that are formed through chemical reactions in the atmosphere from precursor pollutants and have the potential to reach island-wide. The ROI for a primary pollutant such as particulate matter is generally much smaller, reaching areas within a few miles (km) from the emissions source. Impacts from both secondary and primary pollutants can vary depending on the rate of emissions from a source, the elevation of the source, the type of pollutant, and the meteorological conditions that limit its dispersion and dilution during transport away from the emissions source.

Cumulative air quality impacts would occur when multiple emissions sources affect the same geographic areas simultaneously, such as when projects overlap or there are consecutive projects that prolong the air quality impacts on a given area when they occur over an extended period of time. The major emission sources associated with the IPBC at PTA include secondary pollutant ozone precursors (VOC and NOx) and directly emitted particulate matter from construction activities, vehicle traffic, and troop training exercises. Emissions of other pollutants are expected to be insignificant and would not negatively impact air quality conditions. Overall, the projected effects of the Proposed Action on air quality would be minor, and their regional influence would be localized; incremental effects on the ROI would be minimal.

Historical Cumulative Effects

Air pollution levels in Hawai‘i have been historically low due to the small size and isolated location of the islands. The NAAQS for ozone have not been exceeded in Hawai‘i in the past decade, despite the cumulative emissions from vehicle traffic, aircraft operations, agricultural operations, commercial and industrial facility operations, and construction projects throughout the islands. In fact, almost all of the monitoring data collected in recent years for the area shows that all of the ambient air quality levels remain well below the values of the relevant state and NAAQS. Training conducted by the Army in the past has resulted in short-term, minor, and localized effects on air quality with little to no measureable effects on air quality from these past actions (USAEC, 2009b).

PTA is situated between three volcanoes on the island of Hawai‘i. Volcanic activity generates gaseous emissions of sulfur dioxide (SO_2), as well as other gases including hydrogen sulfide, hydrogen chloride, hydrogen fluoride, and trace metals like mercury, which reacts with sunlight, oxygen, dust particles, and water in the air to form VOG. VOG creates a haze which obscures visibility and contributes to development of acid rain.

Hawai‘i is currently considered an attainment area for PM_{10}. Nonetheless, Hawai‘i Island and land adjacent to PTA have experienced occasional events in which dust impacts have had an adverse effect on air quality in the region. The soil at PTA is fine, volcanic ash which is particularly prone to wind erosion and dust generation. Furthermore, the land at PTA is sparsely vegetated and susceptible to fugitive dust generation from construction activities, training exercises, off-road vehicle travel, and wind erosion.

Cumulative Impacts on Air Quality

Significant Impact Mitigable to Less than Significant

Particulate matter emissions are generated in conjunction with construction activities, and vehicle traffic from vehicle convoys, construction vehicles, POVs, as well as vehicle maneuver training on unpaved gravel or dirt roads inside the installation and on off-road trails. Other sources of fugitive dust may occur from wind erosion in areas with sparse vegetation and exposed soils, and military helicopter flight operations and fixed wing aircraft operating at BAAF. Ordnance firing and detonations may also generate particulate matter emissions during live-fire training exercises. The impacts from fugitive dust from IPBC construction and construction vehicle activity on unpaved roads would be significantly reduced through mitigation programs.

Recommended Mitigation

The Army could, as necessary and in accordance with existing installation policy, apply dust control palliative products on unpaved military vehicle trails/roads where construction activities would occur.

Recommended Mitigation

Construction contractors would also be required to comply with the provisions of Hawai'i Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of their construction contracts. Implementing these measures would avoid exceeding the PM_{10} standards and any impacts on visibility.

Ongoing road construction on Hawai'i Island includes the Saddle Road Realignment project that will straighten, repave, and separate military traffic from motorists. This project could create short-term impacts on CO due to the interruption of normal traffic flow. As a result of the high traffic volumes and reduced speeds, vehicles could increase fuel burn and other criteria pollutant emissions such as NOx and VOC, which are precursors to ozone. Temporary, localized impacts on air quality would also be anticipated during construction from the generation of fugitive dust and emissions from construction equipment and vehicles associated with the project. Standard BMPs should be employed during the construction phase for the Saddle Road Realignment to mitigate impacts from fugitive dust and PM_{10}.

Less than Significant

Emissions from construction projects, vehicle travel, aircraft operations, wind erosion, troop maneuver exercises, and weapons use in the air quality ROI would generate minor increases in air pollutants.

Aircraft flight operations, maneuver, and live-fire training conducted by troops at PTA and vehicle travel on unpaved roads and off-road areas, would be a recurring activity that contributes to fugitive dust. Additional training activities may reduce vegetative cover in some of the range areas, which could result in increased susceptibility to dust generation from vehicle travel. Live-fire and maneuver training would disturb soils and vegetation through activities such as dismounted movements, vehicle travel, and trenching and digging. Fugitive dust emissions would also be generated from helicopter landing areas and training events where helicopter crews hover aircraft over ranges during live-fire exercises and air-ground integration training. The removal of protective vegetation and continuous aircraft/vehicle use in these areas increases the potential for wind erosion of disturbed soils and, as a result, would increase the generation of fugitive dust. Fugitive dust generated by training and associated vehicle activity would be widely dispersed due to winds in the area and would not be expected to result in exceedances of fugitive dust standards outside of the range. The cumulative air quality effects from these other sources of PM_{10} are expected to be below the General Conformity *de minimis* levels and therefore, less than significant.

Construction equipment, aircraft operation, and vehicle traffic are also important sources of secondary pollutant ozone precursor emissions. From a cumulative perspective, construction and operation of the IPBC at PTA would do little to alter overall vehicle and aircraft traffic.

The Army will continue to avoid traveling during peak hours. Even though vehicle related emissions would increase slightly, cumulative emissions of ozone precursors would be minimal. These emissions would be temporary and would have too small of a net increase in ozone precursor emissions to have a measurable effect on ozone levels. Consequently, vehicle traffic and construction equipment cumulative air quality impacts from secondary pollutants would be less than significant.

The potential exists for aircraft flight activity to increase in the future as other modernization projects at PTA are completed and come on-line. UAV flight activity would be minimal and have little effect on ambient pollutant concentrations. In addition, modernizing the range infrastructure would not result in additional helicopter activity at PTA. Therefore, cumulative impacts of emissions from future increased aircraft operations would be less than significant.

The Army is also implementing several projects at PTA that would serve to accommodate the future permanent stationing of the 2/25th SBCT. This includes adding tactical armored vehicles and support vehicles to the training inventory used at PTA. The construction of new facilities and support infrastructure, as well as improvements to existing structures will provide necessary training required for an SBCT.

The 3rd Marines have also proposed a plan to further develop joint training facilities at PTA and create additional joint training complexes at PTA to support live-fire and maneuver training, urban warfare, convoy live-fire training, and weapons training requirements. As a result, emissions from the 2/25th, (and other Army unit) tactical vehicles and other Marine Corps tactical vehicles, in addition to heavy construction equipment, would occur. However, emissions from military vehicle engines, temporary use of construction equipment, and fugitive dust generated during construction activities would not be generated in sufficient quantity to have meaningful effects on ambient air quality conditions or negatively affect the attainment status of the project area. Consequently, the increase in emissions from activities associated with the permanent stationing of the 2/25th SBCT and use of military training facilities by the 3rd Marines would have a less than significant impact on air quality.

The HIARNG has proposed to implement additional HAAT, which will also include training for the 25th CAB. The Navy is also proposing a new mission to provide proficiency training of pilots in the MV-22 Tiltrotor Osprey aircraft and H-1 Cobra and Huey attack helicopters at the proposed UCAS range, and other ranges as they are available (e.g., IPBC), in support of III Marine Expeditionary Force elements stationed in Hawai‘i. Emission sources associated with these projects may include military helicopter engines and fugitive dust from helicopter landings and take-offs. Localized fugitive dust can be generated by wind effects on exposed soils and unpaved roads, and dust would be expected from these aviation training operations. It is expected that the emissions from military helicopter use from HAAT, MV-22, and H-1 aircraft proficiency training at PTA would have a less than significant impact on air quality conditions due to the limited number of missions. Emissions from military helicopter use at PTA associated with the Proposed Action would also be minimal. Impacts of construction and operation of the IPBC when added to the impact of these activities would have little effect on ambient pollutant concentrations and would not contribute to cumulatively significant impacts on existing air quality.

An MEC/UXO clearance project on the former Waikoloa Maneuver site and Nansay live-fire training sites could have impacts on air quality if open burning/open detonation is used as a treatment approach to dispose of materials. Open burning in the ambient air or in a receptacle does not control combustion of gaseous or particulate emissions and they are emitted directly in to the air. The combination of the IPBC project with MEC/UXO removal would be expected to have none to less than significant cumulative impacts on air quality conditions due to the distance from PTA that could limit the dispersion and dilution of pollutants during transport away from the emissions source.

As a result of historical air quality conditions on the island, overall air quality impacts from construction equipment, aircraft operation, and vehicle traffic associated with the Proposed Action, in combination with emissions from other DoD and non-DoD projects, and the continuing emissions from other emissions sources in the ROI would not violate any state or NAAQS. Therefore the Proposed Action, when considered in combination with other past, present, and reasonably foreseeable future actions, would not have a significant cumulative impact existing air quality conditions.

5.3.2.5 Noise

Determining the cumulative noise impacts of spatially related projects, such as those listed in Table 5.2-1, creates a unique challenge. Due to the complexity of calculating noise impacts, modeling is typically used to create contours that present the location and amount of noise impact, based on the selected metric. Normally, modeling is completed during the environmental review of an individual project and metrics are selected based on best practices for noise analysis (e.g., DNL for measuring human annoyance). Many of the projects being considered in the cumulative impacts analysis are in the early planning stages, with few details available to provide an accurate quantitative analysis of the cumulative noise impacts. Therefore, this section presents a qualitative analysis and discussion of the relevant projects from Table 5.2-1 with the potential for cumulative noise impacts.

The ROI for cumulative noise impacts depends on the intensity of noise generation. For most common noise sources, the ROI is limited to areas within 0.5 mile (1 km) of the noise source. High intensity noise sources, such as ordnance detonations, may have an ROI extending several miles (km) from the noise source. Generally, this area includes PTA and its adjacent environs. Therefore, the ROI for cumulative noise impacts is identical in scope to the ROI used to discuss noise impacts in Sections 3.5 and 4.5 of this document.

Several planned projects identified in Table 5.2-1 at PTA involve helicopter stationing or training activities such as the Army's HAAT action, the proposed UCAS range, and the Marine Corps' plan to introduce helicopter squadrons on the island of Hawai‘i. Similar to the HAMET, the proposed HAAT action requires pilots to train in mountainous high-altitude environments. Pilots conducting HAAT flights follow standard FAA procedures for flights conducted in and out of controlled airspace. The overall HAAT flights contribution would likely be small compared with current and recreational air traffic, and pilots would be redirected temporarily through FAA air traffic control. Details on the proposed HAAT action are still being planned; the HIARNG is preparing an EA to address the potential impacts from training and LZs at PTA or to lease private lands.

The Navy prepared a Final EIS to evaluate the introduction of up to two squadrons (total of 24 MV-22 aircraft) and one Marine Light Attack Helicopter squadron (18 AH-1Z and 9 UH-1Y helicopters). Proficiency training would occur at PTA, whereas, stationing and infrastructure improvements to accommodate the new mission would occur primarily on O‘ahu. Military aircraft would continue to be flown in accordance with FAA regulations and within recommended altitudes established by the FAA, the state of Hawai‘i, and restricted airspace (R-3103) over PTA.

Only a limited amount of detail is available regarding potential noise impacts from the majority of projects identified in Table 5.2-1 on PTA and on surrounding land uses. Based on the review of the proposed and planned projects, several have the potential to create noise impacts. Additional data would be needed (such as noise modeling and contour maps) in order to compute the sum of all noise levels and assess the spatial relationships of noise impacts. Further analysis completed in project-specific environmental reviews should be used to determine whether the cumulative impact exceeds established significance thresholds, particularly for aircraft and live-fire operations (whereas construction activities and maneuver operations would be less likely to result in significant cumulative impacts). For example, while it is not currently possible to determine whether HAAT and MV-22 training at PTA could be significant when added to the existing operations levels at PTA, future noise analyses should address the cumulative noise impacts using modeling data from each of these projects.

Cumulative Impacts on Noise

Live-fire training is the dominant source of noise at PTA. Under existing noise conditions for small arms fire, Noise Zone III is fully contained on the installation. Noise Zone II is mostly contained within the installation boundary with the exception of one portion, southeast of the Cantonment Area (extending from firing points northeast of the impact area) (Figure 3.5-2). Noise Zone II in this area extends into designated forest reserve land, but the level of noise is considered acceptable for the area (Appendix F). No incompatible land uses exist on or off the installation within the Noise Zone II noise contours. Under existing conditions for large caliber weapons fire, Noise Zone III contours are contained mostly on the installation with the exception of several small areas north of the installation, extending up to 656 ft (200 m) into forest reserve land. Noise Zone II contours also extend into forest reserve land at that same location. After conducting modeling, the Army determined that there are no incompatible land uses on or off the installation within Noise Zones II and III noise contours from large caliber weapons firing (Appendix F).

Noise producing activities at PTA other than the IPBC include military live-fire training, and military aircraft maneuvers or non-live-fire operations. Civilian sources of noise include traffic from Saddle Road, which does not contribute considerably to noise conditions at or outside the installation.

No Impact

Noise generated from construction is generally considered temporary and would not extend beyond the boundaries of the installation. There would be no sensitive receptors for this noise. Additionally, construction noise would not add incrementally to other long-term sources of noise.

Less than Significant

Opening up new areas of the PTA impact area in particular, could modify the Zone II contour. Figure 4.5-1 shows that Zone II is expanded for the Western Range Area Alternative but still does not go outside the installation boundaries nearest the proposed IPBC.

The proposed HAAT activities would include helicopter operations at PTA with landings and takeoffs at the BAAF. Details on the proposed HAAT activities are still being planned; the HIARNG is preparing an EA to address the potential impacts from training and LZs at PTA to lease private lands.

The Marine Corps prepared a 2009 EA covering construction and operation at PTA of a MOUT facility, CLF range, and a live-fire grenade/Shoothouse with the enhancement of three FOB sites. The EA stated that noise impacts due to construction activities would not be significant. Furthermore, noise impacts due to additional live-fire operations would be periodic in nature and impacts would not be significant.

The Navy's mock airfield and associated targets at PTA provide realistic training opportunities that include carrier air wing strike warfare, mobile EW, time sensitive targets, and IFF radar. The Navy proposed the use of inert bombs in the area of the mock airfield; noise generated from inert munitions items are generally much lower than what is generated from the standard munitions item upon detonation.

Noise Zone II from the proposed IPBC in the Western Range Area Alternative (Preferred Alternative) extends into areas outside of the impact area where there have been historically documented occurrences for the Hawaiian Hoary Bat, Hawaiian Hawk, and the nēnē. Direct impacts from live-fire noise on these species are addressed in Section 4.9. No other noise contours from live-fire training extend to the Western Range Area Alternative (see existing noise contours (Figure 3.5-2). No new noise contours would extend off the installation boundary as a result of operating the IPBC.

Although the noise from the IPBC would combine with other noise to expand noise contours, these contours would not go outside the installation boundaries. Therefore, this impact is not significant.

5.3.2.6 Transportation and Traffic

Factors the Army considered in determining whether a cumulative impact on traffic and transportation could occur in relation to projects in Table 5.2-1, include the extent to which the Proposed Action would result in increased traffic in the ROI, and disrupt traffic circulation patterns, and/or cause safety hazards. For the purposes of this analysis, significant effects could occur if traffic flow is degraded to a LOS of E as described in Table 5.3-1 and discussed in the following text.

Table 5.3-1. Summary of Potential Cumulative Impacts

LOS	Volume/Capacity Ratio	Description
A	Less than 60%	Free-flow operation
B	60% to less than 70%	Reasonably free-flow
C	70% to less than 80%	Flow at or near free-flow speed
D	80% to less than 90%	Borderline unstable
E	90% to less than 100%	Operation at capacity
F	100% or Greater	Breakdown

Hawai‘i County and Hawai‘i State (2010) approximated the ADT on Saddle Road to be 1,400 vehicles per day, and further projected that daily traffic would triple to 4,058 by 2013 resulting from road improvements. After completing realignment of Section I, the state and Hawai‘i County projected that total traffic volumes could rise to over 5,000 by 2020 and 8,125 by 2034 (approximately 6,500 vehicles (80%) would utilize the realigned section, and 1,625 vehicles (20%) would use the old Saddle Road through Waiki‘i. Portions of Saddle Road currently operate at a LOS of E (passing is unsafe, and the road operates at 90% to less than 100% capacity). After improvements are complete, Saddle Road would operate at LOS B (60% to less than 70% capacity, reasonably free-flow speed). It should be noted that even with the proposed improvements, the Saddle Road LOS near KMA would remain at a rating of C (70% to less than 80%, near free-flow speed) as late as the design year 2034 (County of Hawai‘i, State of Hawai‘i, 2010).

The Saddle Road Realignment would improve the LOS because current deficiencies would be corrected to incorporate newer design standards. These higher standards would improve sight distances and provide sufficient lane widths and shoulders, and would result in higher operating speeds.

Traffic throughout the island of Hawai‘i has increased steadily over the last decade for a number of reasons including, but not limited to, the following factors:

- Population increase (as reported by the Census Bureau 2009 data, the population has grown from 120,317 in 1990 to 172,370 in 2009). This accounts for a growth rate that more than doubles average state growth rate. The island of Hawai‘i makes up approximately 13.5% of the total state population
- Relative steady increase in tourism to the island (the Hawai‘i Department of Business, Economic Development & Tourism (2011) conducted a long-term visitor analysis beginning in 2000 and forecasting out to 2014 that, even accounting for the 2008 economic downturn, projects an overall steady increase tourism into the foreseeable future[75]
- Increase in demand for consumer goods from outside of the island of Hawai‘i commensurate with growth in population and tourism, and resulting in more trucks and delivery vehicles travelling on Hawai‘i County roadways
- Implementation of the Hawai‘i Long Term Transportation Plan and roadway improvements as discussed in Section 3.6, resulting in temporary traffic congestion, but having an overall long-term benefit to traffic flow.

For the purposes of this cumulative impacts analysis, the ROI for the IPBC is Saddle Road. Action proposed in the EIS does not involve increasing training deployments to PTA. Therefore, impacts on traffic from transporting Soldiers and equipment to PTA to conduct their training on mission essential and pre-deployment tasks would be the same as were analyzed in the SBCT transformation Final EIS (U.S. Army and USACE, 2004) where delays related to military vehicle convoys would be limited and convoys would yield to traffic along state highways. There would be minimal impact on LOS on public highways.

[75] http://hawaii.gov/dbedt/info/visitor-stats/tourismforecast/

For this EIS, the Army would continue to avoid traveling during peak hours, provide media releases notifying the public of convoy travel, and maintain a public Web site listing upcoming PTA activities, including training and public involvement projects. Subject to force protection measures and other security measures, the Web site would contain PTA training and convoy schedules, community projects the Army is involved in, any PTA-related activity or function that the public could attend, any general Army news that might be of interest to the public, and Army services available to the public.

Construction traffic on Saddle Road resulting from IPBC construction would include, but would not be limited to, construction worker POVs, dump trucks, water trucks, and haulers (e.g., flatbeds, stretch trailers, and lowboys) hauling bulldozers, excavators, cranes (for some construction), and other construction equipment. Construction equipment would account for on-site construction activities, including site clearing, grading, foundation excavation, and ground softening, for example.

There are projects that may increase short- or long-term daily traffic along Saddle Road. Troop drawdown overseas coupled with increased dwell time at the home station is expected to change semi-annual training deployments to PTA at - or approaching - average historic training levels (pre- early 2000s). Troops and equipment would continue to be transported via convoys on public roadways to access PTA from Kawaihae Harbor. Military trucks and vehicles would use state and county two-lane roads to and from PTA. Convoys would include no more than 30 vehicles at one time. If multiple convoys would be required, they would be spaced out in 15-minute intervals.

Saddle Road is being developed to meet rural arterial design standards of the Hawai‘i DOT and American Association of State Highway and Transportation Officials with a design speed of 60 mph (97 km/h). Portions of Saddle Road have been realigned to date with uphill passing lanes, truck escape ramps, scenic pullouts, and military-vehicle crossings incorporated into the project design, as needed, to enhance safety, and improve the projected LOS (DOT, 2010). The benefits of the Saddle Road realignment north of the Cantonment Area have since mitigated much of the safety concerns (commuter traffic encountering military convoys or construction traffic) near PTA. Furthermore, the SBCT transformation Final EIS (U.S. Army and USACE, 2004) fully analyzed the impacts that SBCT deployments would incur to Saddle Road traffic concluding that less than significant impacts would occur. Delays related to military vehicle convoys would be limited and convoys would yield to traffic along state highways.

Troop movements to PTA would continue to increase temporarily, and then decrease again due to Joint training activities (e.g., RIMPAC) that occur every two to three years. These increases would be nominal (having minor almost imperceptible impacts) because much of the training at PTA would be aviation maneuvers, only some command and control, or exercise planning-related vehicle traffic may occur along Saddle Road to access the installation.

At this time, it is unclear if the Marine Corps or Navy are considering proposing range construction for facilities associated with the MV-22 Osprey and H-1 aircraft. If new ranges supporting these aircraft are required, construction-related traffic would be temporary.

In summary, the cumulative ADT on Saddle Road is anticipated to increase substantially over the next ten years for the following reasons:

- Rise in population growth resulting in greater use of roadways County-wide
- Rise in consumer demand resulting in greater use of roadways County-wide
- Rise in visitor and tourism resulting in greater use of roadways County-wide
- Return to the baseline of training at PTA due to increased dwell time at the home station and drawdown of troops from overseas engagement.

Cumulative impacts along Saddle Road must be reviewed in two parts; impacts on sections that have already been realigned or may complete realignment in the near future (i.e., Section II, and portions of Section III); and impacts on sections that have not yet been realigned (i.e., Section I and IV, and portions of Section III).

Cumulative Impacts to Realigned Sections

Less than Significant

The Saddle Road Realignment project is designed to improve the LOS along the entire roadway from E to B, including accommodating projections on traffic increases out to the year 2034 (up to 8,125 vehicles daily). Current traffic projections through the 10-year period covered in this EIS were modeled by Hawai‘i State and Hawai‘i County to be at approximately 5,000 vehicles daily. It is feasible to assume that construction-related daily traffic would increase to above state and county projections temporarily. The improvements from Saddle Road Realignment would easily handle IPBC construction-related traffic. Construction-related traffic would not reduce the LOS on completed sections to above B. Therefore, the cumulative traffic impacts are rated at Less than Significant.

Cumulative Impacts to Saddle Road Sections not yet Realigned

Less than Significant

Without modeling, it is feasible to assume that IPBC construction-related traffic along unfinished sections of Saddle Road, chiefly Section I and near the KMA, would temporarily degrade traffic conditions, and possibly reduce the LOS from E to F. These impacts could be mitigated through implementing a traffic control plan, issuing press releases, and ensuring construction contracts include limitations on equipment deployments to PTA.

Recommended Mitigation

The Army should work with Hawai‘i State and County to prepare a traffic control plan that outlines steps to minimize congestion and maintain access to adjacent properties during construction, and also to maintain access to areas of Saddle Road that serve recreation, including hunting units.

Recommended Mitigation

The Army could consider limiting heavy equipment construction traffic to non-peak commute times to minimize conflicts with other users of Saddle Road, and minimize safety hazards posed by passenger cars encountering heavy equipment.

Recommended Mitigation

Prepare regular media releases advising the public when major construction traffic could occur, primarily during phases of construction start-up when heavy equipment would travel to PTA for site clearing, ground softening, etc., and publish the estimated initiation dates and times.

5.3.2.7 Water Resources

Cumulative impacts on water resources include water supply, surface water quality, groundwater quality, and flooding. The ROI is the same as described in Section 3.7, and includes the region within the installation boundaries or easements where the projects would be implemented, the watershed downstream of the installation boundaries (for surface water impacts), or the aquifer(s) down gradient of the installation boundaries (for groundwater impacts). The ROI of the projects outside the boundaries of PTA vary in size and are not well defined. In general, the cumulative impact assessment is intended to be descriptive rather than quantitative.

There are no surface streams, lakes, or other bodies of water within PTA boundaries due to low rainfall, porous soils, and lava substrates. Intermittent stream channels quickly dry after rainfall stops. Rainfall is the main source of water that sustains plants and animals in the dryland habitat of PTA. Limited data on surface water quality are available for the PTA watersheds.

There are several intermittent streams that drain surface water off the southwestern flank of Mauna Kea and lie within the same drainage area as PTA. Popo's Gulch is the closest stream to PTA boundaries. Popo's Gulch converges with ʻAuwaiakeakua Gulch to drain surface water toward the Waikoloa community to the west of PTA. There are three intermittent streams located within 2 miles (3.2 km) of the Cantonment Area (Waikahalulu Gulch, Pōhakuloa Gulch, and one unnamed gulch), which collect runoff from the southern flank of Mauna Kea (U.S. Army and USACE, 2008a). One perennial stream occurs downstream of PTA, the Waikoloa Stream, which heads towards the Kohala Mountains, runs north parallel to State Highway 19, and discharges into Kawaihae Bay through the Waiulaula Gulch (State of Hawaiʻi, 2002b).

Similar to surface water quality, groundwater occurrence and quality on the island of Hawaiʻi and more specifically at PTA have not been well studied. It is believed that groundwater beneath PTA is at great depths. Test wells are being drilled, as discussed in Section 5.2.2.6.

Among the trends considered within this cumulative impacts analysis for water resources in Hawaiʻi are increases in demand for potable water, due to an increasing population and expansion of urban and residential 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 has also been supplied through drilling wells to tap abundant groundwater resources. Drilling and pumping water are expensive, and over-pumping can lower groundwater levels, causing salt water intrusion in coastal areas. To prevent overdrawing groundwater resources, the state of Hawaiʻi 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 available water supplies requiring expensive treatment to make usable water. Similarly, urban expansion and industrial and agricultural development have impacted surface water quality. Nutrients, sediment, toxic chemicals, and debris from nonpoint sources collected by runoff in streams are eventually discharged to lakes, estuaries or the ocean. These pollutants can adversely affect aquatic species or 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.

Less than Significant

The proposed IPBC considered with the projects listed in Table 5.2-1 would have a significant cumulative impact on the water resources not only of PTA but the surrounding areas of PTA; however, these cumulative impacts are mitigable. Projects that modify the pervious balance of infiltration would be required to restore that balance through the compliance of Section 438 of the EISA, thereby protecting the watersheds, water table, and water quality of the island of Hawai‘i from any adverse cumulative impacts.

Runoff from these projects has the potential for significant adverse impacts on water quality surrounding PTA. Proposed projects may require a NPDES permit to mitigate potential impacts on the water supply “downstream” of PTA, also known as non-point source pollution. NPDES permitting requires an approved BMP plan (such as an erosion and sediment control plan with the HDOH-CWB) that would discuss pollution prevention measures that must be implemented during construction activities with continuous monitoring. In particular, weekly inspection(s) during and after a rain event are requirements of all NPDES permitted projects. Implementation of BMPs identified in the NPDES permits these projects would be required to obtain would mitigate these impacts to less than significant. To avoid significant adverse cumulative impacts on water quality, not only of PTA, but the island of Hawai‘i, the projects must meet all city, county and state regulation requirements, such as HDOH, SDWB, and Wastewater Branch (WWB).

The IPBC will result in soil disturbance and expose soils to erosion. Several of the projects identified in Table 5.2-1 involve ground disturbance. Those projects with ground disturbing activities of more than 1 ac (0.4 ha) of land would be required to comply with stringent stormwater pollution prevention requirements, including use of BMPs identified prior to construction in stormwater pollution prevention plans, to minimize potential impacts on surface water quality from soil erosion and sediment loading. As with the impacts of sediment loading, the effects of chemical contaminant loading could also contribute to cumulative impacts on water quality. However, implementing construction BMPs for stormwater would also address the potential for contaminant transport. Complying with regulatory requirements by implementing Phase 2 stormwater management regulations would ensure that the contributions of sediments and pollutants from the project 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.

Compliance with city, county, and state regulation requirements and BMPs to protect watersheds and water quality on the island of Hawai‘i. Examples of BMPs that may be employed include:

- Stabilized construction entrances to provide and reduce vehicle tracking of sediments
- Erosion and Sediment Control Inspections and Maintenance Practices; all control measures would be inspected once each week and following a rain event to ensure effectiveness
- Built-up sediment would be removed from silt fences when it has reached one-third the height of the fence and or on a bi-weekly basis.

Water resources impacts are considered less than significant because of the lack of permanent surface water resources and the great depth to the groundwater at PTA, implementation of construction BMPs, adherence to spill prevention and response procedures, and facility designs to account for flooding and runoff potentials.

The Army continues to address potential groundwater contaminants resulting from past practices. 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 infrequently and could have more significant local impacts on groundwater quality. Their occurrence cannot be predicted, but SOPs have been established (i.e., 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) to reduce the potential and impacts of accidental spills and releases. If spills occur at PTA, the extent of the spill is expected to be fully investigated and characterized and then remediated, in compliance with regulatory requirements. The project is not expected to increase significantly the cumulative potential for spills that could affect groundwater quality. Because implementation of SOPs would 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.

Construction projects involving paving, new facilities, 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 project is not expected to contribute significantly to an increase in the potential for flooding at PTA or surrounding areas. Impacts from construction projects would not be 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. The project will 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 could increase erosion.

Beneficial Impact

The IPBC would not increase demand for potable water, although water may need to be transported farther. Two small-diameter test bores are being drilled to depths of approximately 1.2 mi (2,000 m) below the ground surface, beneath the installation, to help determine if water is present and in what quantity, and for water samples to determine water quality. Plans for the test bores are in progress. As there are no potable water sources at PTA, if water was found under the installation, it would be a beneficial impact to the area.

5.3.2.8 Geology and Soils

The PTA ROI for geology and soils includes all areas in which project-related activities may occur, including the General Range Area and the corridors of the military vehicle roads. These projects may contribute to cumulative impacts from soil erosion. The major historic influence on soil erosion in the ROI is the disturbance of soils, slope modifications, changes to drainage features, and loss or disturbance of vegetation due to agricultural conversion, military activities, fires, roads, and development. As soil disturbance can change the soil profile of an area and expose soils directly to rain and runoff, this can increase the potential for soil erosion. Although it is difficult to quantify historic soil loss, many of the lower slopes of the island of Hawai‘i have experienced vegetation removal and subsequent increased soil erosion rates. Soil erosion and deposition are naturally occurring phenomena in any landscape. Adverse impacts, such as loss of productive topsoil, loss of fragile soils supporting unique plants or endangered habitats, impacts on water quality, and down slope soil movement, may result when erosion rates are accelerated by human or natural disturbances.

In recent years, soil erosion and/or soil loss has been reduced through better management of agricultural lands, stormwater controls on urbanized lands, revegetation of disturbed lands, and an understanding of the importance of vegetative cover within an area. Notwithstanding, activities that disturb or remove vegetative cover are planned to or will occur in the reasonably foreseeable future, which will continue to result in greater soil erosion and loss than without these activities. Areas with well developed (deep) soils would likely be revegetated and stabilized, however, areas with newly formed soils or shallow soil profiles may not be able to recover from soil erosion or soil loss impacts.

Construction projects, such as some of those listed in Table 5.2-1, are examples of potential soil disturbing activities that can contribute to soil erosion. However, to date, there are increasingly strict regulations at the federal, state, and often local level that require implementation of BMPs to reduce the potential for soil erosion from construction sites to protect water resources. The use of BMPs, and other management plans, has the indirect effect of reducing soil erosion at the source. Similar practices can be applied to all ground-disturbing activities, as awareness of the effects of soil erosion on downstream resources increases, and the forward trend in soil erosion is expected to be a continued decrease in erosion from human activities. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis.

The potential for soil erosion or soil loss within the ROI would increase with different land use activities or the level of disturbance planned for at PTA. In areas where soils are thin and fragile, the effects of soil loss may be irreversible. Impacts on water quality from the IPBC and other reasonably foreseeable projects can be mitigated with stormwater management and runoff controls (see Section 4.7).

Cumulative Impacts on Geology and Soils

Significant Impact Mitigable to Less than Significant

Projects proposed outside PTA boundaries on the island of Hawai‘i include various construction, demolition, and alteration projects; military training exercises/tests; and MEC/UXO clearance activities. These projects could increase the amount of vegetation cleared, thereby an increase in soil erosion may be experienced. Construction of the IPBC involves a substantial amount of ground softening in which lava is crushed into finer material. Site clearing and grading for construction of the proposed IPBC would expose lava flow areas and soils to enhanced erosion by water or wind. This impact would be expected to be less than significant because the proposed IPBC would be constructed on lava flow areas with little soil development using standard erosion control practices. Construction impacts would be temporary. Many of the other projects listed in Table 5.2-1 also involve crushing of lava. However, with the implementation of federal, state, and local regulations in conjunction with BMPs, the potential impacts from IPBC construction on cumulative geology and soil impacts would result in significant impacts mitigable to less than significant.

There would be potential dust and surface runoff erosion from use of trails and unpaved roads at PTA near the Western Range Area Alternative (Preferred Alternative). The impacts would not be significant relative to long-term soil loss or erosion because use of the trails and roads would not significantly alter the rate of erosion. The Army would follow BMPs in maintaining these trails and unpaved roads.

Less than Significant

The construction of the IPBC may increase the potential for soil erosion and vegetation cleared. Use of the IPBC would also involve additional vehicles driving from the Cantonment Area to the Western Range Area Alternative, causing an incremental increase in the levels of fugitive dust. At the regional level, however, the effects are not expected to be significant when combined with the effects of other regional actions. With the implementation of BMPs and recommended mitigation measures these potential cumulative impacts would be less than levels.

Recommended Mitigation

The Army would develop and implement an Erosion and Sediment Control Management Plan to minimize dust emissions.

Recommended Mitigation

The Army would continue to implement land rehabilitation projects, as needed, within the LRAM program.

Less than Significant

Although exposure to chemical contaminants in soils from construction of the IPBC could occur, the risk from exposure to contaminated soils would be low. Even though construction would require the conversion of a portion of the range impact area, Soldiers would be exposed to contaminated soils in a limited capacity for a period of days or weeks. The level of chemical compounds present would be below their respective industrial PRGs. Considered together, the potential duration of exposure to the chemical concentrations on the training ranges would represent a low risk to personnel. Airborne pathways (such as windblown contaminated dust) would not be a migration pathway that soils contaminated with munitions constituents would reach receptors outside the Range Area. Therefore, no significant exposures to chemical contaminants related to munitions constituents in soils would be expected.

Future training activities at PTA could include dismounted maneuver training, with vehicle use generally limited to existing trails or roads. Military units using PTA involve mounted, dismounted, and aviation maneuver training. Maneuvers that occur off-road result in soil erosion, soil compaction, and soil loss. In areas of PTA where soils are thin and fragile, the effects of soil loss are irreversible and the impacts from mounted maneuvers in these areas are considered to be significant. Impacts on water quality by proposed projects or activities may be mitigated with stormwater management and runoff practices (see Section 4.7). Maintaining a persistent vegetative cover in areas of intensive use or development is not possible because of the nature of the proposed training. Proposed maneuver training could contribute to significant soil loss and compaction at PTA, and mitigation measures would substantially reduce impacts.

Proposed road or trail construction of the IPBC could cause soil loss, however the cumulative impact would be less than significant. Road or trail construction activities would occur on previously disturbed areas. There would be potential dust and surface runoff erosion from use of roads at PTA. The impacts would not be considered to be significant relative to long term soil loss or erosion because the porosity of soils there coupled with a general lack of gulches or surface water would highly localize sedimentation from runoff erosion.

Seismic or volcanic eruption hazards could result in a natural disaster that influences areas at or surrounding PTA. 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 to the civilian population in the region. Overall, the construction and use of the IPBC would add little incremental impact to these risks.

5.3.2.9 Biological Resources

Cumulative impacts for biological resources were assessed by analyzing factors that could impact resources cumulatively for past, ongoing, or future projects by analyzing several factors, such as overall abundance of a particular resource, amount of the resource impacted, and state or federal status of the resource. The ROI used in this analysis includes PTA and the island of Hawai‘i.

Impacts were assessed based on the resource in question. A species or ecosystem with regional or local significance would result in more significant impacts than a species more geographically abundant and prevalent. Impacts that could alter or destroy high quality to moderate quality habitat, affect populations, or increase undesirable nonnative species would be considered significant. Impacts to other resources more abundant and geographically prevalent, such as non-sensitive wildlife and vegetation, could range from less than significant to mitigable to less than significant.

Past, present and future projects identified in Table 5.2-1 were reviewed to determine potential cumulative impacts on biological resources found within and outside the boundaries of PTA. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis. The Marine Corps prepared an EIS evaluating the introduction of new troops in support of several helicopter squadrons with proficiency training occurring at PTA (U.S. Navy, 2012b). Furthermore, there are numerous projects planned or proposed on the island of Hawai‘i outside of PTA’s boundaries, including roadway extensions/pavements, construction of facilities, submarine warfare exercises, harbor extension, and MEC/UXO clearance.

Wildlife, Vegetation, Listed Species and Critical Habitat

Significant Impact

Construction of the IPBC would increase the amount of vegetation cleared and potentially disturb habitats. Listed species and their habitats have been observed within the General Range Area (Section 3.9). The effect on endangered plants is discussed in Section 4.9.

Projects proposed outside PTA boundaries on the island of Hawai‘i include various construction, demolition, and alteration projects; military training exercises/tests; and MEC/UXO clearance activities. These projects could increase the amount of vegetation cleared, potentially disturb, or take listed species and their habitat, may alter or disturb sensitive ecosystems, potentially introduce and spread invasive species, and may disturb native wildlife. The cumulative impacts on biological resources from these projects could result in significant impacts, depending on the extent of disturbance to listed species or ecosystems. Some listed species and their habitats are geographically found only on the Hawaiian Islands. Population numbers and structure, genetic variability, and other demographic factors for these species could have large, short-term declines with long-term population numbers significantly depressed. Furthermore, the possible spread of invasive plants could increase the potential of habitat loss, which could also impact sensitive ecosystems. Loss of habitat might also affect the viability of at least some native species. Mitigation measures would reduce impacts, but not to less than significant.

The Army has completed an ESA Section 7 formal consultation with the USFWS for the proposed IPBC at PTA. The Army will abide by all the terms and conditions and the conservation measures identified in the 2013 BO (Appendix G), which includes an analysis of cumulative impacts.

Less than Significant

The PTA INRMP, PIP, and measures identified in previous ESA Section 7 consultations adequately minimize and/or mitigate the potential impact of dust or soil erosion that may occur from ground training at PTA. The loss of habitat and listed species within the impact area have been mitigated and/or minimized through these NEPA and ESA consultations. Cumulative impacts on biological resources from training activities would likely result in less than significant impacts. Impacts would not be expected to result in large, short-term declines having long-term population numbers significantly depressed, as Soldiers would utilize existing training areas.

Military readiness activities are exempt from take of migratory birds under the MBTA, unless the Army determines that such take may have a significant adverse impact on a population of migratory bird species. A number of birds are known to occur at PTA, but the numbers of native migratory birds in the area have not been assessed. However, it is not anticipated that ground training activities at PTA would take many birds, especially not to the degree of significant impact on a population level. Overall, the Proposed Action would add only slight incremental impacts on the other anticipated impacts and therefore, cumulative impacts would not be significant.

Invasive Species

Significant Impact Mitigable to Less than Significant

The construction and operation of facilities, ranges, and infrastructure may possibly introduce and spread invasive species. The possible spread of invasive plants could increase the potential of habitat loss, which could also impact sensitive ecosystems. Loss of habitat might also affect the viability of at least some native species. Disturbance from these activities would leave surrounding habitats vulnerable to the spread of nonnative species (including the potential introduction of nonnative species that do not presently occur on PTA) that can outcompete native species. The potential to spread invasive plants may occur; however, control measures would be continued (e.g., vehicle washing requirements, invasive plant management guidance, and a weed control program) to minimize the establishment of introduced species. Considering the past, ongoing, and reasonably foreseeable future actions, although mitigation measures would be implemented, the overall cumulative impact from the spread of invasive (nonnative) species from the Proposed Action and those listed above in Table 5.2-1 would be significant. Mitigation measures, such as following BOs, implementation plans, and various guidelines would reduce impacts, but not to less than significant.

The Army has completed an ESA Section 7 formal consultation with the USFWS for the proposed IPBC at PTA. The Army will abide by all the terms and conditions and the conservation measures identified in the 2013 BO (Appendix G).

Recommended Mitigation

Consider implementing the following mitigation measures to minimize the spread of invasive species from construction-related activities:

- Educate construction contractors about the need to wear weed-free clothes and maintain weed-free vehicles when accessing the construction site
- Educate Soldiers and civilians that use PTA facilities and roads on the importance of cleaning vehicles, equipment, and field gear
- Prepare a one-page insert for construction contract bids that inform bidders of invasive species BMP requirements
- Inspect and wash all military vehicles at washrack facilities prior to leaving the installation to minimize the spread of weeds (e.g., fountain grass), and animals (i.e., invertebrates)
- Implement invasive animal control programs to include protocols for the removal of introduced animals.

5.3.2.10 Cultural Resources

This section discusses the cumulative impacts for cultural resources. The cumulative ROI for cultural resources is the island of Hawai‘i. While the most directly connected resources to those at PTA are within the surrounding communities, archaeological sites throughout the island would be affected by the continued development and military training included in the cumulative projects.

Many factors were considered for this cumulative analysis, including public comments for this project and the projects listed above. Most of the public comments related to access to traditional areas and the potential destruction of cultural sites and landscapes from training activities. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis.

Historical Cumulative Effects

Residential, commercial, and military development throughout the state of Hawai‘i has destroyed or damaged many cultural resource sites, but Hawai‘i’s rich history produced a dense collection of historical properties, many of which are as yet undiscovered. Past cumulative effects on cultural resources have resulted from Euro-American settlement and over 50 years of military activity at PTA. Significant impacts on cultural resources can include destruction of the properties or elements of the resource that qualify it for inclusion on the NRHP. Other impacts can occur from changing the setting and character of the resource. For places important for traditional reasons, significant impacts can include reducing or eliminating public access to these areas, altering the landscape or setting, or destroying or altering the natural setting by prescribed burns.

Prior to military use at PTA, ranching and cattle altered much of the indigenous vegetation in the 1800s, causing the destruction or alteration of many of the prehistoric and historic period archaeological sites due to cattle trampling and landscape alteration. It is likely that early military use of PTA, prior to cultural resource legislation and current management efforts may have resulted in the loss, destruction, or alteration of cultural sites from training activities. Because access to PTA has been restricted for over 50 years, it is difficult to find community members with specific knowledge of the historic use of these areas.[76] This loss of knowledge is an additional effect of the prolonged military use of these areas.

Significant Impact

Construction projects on the island of Hawai‘i could result in significant impacts on cultural resources. Previous public comments indicate that there are significant Native Hawaiian resources in the area around Kawaihae Harbor, including an underwater heiau; the harbor deepening and Saddle Road Realignment could significantly affect these resources. Construction of new facilities at PTA could have significant impacts on cultural resources, depending on its location.

For the federal projects identified in Table 5.2-1, cultural resources surveys would be conducted as part of the required site-specific NEPA documentation. However, if numerous cultural resources (i.e., excavated pits) are found at other newly proposed ranges such as the AGR, or during road/trail construction at PTA, there could be an overall loss of cultural resources. The Army consulted with the SHPD and other interested parties on the effects to historic properties for the proposed IPBC within the impact area.

In recent years, the loss of cultural resources at PTA has been greatly reduced through implementation of avoidance measures, an understanding of the importance of cultural resources in the area, and education of Soldiers training in the General Range Area. The Army is developing an Integrated Cultural Resource Management Plan (ICRMP) for all its installations in the state, including PTA. 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.

Although each of the projects identified would be consulted on under federal or state historic preservation laws and regulations, as appropriate, with accompanying agreement documents as needed, the cumulative impact on cultural resources on the island of Hawai‘i could be significant because cultural resources could be damaged or destroyed. These impacts could be limited to a greater or lesser extent, depending on the ability of project proponents to avoid or mitigate the damage.

[76] The oral history interviews cited earlier in Chapter 3.10 is evidence of some of the remaining memory of historic use and tradition. The oral history interviews cited earlier indicated that memory at least of trapping birds for feather collection persisted into the late 20th century. Loss of knowledge of use of the PTA area has also resulted from changing lifeways due to technology and the economy and shifts in population/residential patterns.

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 would be documented before being destroyed, in accordance with Department of Interior standards and Section 106 of the NHPA. The Army intends to work with range planners and the Corps of Engineers during the range design process to ensure avoidance measures are taken into consideration when locating firing points, targetry, and maneuver areas on the ranges. Appropriate mitigation would be established in consultation with SHPD and other parties. Collection of data and distribution of information through public outreach would also be conducted. Continuing education and awareness of Soldiers training at PTA would be conducted using in-briefing materials to ensure units using proposed new ranges can identify sites and take avoidance measures during training.

Given the damage or destruction of cultural resources from the impact of the projects identified in Table 5.2-1, these activities could accelerate the trend of damage to cultural resources in Hawai'i. Although specific actions for the proposed activities on PTA can be mitigated on a case-by-case basis, the overall effect of continued development throughout Hawai'i would result in substantial alteration and restriction of native use of traditional areas and the potential destruction of numerous archaeological sites.

The Army and USAG-P continue to work with the SHPD to incorporate historic preservation goals, which are outlined in the State's Historic Preservation Plan found on the SHPD Web site[77] (State of Hawai'i, 2001). Each goal, as stated below, further has objectives that the state and its cooperating partners (including the Army) integrate into its planning practices:

- Promote effective land use planning that incorporates historic preservation concerns
- Promote sensitive historic preservation, community revitalization, and economic revitalization
- Increase recognition and improve management of Hawai'i's historic resources
- Increase public knowledge of Hawai'i's historic properties and the benefits of historic preservation.

USAG-HI has committed to preserving some historic properties under its control at PTA, and is actively protecting those sites through fencing and regular monitoring. The Army recognizes that cultural resources at PTA are not entirely representative of the rest of the island of Hawai'i, The Proposed Action involves damage or destruction to cultural resources. Its impacts add incrementally to the area, already-significant, impacts therefore, the cumulative impact will be significant. This tends to diminish the incremental impact of the Proposed Action when placed in context.

[77] http://state.hi.us/dlnr/hpd/hpgreeting.htm

5.3.2.11 Hazardous Materials and Hazardous Waste

The discussion of the cumulative effects of HM/HW requires a detailed look at the properties of the ROI in which the cumulative projects are taking place. The effects of HM/HW are most commonly localized and limited to the boundaries of the project ROI. Due to the localized nature of these environmental effects, most would be classified as either a less than significant impact or significant impact mitigable to less than significant depending on the control measures in place and environmental characteristics of the ROI. The cumulative effects of HM/HW become a concern due to continued deposition over time and/or the existence of a transport mechanism such as an airway, waterway, or groundwater at many locations throughout the U.S. The effects of extensive accumulation and/or rapid transport and dispersion of contamination could result in a significant impact.

Due to the localized nature of HM/HW effects and the characteristics of PTA, the ROI impacted by the cumulative effects of HM/HW is limited to the boundaries of PTA. The lack of surface or groundwater greatly reduces the probability of contaminant migration in both the Cantonment Area and Range Area. The conclusions of an ORAP assessment of PTA conducted in 2010 (discussed in detail in Section 3.8) found that migration pathways that contaminants would use to leave the range area do not exist at PTA. As a result, contaminants are generally confined to the range areas and within the impact area at PTA.

The regional project list found in Table 5.2-1 includes projects that have, or would occur within the boundaries of PTA, and those which do not. As a result of the information discussed in the previous paragraph, projects that do not occur within the boundaries of PTA, or directly adjacent to, are not discussed as contributing to the cumulative effects of HM/HW in this section. The effects of hazardous waste/hazardous materials for projects outside of the PTA boundary would be limited to their respective transport (migration) mechanisms and ROI.

Cumulative Impacts to Hazardous Materials/Hazardous Waste

Significant Impact Mitigable to Less than Significant

Some of the future projects proposed by other Military Services involve training the MV-22 Osprey and Cobra Attack Squadron, and Navy bombing exercises (e.g., at the mock airfield) at PTA. Both live and inert munitions would be used during training exercises under these actions. While these actions would increase the amount of MEC/UXO generated at PTA, both would involve firing into the impact area, which is a restricted access area, thereby resulting in less than significant impacts on human health and safety. Significant impacts on human health as a result of reclaiming future impact area to create training area (such as what is proposed for the IPBC) could occur by exposure to explosives. Installation personnel and contractors surveying the impact area for natural resources, cultural resources, and MEC/UXO would be accompanied by experts trained in MEC/UXO identification, to minimize dangerous contact with dudded munitions items. MEC/UXO found would be GPS-tagged so that those areas could be cleared safely prior to construction. There is a chance that construction workers conducting ground clearing and build-up of the new range would encounter MEC/UXO not found during initial surveys.

Recommended Mitigation

Ensure all construction workers on the range (and Soldiers using the range once completed) would be educated on how to identify MEC/UXO and learn the proper protocols if MEC/UXO is found.

Recommended Mitigation

Continue education and training programs, and implement safety protocols within the General Range Area.

Recommended Mitigation

Continue surveys of new or previously used areas, and through survey of training areas at the completion of live-fire exercises involving dudded munitions, MEC/UXO could be properly disposed of.

Less than Significant

The construction and operation of the IPBC project would increase the amount of hazardous materials stored at PTA, and increase (by a currently undetermined amount) of hazardous waste generated and stored on the installation; however, the introduction of new maintenance facilities would be an improvement on the current facilities by which waste is temporarily maintained prior to disposal. There would be no change in procedure for handling and managing waste.

General Range Area construction would generate small amounts of hazardous waste (e.g., POLs). The IPBC would require an increase in herbicide and/or pesticide materials that may, over time, require an increase in the storage space at environmental or DPW facilities in the Cantonment Area. The implementation of BMPs, SPCC Plans, and continued implementation of the IHWMP would minimize the impacts from hazardous material and waste production, storage, handling, and disposal. The incremental addition of IPBC impacts on existing and anticipated impacts would be less than significant.

5.3.2.12 Depleted Uranium

Factors the Army considered in determining whether a significant impact could occur were determined based upon the risk that receptors would be exposed to DU exceeding the acceptable risk range that the EPA considers safe (10^{-6} to 10^{-4} millirems/yr).

The ROI for DU contamination only extends to the boundaries of PTA, and not beyond. Since the Army ceased using DU at PTA in the 1960s, no additional DU-containing munitions have been used at the installation. Therefore, no additional DU accumulation has occurred at PTA beyond the 1960s.

Cumulative effects of DU may be viewed as the cumulative, long-term exposure to DU at PTA. This is addressed in the section on DU exposure below.

The public has also raised concern that DU contamination at the installation may contribute to background levels of radiation, and presents a substantial safety concern. This concern is addressed below under Cumulative Impacts on Background Levels of Radiation.

Impacts from DU Exposure

Less than Significant

Studies conducted by the Army through 2005 consistently indicate that the health risks associated with DU exposures are low. The form of uranium found on PTA (other than natural) is a molybdenum alloy. According to the Archives Search Report, the primary suspected contaminant associated with the Davy Crockett System is D-38 uranium alloy, also called DU. An M101 Spotting Round projectile body was comprised of approximately 8 oz (226.8 g) of the D-38 uranium alloy. The alloy was manufactured with 92% DU and 8% molybdenum, resulting in approximately 7.36 oz (208.6 gram (g)) of DU per projectile.

Based on data presented in a Baseline Health Risk Assessment for Residual DU at PTA (CABRERA, 2010), the maximum doses or exposure risks that receptors at PTA may experience are well below that of the EPA acceptable risk range.[78] These conclusions are based upon conservative estimates of long-term potential exposure to DU at the installation. That study also found that no exposure pathways exist for receptors outside of PTA's boundaries (including nearby residents or those using recreational areas close to the installation).

None of the projects reviewed in Table 5.2-1 involve the use or handling of DU. The chance that aerosolized particles in areas adjacent to where modernization projects would occur, could become re-suspended from construction activities in any quantities that could pose an unnecessary health risk would be less than significant.

Cumulative Impacts to Background Levels of Radiation

No Impact

Background levels of radiation have increased worldwide from those before the 1900s primarily due to atmospheric weapons testing. The U.S. DoE reports that "Following the explosion of the Chernobyl plant in Ukraine in 1986, air monitoring in the U.S. also picked up trace amounts of radioactive particles, less than one thousandth of the estimated annual dose from natural sources for a typical person." (EPA Radiation Protection Web site, 2011).[79] Ongoing monitoring of radiation by the EPA has further detected miniscule quantities of iodine isotopes and other radioactive particles (that pose no health risk) in the U.S. since the April 2011 Fukushima nuclear plant disaster in Japan.

[78] Receptors are defined as current/future maintenance workers, future construction workers/remediation workers, future adult cultural monitor/trespasser/visitor, future site worker, and current/future Soldier.

[79] http://www.epa.gov/radiation/docs/readytorespond/520-1-91-027-pg2.html

Current Army activities at PTA are not increasing these levels. AR 385-63 *Range Safety* prohibits the use of DU ammunition for training worldwide, a policy that has been in effect for over 20 years; and, DU containing munitions has not been used at PTA since the 1960s. The Army considered background levels of radiation when it prepared the PTA Baseline Health Risk Assessment for Residual DU (CABRERA, 2010). The EPA (1996) reported that "Background levels of radiation are ubiquitous (existing or being everywhere), and at levels that exceed typical risk targets; therefore, natural variability may preclude the ability to quantify small incremental risks due to contamination." [80] The Army assessed that no adverse human health impacts are likely to occur as a result of exposure to the uranium present in the soil at PTA. The Army, as a result, assesses no cumulative impacts on human health from the action proposed in this EIS coupled with background radiation, and past, present, or reasonably foreseeable future actions. For many of the proposed modernization projects, the duration of construction would be very short. Workers would not meet the maximum exposure limits or dosing limits of uranium. The IPBC is located about 3.7 mi (6 km) from the area of PTA where DU was used. Construction and operation of the IPBC would add no incremental impact to the already-negligible DU impacts. The rounds fired at the IPBC would not go in the direction of the DU areas.

5.3.2.13 Socioeconomics and Environmental Justice

The main data points used to describe the prevailing socioeconomic conditions in the area that comprise the ROI include population demographics; economic data such as regional employment, housing, and income; access to schools and emergency services; and environmental justice and protection of children (per EOs 12898 and 13045, respectively). The socioeconomic analysis discusses the potential impacts of the proposed projects on the economy and sociological environments within the ROI for PTA. PTA is located in Hawai'i County, which serves as the ROI. Hawai'i County covers the entire island; PTA is primarily contained within the Pā'auhau-Pa'auilo CCD, as well as small portions of the North Kona, South Kohala, and North Hilo CCDs.

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

[80] Natural variability means uncertainties that stem from inherent randomness or unpredictability in the natural world, but may be characterized through monitoring or other programs of observation. In the case of DU at PTA, the Army determined that accounting for background radiation in modeling would diminish the model's ability to quantify health risks.

Historical Cumulative Effects

Past actions in the ROI affecting socioeconomic conditions include establishing and operating Army installations on the island of Hawai‘i and constructing and operating training ranges at PTA. Other past actions affecting socioeconomic conditions include private actions, such as developing residential communities or commercial areas (e.g., restaurants, hotels, and resorts). These past actions stimulated the local economy, generating beneficial economic impacts on ROI employment, income, and business volume. Some of these impacts, such as construction projects, are short-term in nature and are now removed in time from present economic conditions. However, other past actions can continue and have positive impacts on the local economy.

Cumulative Impacts on Socioeconomics and Environmental Justice

Less than Significant

Projects proposed outside PTA boundaries on the island of Hawai‘i include various construction, demolition, and alteration projects. Cumulatively, there would be less than significant impacts on the protection of children as a number of projects may be located fairly close to nearby populations (particularly children), but construction areas are typically taped-off from public access and include signage to warn of safety hazards. There could be risks, although minor, inherent to increased project construction and activities. To minimize impacts, applicable safety regulations and procedures would be followed. There are no children in the vicinity of the proposed IPBC.

No Impact

There would be no impact on population, housing, schools, and environmental justice from the projects proposed at PTA. New staff added to PTA would be minimal (less than five people). This increase in staff would have minimal effect on the ROI economy. Other projects identified in Table 5.2-1 are not expected to increase ROI population. Furthermore, population projections through 2020 generated by the state of Hawai‘i indicate continued slow growth in Hawai‘i County, as well as in the state of Hawai‘i (HDBEDT, 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 1% from 2000 to 2005 to 0.9% from 2005 to 2020 (HDBEDT, 2000, 2003).

No adverse cumulative effects on the protection of children would be expected. Noise sources associated with construction projects occurring in the ROI would not result in a significant change from current conditions. The IPBC construction would occur in an area that is off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Risks to the general public would be minimized by strictly adhering to applicable safety regulations and procedures.

Beneficial Impact

Beneficial cumulative impacts on the PTA ROI economy would be expected from several of these projects as there would be increased employment, income, and business volume, especially resulting from modernization projects, range construction, and training at PTA and construction projects on the island of Hawai‘i (such as the various roadway improvements and deepening of Kawaihae Harbor). The economic benefits would mainly last for the duration of the construction periods and thus would be temporary in nature and less than significant yet beneficial impact. The proposed IPBC construction would have a slight incremental addition to these economic benefits.

5.3.2.14 Public Services and Utilities

Public services consist of police, fire, and emergency medical services. Public utilities include water, sewer, solid waste management, stormwater drainage, electrical, and telephone services. These public services and utilities are owned and operated by various county, federal, and private organizations. The ROI encompasses a geographic area in which a public service or utility used at PTA is indirectly or directly affected by a military project. Potential impacts caused by the projects identified in Table 5.2-1 could directly or indirectly affect the agencies responsible for providing public services or utilities to the community. Therefore, cumulative ROI for water, electrical, solid waste management, and telephone services is the island of Hawai‘i. Changes in demands for these services may adversely influence the public service’s ability to provide capacity to the island community.

Much of the land directly surrounding PTA is designated as a conservation district, including both state and privately-owned land. Grazing is the primary use of the surrounding conservation district. The demand for utilities and public services, per capita use, across the larger island of Hawai‘i has grown along with the general population.

The cumulative impact analysis considered the net effects of the Proposed Action and projects listed on Table 5.2-1 on the capability of local public service and utility providers to meet the cumulative demand for service. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis. In addition to population increases, per capita use has increased for utilities such as water, electricity, and fuel. Public services have seen a similar linear increase following the population trends. Meeting fuel demands, for vehicles and to generate electricity, is a challenge since all fuel sources must be shipped to the island. Other services such as waste disposal are limited by availability of land. With the increased demand for public services and utilities, the public and private sectors in Hawai‘i have been working to reduce energy demand. Between 1980 and 1995, growth in energy use lagged far behind population growth. Alternative energy sources and increased conservation measures have reduced per capita energy demand. Wastewater in Hawai‘i is treated by wastewater treatment plants and by UIC (Juvik, 1998, 2002).

In addition, modern military ranges often demand more energy due to use of automated targetry. To reduce this demand, the Army seeks opportunities to use alternative energy sources, such as solar power, when feasible, to control targetry. Range operations facilities still demand energy from the common grid.

Cumulative Impacts on Public Services and Utilities

Less than Significant

Cumulative impacts on public services would be expected to be less than significant. The military's presence at PTA ensures that federal police, fire, and emergency management presence would continue. The Army would continue to have MP appropriately staffed for any increases in Soldiers to address crime issues on base. In addition, no significant increases in demand for these services for other projects in the ROI would be expected.

All wastewater at PTA is handled through septic tanks and/or underground injection wells (see Section 3.14.1.2). Since wastewater is treated internally at PTA, it would not contribute to any island trends regarding increased demand for treatment facilities. There would be no significant cumulative impacts on wastewater and stormwater.

Cumulative construction activities by the military at PTA and regional construction projects on the island, such as highway construction, would place an increased demand on the solid waste disposal system from construction/demolition debris. When viewed regionally, construction of the IPBC is not anticipated to have a significant impact on the capacity of the West Hawai‘i Landfill. While construction and demolition activities would be anticipated to contribute to demand, the overall demand on capacity would be less than significant due to programs that the landfill is presently implementing to mitigate regional capacity issues (e.g., metal recycling).

The contribution of the proposed construction activities to stormwater runoff impacts would be minimized to less than significant levels by implementing standard construction practices such as grading and installing curbs, drains, and gutters. Construction of the IPBC in combination with other construction projects, such as the Saddle Road Realignment, 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 PTA would be designed to comply with stormwater management regulations to control runoff. There would be no significant cumulative impacts on stormwater runoff.

The cumulative impacts on utilities such as electrical, sewer, and telephone services would be less than significant. Electricity demand would be expected to increase as a result of cumulative construction projects and could place an additional demand on utility systems. Extension of power and phone lines to the IPBC ROCA would have little incremental impact and the cumulative impact would be less than significant.

5.3.2.15 Wildfires

The projects featured in Table 5.2-1 include past, current, and future projects occurring within PTA boundaries, as well as outside of PTA. Wildfires within PTA have the potential to burn outside of the PTA boundaries and wildfires on Hawai'i Island have the potential to enter PTA. In the event of a wildfire, regional air quality can be affected, entire plant and animal communities can be damaged, cultural resources can be destroyed, and major losses in vegetation can occur. Due to these factors, the ROI was determined to be island of Hawai'i, to include PTA.

Between 1987 and 1999, a few large wildfires were responsible for 97% of the fire damage at PTA. Current projects occurring within PTA remain an ignition concern, as numerous small fires have been recorded since live-fire exercises began at PTA. However, the greatest concern lies with ignition of wildfires off-post. Non-Army projects with potential fire-producing activities (such as road construction and development), coupled with the fact that 91% of all acres burned on PTA were caused by lightning, arson, or carelessly discarded cigarettes off Army lands, are outside of Army control. The Army cannot mitigate for all potential scenarios. Since July 1990, a total of 7,700 ac (3,116 ha) within PTA were burned as a result of fires ignited outside of the PTA boundaries. For this reason, projects occurring outside of the PTA boundary must be considered when addressing the cumulative impacts of these projects, particularly non-Army projects.

Potential direct impacts from wildfires include damage to biological and cultural resources and impairment of air quality. Examples of potential indirect impacts from wildfires include increased soil erosion rates due to removal of vegetation from the land and reduced water quality from water running over land cleared by fire. Wildfires could occur from the ignition and spread of a wildfire, either from training activities or the re-ignition of a fire thought to be extinguished. Because it is possible for many fires to affect a relatively limited area (resulting in limited impacts) or for a wildfire to affect a large area (resulting in many impacts), the frequency of wildfires is not used as a means for assessing the impacts of wildfires. Instead, the potential for wildfire ignition is used as the criterion for assessing wildfire impacts. Wildfires are considered significant if there is a high probability of increasing the frequency and intensity of the fires, especially in sensitive ecological areas.

Cumulative Impacts on Wildfires

Significant Impact

Present and future training activities that involve live-fire training at PTA would have the potential to cause wildfires due to the weapons fired, detonation of munitions, use of welding torches, vehicle engines, and other training-related activities. These activities could result in wildfires, which could impact listed species and their habitats, cultural resources, and air quality. Furthermore, live-fire training could destroy habitat for wildlife or increase incidental mortality to wildlife from potential increases in wildfire, vegetation removal, soil erosion, and water run-off. Cumulative impacts on wildfire potential would be considered significant based on the extent of live-fire training activities proposed at the IPBC and the presence of sensitive ecological resources located in the general range area. Firefighting infrastructure and SOPs would reduce impacts, but not to less than significant.

Projects proposed outside PTA boundaries on the island of Hawai‘i include various construction, demolition, and alteration projects; military training exercises/tests; and MEC/UXO clearance activities. These projects could increase the amount of vegetation cleared, potentially disturb, or take listed species and their habitat, may alter or disturb sensitive ecosystems, potentially introduce and spread invasive species, and may disturb native wildlife. These activities would likely have similar cumulative impacts as those discussed for the IPBC. In addition, wildfires could potentially impact sensitive ecological resources found only on the island of Hawai‘i with limited firefighting infrastructure in place or lack of fire management guidance to reduce impacts. Operation of the IPBC would have a slight incremental addition to this risk. Therefore, cumulative impacts on wildfire potential would be considered significant.

Significant Impact Mitigable to Less than Significant

The projects listed in Table 5.2-1 include the construction of several ranges, facilities, and infrastructure within the PTA General Range Area. The IPBC would involve site clearing and grading for construction projects, with possible ignition sources from construction vehicles and machinery, as well as potential introduction of invasive species. Invasive species and ignition sources have the potential to cause wildfires. Cumulative impacts on wildfire potential would be considered significant to mitigable to less than significant with implementation of the following mitigation measures.

Recommended Mitigation

Implement a system of FMCs to monitor and manage fuels to reduce fuel loads and minimize wildland fire.

Recommended Mitigation

Projects at PTA will require adherence to the fire threat minimization measures in the most recent versions of the IWFMP (currently, 2003).

Recommended Mitigation

Implement established fire-fighting SOPs and continue to provide education on fire safety and prevention to Soldiers and contractors.

Less than Significant

Table 5.2-1 lists several planned and future modernization projects that would occur within the Cantonment Area. These projects would require some ground disturbance from construction-related activities, which as mentioned in Section 5.3.9, could introduce invasive species. The spread of invasive plants or noxious weeds increases the potential of wildfires occurring. In addition, possible ignition sources, such as catalytic converters and sparks associated with construction vehicles and machinery, have the potential to cause wildfires. Wildfires can have impacts on listed species, cultural resources, air quality, vegetation, and wildlife. Cumulative impacts on wildfire potential would be considered less than significant based on the overall lack of vegetation present in the Cantonment Area and the presence of firefighting infrastructure (firebreaks and dip tanks) in place.

5.3.2.16 Sustainability

The factors to be considered in evaluating cumulative effects on sustainability include energy and water use, waste production, fuel consumption, and GHG emissions.

Energy consumption consists of fuel used to create electricity at PTA and purchased electricity or thermal energy produced outside PTA. PTA also purchases and burns propane fuel for various on-site activities. At this time, PTA does not have its own water source on the installation, so water consumption consists of water purchased or provided outside the installation and delivered to PTA. Waste production is a result of Soldier activities, and support provided to Soldiers and training units. GHG emissions are primarily a result of electricity and fuel and gasoline consumption.

Given the discussion above, the ROI for the cumulative effects of all four sustainability factors contains the island of Hawai‘i. Because project-specific data are not available for all cumulative projects, the cumulative analysis was conducted on a qualitative basis. The USAG-HI has developed Strategic Sustainability Action Plan Goals for several of these sustainability factors such as to reduce per capita potable water consumption, maintain utility consumption per square foot (square meter) at or below current usage, and reduce solid waste disposal.

Cumulative Impacts on Sustainability

Less than Significant

The projects identified in Table 5.2-1 could adversely impact fuel consumption and GHG emissions (construction equipment) and solid waste production (construction materials). The addition of permanent facilities within the ROI could potentially adversely impact energy (electricity) and water consumption, however, the implementation of sustainable facility design features and energy-saving technologies that could be incorporated into standard design features for most projects can mitigate a portion of these impacts. Additionally, if the test wells indicate a potable water source/well at PTA, successful development of a water distribution system would not require the military to truck in water to PTA, thereby reducing transportation costs and alleviating demand on a public water supply. However, until the test well samples are conducted, requirements for trucking water will remain the same as present day.

Military training by the Army, Marine Corps, Navy, and Air Force at PTA impacts all four sustainability factors. Fuel is consumed by tactical wheeled vehicles and aviation platforms, and electricity is consumed within the support facilities are used by training units while at PTA. The tactical vehicles and aviation platforms also produce GHG emissions while operating. Units and Soldiers require a constant supply of potable water for drinking, cooking, personal hygiene and other activities. Training units and Soldiers produce solid waste, primarily packing materials and consumable/expendable supply items, while at PTA. Modification and construction of training facilities by the Army and Marine Corps will increase the impact on energy, GHG emissions, and solid waste during the temporary construction/modification phases. Transformation of the Army’s 2/25th Brigade from a “light” or Brigade to a Stryker-equipped BCT increased the number of tactical vehicles training at PTA and thus fuel consumption and GHG emissions. The Navy’s proposed stationing of MV-22 Osprey aircraft and H-1 helicopters on O‘ahu and Hawai‘i, and the proposed HAAT activities for the HIARNG near PTA could intermittently impact GHG emissions on and off PTA. Fuel use in construction activities to and from the IPBC during operation will have a slight incremental impact to these effects.

Beneficial Impact

The main impacts on sustainability on the island of Hawai‘i outside PTA would result from the Saddle Road Realignment. The construction activities to support this project would impact fuel consumption and GHG emissions from construction equipment operations and solid waste production and from the construction itself and construction materials. These impacts could feasibly be off-set by the resulting benefits, post-construction. The modernization of the highway should improve traffic flow and possibly reduce fuel consumption and GHG emissions. After completion of the Saddle Road Realignment a decrease in fuel consumption and GHG emissions is anticipated as traffic will use the shorter and safer Saddle Road route to cross the island instead of the longer perimeter route.

5.3.3 Summary of Cumulative Impacts

As summarized in Section 5.3 and Table 5.3-1 above, although the construction and operation of the proposed IPBC at either of the alternative sites would have significant cumulative impacts on biological, cultural resources, and wildfires, the majority of the cumulative impacts are less than significant. The cumulative impacts are less than might otherwise be expected because no additional Soldiers will be traveling to PTA to use the range and the IPBC will be located in a relatively unused area of PTA away from most other ranges. Mitigation measures are identified for resource areas with cumulative effects.

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