Fort Hunter Liggett
Army Total Force Training Integration
Environmental Assessment

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and
Fort Hunter Liggett

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DRAFT FINDING OF NO SIGNIFICANT IMPACT

FORT HUNTER LIGGETT

ARMY TOTAL FORCE INTEGRATION

Introduction

The Department of the Army (Army) has prepared an Environmental Assessment (EA) to evaluate the environmental, cultural, and socioeconomic impacts of enhancing Army Total Force Integration – that is, improving the way the Active, Reserve, and Guard components of the Army train and fight together – by increasing the frequency of brigade-level collective training exercises and incorporating off-road vehicle maneuver training of company-size units at Fort Hunter Liggett (FHL), California. These enhancements to training at FHL would also greatly benefit the U.S. Marine Corps and U.S. Navy units that frequently utilize FHL for similar training purposes, and similarly enhance the integration of their Active, Reserve, and Guard components. The National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to give appropriate consideration to potential environmental effects of proposed major actions in planning and decision-making.

In accordance with both Council on Environmental Quality (CEQ) and Army National Environmental Policy Act (NEPA) regulations (40 Code of Federal Regulations [CFR] 1508.13 and 32 CFR 651.21, respectively), this Draft Finding of No Significant Impact (FNSI) hereby incorporates the entire EA by reference.

1 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to enhance training capabilities at FHL using existing infrastructure to conduct company-level off-road vehicle maneuvers, and increasing the frequency of brigade-level collective training exercises. This would improve the integration of the Army's Active Component (AC) and Reserve Component (RC), as well as enhance readiness of maneuver units from the Army and other Services that train at FHL. This proposal is in accordance with the Army Total Force Policy (ATFP), as well as the Department of Defense's (DoD's) requirement to maintain readiness of AC and RC units.

The Army needs to provide opportunities for units to complete maneuver Mission Essential Task List (METL) tasks to meet current training requirements per the ATFP, and to support projections for scheduled and anticipated brigade-level collective training exercises. This would allow units to conduct realistic and coordinated training that integrates RC and AC units in collective training exercises so that units may train as they would fight. When deployed, U.S. Army Reserve (USAR) and Army National Guard (ARNG) units provide support to AC units (e.g., USAR provides fuel and food, and ARNG provides combat engineers while AC units lead combat efforts). AC units conduct training in cycles year-round, whereas USAR and ARNG units are generally limited to weekend and annual training cycles. In order to integrate RC and AC, the Army must synchronize training cycles by including Active Army units in USAR and ARNG collective training exercises at brigade- and battalion-levels.

In order to integrate RC and AC units in realistic, collective training exercises and support readiness of maneuver units, Movement and Maneuver functions require off-road vehicle travel

for units to acquire positional advantage over opposing forces. In order to fully support Active Army, Army Reserve, ARNG and other Service units, it is important for FHL to be able to support off-road vehicle maneuvers to accommodate maneuver training. Recent NEPA analyses did not consider the impacts of off-road vehicle maneuvers at FHL.

2 Description of the Proposed Action and Alternatives

Chapter 2 of the EA presents a detailed discussion of the screening criteria used to develop alternatives, a description of alternatives considered, and alternatives considered but not brought forth to analysis. The Proposed Action is to conduct off-road vehicle maneuver exercises, and increase the frequency of brigade-level collective training exercises at FHL in designated proposed maneuver corridor area(s). Based on the screening criteria, the Army carried forth the following alternatives within the EA:

- No Action Alternative. Under this alternative, the Proposed Action(s) would not be implemented, and the purpose and need would not be met. Training activities at FHL would continue to occur in accordance with current operating environment conditions, using infrastructure described in the 2010 *EA for Installation Development and Training* (2010 EA).
- Alternative 1 – Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only). This alternative would incorporate off-road vehicle maneuver training, would include conducting one additional brigade-level exercise (for a total of four), and would occur in 2016 only. This alternative is included to satisfy immediate U.S. Army Forces Command training requirements in the current fiscal year.

  Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Two of the four brigade-level exercises may be conducted simultaneously with the other two occurring separately, but potentially back-to-back. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur only during the dry season in the proposed primary maneuver corridor. Also, no additional off-road vehicle maneuver would occur under this alternative outside of the brigade-level training exercises.
- Alternative 2 – Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly). This alternative would incorporate off-road vehicle maneuver into the current operations. No additional brigade-level training exercises would occur (continuing a total of three).

  Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Six separate battalion exercises each year would include a maneuver company. None of these exercises would overlap, but could be conducted back-to-back. The separate battalion-level exercises would not occur simultaneously with brigade-level events. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur only in the dry season in both proposed primary and secondary maneuver corridors.

- Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly). This alternative would incorporate off-road vehicle maneuver training, and would include conducting one additional brigade-level exercise (for a total of four) annually.

  Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Six separate battalion exercises each year would include a maneuver company. Two of the four brigade-level exercises could be conducted simultaneously with the other two occurring separately, but potentially back-to-back. The separate battalion-level exercises would not occur simultaneously with brigade-level events. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur only in the dry season in both proposed primary and secondary maneuver corridors.

- Alternative 4 – Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly). This alternative would incorporate off-road vehicle maneuver training, and would include conducting two to five additional brigade-level training exercises (for a total of five to eight).

  Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Six separate battalion exercises each year would include a maneuver company. Up to two of the brigade-level exercises would be conducted simultaneously with the others occurring separately, but potentially back-to-back. The separate battalion-level exercises would not occur simultaneously with brigade-level events. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur year-round in both the proposed primary and secondary maneuver corridors. Implementation of Alternative 4 would require subsequent tiered NEPA review.

As stated within the EA, one or a combination of the Proposed Action Alternatives may be chosen to implement ATFP at FHL.

3 Environmental Analysis

Environmental Consequences and Comparison of Alternatives: Chapter 3 of the EA discusses the affected environment and potential environmental consequences for the Proposed Action Alternatives by valued environmental component (VEC). The No Action Alternative serves as a baseline from which to compare the potential impacts of the Proposed Action. Due to the nature of the Proposed Action and the nature of effects, it was determined that the following VECs would have negligible adverse effects and were not retained for further analysis within the EA: land use, noise, socioeconomics (including Environmental Justice), groundwater, floodplains, airspace, facilities, energy demand and generation, and utilities, and hazardous materials, hazardous waste and health and safety.

A summary of potential effects for the VECs retained for further analysis is presented in Table 1.

Table 1. Comparison Summary of Potential Effects[1]

RESOURCE	ALTERNATIVES					CUMULATIVE EFFECTS
	No Action Alternative	Proposed Action 1	Proposed Action 2	Proposed Action 3	Proposed Action 4	
Air Quality and Greenhouse Gases	Minor	Minor	Moderate reduced to Minor	Moderate reduced to Minor	Moderate reduced to Minor	Minor
Natural Resources	Minor	Minor	Significant reduced to Moderate/ Minor	Significant reduced to Moderate/Minor	Follow-on NEPA analysis required[2]	Minor
Cultural Resources	Minor	Minor	Significant reduced to Minor	Significant reduced to Minor	Follow-on NEPA analysis required[2]	Minor
Geology and Soils	Minor	Minor	Significant reduced to Minor	Significant reduced to Minor	Follow-on NEPA analysis required[2]	Minor
Transportation	Minor	Minor	Minor	Minor	Moderate	Minor
Surface Water and Wetlands	Minor	Moderate/ Minor	Significant reduced to Moderate/ Minor	Significant reduced to Moderate/ Minor	Follow-on NEPA analysis required[2]	Minor

[1] Refer to Section 3.1 of the EA for a discussion of impact ratings.

[2] Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse effects under this alternative.

As shown in Table 1, implementation of the Proposed Action is not anticipated to result in adverse significant environmental impacts, with the exception of Alternative 4, for which the EA has concluded that – while significant impacts are possible for natural and cultural resources, soils, and surface waters and wetlands – additional analysis would be required. These conclusions are based on the existing best management practices in impact avoidance measures outlined in Table 2; proposed resource protection measures outlined in Table 3; and proposed mitigation measures listed in Table 4 that FHL would enact to reduce potentially-significant impacts generated by the Proposed Action Alternatives.

Table 2. Summary of FHL Existing Resource Protection Measures[1]

Concern	Primary Resource(s) Affected	Existing Control/Description
Dust Generation	Air Quality	• Operational Control: Require vehicles to stay on established roads and trails unless conducting authorized training activities, and observe speed limits (maximum 25 mph unless otherwise posted). • Resource Protection: Implement dust control such as use of tackifiers or wetting surfaces prone to dust generation prior to dust-generating activities.
Invasive Species	Natural Resources	• Management Control: Implement the FHL Integrated Pest Management Plan and Invasive Species Management Plan to control and manage the spread of pests and invasive species at FHL. • Resource Protection: Reseed areas identified for land rehabilitation following training using an approved, site-specific seed mix (including native grasses and forbs) to reduce the potential establishment of invasive plant species. • Resource Protection: Require units to wash vehicles prior to leaving their home station in order to limit the spread of invasive species.
Disturbance of Sensitive Resources	Cultural Resources Natural Resources Surface Waters Wetlands	• Operational Control: Complete a REC prior to training approval, which considers protection of sensitive resources (e.g., SRMAs, historic properties, riparian areas and wetlands, federally protected species, priority species of concern, migratory birds) and restricts certain activities, where applicable. • Operational Control: Maintain maximum use of established trails and range roads for administrative moves and road marches. Operators will not create new trails when existing trails are available for use. • Operational Control: Provide units with environmental education briefings prior to training events. • Resource Protection: Prohibit off-road vehicular traffic (wheeled and tracked) within 66 feet (20 meters) of any stream or lake bed (wet or dry) unless approved by the Range Officer. • Resource Protection: Restrict vehicles from travel within sensitive natural and cultural resource areas marked with orange traffic cones or areas otherwise demarcated (e.g. signs, Seibert stakes). • Resource Protection: Mark protected areas with Seibert stakes or Seibert signs for avoidance prior to training events as practical (e.g., Seibert stakes mark the purple amole occurrence in training area 24 as off-limits to vehicles).
Contamination	Soils Surface Waters Wetlands	• Management Control: Implement the Installation Spill Contingency Plan to manage and reduce potential impacts associated with accidental spills of hazardous materials (e.g. oil, fuels, and solvents). • Operational Control: Require units to properly maintain vehicles and equipment for reducing leaks of oil, fuel and other fluids. Conduct inspections to ensure refueling and maintenance sites have appropriate containment measures in place, and that spills are reported, cleaned, and contaminated waste disposed of properly. • Resource Protection: Maintain 300 feet (91 meters) buffer between refueling, or maintenance of vehicles or equipment, and wetlands or waterways.

Table 2. Summary of FHL Existing Resource Protection Measures[1]

Concern	Primary Resource(s) Affected	Existing Control/Description
Federally-Protected Species	Natural Resources	• Resource Protection: Implement existing programs for federally protected species to monitor population status, evaluate disturbance threats and impacts, survey for potential new species locations, conduct pre-action surveys to adjust activities to minimize impacts, and evaluate and adapt protective measures as needed. • Resource Protection: Adhere to conditions within the programmatic BO for monitoring and protection of protected species (refer to Section 3.3.1.6) and implement the FHL INRMP to maintain ecosystem integrity and quality. Develop Endangered Species Management Components per the INRMP.
Habitat Degradation (including effects of erosion)	Air Quality (dust) Natural Resources Cultural Resources Soils Surface Waters Wetlands	• Resource Protection: Reseed areas identified for land rehabilitation following training using an approved, site-specific seed mix (including native grasses and forbs) to reduce habitat degradation. This includes repair and rehabilitation of existing erosion sites. • Operational Control: Require vehicles during training to follow approved routes and make use of existing roads and trails to reach their assigned training areas. This reduces operational footprints to and from training sites. • Operational Control: Provide environmental coordination with units to minimize impacts during aviation exercises, on-road maneuvers, bivouacs, and use of military training sites and facilities.
Protection of Aquatic Habitat and Water Quality	Natural Resources Surface Waters Wetlands	• Operational Control: Prohibit off-road vehicular traffic (wheeled and tracked) within 66 feet (20 meters) of any stream or lake bed (wet or dry) unless approved by the Range Officer. • Operational Control: Maintain 300 feet (91 meters) buffer between refueling or maintenance of vehicles or equipment and wetlands or waterways. • Operational Control: Maintain low-water crossings, and as practicable, restrict vehicle crossings of streams to these locations. • Resource Protection: Submit a Notice of Intent package under the California State Water Resources Control Board Construction General Permit Order 2009-0009-DWQ for site restoration activities involving soil disturbance of one or more acres of soil. This includes preparation of a project-specific SWPPP containing BMPs proposed to protect stormwater runoff during site restoration activities.
Protection of Historic Properties	Cultural Resources	• Resource Protection: Physically demarcate a 33-foot (10-meter) buffer around eligible or potentially eligible sites prior to training events that may result in damage to sites in order to prevent disturbance from on-road maneuvers, bivouacs, and use of military training sites and facilities. • Resource Protection: Protect sites through land use restrictions in Sensitive Resource Management Areas and Environmental Constraint Areas, such as Stoney Valley, in order to prevent damage to sites. • Resource Protection: Implement the FHL ICRMP, and include cultural resources protection in educational briefing s provided to units prior to training exercises.

Table 2. Summary of FHL Existing Resource Protection Measures[1]

Concern	Primary Resource(s) Affected	Existing Control/Description
Traffic Safety	Transportation	• Operational Control: Coordinate convoy movements from Camp Roberts to FHL on highway roads and large transportation events of vehicles to FHL with CALTRANS. • Operational Control: Notify media outlets and the public in advance of large planned convoy operations, identifying the route, anticipated times of operations and delay periods. • Operational Control: Continue FHL's federal police force patrols speed checks and response to accidents or safety concerns on FHL roadways.
Traffic Congestion	Transportation	• Operational Control: Schedule movements to avoid peak traffic periods to the extent possible. • Operational Control: Place intelligent signage along the convoy route to alert the traveling public on Highway 101 of planned convoy operations or those in progress, identifying the anticipated times of operations and potential delays, if any.

[1]Measures apply to all Alternatives.

BMP = best management practice; BO = biological opinion; CALTRANS = California Department of Transportation; FHL = Fort Hunter Liggett; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; mph = miles per hour; REC = Record of Environmental Consideration; SRMA = Sustainable Resource Management Area; SWPPP = Stormwater Pollution Prevention Plan

Table 3. Summary of Proposed Resource Protection Measures to Reduce Disturbance

Concern	Primary Resource(s) Affected	Description of Proposed Mitigation	Mitigative Effect	Alternative
Dust	Air Quality	• Resource Management: Restore disturbed areas and reestablish vegetation cover following off-road training events and additional bivouac sites.	Restoring the land quickly reduces wind and water erosion.	1 through 4
		• Resource Management: Monitor and evaluate dust control strategies over time based on applicability and effectiveness.	Analyzing the effectiveness of dust control strategies would aid FHL in focusing on those strategies proven most beneficial for prevention of wind-borne erosion.	2 through 4
Spread and Proliferation of Invasive Species	Natural Resources	• Operational Control: Include in notifications to units that vehicle washing prior to leaving home station is required to limit spread of invasive species, and vehicle washing at the close of exercises on FHL is required.	Cleaning of equipment reduces the potential spread of invasive plant species from off-road vehicle maneuvers and to prevent transport of species off-site.	1 through 4

Table 3. Summary of Proposed Resource Protection Measures to Reduce Disturbance

Concern	Primary Resource(s) Affected	Description of Proposed Mitigation	Mitigative Effect	Alternative
		• Operational Control: Consider placement of rumble plates at key locations to reduce transport of soils and mud.	Rumble plates would reduce the potential for spreading of invasive species by dislodging plant parts and seeds.	1 through 4
Soil Disturbance	Natural Resources Soils Surface Waters Wetlands	• Operational Control: Minimize the use of neutral steer turns by units (i.e., a turn during which one of the tank's tracks moves forward while the other moves in reverse, allowing the vehicle to turn on the spot).	Limiting the use of neutral steers would reduce the levels of vegetation loss, and the degree of soil compaction and soil erosion.	1 through 4
		• Management Control: Develop a model for predicting trafficability based on soil type and moisture content using weather data.	Use of predictive modelling could reduce the possibility of off-road vehicle maneuver training occurring on saturated soils, reducing erosion and indirect effects, and enhanced planning capabilities for units.	2 through 4
		• Resource Protection: As needed, harden troop assembly areas and stream crossings.	Use of hardened assembly areas and stream crossings would reduce the intensity and extent of disturbance from assembly area activities and stream crossings.	1 through 4
		• Resource Protection: Identify highly erodible soil types and their locations. As feasible, limit soil disturbing activities at those locations or implement protective soil erosion BMPs.	Identification and avoidance of highly erodible soils would reduce adverse effects of off-road vehicle maneuvers and soil erosion.	1 through 4
		• Resource Protection: Plan off-road vehicle maneuvers for areas with less than 30 percent slopes.	Off-road vehicle maneuvers in lower sloped areas would reduce levels of disturbance from erosion.	1 through 4
Protection of Sensitive Resources	Natural Resources (federally protected species) Cultural Resources	• Management Control: Update INRMP and ICRMP in coordination with cooperators in order to include new impacts from off-road vehicle maneuvers and impact control measures.	Implementation of updated INRMP and ICRMP considering potential effects from off-road vehicle maneuvers and impact control measures would help ensure continued protection of these resources.	1 through 4

Table 3. Summary of Proposed Resource Protection Measures to Reduce Disturbance

Concern	Primary Resource(s) Affected	Description of Proposed Mitigation	Mitigative Effect	Alternative
		• Operational Control: Coordinate with units and the installation to identify maneuver lanes within the corridors that take into account protected resources, slopes, erodible soils, and training mission objectives.	Consideration of protected resources and environmental constraints during the field exercise planning stage would help avoid and minimize impacts to these resources from off-road vehicle maneuver training.	1 through 4
		• Operational Control: Develop educational materials for off-road vehicle maneuver units.	Educational materials would help Soldiers further understand and identify resource avoidance and protection measures while training in the field.	1 through 4

FHL = Fort Hunter Liggett; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan

Table 4. Summary of Proposed Mitigations for Off-road Vehicle Maneuvers to Reduce Potentially Significant Impacts

Concern & Related Resource Significant Thresholds	Description of Proposed Mitigation	Mitigative Effect	Alternative
Effects of Erosion[1]: ***Natural Resources***: Substantial permanent net loss of habitat at the landscape scale ***Cultural Resources***: Alteration of the characteristics that qualify a property for inclusion in the NRHP ***Soils***: The landscape could not be sustained for military training, and excessive soil loss were to impair plant growth ***Surface Water***: Result in an excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs.	• Operational Control: Minimize off-road vehicle maneuver training to the extent practicable when soil moisture conditions are not favorable. Planned exercises would be compatible with wet season conditions when feasible.	Training activities could be restricted or reduced by the Commander during this period if the soils are saturated (e.g., after a rain event) to minimize soil rutting and effects of erosion.	4[2]
	• Management Control: Implement a program to assess the effectiveness of mitigation measures and the FHL environmental review process, and to implement adaptive management. Conduct site rehabilitation, and distribution and monitoring surveys for protected species locations in the proposed maneuver corridors and locations where increases in training would occur.	A program evaluating effectiveness of mitigation measures and the FHL review process would allow FHL to continually evaluate mitigation actions and adaptively manage to observed conditions and desired results.	2 through 4

Table 4. Summary of Proposed Mitigations for Off-road Vehicle Maneuvers to Reduce Potentially Significant Impacts

Concern & Related Resource Significant Thresholds	Description of Proposed Mitigation	Mitigative Effect	Alternative
	• Management Control: Adopt sediment and erosion control mitigations including rapid response and long-term land rehabilitation and monitoring program for off-road vehicle maneuver training as outlined in Appendix D. This includes restoring barren or highly disturbed areas and rutted soils to a suitable vegetation coverage, and restricting rehabilitated areas from off-road vehicle maneuver and intensively used sites until recovery goals are achieved.	A long-term land rehabilitation and monitoring plan would complement FHL's ITAM program by prescribing measures to mitigate significant resource impacts from off-road vehicle maneuvers including: 1) reduction of potential for wind-borne dust, 2) restoring and maintaining habitat, 3) reduction of potential for adverse indirect adverse effects to the integrity of historic properties, and 4) reduction of potential for water erosion and sedimentation into surface waters and wetlands.	2 through 4
Protection of Federally-protected resources: ***Cultural Resources***: Disturbance to cultural resources sites.	• Resource Protection: Physically demarcate[3] a 33-foot (10-meter) buffer around identified sites (eligible or potentially eligible) prior to training events that may result in damage to sites in order to prevent disturbance from off-road vehicle maneuvers and increased support and sustainment associated with exercises.	Installation of protection measures would ensure these sensitive sites are avoided during training.	1 through 4
Water Quality: ***Surface Water***: Excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs.	• Management Control: Establish monitoring sites upstream, within, and downstream of maneuver areas along the San Antonio and Nacimiento Rivers.	Analyzing the effectiveness of sediment and erosion prevention and control through water quality monitoring would aid FHL in focusing on those strategies proven most beneficial for prevention of water-induced erosion and water quality degradation (sedimentation) from training events. FHL could scale BMPs and impact reduction measures based on monitoring data as appropriate.	2 though 4

[1]Although the Proposed Action would not result in significant impacts to air quality and wetlands, these resource areas would benefit from implementation of this mitigation measure by reducing potential for erosion (dust generation and sedimentation into wetlands).

[2]Alternatives 1 through 3 propose off-road vehicle maneuver training during the dry season only as defined in Sections 2.2.2.4 through 2.2.2.6, respectively.

[3]Specific cultural resources protection measures including signage, stakes, cones, fences, boulders, capping, or hardening would be selected based on training needs, type of site, and effectiveness as determined by professional judgement, Army experience, and monitoring and consultations with the SHPO.

BMP = best management practice; FHL = Fort Hunter Liggett; ITAM = Integrated Training Area Management

Cumulative Impacts: Cumulative effects are the combination of impacts of the Proposed Action, when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes those other actions (CEQ Regulation 1508.7). Cumulative effects can result from actions occurring over a period of time that are minor when each is considered individually, but that are significant when viewed collectively.

The cumulative impacts analysis considered activities within FHL and adjacent lands (including communities around FHL and activities at Camp Roberts). Projects at FHL with the potential for cumulative impacts when considered with the Proposed Action are generally limited to future construction in the cantonment area, as well as construction at Schoonover Airfield. Projects at Camp Roberts were primarily related to a few training initiatives. No large scale projects or actions were identified within the region surrounding FHL, with a landscape historically devoted to agricultural uses, including the Jolon Road area winery corridor, and large grazing operations. The primary impacts associated with the Proposed Action would be associated with direct disturbances to soils, soil erosion, vegetation and habitat loss, and indirect effects to surface waters, wetlands, and potentially cultural resources. The Proposed Action would also have minor adverse effects on transportation. As outlined in Table 1, minor cumulative adverse impacts are anticipated to these resources due to the location and type of projects occurring at FHL, Camp Roberts, and within the region.

Proposed Impact Reduction Measures: As demonstrated in Table 2, impacts resulting from the Proposed Action would be less than significant. Various permits, plans, and measures have been identified within the EA analysis that would be undertaken by FHL to minimize adverse effects. The Army finds that adoption and implementation of the measures listed in Chapter 4 of the EA would reduce all impacts from Alternatives 1, 2, and 3 to less than significant. This includes continued implementation of existing operational and management controls, and resource protection measures (Table 2), and the adoption and implementation of proposed operational and management controls measures (Table 3) and mitigations (Table 4). No other mitigation measures would be required.

4 Public Review and Comment

The EA/Draft FNSI was made available for a 30-day public review and comment period. Documents were also made available at local libraries and available online at the Fort Hunter Liggett Environmental website (http://www.liggett.army.mil/sites/dpw/environmental.asp). A Public Notice was also published in local newspapers.

5 Finding of No Significant Impact

I have considered the results of the analysis in the EA, the comments received during the public comment period, and associated cumulative effects. Based on these factors, I have decided to proceed with the Proposed Action Alternatives 1 through 3. Implementation of the Proposed Action, along with specified permits, plans, and measures identified above, will not have a significant impact on the quality of human life or natural environment. This FNSI does not include selection of Alternative 4, and I make no finding as to its potential impacts; further follow-on NEPA analysis would be necessary prior to implementation of this alternative. Future monitoring of impacts from maneuver training under the other selected alternatives would provide useful data to conduct the follow-on analysis. This analysis fulfills the requirements of the NEPA of 1969 as implemented by the CEQ regulations (40 CFR Parts 1500-1508), as well as the requirements of the Environmental Analysis of Army Actions (32 CFR Part 651). Therefore, issuance of a FNSI is warranted and an Environmental Impact Statement is not necessary.

_____ Date:_____

Colonel Jan C. Norris
Garrison Commander

Fort Hunter Liggett
Army Total Force Integration
Environmental Assessment

[Placeholder]

Approved By:

_____ Date:_____

Colonel Jan C. Norris
Garrison Commander

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1 Purpose and Need for the Proposed Action

FHL's mission is to maintain and allocate training areas, airspace, facilities, and ranges to support field maneuvers, live-fire exercises, testing, and institutional training. Additionally, the installation provides quality-of-life and logistical support to training units.

The Department of the Army (Army) is preparing an Environmental Assessment (EA) to evaluate the environmental, cultural, and socioeconomic impacts of conducting proposed off-road vehicle maneuver training with brigade- and/or battalion-level training exercises at Fort Hunter Liggett (FHL), California. The National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to give appropriate consideration to potential environmental effects of proposed major actions in planning and decision-making. The Council on Environmental Quality (CEQ) is responsible for issuing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) implementing the provisions of NEPA. CEQ regulations in turn are supplemented by procedures adopted on an agency-specific basis. The pertinent Army regulation is 32 CFR Part 651, Environmental Analysis of Army Actions. The Army has prepared this EA to evaluate the potential impacts of actions that would enable future mission and training operations at FHL, involve the public, and inform decision-makers.

1.2 Background

FHL is situated about 25 miles southwest of King City in Monterey County, California (Figure 1-1). In 1940, in anticipation of training Soldiers for combat on World War II European fronts, the War Department purchased more than 200,000 acres of local ranch lands in the foothills and mountains of the Santa Lucia Range. Since this time, the Department of Defense (DoD) and other government agencies have conducted "real world" training and defense technology testing using FHL's diverse terrain, which varies from level valleys bordered by gentle hills to steep, rugged mountains.

At present, the installation encompasses approximately 162,000 acres and provides a vast array of training ranges and other facilities year-round for the U.S. Army Reserve (USAR), Active Army Components, and training opportunities for other branches of the U.S. military and government agencies. For example, the Air National Guard (ANG), Army National Guard (ARNG), Reserve Officer Training Corps, U.S. Air Force (USAF) and Reserves, Army, U.S. Coast Guard (USCG), U.S. Marine Corps (USMC), U.S. Navy (Navy), and other Federal and international government entities conduct exercises at FHL. Other international coalition partners including Great Britain, Canada, Belgium and France routinely train at FHL. In the future, other nations may train at FHL.

Existing infrastructure to support training includes more than 150,000 acres of training area, an airfield capable of handling C-17 aircraft, more than 20 drop zones, widely varied terrain, convoy live-fire areas, Tactical Training Bases, weapons qualification and multi-purpose ranges, live-fire range complexes, training classrooms, dining facilities, barracks, and other billeting.

FHL is the Major Training Area for USAR units in the western states. Army National Guard (ARNG) units that train at Camp Roberts (located 12 miles to the southeast) also commonly train at FHL.

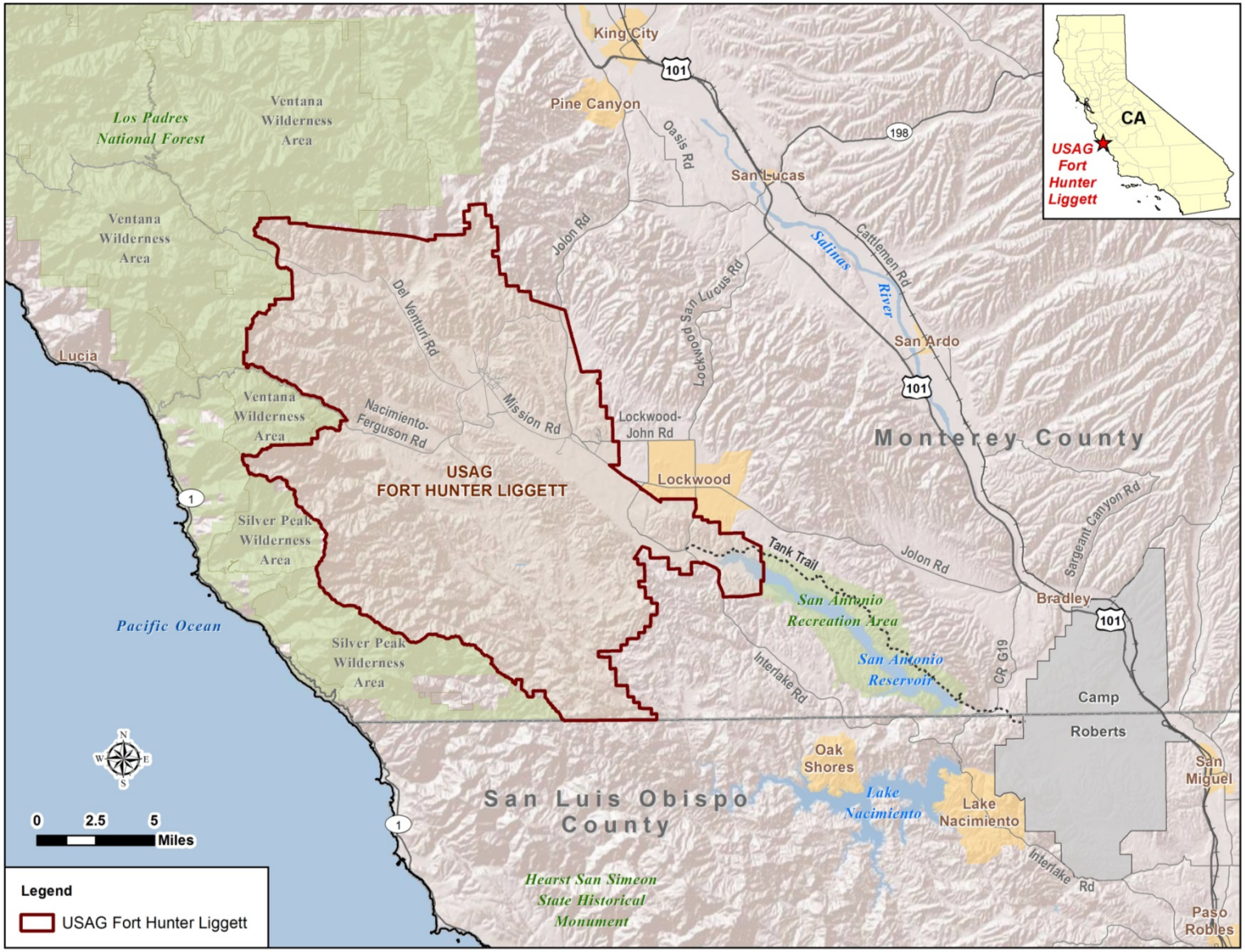

Figure 1-1. U.S. Army Garrison Fort Hunter Liggett, California

FHL currently supports individual and collective training exercises to complete unit Mission Essential Task List (METL). Examples of individual training could include classrooms and individual weapons training and qualifications. Small unit training could include tasks conducted in teams such as unit live-fire training or combat engineer construction. Collective training brings units together into larger teams to conduct more complex sets of tasks, which increases the challenges to units in planning, coordination, and completing METL tasks to DoD standards. Collective training exercises include platoons (16-40 Soldiers), companies (100-200 Soldiers), battalions (750-1200 Soldiers), or brigades 3,000 to 5,000 Soldiers.

Currently, exercises focus primarily on Combat Support (CS) and Sustainment training with limited maneuver training conducted by light infantry units. CS refers to operational support to combat units, such as chemical warfare, combat engineering, intelligence, security and communications. Sustainment refers to logistical support, such as supply, maintenance, transportation, and health services. These units do not typically conduct off-road vehicle maneuvers as part of their METL. Current training activities are described in more detail in Chapter 2 under the No Action Alternative.

1.3 Purpose

The purpose of the Proposed Action is to enhance training capabilities at FHL using existing infrastructure to conduct up to company-level off-road vehicle maneuvers, and increasing the frequency of brigade-level collective training exercises. This would improve the integration of the Army's Active Component (AC) and Reserve Component (RC), as well as enhance readiness of maneuver units from the Army and other Services that train at FHL. This proposal is in accordance with the Army Total Force Policy (ATFP) (Secretary of the Army 2012), as well as DoD's requirement to maintain readiness of AC and RC units.

The **Total Force Concept** refers to DoD policies that require "military departments to organize, man, train, and equip their active and reserve components as an integrated operational force to provide predictable, recurring, and sustainable capabilities".

The RC includes the USAR and ARNG. AC units include up to battalion-sized (approximately 750 Soldiers) maneuver units from various locations in the Western U.S. Maneuver units may also include battalion-sized ARNG units, as well as Marine Expeditionary Units (up to 2,000 Service members) or sub-components of the Marine Air-Ground Task Force (MAGTF).

To integrate AC and RC unit forces, the AC unit would provide maneuver units for CS and Sustainment brigade-level training exercises. Combining and collectively training units from sister components accomplishes the Army's goal of providing linked, synchronized and more transparent operations in support of decisive action operations (i.e., continuous, simultaneous combinations of offensive, defensive, and stability or defense support of civil authorities tasks).

In addition to integrating AC and RC forces, the Proposed Action would facilitate potential future changes in training requirements at FHL. FHL is proposing to programmatically evaluate levels beyond currently scheduled 2016 training events. The programmatic approach used within this document would provide FHL with the flexibility to evaluate environmental impacts and a more effective mechanism for implementing future requirements regarding RC and AC unit integration, as well as readiness of maneuver units (e.g., Army and along with other forces such as USAF, USCG, USMC, or the Navy) integration to maintain Soldier readiness. This

approach is consistent with the President's Council on Environmental Quality's Final Guidance for Effective Use of Programmatic NEPA Reviews (CEQ 2014).

As noted above in Section 1.2, ARNG units that train at Camp Roberts also commonly train at FHL. In 1996, the National Guard Bureau (NGB) completed a final environmental impact statement (FEIS) analysis entitled Combined-Forces Training Activities, New Equipment Utilization, and Range Modernization Program at Camp Roberts Army National Guard Training Site, California (ARNG 1996). The proposed action analyzed the 1996 FEIS consisted of three components: combined forces training with two brigades of personnel and associated equipment (3,000-5,000 personnel), new equipment utilization including the M1 Abrams tank and Bradley Fighting Vehicles, and the construction and modernization of five small arms ranges. The FEIS also analyzed a "Peak Training Use of Camp Roberts/Fort Hunter-Liggett Alternative", which examined the relationship between Camp Roberts and FHL, stating that Camp Roberts units periodically utilized FHL for training, but did not include increases or any changes in training at FHL as part of that proposed action. For the immediate future, training at Camp Roberts is anticipated to remain substantially the same as was analyzed in the 1996 FEIS. As explained in Section 3.1.4, Cumulative Effects, Camp Roberts is anticipating the need for an environmental assessment to analyze proposed future mission enhancements at that installation, the details of which are unknown at this time. None of the proposed activities that will be analyzed in the Camp Roberts EA are anticipated to change the type or amount of California ARNG training on FHL.

1.4 Need

The Army needs to provide opportunities for units to complete maneuver METL tasks to meet current training requirements per the ATFP, and to support projections for scheduled and anticipated brigade-level collective training exercises. This would allow units to conduct realistic and coordinated training that integrates RC and AC units in collective training exercises so that units may train as they would fight. When deployed, USAR and ARNG units provide support to AC units (e.g., USAR provides sustainment and logistical support, and ARNG provides maneuver support while AC maneuver units lead combat efforts). AC units conduct training in cycles year-round, whereas USAR and ARNG units are generally limited to weekend and annual training cycles. In order to integrate RC and AC, the Army must synchronize training cycles by including Active Army units in USAR and ARNG collective training exercises at brigade- and battalion-levels.

Maneuver areas would need to provide suitable terrain to conduct METL tasks that encompass on- and off-road vehicle maneuvers. Suitable terrain includes slopes that are <30 percent and open vegetation, such as grasslands and savannas. Severely restricted terrain (>30 percent slope, dense vegetation) is unfavorable for training and should be avoided during METL training events. At FHL, approximately 40 percent of the installation land area contains potentially suitable slopes <30 percent.

Army Doctrine Publication 3-0 (U.S. Army 2011) describes six warfighting functions to include Mission Command, Movement and Maneuver, Intelligence, Fires, Sustainment, and Protection. In order to integrate RC and AC units in realistic, collective training exercises and support readiness of maneuver units, Movement and Maneuver functions would require off-road vehicle travel for units to acquire positional advantage over opposing forces. In order to fully support

Active Army, Army Reserve, ARNG and other Service units, it is important for FHL to be able to support off-road vehicle maneuvers to accommodate maneuver training. Recent NEPA analyses did not consider the impacts of off-road vehicle maneuvers at FHL. At present, Soldiers and other Service Members training on FHL are limited to on-road vehicle travel, preventing units from experiencing the training challenges and benefits of operating their vehicles off-road, as they would do in an actual combat scenario. Traveling on paved or dirt roads does not provide the same training benefits or training flexibility as off-road vehicle maneuver, nor does it allow for the practice of gaining positional advantage over an enemy, a critical combat skill.

Soldiers training on FHL need to train together during collective training events, involving a multitude of Military Occupational Specialties from RC and AC. Without integration of these components, Soldiers would be forced to train in their specialties in isolation, and not in the integrated manner in which they would fight. For example, without integration, Reserve CS and Sustainment forces would train without providing actual support to combat units conducting Movement and Maneuver exercises. With integration, units would practice their skills along with other units in the manner in which they would actually employ them on the battlefield.

Per U.S. Army and Training Doctrine Command Pamphlet 525-3-6, the Movement and Maneuver warfighting function includes the related tasks and systems that move forces to positions of advantage in relation to the enemy. These tasks include deploying, moving, maneuvering, employing direct fires, occupying an area, performing mobility and counter mobility operations, and employing battlefield obscuration. Movement is the dispersion and displacement of forces during maneuver. Maneuver is the employment of movement and fires to move to positions of advantage to defeat the threat.

The Fiscal Year (FY) 16 training cycle calls for conducting concurrent RC brigade-level training exercises with AC unit maneuver training beginning in late spring and early summer 2016. Training by AC and RC units of the Army, Navy, and USMC are additionally planned at other times during the training year. Off-road vehicle maneuver capability is needed to provide realism to training and allow units to complete and validate tasks. For example, Zone Reconnaissance, Breaching, Hasty Defense, and Hasty Offense maneuvers are tasks that require off-road vehicle maneuvers.

Beyond the FY 16 training cycle, FHL's leadership anticipates a potential increase in training demand compared to the 2016 event at FHL due to the Army transitioning from the Army Force Generation (ARFORGEN) process to the Sustainable Readiness Model (SRM). The ARFORGEN model (Army 2011) was the Army's method for effectively and efficiently generating trained and ready forces for combatant commanders on a sustainable, rotational basis. It facilitated the development and synchronization of long-range training demands, which helped national, regional and local training centers anticipate for and manage requirements. At present, the SRM process is more adaptive and flexible and provides for a steadier training throughput than the "peaks and valleys" endured under the ARFORGEN process. The SRM model could subject FHL to increased training demand and pressures, thus resulting in multiple large units vying for training area use simultaneously. For this reason, FHL's leadership desires to programmatically assess and evaluate the impacts of multiple large unit training exercises potentially occurring at FHL at the same time in the future. This would satisfy FHL's need to

expedite the NEPA process to quickly implement Soldier training to meet evolving training requirements.

1.5 Scope of the Analysis and Decision to be Made

This EA addresses environmental and socioeconomic impacts associated with the implementation of off-road vehicle maneuver and potential increases in brigade- and battalion-level training frequency and intensity at FHL. For Alternative 4, this EA evaluates potential increases in brigade- and battalion-level training on a programmatic level. The intent of this programmatic approach is to facilitate future NEPA analyses by: providing information that can be incorporated by reference in future documents; narrowing the focus of future analyses; and identifying information that will be useful for future analyses. This EA has been developed in accordance with NEPA regulations issued by the CEQ (40 CFR Parts 1500–1508), and the Army's implementing procedures published in 32 CFR Part 651.

The following Valued Environmental Components (VECs) were identified by FHL as having the potential for adverse impacts, and are therefore analyzed for the Proposed Action and No Action alternatives:

- Air Quality and Greenhouse Gases
- Cultural Resources
- Transportation
- Natural Resources
- Geology and Soils
- Surface Waters and Wetlands

These resource areas were identified as being potentially affected by the Proposed Action and include applicable critical elements of the human environment that are mandated for review by Executive Order (EO), regulation, or policy. Appendix A contains examples of relevant laws, regulations, and other requirements that are often considered as part of the analysis. Where useful to provide the reader with better understanding, key provisions of the statutes and EOs are discussed in more detail within this EA. Refer to Section 3.1 for a discussion of all resources considered, including those resources that are not being carried forward for detailed analysis.

In 1995, the Army prepared an EA for long-term training and testing that included ongoing and projected aviation and field training to include off-road vehicle maneuver exercises. In 2009, the USAR prepared an EA establishing FHL as a Combat Support Training Center. In 2010, the Army prepared an EA for range and cantonment development, and increasing troop levels of training at FHL, *EA for Installation Development and Training*. That EA, however, did not address off-road vehicle maneuvers.

The geographical scope of the analysis includes alternatives being considered for implementation at FHL involving off-road vehicle maneuvers. The Proposed Action consists of a number of proposed alternatives that may be necessary to conduct off-road vehicle maneuver and additional brigade- and battalion-level exercise frequency and/or intensity to meet the ATFP objectives. Section 2.2.2 discusses specific methods that may be implemented to help FHL meet its supplemental objectives. As part of ATFP implementation at FHL, one or a combination of the Proposed Action Alternatives may be chosen. The final decision of which alternatives to be

implemented would be included within a Finding of No Significant Impact (FNSI) if applicable. If it is determined that implementation of the selected Proposed Action Alternative(s) would result in unavoidable or non-mitigable significant environmental impacts, the Army would publish a Notice of Intent and initiate the preparation of an EIS.

1.6 Public and Agency Involvement

The Army invites public participation in the NEPA process. NEPA ensures that environmental information is made available to the public during the decision-making process and prior to actions being taken. The premise of NEPA is that the quality of Federal decisions will be enhanced if proponents provide information on their actions to state and local governments and the public, and involve them in the planning process. The Intergovernmental Coordination Act and EO 12372, *Intergovernmental Review of Federal Programs*, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal. All agencies, organizations, and members of the public that have a potential interest in the Proposed Action are urged to participate in the decision-making process.

Through the coordination process, FHL notified relevant Federal, state, and local agencies, and federally- and state-recognized Tribes of the Proposed Action and provided them sufficient time to make known their environmental concerns specific to the action. FHL coordinated with the U.S. Environmental Protection Agency (USEPA); U.S. Fish and Wildlife Service (USFWS); State Historic Preservation Office (SHPO); California Department of Fish and Wildlife; California Environmental Protection Agency; and other Federal, state, and local agencies. Agency responses are incorporated into this EA. Appendix B includes all coordination letters and responses. A Notice of Availability (NOA) for this EA and FNSI was published in local newspapers (the *Monterey County Herald, King City Rustler, Greenfield News, Soledad Bee,* and the *Gonzales Tribune*) announcing a 30-day public review and comment period. Documents are also made available for review at local libraries (San Antonio School Library, PO Box 5000 Lockwood, CA 93932; Monterey County Free Library, Buena Vista Branch, 8250 Tara Drive, Salinas, CA 93908; Monterey County Free Library, King City Branch, 402 Broadway, King City, CA 93930; Fort Hunter Liggett Library, Building 291, Fort Hunter Liggett, Jolon, CA 93928) and available online at the Fort Hunter Liggett Environmental website (http://www.liggett.army.mil/sites/dpw/environmental.asp).

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2 Description of the Proposed Action and Alternatives

2.1 Screening Criteria

FHL has completed a screening process to determine where integrated RC and AC unit off-road vehicle maneuver training could occur and when additional brigade- or battalion-level training exercises could take place given potential training demands, and environmental and geographic constraints. In order to be considered a viable alternative and carried forward for analysis, the alternative must meet the following screening criteria:

- Utilize land under Army operational control.
- Provide sufficient land and airspace to support a brigade-level collective training exercise involving AC and RC units that would typically be based in and near California.
- Provide maneuver areas to support heavy and light maneuver vehicles with suitable terrain for land-intensive training for one maneuver company; in highly constrained situational training exercise environments, such as an ARNG validation exercise, and support up to four maneuver companies simultaneously.
- Provide terrain and land use that is compatible with off-road vehicle maneuvers. This includes large and continuous land areas containing no more than a 30 percent side slope grade for maneuver vehicle safety (Stryker rollover) threshold (U.S. Army 2008).
- Enable other training requirements, such as weapons qualification, improvised explosive device defeat, and convoy live-fire exercises to continue on FHL and not be displaced by maneuver training.
- Be able to provide adequate training, infrastructure and sustainment support capabilities, such as bivouac sites and utilities.
- Be within one day's reach of Camp Roberts railhead and Highway 101 by convoy to minimize loss of training time, transportation costs, and time away from families due to lengthy movements.
- Maintain training ranges, maneuver lands, and associated airspace capable of supporting current and future military training to standard while sustaining training resources.
- Maximize use of existing infrastructure to minimize cost and additional environmental impacts.

2.2 Alternatives Considered

2.2.1 No Action Alternative – Continue Existing Mission and Training Operations

The No Action Alternative is required by NEPA regulations to encompass baseline conditions and serves as a benchmark against which the environmental impacts of the Proposed Action alternatives can be compared.

Under the No Action Alternative, the Proposed Action(s) would not be implemented. Training activities at FHL would continue to occur in accordance with current operating environment conditions, using infrastructure described in the 2010 *EA for Installation Development and Training* (2010 EA). Force structure, assigned personnel and equipment, and training operations at FHL would remain unchanged.

The Army would not be able to fully and effectively integrate AC and RC unit training on FHL, particularly off-road vehicle maneuver training. AC and RC units would not have the ability to train as they must fight: together, in a fully integrated manner. At present, Soldiers and other Service Members training on FHL are limited to on-road vehicle travel, preventing units from experiencing the training challenges and benefits of operating their vehicles off-road, as they would do in an actual combat scenario. Off-road vehicle maneuver training is required for maneuver units to achieve METL proficiency. Likewise, USAR/ARNG CS/CSS units are required to provide sustainment support to maneuver units to achieve METL competence. Traveling on paved or dirt roads does not provide the same training benefits or training flexibility as off-road vehicle maneuver, nor does it allow for the practice of gaining positional advantage over an enemy, a critical combat skill. The addition of off-road vehicle maneuvers would provide opportunities for collective training and for units to complete METL tasks to DoD standards.

The current operating environment on FHL establishes the baseline under the No Action Alternative. As such, training frequencies and intensities, Service Member populations, equipment densities, and the conduct of training are described using information provided by installation support staff and Army reporting databases. Sections 2.2.1.1 through 2.2.1.4 describe baseline conditions at FHL that are relevant to the proposed alternatives. Additional training exercises also occur, such as fixed and rotary winged aviation, weapons live-fire, simulations, classroom, combat engineering construction, military vehicle driver training and other activities.

2.2.1.1 Brigade and Battalion-Level Training Frequency and Intensity

Brigade-level training exercises are conducted separately and with little to no overlap at FHL. Under the No Action Alternative, a brigade-level exercise includes Service Member populations ranging between approximately 2,700 – 5,500 personnel per training exercise. There were two back-to-back brigade-level training exercises in FY 2014 and three separate ones in FY 2015. Each event involved conducting a 14-35 day situational training exercise that included no off-road vehicle maneuver. See Section 2.2.1.4 for a description of how training is scheduled and conducted.

Separate battalion-level training events are conducted more frequently than brigade-level events and have occurred simultaneously at FHL. In addition to Army battalion-level events, other military services, such as the Navy, USMC and ANG conduct battalion and larger scale operations. These operations are aggregated into battalion-level events for baseline development purposes and range between 325 and 1,410 Service Members under the No Action Alternative. In FY 2014 and 2015, nine separate battalion-level training events occurred throughout each calendar year.

There were five ARNG, one Army, one Navy, one USMC and one ANG battalion-level training exercises in FY 14. Four of the ARNG exercises lasted for four days, and one reached 14 days in duration. The one active Army battalion exercise consisted of light infantry operations and lasted for 26 days. The Navy exercise lasted for 19 days, the USMC for 10 days and ANG for seven days.

In FY 2015 there were two ARNG, zero Army, three Navy, three USMC and one ANG battalion-level training exercises at FHL. The two ARNG exercises lasted for five days each.

Navy exercises lasted between 17 and 23 days. The USMC events lasted between six and 20 days while the ANG exercise lasted for seven days in duration.

None of the battalion-level training events in FY 2014 and FY 2015 involved off-road vehicle maneuver. Battalion maneuvers, however, occur on FHL's extensive network of dirt roads.

2.2.1.2 Service Member Training Populations

Service Member populations vary significantly between each brigade and battalion exercise under the No Action Alternative. Each exercise's Service Member population is summarized in Table 2-1 relative to the type of training event conducted between FY 14 and FY 15.

Table 2-1. FY 14 – FY 15 Service Member Populations Relative to Type of Training Event

BDE- and BN- Level Type of Training	Population Range	Training Instances Per Year
BDE – Sustainment Brigade Type	3,000 – 5,500	2
BDE – Light IBCT	2,686	0 – 1
BN – ARNG Light Infantry FTX	499 – 664	0 – 3
BN – ARNG UAV Reconnaissance	412	0 – 1
BN – ARNG Light Infantry Demolitions Training	649	0 – 1
BN – ARNG Light Cavalry FTX	469	0 – 2
BN – ANG Air Operations	325	1
BN – Army Light Infantry FTX	1200	0 – 1
BN – USMC FTX	900 – 1,410	1 – 3
BN – Navy FTX	700 – 1,212	1 – 3

ARNG = Army National Guard; BGE = brigade; BN = battalion; IBCT = Infantry Brigade Combat Team; FTX = field training exercise; UAV = unmanned aerial vehicle; USMC = U.S. Marine Corps

The No Action Alternative also includes existing infrequent, less populated and intense training and operational activities, such as company/platoon-level, special operations forces, and schoolhouse training and functions. The No Action Alternative is centered around brigade- and battalion-level training exercises to facilitate comparisons with the proposed alternatives in this EA.

2.2.1.3 Equipment Use and Densities

Under the No Action Alternative, the type of training event, associated equipment (wheeled vs. tracked) and number of training instances per year are highlighted in Table 2-2. In addition, the type, use, and training area requirements of the equipment assigned to units conducting training at FHL are described in Table 2-3. Figure 2-1 presents representative images of similar equipment, and some examples are presented in Table 2-3.

Table 2-2. FY 14 – FY 15 Equipment Density Relative to Type of Training Event

BDE- and BN- Level Type of Training	Vehicle Density[1]		Training Instances Per Year
	Wheeled	Tracked	
BDE – Sustainment Brigade Type	1,000	0	0 – 2
BDE – Light IBCT	1,000	0	0 – 1
BN – ARNG Light Infantry FTX	100	0	0 – 3
BN – ARNG UAV Reconnaissance	100	0	0 – 1
BN – ARNG Light Infantry Demolitions Training	100	0	0 – 1
BN – ARNG Light Cavalry FTX	100	0	0 – 2
BN – ANG Air Operations	50	0	1
BN – Army Light Infantry FTX	200	0	0 – 1
BN – USMC FTX	150	20	1 – 3
BN – Navy FTX	280	20	1 – 3

[1]Estimated numbers

ARNG = Army National Guard; BGE = brigade; BN = battalion; IBCT = Infantry Brigade Combat Team; FTX = field training exercise; UAV = unmanned aerial vehicle; USMC = U.S. Marine Corps

Table 2-3. Example Equipment Assigned to Units Training at Fort Hunter Liggett

Category	Equipment	Mission	Training Area Requirements
Tracked Vehicles	M1A2 Abrams Main Combat Tank	Provides heavy armor superiority on the battlefield (simulated ammunition).	Maneuver areas and firing ranges
	M2/M3 Bradley Fighting Vehicles	Provide protected transport of an infantry squad and overwatches fires to support the dismounted infantry (simulated ammunition).	
	Bradley Fighting Vehicle Variants (e.g., M4 C2V, Stinger, Warhammer, M7 Fire Support Team Vehicle [BFIST], Engineer Support Vehicle, Brigade [BDE] Battle Command Vehicle)	Provide protected transport of unit command and control elements, and other specialized units, such as anti-aircraft, anti-tank, and engineer elements.	
	M109 Paladin Self-Propelled Howitzer	Provides the artillery support for armored and mechanized units (155- mm artillery training round).	
	Field Artillery Ammo Support Vehicle	Firing position partner for M109 series self-propelled howitzers. It provides armor-protected ammunition delivery to cannon artillery systems.	
	Assault Breacher Vehicle (ABV)	Tracked, armored engineer vehicle designed for conducting in-stride breaching of minefields and complex obstacles.	
	M113A3	Provides a highly mobile, survivable, and reliable tracked vehicle platform that is able to keep pace with Abrams and Bradleys.	
	AAV7A1 Armored Assault Vehicle	Designed to assault any shoreline from the well decks of Navy assault ships, AAVs are highly mobile, tracked armored amphibious vehicles that transport Marines and cargo to and through hostile territory.	
Wheeled Vehicles	Family of Medium Tactical Vehicles	Fills the Army's medium tactical-vehicle requirements for mobility and resupply, and transportation of equipment and personnel.	Maneuver areas and combat roads and trails
	Heavy Expanded Mobility Tactical Truck	Provides line haul and unit resupply; rapid movement of combat-configured loads of ammunition and all classes of supply, shelters and containers.	
	High-Mobility Multipurpose Wheeled Vehicle	Provides a common light tactical vehicle capability.	

Table 2-3. Example Equipment Assigned to Units Training at Fort Hunter Liggett

Category	Equipment	Mission	Training Area Requirements
Wheeled Vehicles (continued)	Stryker	Provides increased combat power by providing armor protection, a vehicle- borne weapon system to support dismounted squads, and the speed and range to conduct missions far from the operating base.	Maneuver areas and combat roads and trails
	Light Armored Vehicle	Combine speed, maneuverability and firepower to perform a variety of functions, including security, command and control, reconnaissance and assault. Able to operate on land and in water, carry communications equipment and provide a weapons platform.	
	Mine Resistant Ambush Protected Vehicles and Mine Resistant All-Terrain Vehicles	Provide protection with blast-resistant underbodies and layers of thick, armored glass, while all-terrain suspension and run-flat combat tires ensure they can operate in complex and highly restricted rural, mountainous and urban terrains.	
	Logistics Vehicle System (LVS)	Designed to transport: bulk liquids, ammunition, standardized containers, bulk break, palletized cargo, and bridging equipment. The LVS also has wrecker and tractor variants.	
	Medium Tactical Vehicle Replacement (MTVR)	Medium tactical fleet family of vehicles that includes: cargo, dump truck, wrecker, and tractor variants.	
	Interim Fast Attack Vehicle (IFAV)	Small, light “jeep-like” vehicles predominantly used by USMC Force Recon and Expeditionary Units to provide for mobility, speed and durability in threat environments.	
	Light Strike Vehicle (LSV)	Aesthetically similar to a “dune-buggy,” special operations forces use LSVs to conduct fast hit-and-run style raids, scouting missions, support and low intensity guerilla warfare.	
Engineer Equipment	Dozers, scrapers, loaders, excavators, dump trucks	Performs horizontal construction to ensure mobility and post support for strike, sustainment, and logistics forces.	Maneuver areas and dig locations; excavation training might require clearing and grubbing
Aerial	Unmanned Aerial Systems	Provides commanders the ability to see beyond the horizon, conduct reconnaissance and strike targets.	Adequate launch surface, airspace coordination
	Attack Aircraft (Fixed and Rotary Wing)	Close air support (simulated).	Range airspace

Table 2-3. Example Equipment Assigned to Units Training at Fort Hunter Liggett

Category	Equipment	Mission	Training Area Requirements
Indirect Fire	Simulated Ammunition	Provides long-range destructive suppressive, and protective indirect and direct field simulated ammunition fires (training ammunition).	Maneuver areas
	Field Artillery	Provides medium and long range indirect fire support (simulated).	
	Mortars	Provides medium-range indirect fire support (no ammunition).	
Anti-armor	Javelin Anti-Tank Missile	Provides a man-portable, highly survivable medium anti-tank weapon system (simulator).	Maneuver areas and firing ranges
	Tube-Launched, Optically-Sited, Wire-Guided Missile System	Defeats threat armored vehicles and urban enclosed threats at extended ranges in all expected battlefield conditions (simulator).	
	Squad Multi-Purpose Assault Weapon (SMAW)	Provides multipurpose assault support ordnance to breach fortifications.	
	Karl Gustav (NSW weapon)	Anti-armor and assault breaching ordnance support.	
Individual and Crew-Served Weapons	M2 .50-Caliber Machine Gun	Engages targets with accurate automatic direct fire (.50-caliber).	Firing Ranges
	MK-19 Automatic Grenade Launcher	Engages targets with accurate automatic indirect fire (40-mm training grenades).	
	M240B Machine Gun	Engages targets with accurate automatic direct fire (7.62-mm).	
	M249 Squad Automatic Weapon	Engages targets with accurate automatic direct fire (5.56-mm).	
	M-4 Carbine	Engages targets with accurate direct fire (5.56-mm).	
	M9 Pistol	Engages targets with accurate direct fire (9-mm).	
	M-16 Rifle	Engages targets with accurate direct fire (5.56-mm).	
	M203 Grenade Launcher	Engages targets with accurate indirect short-range fire (40-mm training grenades).	

Figure 2-1. Example Equipment Used at Fort Hunter Liggett, CA

2.2.1.4 Coordination and Conduct of Training

FHL encourages large units to request training areas six months to one year out from their proposed exercise date. Units are required to send their training support requests through the Range Facility Management Support System (RFMSS). Units are prioritized for training areas based on their mobilization status, which the Army generally prescribed using the ARFORGEN process. Upon sending in a request and other supporting conceptual information FHL grants each unit a conditional reservation. Subsequently, the Directorate of Plans, Training, Mobilization, and Security (DPTMS) and Directorate of Public Works Environmental Division (PWE) conduct a thorough review to ensure training resources are adequately planned for and environmental impacts are considered and mitigated for before, during and after each event. Specific to environmental planning issues, PWE coordinates with the training requestor to identify exercises that (i) are fully encompassed by categorical exclusions in 32 CFR 651 that do not require a Record of Environmental Consideration (REC), (ii) are fully encompassed by a REC that addresses categorical exclusions that require a REC as well as recurring, routine use of specific firing ranges and training facilities as identified in the 2010 *EA for Installation Development and Training*, (iii) require an individual REC to document that the activities are addressed by the 2010 EA, or (iv) that require an EA to determine if significant impacts may occur. This environmental review process considers location and type of training activity, proximity to sensitive resources, and time of year restrictions. As previously stated, the environmental review process may also require units adhere to one of the following categories of mitigation:

- *Avoidance and minimization* are two categories of mitigation most commonly used at FHL. During the scoping phase of a project, activities are routinely readjusted to avoid or minimize impacts to sensitive resources.
- *Rectifying the impact* is practiced at FHL by reseeding disturbed areas with native seed mixes or planting native oak seedlings to account for losses that occur.
- *Reducing or eliminating the impact* through time is used at FHL during project execution, e.g., using erosion control measures, stormwater control measures, air pollution control devices, and encouraging use of car pools or buses.
- *Compensation* replaces or provides a substitute for the resources impacted. This is typically used in wetland mitigation by replacement in kind.

The reservation goes from conditional to reserved status once all planning measures are considered acceptable and in place. FHL requires units to provide concept of the operations (CONOPS) products, operations orders (OPORDs) and other commander training objectives (CTOs) throughout the training site scheduling process. Additionally, FHL requires units to conduct scheduled in progress reviews (IPRs) with DPTMS staff prior to the commencement of training. IPRs are conducted at the six-month mark if units request a training area one year out. Training is considered locked-in 30-days out from each scheduled training event. Once a unit is 90-days out, FHL and requesting units conduct IPRs approximately every two weeks thereafter until the unit arrives at FHL.

Units typically initiate movement from home station to an authorized railhead. Vehicles are then transported by rail to nearby Camp Roberts. Once vehicles arrive at Camp Roberts they are offloaded into a marshalling area and subsequently convoyed to FHL via tank trails or Highway

101 and Jolon Road. Upon arriving at FHL, select personnel from training units attend a coordination in brief where DPTMS issues installation environmental, range operations, and other applicable policies. DPTMS also assigns one point of contact for each unit to liaison with during each training event. After unit and DPTMS coordination occurs, units may occupy their training sites and conduct collective training.

Most large scale collective training exercises at FHL include CS and Sustainment operations where one, or several battalion-level units (brigade-level in aggregate, similar to a Sustainment Brigade) coordinate, synchronize, and execute replenishment operations in support of brigade combat teams (BCTs). In order to provide this level of support, one or several battalion-level logistical support areas are setup in close coordination with DPTMS staff. Once approved by DPTMS, support battalions move to their respective locations via approved combat roads and trails and setup their battalion support areas (BSA), which are located in a field environment. Tasks typically associated with BSAs include distributing food, rations, and water; clothing; petroleum, oil and lubricants; fortification and barrier materials; ammunition; major end items; and repair parts. Additionally, these areas provide food service, medical support, field maintenance and limited recovery. Logistical support units supply other training units using their assigned equipment primarily through use of established and approved roads and trails. Vehicles are not currently authorized for off-road deliveries or maneuver.

Once units begin transitioning from the training/operations phase to the recovery phase they conduct policing activities of occupied training areas. They remove trash and debris and attempt to restore areas to pre-occupation conditions. DPTMS requires units to restore any maneuver damaged areas using organic assets to the best of their ability. This may include using engineer equipment (e.g., dozer, scraper, front-end loaders, etc.) or other types of equipment from using units. If timing does not work out appropriately, this work may be pushed to follow-on training units and completed as METL training activities. Once maneuver damaged areas are restored, or planned for restoration to the satisfaction of DPTMS, and the training areas meet the standards of FHL requirements, a checklist is completed and units may demobilize to home station. If for some reason units do not complete this process to standard, FHL prepares correspondence between their leadership and using unit leadership that prohibits future use of FHL as a training site. This, however, occurs infrequently. Section 2.2.1.5 discusses long-term management and sustainability strategies for Army lands.

2.2.1.5 Training Area Management

The main drivers for training area management are road and facility maintenance, environmental stewardship and compliance, and land rehabilitation and monitoring. FHL has over 700 miles of maintained roads, as well as culverts, bridges, low-water fords, dams, and training facilities, such as targets, firing points, buildings, parking areas, and bivouac sites. Maintenance requirements vary based on weather, training loads, age of facilities and other factors. Environmental stewardship and compliance is described in more detail in the Integrated Natural Resources Management Plan (INRMP), the Spill Prevention, Control, and Countermeasure (SPCC) Plan, and other plans. Environmental review of training activities is conducted as described above in Section 2.2.1.4.

Short- and long-term land rehabilitation efforts are programmed and planned for using the Army's Integrated Training Area Management (ITAM) planning gates and cycles. ITAM is a part of the Army's Sustainable Range Program (SRP) and provides Army range officers with the capabilities to manage and maintain training lands and support mission readiness. ITAM

integrates the mission requirements derived from the Range and Training Land Program (RTLP) with environmental requirements and environmental management practices. ITAM also establishes policies and procedures to achieve optimum, sustainable use of training and testing lands by implementing a uniform land management program. The FHL ITAM program is implemented through the Range Complex Master Plan where land rehabilitation and other projects are submitted for approval, funding, and implementation. Additionally, FHL conducts rapid response land rehabilitation in response to bivouac sites and engineer training activities.

2.2.2 Proposed Action and Alternatives

The Proposed Action is to conduct off-road vehicle maneuver exercises, and increase the frequency of brigade-level collective training exercises that incorporate AC maneuver company integration. This provides for realistic, "real-world" combined arms maneuver and sustainment training. Off-road vehicle maneuver training is required for maneuver units to achieve METL proficiency. Likewise, USAR/ARNG CS/CSS units are required to provide sustainment support to maneuver units to achieve METL competence. Combining these types of units during training events is intended to capitalize on training resources while synchronizing maneuver and support functions.

2.2.2.1 Description of Proposed Off-Road Vehicle Maneuver Training

Off-road vehicle maneuver training would typically consist of a company-sized, medium- to heavy- maneuver unit training at one time, regardless of the size of the collective training exercise. A company maneuver exercise would be expected to occur during each brigade exercise and up to 6 battalion exercises (see section 2.2.2.3). During a situational training exercise for validating RC proficiency, maneuvers are highly constrained to allow evaluators to observe and assess platoon and company maneuvers against an opposing force while units are completing required METL tasks. This constrained validation scenario would support multiple companies (up to 4) training at one time, and would typically occur once per year (see section 2.2.2.3).

FHL has identified areas of suitable, contiguous terrain (see Section 2.2.2.2). The proposed maneuver corridors are suitable for multiple platoon-level collective training events according to Army Training Circular 25-1, *Training Land* (TC 25-1) (Figure 2-2).

A company includes 3-4 platoons, and approximately 30 vehicles. To make best use of the limited suitable maneuver terrain available, and to complete METL tasks, training would typically occur as platoon-level maneuver exercises, with each platoon completing a series of tasks in a round-robin pattern.

For the purpose of realistic and conservative analysis, each company would contain two armored cavalry and one Stryker platoon (approximately 15 Soldiers per platoon), which would serve as an "upper bound" scenario for analysis[1]. These types of platoons are typically assigned to

[1] Because analyzing all potential training scenarios would be too extensive, an "upper bound" is established. An "upper bound" training scenario would mask or account for other potential environmental impacts associated with training conducted by other units with differing maneuver requirements, fewer/similar number of personnel/vehicles and/or lighter equipment, etc. An example would include training conducted by a Military Police (MP) Company (Combat Support) equipped with Armored Security Vehicles (ASV). These MP units are comprised of four separate platoons that routinely operate in non-contiguous training areas. They have a similar number of personnel/vehicles as established in the upper bound scenario, but have vehicles that are significantly lighter than Strykers and armored vehicles; therefore their impacts would be considered masked for analysis purposes.

armored cavalry units that contain a varied mix of heavy (e.g., tanks, and infantry fighting vehicles [IFV]), medium (e.g., Strykers), and light vehicles (e.g., cargo and utility vehicles). Off-road vehicle maneuvers would be anticipated to occur for 6 to 10 days during each brigade's/battalion's 14 to 35-day rotation.

An Army armored cavalry and Stryker platoon vary in regard to Soldier and equipment densities. An armored cavalry platoon has 16 personnel, and can have two tanks and two IFVs. A Stryker platoon has 12 personnel and four Stryker variant vehicles.

During maneuver training, the different types of platoons use their vehicles to conduct training that supports their general METL tasks, which vary depending on the type of unit. Regarding Stryker and armored cavalry platoons, TC 25-1 suggests using the same overall amount of maneuver area based on their METL, which collectively range between 18 and 30 square kilometers (6.9 and 11.6 square miles) (see Table 2-4). Both units could train proficiently on all of their METL requirements using the same approximate maneuver area dimensions.

Table 2-4. Maneuver Area Requirements for Stryker and Armored Cavalry Platoons per TC 25-1

Platoon and Task Type	Maneuver Area Requirements	Annual Repetitions	Days Per Repetition
Stryker/Armor Offense	4 x 6 = 24 km^2 (9.3 mi^2)	4	2
Stryker Defense	3 x 10 = 30 km^2 (11.6 mi^2)	4	2
Armor Defense	3 x 6 = 18 km^2 (6.9 mi^2)	4	2
Armor Retrograde	3 x 10 = 30 km^2 (11.6 mi^2)	4	2
Stryker/Armor Stability	3 x 6 = 18 km^2 (6.9 mi^2)	4	2
Stryker/Armor Support	3 x 6 = 18 km^2 (6.9 mi^2)	4	2

km = kilometer; mi = mile

In an effort to capitalize on training space and time, the Army is proposing the establishment of a primary and secondary maneuver corridor for accomplishing proposed maneuver training requirements at FHL (see Section 2.2.2.2). Figure 2-2 demonstrates that the general size of the proposed primary maneuver corridor is large enough to accommodate armored and Stryker platoon troop METL offensive tasks in accordance with TC 25-1 requirements; however, given other environmental and terrain constraints, additional area or "work arounds" may be required to conduct simultaneous platoon- or company-level training events.

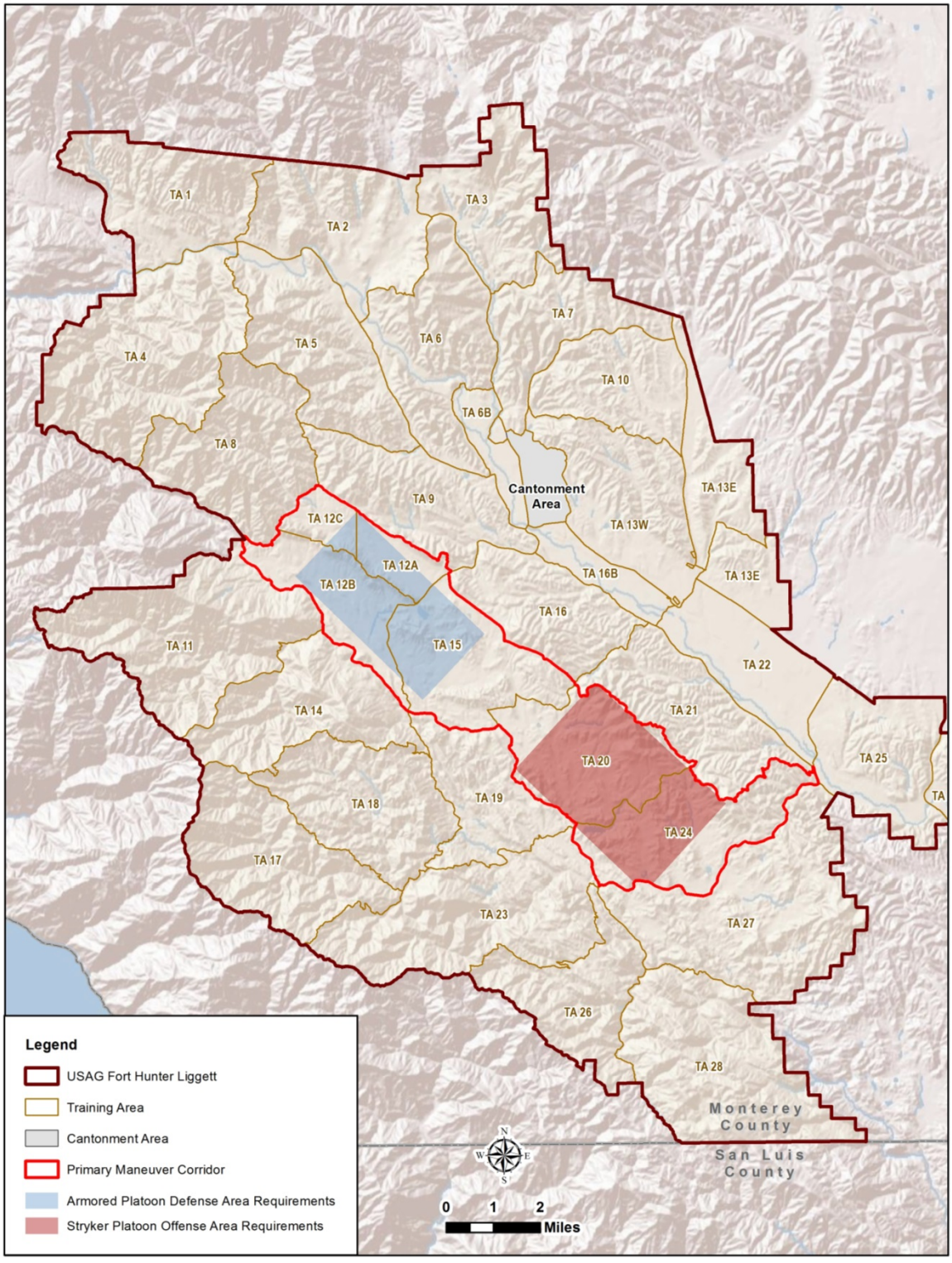

Figure 2-2. Example Army Maneuver Area Requirements for Armor and Stryker Platoons Using Training Circular 25-1

2.2.2.2 Proposed Primary and Secondary Maneuver Corridors

Based on the above screening criteria, FHL identified two areas for proposed establishment of maneuver corridors within the installation occurring in the Nacimiento Valley and Upper San Antonio River Valley (Milpitas). Maneuvers would be conducted in either maneuver corridor. These corridors were selected because they provide suitable terrain for off-road vehicle maneuver lanes. These areas were used until the early 2000's for off-road vehicle maneuver exercises. The corridors and suitable training activities within each proposed maneuver corridors are as follows:

- The primary maneuver corridor lies within the main valley of the Nacimiento River and includes suitable locations within training areas 12, 15, 20, and 24. FHL has designated this area as the 'primary' corridor as it encompasses the largest contiguous areas for maneuver lane training (approximately 79 square kilometers [31 square miles]). The relatively gently-sloping main valley (approximately 63 square kilometers [24 square miles]) provides areas with suitable terrain for off-road vehicle maneuvers (<30 percent slope and open vegetation communities) and would not pose an incompatible land use to existing training assets.

  Suitable training activities include medium and heavy unit off-road vehicle maneuver training requiring expansive open terrain; air assault and airborne; convoy training; engineer mobility, countermobility, survivability, and general engineering operations; and sustainment operations. Medium and heavy units require large open areas to conduct most offensive and defensive operations in areas that simulate current operating environment conditions in theatres of war.

- The secondary maneuver corridor is situated within the foothill valleys of the Nacimiento Valley and the Milpitas Valley and includes suitable locations within training areas 1, 2, 3, 9, 16, 21, and 27. Although total acreage within the secondary maneuver corridor boundaries is greater (approximately 147 square kilometers [59 square miles]), FHL has designated this area as 'secondary' because it provides smaller areas non-contiguous from each other with suitable terrain, totaling approximately 77 square kilometers (30 square miles).

  Suitable training activities include light and limited medium infantry maneuver and tactical training, support battalion base of operations, and land navigation. These activities are well-suited in this terrain due to the availability of cover and concealment for light maneuver operations and base/assembly area establishment. Light infantry units are often placed in areas with constrictive, close terrain in wartime operating environments. Limited squad to platoon-level medium infantry units could train in the more open areas that have suitable terrain.

Figures 2-3 and 2-4 show the training areas that comprise the areas of the proposed primary and secondary corridors, compared to terrain constraints.

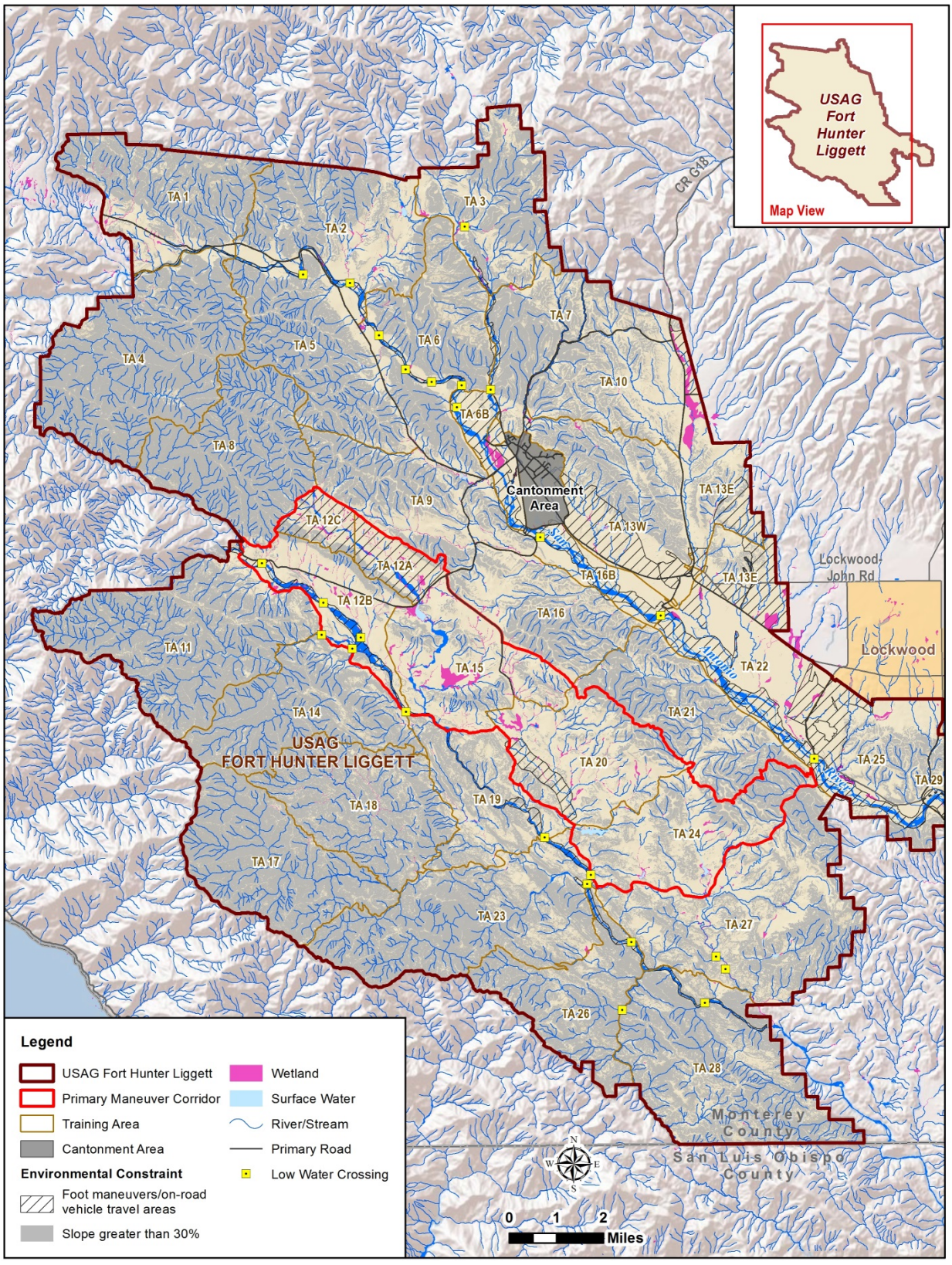

Figure 2-3. Primary Maneuver Corridor at Fort Hunter Liggett, CA

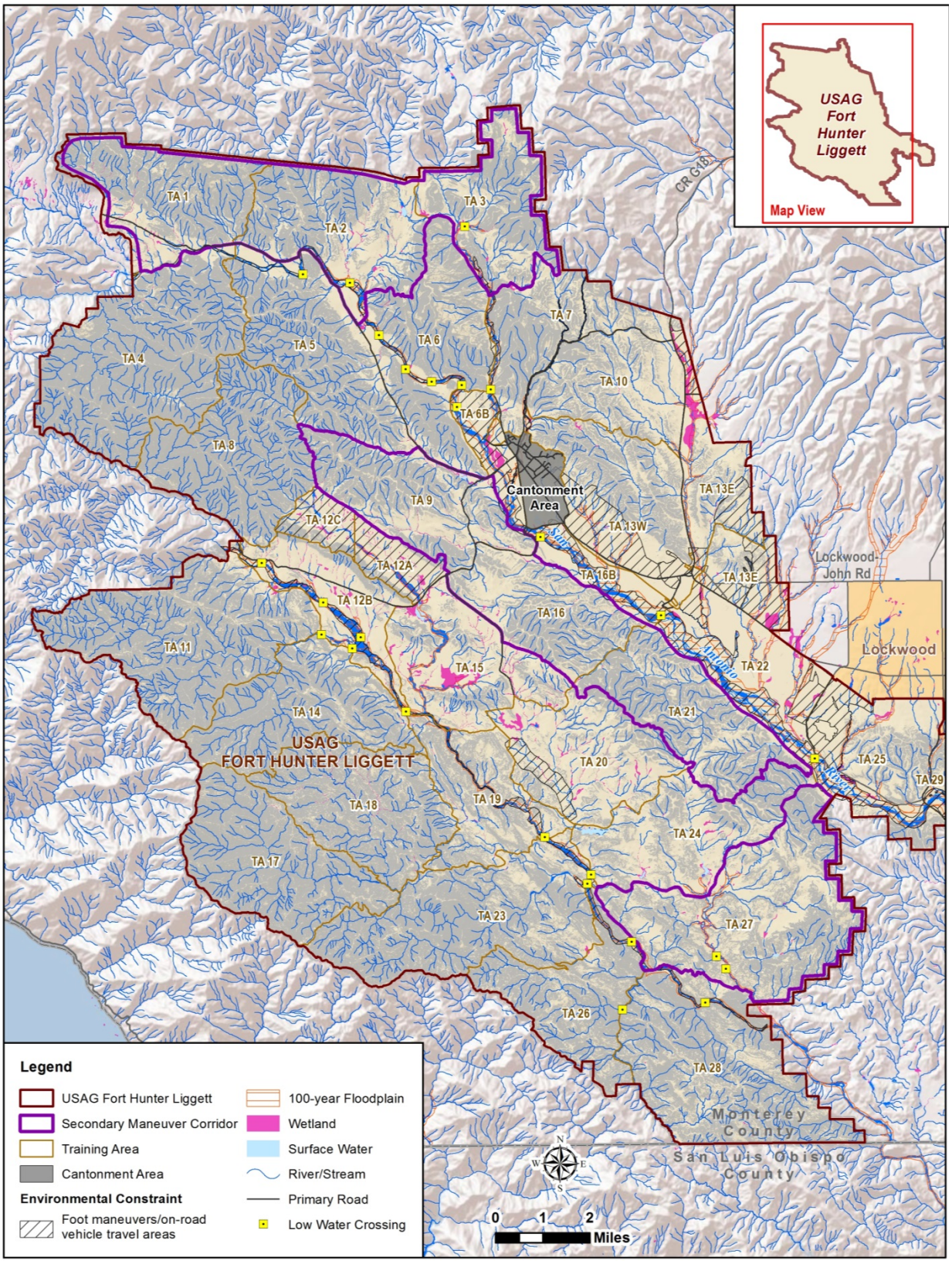

Figure 2-4. Secondary Maneuver Corridor at Fort Hunter Liggett, CA

Maneuver areas for each training event would be designated before each training event based on exercise requirements and environmental constraints. Within both corridors, FHL would restrict off-road vehicle maneuvers to areas containing less than 30 percent slope. As discussed in Section 2.2.1.4, FHL would also manage training within these corridors to consider additional factors such as sensitive environmental resources (e.g., wetlands, cultural resources, and endangered species sites) and land use constraints (e.g., existing facilities such as fixed targets, forward operating base locations, or potentially-contaminated sites). Prior to each training event, a REC would be completed that would consider existing environmental constraints and identify the maneuver area for each exercise.

2.2.2.3 Training Levels

Each proposed alternative includes multiple brigade-level collective training exercises, and continues to support nine battalion level or similar (MEU or Navy) exercises per year. A brigade-level exercise would continue to support approximately 5,500 personnel and 1,000 vehicles. A battalion-level exercise would continue to support an average of 800 personnel and 200 vehicles. A maneuver company would typically support 30 vehicles. Table 2-5 provides an approximated breakdown in training scenarios evaluated under the Proposed Action Alternatives compared to the No Action Alternative. Sections 2.2.2.4 through 2.2.2.7 further describe the Proposed Action Alternatives.

Table 2-5. Summary of Training under the Proposed Action Alternatives and No Action Alternative

	No Action	Alternative 1 (FY 16)	Alternative 2	Alternative 3	Alternative 4 (range)
Brigade-Level Exercises/Year	3, none concurrent	4, up to two concurrent	3, non-concurrent	4, up to two concurrent	Between 5 and 8, up to two concurrent
Personnel/Year for Brigade and Battalion-Level Exercises	23,700	29,200	23,700	29,200	34,700-51,200
Personnel/Year above No Action	0	5,500	0	5,500	11,000-27,500
Frequency	Yearly	2016 only	Yearly	Yearly	Yearly
Off-road Company Exercises/Year	0	3	8	9	10-13
Off-road Constrained Validation Scenario/year	0	1	1	1	1
Off-road exercise constraints	N/A	Dry season[1]	Dry season[1]	Dry season[1]	No Constraint
Total Days off-road/year	0	40	90	100	154 - 196

Table 2-5. Summary of Training under the Proposed Action Alternatives and No Action Alternative

	No Action	Alternative 1 (FY 16)	Alternative 2	Alternative 3	Alternative 4 (range)
Maneuver Corridors Utilized	Primary and Secondary	Primary	Primary and Secondary	Primary and Secondary	Primary and Secondary

[1] The start of the dry season occurs when soil moisture is depleted following peak standing crop (George 2015). The onset of the dry season varies year to year as precipitation amounts fluctuate, but typically occurs at some point between late April and early May. The start of the wet season occurs when soils become saturated with rain. The onset of the wet season varies, but typically occurs at some point between November and December (see Section 3.3, Natural Resources for more information).

2.2.2.4 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 would incorporate off-road vehicle maneuver training, would include conducting one additional brigade-level exercise (for a total of four), and would occur in 2016 only. This alternative is included to satisfy immediate U.S. Army Forces Command training requirements in the current fiscal year.

Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Two of the four brigade-level exercises may be conducted simultaneously with the other two occurring separately, but potentially back-to-back. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur only during the dry season[2] in the proposed primary maneuver corridor. Also, no additional off-road vehicle maneuver would occur under this alternative outside of the brigade-level training exercises.

2.2.2.5 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Alternative 2 would incorporate off-road vehicle maneuver into the current operations. No additional brigade-level training exercises would occur (continuing a total of three).

Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Six separate battalion exercises each year would include a maneuver company. None of these exercises would overlap, but could be conducted back-to-back. The separate battalion-level exercises would not occur simultaneously with brigade-level events. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur only in the dry season in both proposed primary and secondary maneuver corridors.

[2] The start of the dry season occurs when soil moisture is depleted following peak standing crop. The onset of the dry season varies year to year as precipitation amounts fluctuate, but typically occurs at some point between late April and early May. The start of the wet season occurs when soils become saturated with rain. The onset of the wet season varies, but typically occurs at some point between November and December (see Section 3.3, Natural Resources for more information).

2.2.2.6 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 would incorporate off-road vehicle maneuver training, and would include conducting one additional brigade-level exercise (for a total of four) annually.

Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Six separate battalion exercises each year would include a maneuver company. Two of the four brigade-level exercises could be conducted simultaneously with the other two occurring separately, but potentially back-to-back. The separate battalion-level exercises would not occur simultaneously with brigade-level events. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur only in the dry season in both proposed primary and secondary maneuver corridors.

2.2.2.7 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Alternative 4 would incorporate off-road vehicle maneuver training, and would include conducting two to five additional brigade-level training exercises (for a total of five to eight).

Analysis for this alternative assumes that each brigade-level exercise would integrate a maneuver company; one would support up to four maneuver companies conducting constrained validation training. Six separate battalion exercises each year would include a maneuver company. Up to two of the brigade-level exercises would be conducted simultaneously with the others occurring separately, but potentially back-to-back. The separate battalion-level exercises would not occur simultaneously with brigade-level events. Off-road vehicle maneuver training would be conducted as described in section 2.2.2.1, and would occur year-round in both the proposed primary and secondary maneuver corridors. Implementation of Alternative 4 would require subsequent tiered NEPA review.

2.3 Alternatives Considered but not Brought Forth to Analysis

The following alternatives to the Proposed Action were considered but dismissed by the Army.

2.3.1 Establishment of Maneuver Corridors Elsewhere on FHL

FHL examined locations throughout the installation for off-road vehicle maneuvers. Both terrain and existing infrastructure/land use were primary limitations in consideration of maneuver corridors elsewhere within FHL. Based upon terrain, much of the land area surrounding the valleys is too rugged to support off-road vehicle maneuvers, and is a training resource for road and foot maneuvers, as well as aviation. The Lower San Antonio River Valley (to include Jolon Valley that borders training areas 13E and 13W) was excluded from consideration due to incompatible land use (airfield, fixed ranges, cantonment, Jolon and Mission Roads).

2.3.2 Conduct Training at Other Active Installations

An alternative considered but dismissed was to conduct training at other military installations, such as Fort Irwin or Camp Roberts. This alternative would not be practical. Other installations would not be able to accommodate this type of training and training levels along with the training requirements of their own supported and home-stationed units. In addition, such an

action would result in lost training time for Soldiers and inefficient use of appropriations (funds) for training due to increased costs that would result from extensive logistics and transportation.

2.3.3 Conduct Simulated Training

Another alternative considered but dismissed was to provide Soldiers with simulated training opportunities. This alternative, however, would not prepare Soldiers for deployment as technology has not advanced sufficiently to enable simulations alone to provide Soldiers and units adequate training to meet doctrinal training readiness standards.

3 Affected Environment and Environmental Consequences

This chapter describes the impact assessment methodology, the affected environment (existing conditions), and the environmental consequences for the No Action Alternative and the Proposed Action alternatives. Section 3.1.1 provides a description of baseline and data sources used to prepare this EA. A description of impact assessment methodology and thresholds of significance are discussed in Section 3.1.2.

Several resources were determined not to be affected by the Proposed Action Alternatives; therefore, a detailed analysis of these topics is not presented in this chapter. A discussion of VECs carried through for further analysis within this EA and justification for those VECs dismissed from further analysis are presented in Section 3.1.3.

3.1 Impact Assessment Methodology

3.1.1 Introduction and Description of Baseline Data and Sources

The following types of data were used to characterize the affected environment discussion within the EA:

- Geographical Information System (GIS) data, including land cover, vegetation, hydrology, wetlands, sensitive species, and aerial photography.
- Regional and local reports, including Natural Resources Conservation Service (NRCS) Soil Surveys.
- Previous NEPA documentation.
- FHL management plans, including the Integrated Cultural Resources Management Plan (ICRMP), INRMP and SPCC Plan.
- Public information from databases and publications managed and authored by USEPA, U.S. Army Public Health Command [USAPHC], National Wetland Inventory [NWI], U.S. Census, Bureau of Economics, and Department of Transportation.
- Additional publications, research, and surveys.
- County Planning Department/county records/online databases and plans.
- Agency consultation.

3.1.2 Approach for Analyzing Impacts

Context and intensity are taken into consideration in determining a potential impact's significance, as defined in 40 CFR Part 1508.27. The context means that the significance of an action must be analyzed in several contexts such as the affected region, the affected interests, and the locality. The intensity of a potential impact refers to the impact's severity and includes consideration of beneficial and adverse impacts, the level of controversy associated with a project's impacts on quality of the human environment, whether the action establishes a precedent for future actions with significant effects, the level of uncertainty about project impacts, and whether the action threatens to violate Federal, state, or local law requirements imposed for the protection of the environment. The severity of environmental impacts is characterized as none/negligible, minor, moderate, significant, or beneficial:

- None/Negligible – No measurable impacts are expected to occur. A negligible impact may locally alter the resource, but would not measurably change its function or character.
- Minor – Primarily short-term but measurable adverse impacts are expected. Impacts on the resource may be slight.
- Moderate – Noticeable adverse impacts that would have a measurable effect on a wide scale (e.g., outside the footprint of disturbance or on a landscape level). If moderate impacts are adverse, they would not exceed limits of applicable local, state, or Federal regulations.
- Significant – A significant impact may exceed limits of applicable local, state, or Federal regulations or would untenably alter the function or character of the resource. These impacts would be considered significant unless mitigable to a less-than-significant level.
- Beneficial – Impacts would benefit the resource/issue.

Impacts that range from none to moderate and beneficial are considered less than significant.

To maintain a consistent evaluation of impacts in this EA and in accordance with the Army NEPA regulations, thresholds of significance were established for each resource. Although some thresholds have been designated based on legal or regulatory limits or requirements, others reflect discretionary judgment on the part of the Army in accomplishing its primary mission of military readiness, while also fulfilling its conservation stewardship responsibilities. Significance thresholds are summarized in Table 3.1-1 and are also discussed within each resource section. A region of influence (ROI) was determined for each resource area and was based on the potential impacts to the affected resource. For example, the ROI may focus on the specific location of an alternative, on FHL and the surrounding area, or may include the entire watershed. Table 3.1-1 presents resource-specific ROIs and the relevant factors in evaluating the context and intensity of a potential impact to determine if the impacts may be significant.

3.1.3 Level of VEC Analysis

In compliance with the NEPA and CEQ regulations, the description of the affected environment focuses on those resources and conditions potentially subject to effects from implementing the Proposed Action. CEQ regulations encourage NEPA analyses to be as concise and focused as possible. This is in accordance with CEQ regulations at 40 CFR Part 1500.1(b) and 1500.4(b): "…NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail….prepare analytic rather than encyclopedic analyses."

Table 3.1-1 presents each VEC and corresponding ROIs and thresholds of significance. The table also identifies those VECs that are dismissed from further analysis or are fully analyzed in this EA, and the rationale for dismissing or analyzing each VEC. In conducting this analysis, a qualified subject matter expert (SME) reviewed the potential direct and indirect effects of the No Action Alternative and the Proposed Action Alternatives relative to each VEC. The SME carefully analyzed and considered the existing conditions of each VEC within the Proposed Action's ROI. Through this analysis, it was determined that, for several VECs, negligible adverse effects would occur.

Table 3.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from further Analysis?	Rationale for Level of Assessment
Land Use	Land use within and adjacent to proposed maneuver corridors.	Significant impacts would occur if the land use were incompatible with existing military land uses and designations (including recreation). These impacts may conflict with Army land use plans, policies, or regulations, or conflict with land use off-post.	Yes	The Proposed Action would be conducted within existing range and training lands. As stated in Section 2.1, FHL selected the proposed primary and secondary maneuver corridor areas based on terrain and training land use compatibility. Therefore, no further analysis is required. Proposed training activities would not pose conflicts with off-post land uses.
Air Quality and Greenhouse Gases	North Central Coast Intrastate Air Quality Control Region.	An impact to air quality would be considered significant if were to generate emissions which: • Exceed the general conformity rule *de minimis* (of minimal importance) threshold values, • Exceed the greenhouse gas threshold in the draft CEQ guidance, or • Contribute to a violation of any Federal, state, or local air regulation.	No	Training activities would potentially result in fugitive dust emissions and greenhouse gas emissions. This resource area is further discussed in Section 3.2.
Noise	Areas adjacent to and within the installation.	Impacts would be considered significant if noise from Army actions were to cause harm or injury to on- or off-post communities, or exceed applicable environmental noise limit guidelines.	Yes	The Proposed Action would be conducted within existing range and training lands. Noise generated from training activities are not anticipated to change existing noise contours within or adjacent to the installation. Therefore, no further analysis is required.
Natural Resources	Biological resources within the proposed	Impacts to biological resources would be considered significant if Army actions were to result in:	No	The Proposed Action and related training activities could adversely impact natural resources at FHL from ground disturbance and vegetation loss,

Table 3.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from further Analysis?	Rationale for Level of Assessment
	maneuver corridors and associated habitat.	• Substantial permanent conversion or net loss of habitat at the landscape scale, • Long-term loss or impairment of a substantial portion of local habitat (species-dependent), • Loss of populations of species, or • Unpermitted or unlawful "take" of ESA protected threatened or endangered species, or species protected under the BGEPA or MBTA.		habitat degradation, as well as from potential spread of invasive species. As a result, this resource area is further discussed in Section 3.3.
Cultural Resources	Cultural Resources within the proposed maneuver corridors.	Impacts to cultural resources would be considered significant if they cause direct or indirect alteration of the characteristics that qualify a property for inclusion in the NRHP (may include physical destruction, damage, alteration, removal, change in use or character within setting, neglect causing deterioration, transfer, lease, sale), and fail to follow the existing Section 106 process.	No	The Proposed Action and related training activities could adversely impact cultural resources within the proposed maneuver corridors from activities generating ground disturbance. As a result, this resource area is further discussed in Section 3.4.
Geology and Soils	Geology and Soils within the proposed maneuver corridors.	Impacts on geology, topography, and soils would be considered significant if: • The landscape could not be sustained for military training, or • Excessive soil loss were to impair plant growth.	No	The Proposed Action and related training activities could adversely impact soil resources within the proposed maneuver corridors from activities generating ground disturbance. As a result, this resource area is further discussed in Section 3.5.

Table 3.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from further Analysis?	Rationale for Level of Assessment
Socio-economics	Socioeconomic and Environmental Justice factors within FHL, and immediate surrounding communities and counties.	Impacts to socioeconomics and environmental justice would be considered significant if they were to cause: • Substantial change to the sales volume, income, employment or population of the surrounding ROI, • Disproportionate adverse economic, social, or health impacts on minority or low-income populations, or • Substantial disproportionate health or safety risk to children.	Yes	The Proposed Action would not adversely affect socioeconomic conditions. No changes would occur to local populations, including housing and schools. Minor benefits could occur to local businesses patroned by Soldiers during training events and from restoration activities following training events. In addition, no disproportionate adverse effect would occur to minority populations or children. Training activities would be conducted within existing designated training areas inside of FHL managed by Range Control.
Transportation	Public roadways and key access points within and near the Installation; roadways within FHL boundaries.	Impacts to transportation would be considered significant if Army actions: • Permanently reduce traffic conditions by more than two LOS at roads and intersections within the ROI, or • Exceed road capacity and design.	No	Convoy of equipment to FHL for proposed off-road vehicle maneuvers has the potential to adversely affect traffic conditions and the integrity of local roadways. As a result, this resource area is further discussed in Section 3.6.
Water Resources	Watersheds, state-designated stream segments and groundwater aquifers associated with the proposed maneuver corridors. USACE	Impacts to water resources would be considered significant if Army actions: • Result in an excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs, • Result in unpermitted direct impacts to waters of the U.S,	No (surface waters) No (wetlands)	The Proposed Action and related training activities could adversely impact surface water and wetland resources within the proposed maneuver corridors from training activities generating ground disturbance. Surface water quality could be directly impacted by the Proposed Action and indirectly by sedimentation/erosion. As a result, this resource area is further discussed in Section 3.7.

Table 3.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from further Analysis?	Rationale for Level of Assessment
	jurisdictional "waters of the U.S." and wetland resources within the proposed maneuver corridors.	• Substantially affect surface water drainage or stormwater runoff, including floodwater flows, • Substantially affect groundwater quantity or quality, or • Do not comply with policies, regulations, and permits related to wetlands conservation and protection.	Yes (groundwater) Yes (floodplains)	Training activities under the Proposed Action would not change the quality or use of groundwater aquifers. Minimization and management of incidental spills from equipment is discussed in Section 3.7. In addition, the Proposed Action would not result in adverse impacts associated with the occupancy and modification of floodplains per EO 11988, *Floodplain Management*. Therefore, no further analysis is required for groundwater and floodplains.
Airspace	Airspace above and surrounding FHL.	An impact to airspace would be considered significant if the Proposed Action violates Federal Aviation Administration safety regulations or causes an infringement on current military, private, and commercial flight activity and flight corridors.	Yes	The proposed training activities would not impact current airspace designations. Therefore, no further analysis is required.
Facilities, Energy Demand and Generation, and Utilities	Utilities within FHL and immediate surrounding communities and counties.	Impacts to facilities, energy demand and generation, and utilities would be considered significant if the Proposed Action were to cause an impairment of utility service to local communities, homes, or businesses.	Yes	The Proposed Action would not result in significant changes to facilities or infrastructure usage, result in substantial increases in solid waste generation, or result in significant increases in energy or fuel usage. Therefore, no further analysis is required.
Hazardous Materials and Hazardous Waste and Health and Safety	FHL lands, including the proposed maneuver corridors.	Impacts to hazardous materials and hazardous waste would be considered significant if substantial additional risk to human health or safety would be attributable to Army actions, including direct human exposure, substantial increase in	Yes	No appreciable increase of waste would occur during proposed training operations, and any waste generated during training would be properly managed in accordance with Federal, state, and applicable Army and garrison-level regulations. Therefore, no further analysis of hazardous materials and hazardous waste is required.

Table 3.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from further Analysis?	Rationale for Level of Assessment
		environmental contamination or violation of applicable Federal, state, DoD, and local regulations.		Areas of potential UXO and site contamination exist within the proposed maneuver corridors. Training within these areas would be managed according to existing range scheduling protocol with suspected areas of UXO contamination avoided unless cleared prior to the training event. Any UXO materials uncovered will be disposed of in accordance with all current Army regulations and standard operating procedures. In addition, the Army maintains three Radiation Control Areas (RCAs) on FHL for depleted uranium (DU) spotting (training) rounds fired by the Davy Crockett weapon system in the 1960s. These areas are located within training areas 15 and 24 of the proposed primary maneuver corridor and training area 27 of the proposed secondary maneuver corridor. The Army has applied to the Nuclear Regulatory Commission for a license to possess this DU. No training proposed by or analyzed in this EA would impact these RCAs.

BGEPA = Bald and Golden Eagle Protection Act; CO_2 = carbon dioxide; DoD = Department of Defense; DU = depleted uranium; EO = Executive Order; ESA = Endangered Species Act; FHL = Fort Hunter Liggett; LOS = level of service; MBTA = Migratory Bird Treaty Act; NRHP = National Register of Historic Places; RCA = Radiation Control Area; ROI = region of influence; SHPO = State Historic Preservation Office; USACE = U.S. Army Corps of Engineers; UXO = unexploded ordnance

3.1.4 Cumulative Effects

The CEQ regulations implementing NEPA defines a "cumulative impact" as follows:

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable (currently scheduled) actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

USEPA guidance to reviewers of cumulative impacts analyses further adds:

…the concept of cumulative impacts takes into account all disturbances since cumulative impacts result in the compounding of the effects of all actions over time. Thus, the cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (Federal, non-Federal or private) is taking the action (USEPA 1999).

For the purposes of this EA, cumulative impacts result from the incremental impacts of the action when added to other past, present, and currently scheduled actions regardless of who undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. For the purposes of the cumulative impacts analysis, the Proposed Actions ROI is limited to FHL and adjacent lands (including communities around FHL and activities at Camp Roberts). This ROI includes areas where the Proposed Actions effects would most likely contribute to cumulative environmental effects.

The Army considered a wide range of past, present, and currently scheduled future actions by researching existing literature and reviewing websites of local area planning agencies (e.g., Monterey County Resource Management Agency, Monterey County Water Resources Agency, Monterey County Transportation Agency) and state and Federal agencies to identify other projects in the ROI that could contribute to cumulative environmental effects. The Army considered other past, present, and foreseeable future actions regardless of whether the actions were similar in nature to the Proposed Actions or outside the jurisdiction of the Army.

VEC subsections 3.2.3 through 3.7.3 contain a discussion of cumulative effects for each resource area. The discussion below highlights activities identified at FHL, Camp Roberts and the region that are considered within these cumulative effects analyses.

Fort Hunter Liggett

Projects at FHL with the potential for cumulative impacts when considered with the Proposed Action are generally limited to future construction in the cantonment area, as well as construction at Schoonover Airfield.

Cantonment projects include:

- Family, Wellness and Education Center (FY 16)
- Hazardous Waste Facility (FY 16)
- Training Aids, Devices, Simulators, Simulations (TADSS) 2 - Training Support Building (FY 16)
- Fitness Center Expansion (FY 16)

- Launderette (FY 16)
- Emergency Services Center (FY 17)
- Billeting Warehouse (FY 17)
- Chapel Renovation (FY 19)
- Access Control point (FY 22)
- Operational Readiness Training Complex (ORTC) - Dining Facility (DFAC) (FY 22)
- ORTC Vehicle Maintenance (FY 22)

Airfield projects include:

- Schoonover Fire Support Facility (FY 16)

As demonstrated by the list above, a majority of these projects are facility construction projects or improvements within the cantonment area which is directly east and north of training area 9 of the proposed secondary maneuver corridor. The Schoonover Airfield is located within training area 16B, which is directly east training area 16 of the proposed secondary maneuver corridor.

Camp Roberts

Camp Roberts foresees an increase in use of the post by other branches of the military. Levels, however, are consistent with their *Combined-Forces Training Activities, New Equipment Utilization, and Range Modernization Program at Camp Roberts Army National Guard Training Site EIS* (ARNG 1996). The following projects, all training related, have been identified by Camp Roberts as reasonably foreseeable:

- Air Ops for fixed wing and increased unmanned aerial vehicle (UAV) operations
- Nighttime small arms firing after 2330
- Mine Clearing Line Charge (MICLIC) operations
- Mine-Resistant Ambush Protected (MRAP), Husky vehicle fielding

Other Agency (DoD and non-DoD) and Other Public/Private Actions (Past, Present, and Reasonably Foreseeable)

No large scale projects or actions have been identified within the region. Much of the area surrounding FHL is, and has historically been, devoted primarily to agricultural uses and large grazing operations. Monterey County has also designated the Jolon Road area as a winery corridor. Historical agriculture and grazing has affected wildlife, vegetation, soils, and water resources within the surrounding area. Wildfires are common both on FHL (see Section 3.3, Natural Resources), and also in the Los Padres National Forest and other surrounding areas.

Mining has historically occurred throughout the San Antonio and Nacimiento River watersheds throughout the 20th century, typically south of the installation. Lime Mountain Quarry is currently operating south of the installation within the Nacimiento Watershed and produces high quality limestone. Other mines in the San Antonio Watershed produce shale materials. Mines previously operating in the Nacimiento River Watershed include the Buena Vista and Klau mines, which have resulted in mercury contamination in the Nacimiento Reservoir (MCWRA 2008).

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3.2 Air Quality and Greenhouse Gases

Air pollution is the presence in the outdoor atmosphere of one or more contaminants (e.g., dust, fumes, gas, mist, odor, smoke, or vapor) in quantities and of characteristics and duration such as to be injurious to human, plant, or animal life. Air quality as a resource incorporates components that describe air pollution within a region, sources of air emissions, and regulations governing those emissions. The following sections include a discussion of the existing conditions, a regulatory overview, and a summary of greenhouse gases and climate change. The ROI for air quality and greenhouse gas includes the North Central Coast Intrastate Air Quality Control Region.

3.2.1 Affected Environment

The USEPA Region 9 and California Air Resources Board (CARB) regulate air quality in California. The Clean Air Act (CAA) (42 U.S.C. 7401-7671q), as amended, assigns the USEPA responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. Each state has the authority to adopt standards stricter than those established under the Federal program, and the State of California adopted slightly stricter standards for 24-hour PM_{10} (CARB 2015a).

3.2.1.1 National Ambient Air Quality Standards and Attainment Status

Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas. Federal regulations designate AQCRs with levels below the NAAQS as *attainment* areas. Monterey County (and therefore all areas associated with the action) is within the North Central Coast Intrastate AQCR (40 CFR 81.160) as well as the Monterey Bay Unified Air Pollution Control District (MBUAPCD). The USEPA monitors levels of criteria pollutants at sites in each region throughout California. For reference purposes, Table 3.2-1 shows the monitored concentrations of criteria pollutants at monitoring locations within the region. Based on monitored concentration of criteria pollutants, the USEPA has designated Monterey County as in attainment for all criteria pollutants while CARB has designated it as nonattainment for PM_{10} and O_3 (USEPA 2015a, CARB 2015b).

Table 3.2-1. National Ambient Air Quality Standards and Monitored Data

	Air Quality Standard		Monitored Concentrations		
Pollutant	**Level**	**Averaging Period**	**2012**	**2013**	**2014**
CO					
1-hour (ppm)	35	Not to be exceeded more than once per year	1.5	1.7	1.3
8-hour (ppm)	9		1.3	0.8	1

Table 3.2-1. National Ambient Air Quality Standards and Monitored Data

Pollutant	Air Quality Standard		Monitored Concentrations		
	Level	Averaging Period	2012	2013	2014
Nitrogen Dioxide (NO_2)					
1-hour (ppb)	100	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	35	36	32
O_3					
1-hour (ppm)	0.090[1]	3-year average of the fourth highest daily maximum	0.057	0.059	0.063
8-hour (ppm)	0.070	3-year average of the fourth highest daily maximum	0.057	0.059	0.063
$PM_{2.5}$					
24-hour ($\mu g/m^3$)	35	98th percentile, averaged over 3 years	*14*	*16*	12
Annual mean ($\mu g/m^3$)	12	Averaged over 3 years	*6*	*6.7*	6.5
PM_{10}					
24-hour ($\mu g/m^3$)	150(50)[2]	Not to be exceeded more than once per year over 3 years	80	75	66

Source: 40 CFR 50.1-50.12, USEPA 2015b.
[1]1-hour O_3 CAAQS equal to 0.090 ppm
[2]24-hour PM_{10} CAAQS equal to 50 ug/m^3.
CO = carbon monoxide; O_3 = ozone; PM = particulate matter; ppm = parts per million; ppb = parts per billion; $\mu g/m^3$ = micrograms per cubic meter

3.2.1.2 Regional and Installation-Wide Emissions

Table 3.2-2 lists FHL's 2011 facility-wide air emissions from all primary stationary sources. These sources include boilers and furnaces, fuel storage and dispensing, internal combustion engines, and wastewater treatment. The installation's emissions from stationary sources are below the major source thresholds. Each regulated stationary source is covered under a separate air permit with the MBUAPCD.

Table 3.2-2. Annual Air Emissions for FHL

Pollutant	Emissions (tons/year)	
	Potential to Emit	Actual Emissions
Nitrogen oxides (NO_x)	44.8	4.0
Sulfur dioxide (SO_2)	4.3	0.5
Carbon monoxide (CO)	22.0	3.1
Volatile organic compounds (VOCs)	38.3	1.3
Fine particulate matter ($PM_{2.5}$ /PM_{10})	12.9	0.3
Hazardous Air Pollutants (HAPS)	0.43	0.043
Carbon Dioxide (CO_{2e})	12,649	2,681

Source: USARC 2014

3.2.1.3 Regional Haze

Particulate pollution, including sulfates, nitrates, organics, soot, fine soil dust, and coarse particles, contributes to the regional haze that impairs visibility. The CAA declared a national goal to remedy existing visibility impairment and prevent future haze caused by man-made air pollution at selected national parks and wilderness areas of the U.S., known as Class 1 Areas. California has 29 mandatory Class 1 Areas managed by either the National Parks Service or the U.S. Forest Service. There are three regional haze Class I areas within 100 miles of FHL; (1) Ventana Wilderness Area (directly adjacent to the northern and western installation boundary), (2) Pinnacles National Monument (21 miles north), and (3) San Rafael Wilderness Area (81 miles south).

In 1999, the USEPA promulgated a regional haze regulation that calls for states to establish goals and emission reduction strategies to make initial improvements in visibility at their respective Class 1 Areas. In 2009, the CARB prepared a Regional Haze Plan (RH Plan) for California demonstrating reasonable progress in reducing haze by 2018, the first benchmark year on the path to improved visibility.

The USEPA funded five Regional Planning Organizations throughout the country to coordinate regional haze rule-related activities between states in each region. California belongs to the Western Regional Air Partnership (WRAP), the consensus organization of western states, tribes, and federal agencies, which oversees analyses of monitoring data and preparation of technical reports regarding regional haze in the western U.S.

3.2.1.4 Permitting Requirements

CARB oversees programs for permitting the construction and operation of new or modified stationary source air emissions in California. Air permitting is required for many industries and facilities that emit regulated pollutants. Based on the size of the emissions units and type of pollutants emitted, California sets permit rules and standards for emissions sources. This section outlines the primary Federal and state permitting regulations.

The New Source Performance Standards (NSPS) process requires USEPA to list categories of stationary sources that cause or contribute to air pollution that might reasonably be anticipated to endanger public health or welfare. The NSPS program sets uniform emissions limitations for many industrial sources. The CAA Amendments of 1990, under revisions to Section 112, required USEPA to list and promulgate National Emission Standards for Hazardous Air Pollutants (NESHAPs) to reduce the emissions of hazardous air pollutants (HAP), such as formaldehyde, benzene, xylene, and toluene from categories of major and area sources (40 CFR Part 63). New stationary sources whose potential to emit (PTE) exceeds either 10 tons per year (tpy) of a single HAP, or 25 tpy of all regulated HAP, would be subject to Maximum Achievable Control Technology Standards (MACT) requirements.

3.2.1.5 Climate and Greenhouse Gases

FHL average high temperature is 73° Fahrenheit (°F) (22.8° Celsius (°C)) in July, and is 45°F (7.2°C) in t December. FHL has average annual precipitation of 19.3 inches (48.5 centimeters) per year. The wettest month of the year is February with an average rainfall of 4.2 inches (10.7 centimeters) (Idcide 2015; FHL 2016).

Greenhouse gases are components of the atmosphere that trap heat relatively near the surface of the earth, and therefore, contribute to the greenhouse effect and climate change. Most

greenhouse gases occur naturally in the atmosphere, but increases in their concentration result from human activities such as the burning of fossil fuels. Global temperatures are expected to continue to rise as human activities continue to add carbon dioxide (CO_2), methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. Whether or not rainfall will increase or decrease remains difficult to project for specific regions (USEPA 2015c and IPCC 2014).

EO 13693, *Planning for Federal Sustainability in the Next Decade* outlines policies intended to ensure that Federal agencies evaluate climate-change risks and vulnerabilities, and to manage the short- and long-term effects of climate change on their operations and mission. The EO specifically requires agencies within the DoD to measure, report, and reduce their greenhouse gas emissions from both their direct and indirect activities. The DoD has committed to reduce greenhouse gas emissions from non-combat activities 34 percent by 2020 (DoD 2014). In addition, the CEQ recently released draft guidance on when and how Federal agencies should consider greenhouse gas emissions and climate change in NEPA analyses. The draft guidance includes a presumptive effects threshold of 27,563 tons per year (25,000 metric tons per year) of CO_{2e} emissions from a Federal action (CEQ 2014).

3.2.2 Environmental Consequences

This section provides a discussion of the possible environmental effects to air quality and effects to greenhouse gases that could result from the No Action and Proposed Action alternatives. An impact to air quality would be considered significant if were to generate emissions which:

- Exceed the general conformity rule *de minimis* threshold values,
- Exceed the greenhouse gas threshold in the draft CEQ guidance, or
- Contribute to a violation of any Federal, state, or local air regulation.

Table 3.2-3 provides a comparison summary of approximate level of impacts by alternative.

Table 3.2-3. Summary of Air Quality and Greenhouse Gas Effects

Alternative	Negligible	Minor	Moderate	Significant
No Action	[X]			
Alternative 1		[X] ←	[X][1]	
Alternative 2		[X] ←	[X][1]	
Alternative 3		[X] ←	[X][1]	
Alternative 4		[X] ←	[X][1]	

[1]Air quality impacts could be reduced to minor using dust avoidance and suppression measures as defined for each alternative.

3.2.2.1 No Action Alternative – Continue Existing Mission and Training Operations

Selecting the No Action Alternative would result in no changes in air quality. This alternative involves continuing existing training missions and environmental programs at FHL, and maintaining existing environmental conditions through current operational controls. Training activities and training land management would occur in accordance with existing procedures.

Because the number and type of activities would remain consistent with current levels under the No Action Alternative, ambient air quality would remain unchanged when compared to existing conditions.

3.2.2.2 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 has the potential for short-term moderate adverse effects to air quality. Short-term effects would be primarily from increased fugitive dust due to changes in off-road vehicle maneuver training at FHL for FY 16 within the proposed primary maneuver corridor. Effects would be less than significant as emissions would not exceed the *de minimis* threshold levels, exceed the greenhouse gas threshold in the draft CEQ guidance, or contribute to a violation of any Federal, state, or local air regulation. Alternative 1 does not include the establishment of new stationary sources of air emissions subject to air permitting. Should emergency generators or other temporary sources of emissions be necessary, they may require a minor permit to construct and operate from CARB.

The Proposed Action would have no effects on regional haze. There are no new major stationary sources of air emission associated with the Proposed Action that would affect Class I areas as outlined under the PSD rules. The emissions are below the *de minimis* thresholds, the major source thresholds, and are not subject to PSD permitting, therefore, visibility and dispersion calculations for maneuvers activities to determine if the Significant Impact Levels (SILs) for Class I areas are exceeded are not required. It is understood that actions of this size would not have a significant adverse effect on visibility. In addition, neither military training, nor any activity outlined under the Proposed Action are identified in the USEPA approved California Regional Haze Plan or California Regional Haze Plan 2014 Progress Report (CARB 2009 and CARB 2014). These effects would be less than significant.

Direct and Indirect Emissions. Table 3.2-4 lists total direct and indirect emissions resulting from the maneuvers training under each alternative. Combustion emissions from vehicles and emissions from all other installation-wide training were assessed in the 2010 *EA for Installation Development and Training*. The only increase in emissions due to the Proposed Action would be fugitive dust from off-road vehicle maneuvers. There would be no increase in emissions of other criteria pollutants from any alternative. Emissions would be below the *de minimis* threshold of 100 tons per year (tpy); therefore, the level of effects would be minor and preparation of a Record of Non-Applicability (RONA) would not be required. Detailed emissions calculations are presented in Appendix C. Moderate changes in quantity and types of training equipment and vehicles used would not substantially change these emissions estimates, and would not change the level of effects under NEPA.

Table 3.2-4. Estimated Air Emissions by Alternative

	PM_{10}	$PM_{2.5}$	*De minimis* Threshold [tpy]	Exceeds *De Minimis* Thresholds? [Yes/No]
Alternative 1	12.4	1.2	100	No
Alternative 2	21.2	2.1	100	No
Alternative 3	23.0	2.3	100	No
Alternative 4	30.1	3.0	100	No

CO = Carbon monoxide; NOx = nitrogen oxides; SO_2 = sulfur dioxide;
PM = particulate matter; VOC = volatile organic compound

Proposed Dust Reduction Measures. The PM_{10} emissions in fugitive dust generated by the off-road vehicle maneuvers training would be approximately 12.4 tpy. Although below the *de minimis* thresholds, the level of effects for dust would be moderate as CARB has designated the area as nonattainment for PM_{10} CAAQS. Although these effects would be less than significant, the Army could reduce dust from vehicle traffic within the proposed primary maneuver corridor during the FY 16 training through a combination of the following existing dust control measures:

- Require vehicles to stay on established roads and trails unless conducting authorized training activities, and observe speed limits (maximum 25 miles per hour unless otherwise posted).
- Use of tackifiers or wetting surfaces prone to dust generation (e.g. roads, trails, staging areas) prior to dust-generating activities.
- Restoring disturbed areas and reestablish vegetation cover following training events as described in Section 2.2.1.4.

It is expected that this would reduce particulate emissions from off-road vehicle maneuver activities by 50 percent or approximately 6.2 tpy. With these management practices, the level of dust generation and increase of fugitive dust would be minor.

Greenhouse Gases and Climate Change. There would be no increase in emissions of GHG from any alternative. Therefore, all operational activities would not have greenhouse gas emissions above the CEQ threshold. These effects would be minor.

3.2.2.3 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Alternative 2 has the potential for long-term moderate adverse effects to air quality. Activities outlined under Alternative 2 are similar in nature but somewhat greater than Alternative 1 as they would be ongoing and continue after FY 16. Off-road vehicle maneuvers would also occur within the proposed secondary maneuver corridor. As with all the alternatives, effects would be primarily from increased fugitive dust due to off-road vehicle maneuver training at FHL. Effects would be less than significant as emissions would not exceed the general conformity rule *de minimis* threshold values, exceed the greenhouse gas threshold in the draft CEQ guidance, or contribute to a violation of any Federal, state, or local air regulation (see Tables 3.2.5 and 3.2.6).

Alternative 2 does not include the establishment of any new stationary sources of air emissions subject to air permitting.

Proposed dust reduction measures would include those outlined under Alternative 1. As this alternative involves reoccurring annual off-road training events, FHL would additionally develop an adaptive management program for fugitive dust control to optimize the proper timing of dust suppressant applications, including:

- Adoption of sediment and erosion control mitigations including a long-term land restoration and monitoring program for off-road vehicle maneuver training as outlined in Appendix D. Monitoring would include surface moisture conditions.
- Selecting dust control strategies over time based on applicability and effectiveness.

Similar to Alternative 1, these measures would reduce particulate emissions from off-road vehicle maneuver activities by 50 percent or more (less than 11 tpy). This program would ensure indirect effects of dust from wind erosion on disturbed lands are minimized. With these management practices, the level of dust generation and increase of fugitive dust would be minor.

3.2.2.4 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 has the potential for long-term moderate adverse effects to air quality. Activities outlined under Alternative 3 are similar in nature but somewhat greater than Alternative 2 with the addition of a brigade. As with all the alternatives, effects would be primarily from increased fugitive dust due to off-road vehicle maneuver training at FHL. Effects would be less than significant as emissions would not exceed the general conformity rule *de minimis* threshold values, exceed the greenhouse gas threshold in the draft CEQ guidance, or contribute to a violation of any Federal, state, or local air regulation (see Tables 3.2.5 and 3.2.6). Alternative 3 does not include the establishment of any new stationary sources of air emissions subject to air permitting. Proposed dust reduction measures would be identical to those outlined under Alternative 2. With these management practices, the level of dust generation and increase of fugitive dust would be minor.

3.2.2.5 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Alternative 4 has the potential for long-term moderate adverse effects to air quality. Activities outlined under Alternative 4 are similar in nature but somewhat greater than Alternative 3 with the potential of up to eight brigades. As with all the alternatives, effects would be primarily from fugitive dust due to off-road vehicle maneuver training at FHL. Effects would be less than significant as emissions would exceed the general conformity rule *de minimis* threshold values, exceed the greenhouse gas threshold in the draft CEQ guidance, or contribute to a violation of any Federal, state, or local air regulation (see Tables 3.2.5 and 3.2.6). Alternative 4 does not include the establishment of any new stationary sources of air emissions subject to air permitting. Proposed dust reduction measures would be identical to those outlined under Alternative 2. With these management practices the level of dust generation and increase of fugitive dust would be minor.

3.2.3 Cumulative Effects

The State of California takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the State Implementation Plan (SIP). This includes all current and reasonably foreseeable activities on FHL and Camp Roberts as discussed in Section 3.1.4, including cantonment and airfield construction, military uses and activities adjacent to FHL, such as nearby agricultural activities, mining, or wildfires. The state accounts for all significant stationary, area, and mobile emission sources in the development of this plan. The Proposed Action would have long-term minor adverse cumulative effects to air quality. By directly inventorying all emissions and monitoring concentrations of criteria pollutants in attainment regions, the State of California takes into account the effects of all past, present, and reasonably foreseeable emissions in the state. This is done by implementing a regulatory structure designed to prevent air quality deterioration for areas that are in attainment with the NAAQS (USEPA 2015d). This structure of rules and regulations are contained in the SIP. SIPs are the regulations and other materials for meeting clean air standards and associated CAA requirements. The SIPs include:

- State regulations that USEPA has approved;
- State-issued, USEPA-approved orders requiring pollution controls;
- Planning documents such as area-specific compilations of emissions estimates and computer modeling demonstrating that the regulatory limits assure that the air would meet the NAAQS (USEPA 2015e).

The SIP process includes [either specifically or indirectly] all sources of air emissions associated with the proposed training activities at FHL as described in Chapter 2, and all activities in the region. No large-scale projects or proposals have been identified that when combined with the proposed training activities at FHL that would have effects that are greater than significant.

3.3 Natural Resources

3.3.1 Affected Environment

The following section provides a general description of FHL's natural resources, with an emphasis on the natural resources occurring in the ROI to include the proposed maneuver corridors.

3.3.1.1 Vegetation Communities

FHL contains a variety of soil and geological types, resulting in a diverse vegetative composition of more than 1,000 species of vascular plants (NPS 2007). Plant communities at FHL include oak woodlands and savannas, chaparral, grasslands, riparian areas, and seasonal and perennial wetlands. A summary of vegetation communities and approximate acreage within the proposed primary and secondary maneuver corridors are included in Table 3.3-1. See Figure 3.3-1 for a distribution of land cover in the proposed maneuver corridors. Rare vegetation communities occurring on FHL as described by the California Natural Diversity Data Base (CNDDB) include sycamore alluvial woodland, valley needlegrass grassland, and valley oak woodlands (FHL 2012). Refer to Figures 3.3-2 and 3.3-3 for a representative depiction of vegetation types in the proposed maneuver corridors.

Table 3.3-1. Vegetation Communities within the Primary and Secondary Maneuver Corridors

Vegetation Community	Primary Maneuver Corridor (acres)	Primary Maneuver Corridor (percent)	Secondary Maneuver Corridor (acres)	Secondary Maneuver Corridor (percent)
Grassland	7,730	39.5	4,51	12.4
Chaparral	518	2.7	11,692	32.0
Coastal Scrub	261	1.3	893	2.4
Oak Communities	10,031	51.3	18,413	50.4
Mixed-Evergreen Forest	11	0.1	19	0.1
Coniferous Forest	55	0.3	254	0.7
Riparian Communities	573	2.9	306	0.8
Seasonal and Perennial Wetland	262	1.3	97	0.3
Rock Outcrop	33	0.2	72	0.2
Anthropogenic Clearing	5	<0.1	154	0.4
Developed Areas	89	0.5	114	0.3

Source: FHL 2014c

Note: Although shown in the Figure 3.3-1 legend, agricultural vegetation and landscaped areas are not mapped within the proposed maneuver corridors, and therefore, are not listed in the table.

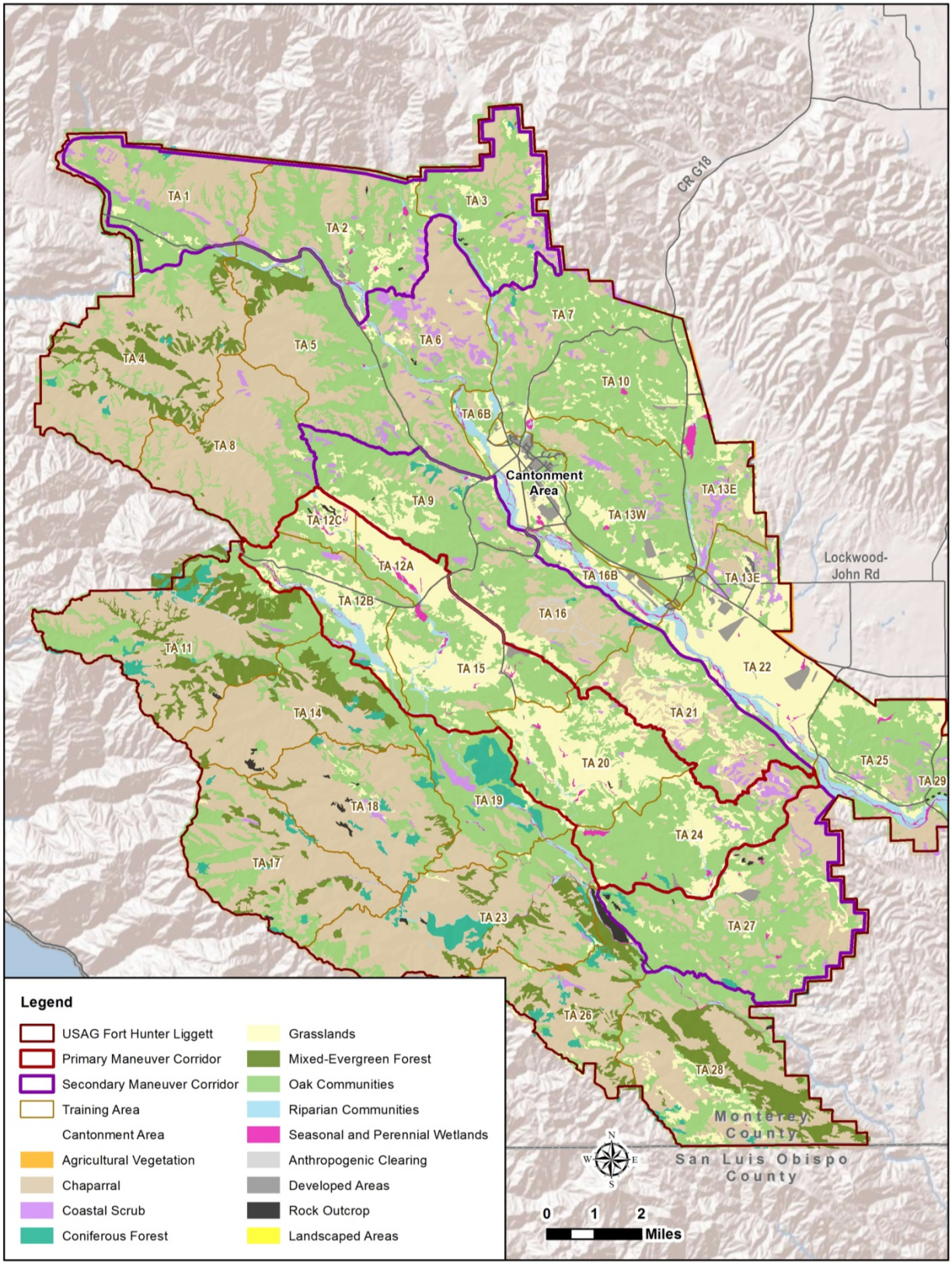


Figure 3.3-1. Vegetation Communities at Fort Hunter Liggett, California

Figure 3.3-2. Representative Grassland Landscape of Maneuver Corridors (1 of 2)

Figure 3.3-3. Representative Oak Community Landscape of Maneuver Corridors (2 of 2)

The following provides a description of the vegetation community types identified in Table 3.3-1 and Figure 3.3-1 (note: rock outcrop, anthropogenic clearing and developed areas are not included as they do not support natural vegetation communities):

Grasslands. Grasslands are typically found on open, level, or moderately sloped areas. Historic species composition of grasslands on FHL is not known; however today, native grasslands are most commonly found on rocky hillsides or unusual soil types (FHL 2004). FHL grasslands are dominated by nonnative grasses that thrive in California's Mediterranean climate and are more resilient to the heavy browsing pressure caused by historic domestic livestock. Nonnative

grasslands are dominated by *Bromus hordeaceous*, and include other species such as *Bromus diandrus*, *Bromus madritensis,* and two species of wild oat (*Avena* spp.). Native grasslands are estimated to compose approximately 2 to 5 percent of existing grasslands on FHL and include native species such as *Stipa pulchra*, *Stipa cernua*, *Deschampsia danthonioides*, *Melica imperfecta,* and *Poa secunda*. Valley needlegrass grasslands are considered a rare vegetation community by CNDDB (FHL 2012); these grasslands occur on FHL including locations within the primary and secondary maneuver corridors, as well as in proximity to roads and training facilities.

Yellow star-thistle (*Centaurea solstitialis*), a noxious exotic forb, is also found in nonnative grasslands and affects an estimated 20,015 acres on FHL (see Section 3.3.1.6). State protection of native grasses are provided under California Fish and Game Code in Native Plant Protection (Fish & Game Code 1900-1913), Native Species Conservation and Enhancement (Fish & Game Code 1750-1722), and Natural Community Conservation Planning Act (Fish & Game Code 2800-2835) (FHL 2012). This community is the second largest by acreage within the proposed maneuver corridors (see Table 3.3-1).

Chaparral. On FHL, chaparral is generally found on south-facing slopes and is the dominant vegetation type along the western mountain areas and the ridges and slopes between the San Antonio and Nacimiento watersheds (FHL 2004). The two most widespread chaparral types on FHL are mixed chaparral and chamise chaparral. Typical woody chaparral species on FHL include several species of oak, ceanothus, and manzanita; and additional species such as toyon (*Heteromeles arbutifolia*), black sage (*Salvia mellifera*), mountain mahogany (*Cercocarpus betuloides*), and others. Mixed chaparral is typified by a codominance of several of these chaparral species, while chamise chaparral (chamisal) is dominated by chamise (*Adenostoma fasciculatum*). Chaparral occurs on slopes in the primary and secondary maneuver corridors, including areas with <30 percent slopes where it would likely create an impediment to off-road vehicle maneuvers due to poor visibility. This could further constrain off-road vehicle maneuvers to more limited areas.

Coastal Scrub. Coastal scrub communities are found along the entire coast of California and can be grouped into a northern and southern phase, both of which can be found in Monterey and San Luis Obispo counties. Evergreen shrubs dominate the northern coastal scrub plant communities, whereas southern coastal scrub communities are characterized by a mixture of shrub and subshrubs including California sagebrush (*Artemisia californica*) and sages (*Salvia* spp.), and herbs. Coastal scrub occurs on slopes in the primary and secondary maneuver corridors, including areas with <30 percent slopes where it would likely create an impediment to off-road vehicle maneuvers due to poor visibility. This could constrain off-road vehicle maneuvers to more limited areas.

Oak Communities. Oak communities on FHL include woodlands, forests, and savannahs. These communities are the most widespread vegetation type on FHL, including within the proposed maneuver corridors (see Table 3.3-1). Blue oak (*Quercus douglasii*) communities are the most prevalent of the oak communities, which can be found in pure stand woodlands to foothill woodlands where they mix with other oak species and foothill pines, or in more open blue oak savannas with a grassland understory. Valley oak (*Q. lobata*) communities are the next most common oak community and are the largest of the California oak species, frequently found growing in deep alluvial soils of valley bottoms and forming savannas with a grassland

understory. Live oak communities, consisting of coast live oak (*Q. agrifolia* var. *agrifolia*), inland live oak (*Q. wislizeni* var. *wislizeni*), and canyon live oak (*Q. chrysolepis*) are also present. Valley oak woodlands are considered a rare vegetation community by the CNDDB (FHL 2012).

Mixed-Evergreen Forest. Mixed-evergreen forests are found along a portion of FHL's border that follows the coast ridge of the Santa Lucia Mountains. These communities are typically dominated by broad-leaved evergreen trees species, but coniferous evergreens are also common and some deciduous trees might be present. Dominant species include coast live oak, black oak (*Q. kelloggii*), canyon live oak, California bay laurel (*Umbellularia californica*), madrone (*Arbutus menziesii*), tanoak (*Lithocarpus densiflorus*), and bigleaf maple (*Acer macrophyllum*).

Coniferous Forest. Coniferous forests on FHL include closed-cone, pine-cypress forest, and yellow pine forest. Closed-cone, pine-cypress includes Sargent cypress (*Cupressus sargentii*), which is generally found on serpentine. Yellow pine forest is dominated by ponderosa pine (*Pinus ponderosa*) and Coulter pine (*Pinus coulteri*).

Riparian Communities. FHL riparian communities include alluvial woodlands composed of sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*), and willow (*Salix* sp.) found along rivers and streams. Sycamore alluvial woodlands are also considered a rare vegetation type by the CNDDB (FHL 2012). These communities occur along scattered drainages in the primary and secondary maneuver corridors.

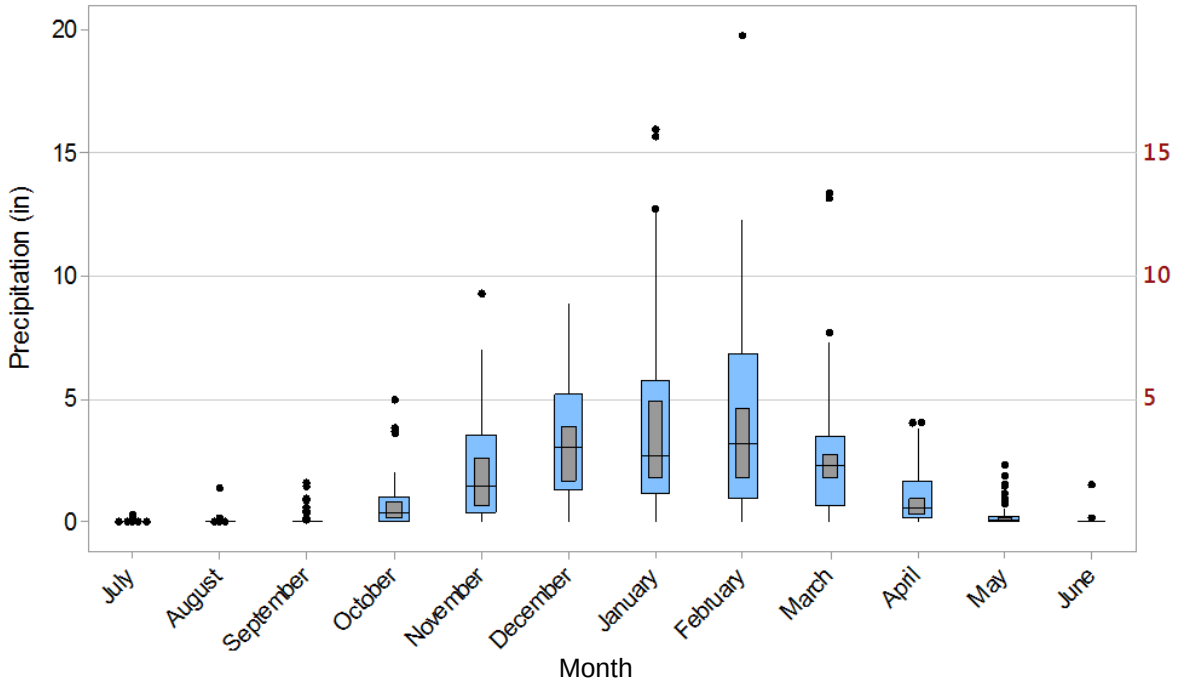
Seasonal and Perennial Wetland. Wetlands are relatively shallow and have slow-moving or stationary water, moist or wet soils, and hydrophytic plants in landscape depressions that include vernal pools, wet meadows, swales and drainages, freshwater marshes, and seasonal wetlands. Wetlands are considered to be special-status communities. The occurrence of vernal pools and wetlands are described in Section 3.7.1.2.

3.3.1.2 Climate and Growing Season

FHL has a Mediterranean climate characterized by warm, dry summers and mild, wet winters. Summer fog is uncommon, but coastal fog occasionally reaches the coast ridge area. Because rainstorms come from the west, rainfall is higher in the western portion of the installation, to include the proposed primary and secondary maneuver corridors, and at higher elevations. In 55 years of climate data collected in the cantonment area, temperature varied from a record minimum of 7°F (-14°C) in December, to a record maximum of 116°F (47°C) in July. Twenty-four-hour variations in temperature of 50°F (10°C) are not uncommon year-round; average temperature ranges from 45°F (7°C) in December to 73°F (23°C) in July (FHL 2004).

The Regional Water Quality Control District defines the wet season as 1 October – 30 April, and the annual rain-year is from 1 July through 30 June. Based on data collected at the FHL cantonment, 97 percent of average annual rainfall occurs during this wet season, and the average annual rainfall is over 19 inches per year. Rainfall totals are higher in the Nacimiento Valley than in the FHL cantonment, however, timing of rainfall is similar. The first seasonal rains may begin as early as August and September, but typically begin in October. Average monthly rainfall peaks in January (Figure 3.3-4). Actual timing and intensity of rainfall is highly variable, with monthly rainfall during the wet season varying from lows of 0 inches to a high of 19 inches in a single month. Annual rainfall has varied from a low of 6 inches to a high of 47 inches. Severe drought conditions persisted through 2015, for the fourth consecutive year.

Figure 3.3-4. Average Monthly Precipitation 1960-2015



Source: FHL 2016
Figure notes: Blue boxes represent the statistical interquartile range; gray boxes represent the 95 percent confidence mean; black dots represent outliers.

Though the cumulative amount and timing of rain needed to saturate soils is not known, the risk of saturated soils greatly increases as the wet season progresses. This puts training activities that occur during and soon after the wet season at higher risk of being adversely affected by saturated soils and stormwater runoff (see *Soil Trafficability* discussion in Section 3.5.1.3), and puts soils and vegetation at greater risk of disturbance from off-road vehicle maneuvers. Though October falls within the wet season, conditions are typically very dry at the onset of rainfall; October rainfall exceeded 3 inches and could have resulted in saturated soils and stormwater runoff in 4 of 55 years of data collected. Average rainfall amounts in April are only slightly higher than October, but conditions are typically wet at the onset of April rainfall.

The amount and timing of fall and winter rains are critical for plants and wildlife, including game animals and sensitive species. The growing season follows the onset of the wet season as soon as conditions are warm and moist enough for plant growth. This change in precipitation and water availability initiates germination of stored seed. As a result, revegetation efforts should begin at or before the onset of the annual wet season. The onset of the growing season can be delayed by low temperatures. This affects natural vegetation growth as well as revegetation efforts. Rapid spring growth commences with warming conditions in late winter or early spring. Rapid growth continues for a short time until soil moisture is exhausted, which is typically associated with the end of the wet season.

3.3.1.3 Wildlife and Aquatic Life

Scientists have recorded more than 300 animal species inhabiting FHL, including many special status species (see Sections 3.3.1.4 and 3.3.1.5).

Typical mammal species on FHL include the California ground squirrel (*Spermophilus beecheyi*), tule elk (*Cervus canadensis nannodes*), California black-tailed deer (*Odocoileus hemionus californicus*), American badger (*Taxidea taxis*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), deer mouse (*Peromyscus maniculatus*), pocket mouse (*Perognathus californicus*), and kangaroo rat (*Dipodomys* spp.).

Migratory birds are present at FHL, with nesting populations present in late spring and summer, overwintering populations in the late fall and winter, and migrating populations transiting the region in between those periods. Birds frequently observed include the western meadow lark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), turkey vulture (*Cathartes aura*), Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk (*Buteo jamaicensis*) (FHL 2012).

3.3.1.4 Federally Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 specifically tasks Federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All Federal agencies must ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a threatened and endangered species or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption.

Federal endangered species are those identified by the USFWS as being in danger of extinction throughout all or a significant portion of their range. Federal threatened species are those identified by USFWS as likely to become endangered in the near future. States can also designate protected species. There are five species that are federally-listed as endangered and four species federally-listed as threatened that have the potential to occur on FHL as listed in Table 3.3-2.

Table 3.3-2. Federally-Protected Species with Potential to Occur on FHL

Scientific Name	Common Name	Group	Federal Status	State Status
Ambystoma californiense	California tiger salamander	Amphibians	T	T
Bufo californicus	Arroyo toad	Amphibians	E	N/A
Rana aurora draytoni	California red-legged frog	Amphibians	T	N/A
Gymnogyps californianus	California condor	Birds	E	E
Vireo bellii pusillus	Least Bell's vireo	Birds	E	E
Branchinecta lynchi	Vernal pool fairy shrimp	Crustaceans	T	N/A
Vulpes macrotis mutica	San Joaquin kit fox	Mammals	E	T
Chlorogalum purpureum var. purpureum	Purple amole	Plants	T	N/A
Cirsium fontinale var. obispoense	Chorro Creek bog thistle	Plants	E	E

E = endangered; N/A = not applicable; T = threatened

California Tiger Salamander. The California tiger salamander inhabits vernal and seasonal pools in grassland, oak savanna, and coastal scrub communities. This species spends much of their lives beneath the ground in active or inactive small mammal burrows, and comes out of burrows on humid or rainy nights to feed and migrate to breeding ponds. California tiger salamanders on FHL are hybrids, a combination of the native California tiger salamander and the nonnative Eastern tiger salamander (*Ambystoma tigrinum*) (FHL 2004). Due to the hybrid status, there is no formal protection for FHL populations. Hybrid salamanders are considered a threat to native California tiger salamanders, and the INRMP prescribes goals to preserve California tiger salamander habitat and consider the eradication of hybrid salamanders (FHL 2012). Hybrid salamanders are widespread on FHL in the Nacimiento and San Antonio River valleys (FHL 2004). Because native California tiger salamanders have not been located on FHL, they will not be further addressed in the EA.

Arroyo Toad. The arroyo toad inhabits seasonal pools and streams where water levels fluctuate and natural disturbance is common during flooding events. Arroyo toads can disperse into adjacent upland areas. At FHL, the breeding season begins typically begins in April, at the end of the wet season when river flows subside. Arroyo toads breed, forage, and aestivate in sandy soils along the San Antonio River. Surveys are conducted annually. Upland habitat occurs along the San Antonio River in portions of training areas 6B, 16B, 22, 25, and 29. FHL is located in the northern recovery unit for the arroyo toad (USFWS 2010). This species does not occur in the proposed maneuver corridors, but does occur in the vicinity of roads and facilities used during military training events. Specifically, Schoonover Airstrip is located adjacent to San Antonio River, as are live-fire range complexes in training area 22, the tank trail in training areas 25 and 29, access roads, river fords, bridges, and the cantonment.

California Red-legged Frog. The California red-legged frog breeds in streams, deep pools, ponds, and marshes in areas with deep, slow-moving water with or without dense vegetation. Occurrences of the California red-legged frog were reported in the Nacimiento River Valley in 1948; however, surveys conducted of the California red-legged frog since 2003 have not detected them on the installation. Potential habitat for this species exists along the San Antonio and Nacimiento Rivers (FHL 2012). Because California red-legged frog have not been located on FHL since 1948, they will not be further addressed in the EA.

California Condor. The California condor is the largest bird in North America, with a wing span of approximately 9.5 feet (2.9 meters). Historically, California condors ranged along the West Coast from British Columbia, Canada, to Baja, Mexico, feeding on a diet consisting primarily of carrion (dead animals). Suitable habitat includes foothill rangeland and forest in remote areas where birds can roost and nest in tall trees and cliffs. No nesting habitat is known on the installation, but the area continues to provide suitable foraging areas with a forage base of carcasses from deer, elk, coyote, and other medium to large animals (FHL 2012). This species is rarely sighted on FHL, but is known to occasionally forage on post and frequently fly over the installation.

Least Bell's Vireo. The least Bell's vireo is a small, gray and white songbird that lives in thick willow habitat with a mix of taller trees and short thick shrubs. The least Bell's vireo was once abundant in the Central Valley; however, populations have declined significantly due to loss and degradation of riparian habitat and the expansion of the range of the nest parasitizing brown-headed cowbird (*Molothrus ater*). There are no historic documented occurrences of the Least Bell's vireo nesting on FHL; however, one least Bell's vireo was sighted on FHL in 1988. Although the species has not been detected, potential for colonization exists with the continuing recovery of the species. Suitable breeding habitat for the least Bell's vireo primarily occurs in riparian habitat along Mission Creek, but may also occur in portions of the San Antonio River and Nacimiento River. Because the least Bell's vireo has not been located on FHL, they will not be further addressed in the EA.

Vernal Pool Fairy Shrimp. The vernal pool fairy shrimp inhabits vernal pools and ephemeral ponds in the Central Valley, coast ranges, southern California, and southern Oregon. Vernal pools and ephemeral ponds have two distinct phases, a wet phase when they are inundated by water from fall and winter rains, and a dry season where the lack of rain in the summer allows the pool to dry up. Vernal pool fairy shrimp cysts hatch at the onset of fall and winter rains when pools fill with water. Vernal pool fairy shrimp eggs (cysts) are able to withstand extremes of heat and cold and extended desiccation, allowing them to survive periodic droughts. At FHL, vernal pool fairy shrimp occur in lowlands of the San Antonio River Valley in the cantonment area and training areas 13E, 13W, 16B, 22, and 25. In the Nacimiento Valley, vernal pool fairy shrimp were documented in one pool in 1995 in training area 20, but do not appear to have persisted at this location as this pool has held water every year since 1995 and vernal pool fairy shrimp were not detected during seven additional years of sampling. Surveys have been conducted annually since 2004. Vernal pool fairy shrimp are found at FHL in pools that vary in quality from natural complexes of vernal pools to ephemeral pools in roads. The training area 20 site lies within the proposed primary maneuver corridor. Sites in the San Antonio Valley are in or near training facilities such as the tank trail, staging areas near Schoonover Airstrip, live-fire ranges in training area 22, and in or near access roads.

San Joaquin Kit Fox. Kit fox inhabit grasslands, scrublands, oak woodlands, and vernal pool areas in the California Central Valley floor and valleys in the interior coastal ranges. They use underground den sites throughout the year, changing den sites frequently. The California ground squirrel (*Spermophilus beecheyi*) is an important prey species for kit fox on FHL. Coyotes are an important predator of kit fox on FHL. Potential habitat for kit fox can be found in the San Antonio River Valley, and Nacimiento River Valley. Surveys have been conducted annually since 1995. The most recent kit fox sightings on FHL were in 2000 in the San Antonio River Valley where most historic observations occurred, and 1995 in the Nacimiento River Valley. Potential habitat is present in the proposed primary and secondary maneuver corridors, as well as other training facilities.

Purple Amole. The purple amole is a bulbous perennial of the lily family that flowers from April through June. Purple amole is found in 19 occurrences on FHL, in the San Antonio River Valley in portions of the cantonment area and training areas 13E, 13W, 16B, 22, and 25, and at one site in the Nacimiento River Valley in training area 24 (FHL 2012). One occurrence of purple amole is located in training area 24 in the proposed primary maneuver corrido. Occurrences in the San Antonio Valley are in or near training facilities such as the tank trail, staging areas near Schoonover Airstrip, live-fire ranges in training area 22, and in or near access roads.

Chorro Creek Bog Thistle. Chorro Creek Bog Thistle inhabits inland seeps associated with serpentine soils. The closest known population is in western San Luis Obispo County, south of FHL's southern border. Serpentine soils occur on FHL in training areas 17, 19, 23, 26, and 28 in the mountainous areas west of Nacimiento River (FHL 2012). The remote location protects potential habitat from most installation activities, and the suitable soil types lie outside of the proposed primary and secondary maneuver corridors, therefore, this species will not be further addressed in this EA.

3.3.1.5 Priority Species of Concern

In addition to federally protected species management, the FHL INRMP identifies high priority sensitive species based on state, Federal, or DoD-designated status, and distribution at FHL (excluding those listed under the Federal ESA). The species listed in Table 3.3-3 are considered in FHL management and monitoring programs, and planning efforts. Additionally, migratory birds, California Native Plant Society (CNPS)-listed plants, and DoD Species at Risk (SARs) at FHL are taken into consideration in developing land management actions and priorities. DoD SARs include those species that are not federally listed under ESA, but that are either candidates for listing or are regarded by NatureServe as critically imperiled (G1/T1) or imperiled (G2/T2) throughout their range. Based on a 2014 review by FHL of G1/T1 and G2/T2 species, there are 30 SARs known to occur and 3 SARs with the potential to occur on FHL (FHL 2014).

> The Migratory Bird Treaty Act (MBTA) protects migratory birds and implements the United States' commitment to international conventions for the protection of migratory birds. MBTA is the domestic law that governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. DoD must coordinate with USFWS if a significant adverse effect on a population of a migratory bird species could occur.

Table 3.3-3. Priority Species of Concern on FHL[1]

Scientific Name	Common Name	Group	Status
Haliaeetus leucocephalus	Bald Eagle	Birds	SE, BGEPA, MBTA
Aquila chrysaetos	Golden Eagle	Birds	BGEPA, MBTA
Athene cunicularia	Burrowing Owl	Birds	MBTA, SSC
Rana boylii	Foothill yellow-legged frog	Amphibians	CDFW SSC
Erythranthe hardhamiae	Santa Lucia monkeyflower	Plants	CNPS 1B.1, SAR
Pogogyne clareana	Santa Lucia Mint	Plants	SE, CNPS 1B.2, SAR
Tropidocarpum capparideum	Caper-fruited tropidocarpum	Plants	CNPS 1B.1, SAR

Table 3.3-3. Priority Species of Concern on FHL[1]

Scientific Name	Common Name	Group	Status
Collinsia antonina	Santo Antonio collinsia	Plants	CNPS 1B.2
Pentachaeta exilis aeolica	San Benito pentachaeta	Plants	CNPS 1B.2, SAR
Eriastrum luteum	Yellow flowered eriastrum	Plants	CNPS 1B.2, SAR

Source: FHL 2015a

[1]Excludes Federally-protected species (see Section 3.3.1.4)

BGEPA = Bald and Golden Eagle Protection Act; CDFW = California Department of Fish and Wildlife; CNPS 1B.1 = California Native Plant Society seriously endangered in California; CNPS 1B.2 = California Native Plant Society fairly endangered in California MBTA = Migratory Bird Treaty Act; SE = State Endangered; SSC = State Species of Concern

The California Department of Fish and Wildlife (CDFW) also designates "fully protected" species, "species of special concern", and special status plants for species native to California with varying conservation concerns. State-protected and species with special state designation are listed in and managed in accordance with the INRMP. State requirements for mitigation of effects on special status species are not applicable on Federal lands; however, documentation of potential effects for these species is required under NEPA. Two state-threatened species have the potential to occur on FHL, the bank swallow and Swainson's Hawk. Because bank swallow and Swainson's hawk have not been detected on FHL, and FHL is not likely to support breeding or wintering areas for these species, they are not further addressed inthis EA.

Nesting populations of migratory birds are generally present in late spring and summer, overwintering populations are present in late fall and winter, and migrating populations are transiting the region in between those periods (FHL 2012).

Bald eagle. The bald eagle is State listed as endangered and protected by the Bald and Golden Eagle Protection Act (BGEPA). Bald eagle surveys are conducted annually on FHL. In 2014, known active nests were in training areas 13E and 22 in the San Antonio River Valley, and training area 24 in the Nacimiento River Valley. The nest in training area 24 is in the proposed primary maneuver corridor.

The Bald and Golden Eagle Protection Act of 1940 prohibits the take, possession, and commerce of bald and golden eagles except under certain conditions.

Golden eagle. Golden eagles nest on cliffs or in the largest trees of forested stands that often afford an unobstructed view of the surrounding habitat. On FHL, golden eagles nest in large trees in the San Antonio and Nacimiento Valley (FHL 2004). Golden eagle surveys are conducted on FHL annually. In 2014, known active nests were in training areas 10, 13W and 22 and known inactive nests were in training areas 12A, 19 and 21 (Guilliam 2015). The nest in training area 12A is in the proposed primary maneuver corridor, and the nest in training area 21 is in the proposed secondary maneuver corridor.

Burrowing owl. The burrowing owl is sighted occasionally during the winter and is not known to be a resident or breeding bird at FHL. The INRMP does not have goals specific to this species; and FHL does not conduct specific surveys for this species. Burrowing owl and San Joaquin kit fox share similar habitat requirements, and burrowing owl sightings are tracked during kit fox surveys. Because this species is not known as a breeding or resident bird on FHL, and sightings are irregular, this species is not further addressed in this EA.

Foothill yellow-legged frog. The foothill yellow-legged frog inhabits rocky streams and rivers in the foothills of central and northern California. At FHL, yellow-legged frogs are known to occur within approximately three miles of Los Burros and North Fork creeks in training areas 17, 18, and 23 west of Nacimiento River. The remote location protects this population from most installation activities, and the habitat lies outside of the proposed primary and secondary maneuver corridors, therefore, this species is not further addressed in this EA.

Santa Lucia monkeyflower. Santa Lucia monkeyflower is endemic to the Coast and inner Coast Ranges of Monterey and San Luis Obispo counties. At FHL, this species is known to occur in training areas 19 and 23. The remote location protects this population from most installation activities, and the habitat lies outside of the proposed primary and secondary maneuver corridors, therefore, this species is not further addressed in this EA.

Santa Lucia Mint. Santa Lucia mint is a small, annual plant that flowers May through July, and is State listed as endangered. It is only known to occur on the banks of moist streams and seasonal pools in the Los Bueyes and Los Burros watersheds on FHL in training areas 19 and 23 (FHL 2012). The remote location protects this population from most installation activities, and the habitat lies outside of the proposed primary and secondary maneuver corridors, therefore, this species is not further addressed in this EA.

Caper-fruited tropidocarpum. Caper-fruited tropidocarpum is a very small member of the mustard family. This species was presumed extinct since the 1950s until found on FHL after yellow star-thistle control efforts were conducted. It is known to occur in training areas 20, 22 and 24. Occurrences in training areas 20 and 24 are within the primary maneuver corridor. The occurrence in training area 22 is adjacent to fixed live-fire ranges where bivouacs are not conducted and vehicles are limited to on-road travel. Areas with known populations are marked for avoidance during military training (FHL 2012).

San Antonio collinsia. San Antonio collinsia is endemic to Monterey County, flowers from March to May, and is found in cismontane woodland and chaparral (CNPS 2016). It is known to occur in training areas 9, 10, 27, and 29; documented occurrences are typically in areas with >30 percent slopes or areas with dense vegetation cover. The occurrences in training areas 9 and 27 are within the secondary maneuver corridor.

San Benito pentachaeta. San Benito pentachaeta is known to occur in Monterey, San Benito, and Santa Clara counties. This plant flowers from March to May and is found in cismontane woodland, valley, and foothill grassland. San Benito pentachaeta is known to occur in isolated patches in training areas 1 and 2 in the proposed secondary maneuver corridor.

Yellow-flowered eriastrum. Yellow-flowered eriastrum is endemic to Monterey and San Luis Obispo counties. This plant is found on dry slopes with sandy or gravelly soils and blooms from May to June (BLM 2015). It is known to occur in training areas 2, 6, 13W, 13E, 15, 19, 20, 25 and 27. Occurrences in training areas 15 and 20 are within the primary maneuver corridor. Occurrences in training areas 2 and 27 are within the secondary maneuver corridor.

Migratory birds: In addition to individual species listed above, migratory birds that are protected by Migratory Bird Treaty Act (MBTA) are common throughout FHL in a diversity of habitats. Grassland nesting birds that are likely to occur in the proposed maneuver corridors include but are not limited to species found in central California, such as horned lark (*Eremophila alpestris*), Western meadowlark (*Sturnella neglecta*), grasshopper sparrow (*Ammodramus savannarum*),

and Northern harrier (*Circus cyaneus)*. FHL conducts a breeding bird survey annually, as well as avian transects in grassland and oak woodland vegetation communities.

Species with 90 Day Findings

Priority species of at FHL also include species that are under status review by the USFWS or National Marine Fisheries Service for listing under the ESA. Following a formal request (i.e., petition) to list a species as endangered or threatened under the ESA, the USFWS or National Marine Fisheries Service must make a finding within 90 days of receiving a petition (to the extent practicable) as to whether or not there is "substantial information" indicating that the petitioned listing may be warranted. If this preliminary finding is positive, a status review is conducted.

In 2015, the USFWS issued 90-day findings to list, reclassify, or delist, fish, wildlife or plants under the ESA for six species either known to be present or with the potential for occurrence on FHL (Federal Register 2015a; 2015b; 2015c). These findings indicated that the petitioned actions may be warranted, initiating a 12-month status review to determine if the listing is either warranted or not warranted. A positive one-year finding would initiate the rule making process by publishing a proposed rule in the Federal Register. Table 3.3-4 lists the species and finding date. All species are currently under 12-month status review, and are not currently afforded formal protection under the ESA.

Table 3.3-4. 90-Day Findings under the Endangered Species Act

Scientific Name	Common Name	Group	Finding Date
Strix occidentalis occidentalis	California spotted owl	Birds	September 18, 2015
Agelaius tricolor	Tricolored blackbird	Birds	September 18, 2015
Charina umbratica	Southern rubber boa	Reptile	September 18, 2015
Actinemys marmorata	Western pond turtle	Reptile	April 10, 2015
Spea hammondi	Western spadefoot	Amphibians	July 1, 2015
Rana boylii	Foothill yellow-legged frog	Amphibian	July 1, 2015

Source: Federal Register 2015a; 2015b; 2015c

California spotted owl. California spotted owl breeds and roosts in forests and woodlands with large old trees and snags, high basal areas of trees and snags, dense canopies (greater than 70 percent), multiple canopy layers, and downed woody debris. Foraging habitat is similar to breeding and roosting habitats, but also includes habitats with more open stands or canopy closures greater than 40 percent. The California spotted owl breeds from mid-February to mid-September or early October, with some birds breeding at mid- to high elevations (Davis and Gould 2008). This species is not known to occur on FHL and habitat would not likely be present in the primary or secondary maneuver corridors, therefore, this species is not further addressed in this EA.

Tricolored blackbird. Tricolored blackbird breed generally in freshwater marshes and riparian areas with access to open water; a protected nesting substrate, including either flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony (Beedy 2008). Tricolored blackbirds are currently listed as a

state species of concern and surveys were conducted for this species in 2014. No occurrences were observed in 2014; this species has been found in Stoney Pond in training area 12B and at Coleman Pond in training area 2 in prior years. Annual surveys are conducted between March and May in accordance with the INRMP (FHL 2015a).

Southern rubber boa. Habitat for the Southern rubber boa includes oak-conifer and mixed-conifer forests at elevations between roughly 5,000 to 8,200 feet (1,524 to 2,499 meters) where rocks and logs or other debris provide shelter (CaliforniaHerps 2015a). Because the southern rubber boa may be limited to southern California, and the individual observed on FHL may be the northern species, this species is not further addressed in this EA.

Western pond turtle. Western pond turtle can be found in riparian areas and in pools to shallower areas of ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grassland. Logs, rocks, cattail mats, and exposed banks are required for basking (CaliforniaHerps 2015b). This species is known to occur in scattered creeks and ponds at FHL, to include sites in the primary and secondary maneuver corridors.

Western spadefoot. Habitat for the Western spadefoot includes open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. The species is nocturnal and completely terrestrial when not breeding. Rainpools which do not contain bullfrogs, fish, or crayfish are necessary for breeding (CaliforniaHerps 2015c). This species has been observed at various times in training areas 3, 12C, 13W, 13E, 16B, 22, and 25. The sites in training area 3 are in the secondary maneuver corridor. The site in training area 12C is in the primary maneuver corridor. The sites in training areas 16B, 22 and 25 are near bivouac sites or live-fire ranges.

Foothill yellow-legged frog are included with FHL priority species described above.

3.3.1.6 Management of Natural Resources

Fire Protection and Prescribed Burning. FHL maintains an Integrated Wildland Fire Management Plan to implement fire management goals within the INRMP. Annual prescribed fires are used to reduce the potential for wildfires from military training and are conducted primarily in grasslands and savannas. Sites for prescribed fires are typically chosen within an area of nearly 30,000 acres within training areas 9, 12, 15, 16, 20, 21, 22, 24, and 27, as well as narrow burns along the northeast, southeast and southern boundaries to prevent fires escaping off-post onto private land. Prescribed fires occur in training areas proposed for off-road vehicle maneuvers. Prescribed habitat burns are conducted to reduce yellow star-thistle, break-up even aged stands of chaparral to improve wildlife habitat, or reduce fuel loads in areas at risk for fire (FHL 2015a). FHL maintains a system of firebreaks. Firebreaks act as fuel-free barriers to contain prescribed fires, as well as to prevent the spread of wildfire. Existing roads and streams on FHL act as effective firebreaks. Routine prescribed fire reduces understory fuel loads, thereby reducing opportunity for wildfire outbreak resulting from range training activities. Firebreaks are maintained by grading or bulldozing to create a dirt berm on alternating sides each year to reduce down cutting. Wildfires can occur throughout the year, but the primary fire season is after winter-spring rains (typically May) until fall rains occur (typically October) (FHL 2004).

Noxious, Invasive and Pest Species. FHL maintains an Integrated Pest Management Plan (IPMP) that identifies and prioritizes pests and their destructive effects to determine particular levels of protection. Non-chemical pest control is used to the extent possible before pesticides are used via integrated pest management. Chemical control is only used when nonchemical techniques are inadequate or impractical (FHL 2015b). The use of pesticides and their effects on federally-listed species were addressed by biological opinion (BO) #1-8-96-F-40 (USFWS 1997). The 1997 PBO does not address effects to California condors and purple amole but activities described in the 1997 BO may be conducted so long as they do not affect these species (USFWS 2010).

FHL maintains and Invasive Species Management Plan that details various forms of management techniques for invasive species. There are four plant species listed as invasive by the California Invasive Plant Council occurring on FHL (Cal-IPC 2015): yellow star-thistle (*Centaurea solstitialis*), medusahead (*Elymus caput-medusae*), stinkwort (*Dittrichia graveolens*), and smallflower tamarisk (*Tamarix parviflora*). Treatment techniques include (but are not limited to) spraying with licensed pesticides, hand pulling and mechanical removal, and prescribed burns. FHL continues to monitor the installation, including locations of historical presence, for occurrence of these species and other new invasives and manage as appropriate (FHL 2014a).

The spread of yellow star-thistle is the most pervasive and prominent invasive plant issue at FHL where the weed occupies more than 31 square miles (81 square kilometers), including lowlands of the Nacimiento and San Antonio River valleys in part due to disturbance regimes. This includes portions of the both the proposed primary and secondary maneuver corridors, particularly training areas 12B, 15, 16, 20, 24, and 27 (FHL 2012). Equipment, vehicles, and humans can transport seeds on clothing, in soil attached to the bottom of shoes, the under carriage and radiator of vehicles, and in equipment tracks or tires. Yellow-star thistle can be spread by these methods and is known to readily establish in recently disturbed areas. In order to prevent the spread of yellow star thistle, it is often recommended that equipment, vehicles, and clothing (including shoes) be washed immediately after leaving an infested area and prior to entering a non-infested area. FHL primarily uses prescribe burns and chemical applications to control this species. Active monitoring is also conducted to determine the extent of the species spread and effectiveness of control techniques. Management of yellow star thistle is further detailed in FHL's integrated weed management plan for the species (FHL 2014b).

Protected Species and Habitat. FHL conducts management and monitoring programs for federally-protected species and other priority species of concern discussed in Sections 3.3.1.4 and 3.3.1.5. Management practices for federally-protected species are prescribed in the Programmatic BO for Activities Conducted at FHL, Monterey County, California in May 2010 (USFWS 2010). The Programmatic BO evaluated the impacts to federally listed species from military training to include field maneuvers, planned development in accordance with the 2010 *EA for Installation Development and Training* at FHL, and other programmatic activities such as fire and land management, and facility maintenance. Field maneuvers consist of vehicle travel (on and off road), fighting positions, bivouac, target and impact area use, and unexploded ordnance disposal. Field maneuvers that include large-scale off-road vehicle travel are most likely to occur in the primary maneuver corridor in Training Areas 12, 15, 20, and 24. FHL is in

consultation with the USFWS to determine whether the Programmatic BO adequately addresses the impacts of proposed maneuver exercises.

The Army implements minimization measures in accordance with the programmatic BO, (USFWS 2010) to reduce the potential for take (i.e., mortality or harm) of federally listed species. Measures include coordinating with military units, implementing land use controls and habitat improvement projects, and conducting surveys and avoiding impacts to federally listed species sites. Coordination with units includes environmental review as described in section 2.2.1.4. Land use controls are implemented in designated Sensitive Resource Management Areas (SRMA's) where vehicle travel is typically limited to on-road travel, as well as in limiting vehicles to roads within 66 feet (20 meters) of streams, rivers, and ponds, and crossing rivers and creeks and established fording sites. Surveys are conducted prior to construction or training events in areas where federally listed species may occur. Surveys are also conducted to monitor the population status of federally listed species. Locations of federally listed species are included in planning and review of training and construction activities.

FHL conducts surveys of activity sites as needed to determine if migratory bird nests are present and active. If a take is unavoidable and would require an MBTA permit, FHL would apply for an appropriate permit for intentional take of migratory birds. Environmental awareness will be provided to Soldiers and support staff to include prohibitions under the MBTA for all actions that are not excepted as military readiness activities. Active nests will be protected from harm for all non-military readiness activities. To the extent practicable, nighttime lighting will be minimized by shielding lights such that they are directed downward. To the extent practicable, reflective walls and guy wires that pose collision hazards to migratory birds will be modified to enhance visibility. Where migratory bird roosting poses a hazard to human health and safety, or to the health of birds, measures will be taken to haze the birds away from harm and/or minimize the attractiveness of the habitat.

Vegetation. Areas identified for land rehabilitation following large bivouac sites or combat engineer training exercises are reseeded using an approved, site-specific seed mix (including native grasses and forbs) to reduce the potential establishment of invasive plant species.

Coordination and Conduct of Training. As stated in Section 2.2.1.4, FHL evaluates large unit training through the completion of a REC before each training event during the training approval process. FHL uses this process to protect SRMAs and sensitive resource sites. Where practical, FHL marks these areas with Seibert stakes or Seibert signs for avoidance prior to training events. Environmental coordination maps are prepared by PWE for training units as needed.

3.3.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to natural resources that could result from the No Action and Proposed Action alternatives. Impacts to biological resources would be considered significant if Army actions were to result in:

- Substantial permanent conversion or net loss of habitat at the landscape scale,
- Long-term loss or impairment of a substantial portion of local habitat (species-dependent),
- Loss of large populations of species, or

- Unpermitted or unlawful "take" of ESA protected threatened or endangered species or species protected under the BGEPA or MBTA.

Table 3.3-5 provides a comparison summary of approximate level of impacts by alternative.

Table 3.3-5. Summary of Natural Resource Impacts

Alternative	Negligible	Minor	Moderate	Potentially Significant
No Action		X		
Alternative 1		X		
Alternative 2			[X] ←	[X] [1]
Alternative 3			[X] ←	[X] [1]
Alternative 4	Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse impacts under this alternative.			

[1]Impacts to natural resources could be reduced using impact reduction measures as defined for each alternative.

3.3.2.1 No Action Alternative – Continue Existing Mission and Training Operations

Under the No Action Alternative, there would be no changes to current training at FHL as described in Section 2.2.1, Continue Existing Mission and Training Operations. Natural resources would continue to be managed through the FHL INRMP and land disturbances from military training would continue to be mitigated through the ITAM efforts in order to maintain the long-term sustainability and availability of lands for military use. Existing land and environmental management programs as described in Sections 2.2.1.5 and 3.3.1.6 would continue.

3.3.2.2 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 would result in overall minor adverse impacts to natural resources as described below.

Vegetation Communities

Impacts associated with the operation of wheeled and tracked vehicles include degradation of vegetative communities during training maneuvers. Impacts to existing plant communities include direct impacts such as loss of vegetation from shearing and crushing of plants. Indirect impacts include habitat degradation through soil compaction which can reduce or restrict plant growth by affecting water, nutrient, and soil-gas dynamics. Soil compaction and erosion and subsequent effects on plant growth can result in degradation or loss of wildlife habitat. The primary vegetation communities that would be affected by the Proposed Action include grasslands and oak savannas, as maneuver training would occur in flatter lowland areas with open vegetation. No tree removal would be required as part of the Proposed Action. Indirect

effects from erosion of maneuver lanes would be least under Alternative 1, as training would be conducted for FY 16 only and during the dry season. The *Soil Trafficability* discussion in Section 3.5.1.3 presents the relationship between precipitation and the level of risk for training in saturated soils. If off-road training maneuvers are conducted early in the dry season (spring) before the soils are dry, or late in the dry season (fall) combined with early onset of the wet season, the potential and degree of direct and indirect impacts associated with soil disturbance and vegetation loss described above would be greater. However, training during the dry season would generally minimize the level of adverse effects to soils (see Section 3.5) because sites could be restored and reseeded at the onset of the growing season. Natural regrowth may also occur from existing seedbanks in the soil.

Prior to training, FHL would coordinate with units to identify maneuver lanes within the corridors that take into account protected resources, slopes, erodible soils, and training mission objectives. As feasible, off-road vehicle maneuver activities would be limited in these locations or best management practices (BMPs) would be implement to reduce disturbance to soils and associated vegetation communities. As part of the Proposed Action, off-road vehicle maneuvers would be restricted to areas containing less that 30 percent slope. During training, vehicles would follow approved routes and make use of existing roads and trails for administrative moves and road marches in order to reduce potential impacts to vegetation. As necessary, units would minimize the use of neutral steer turns (i.e., a turn during which one of the tank's tracks moves forward while the other moves in reverse, allowing the vehicle to turn on the spot) which are more likely to destroy vegetation, compact the soil, increase the probability of erosion and leave evidence of operations. Following training, disturbed sites would be restored as feasible. Barren areas would be seeded and restricted from off-road vehicle maneuver until suitable vegetation coverage is established to minimize soil loss from erosion. Sediment and erosion control devices may be installed to prevent off-site erosion. Overall impacts to vegetation communities would be minor following site restoration activities and natural regrowth.

Invasive Species

Vehicles traveling from locations outside of FHL and training within FHL can transport invasive species. FHL would continue to implement the Integrated Pest Management Plan and Invasive Species Management Plant to minimize the spread of pests and invasive species at FHL. Prior to leaving their home station, all vehicles transported to FHL will be required to be cleaned in a manner that limits the spread of invasive species. FHL could also consider placement of rumble plates at key locations to reduce transport of soils and mud which could carry invasive species seed or plant material.

Invasive plant species are more likely to become established in areas of ground disturbance, particularly yellow-star thistle. To reduce impacts, as feasible, disturbed ground would be restored and reseeded using site-specific approved seed mixes prior to or early in the following growing season. Overall threat for the spread of invasive species would be minor.

Aquatic and Riparian Vegetation Communities

Maneuver training would be required to adhere to existing buffers for waterways and riparian habitat, to include jurisdictional wetlands. This includes prohibiting all off-road vehicular traffic (wheeled and tracked) within 66 feet (20 meters) of any stream or lake bed (wet or dry) unless approved by the Range Officer, and using established low-water crossing sites. As needed, FHL

would harden stream crossings. All field refueling and maintenance of vehicles and equipment would occur at locations designed to contain spills that are at least 300 feet (91 meters) away from creeks, rivers, and ponds. Coordination maps would be prepared for training units identifying designated stream crossing sites, areas restricted from vehicle travel, and location of wetlands. Overall impacts to aquatic and riparian habitat would be minor.

Wildlife

Off-road vehicle maneuvers could also result in adverse impacts to wildlife species within FHL. Larger, more mobile species would likely avoid areas in which units would be training. Subsequent avoidance or relocation of these species could affect species fitness in surrounding areas. Smaller species, however, may not be as able to avoid the paths of oncoming vehicles and may be crushed during training activities. This loss of a small number of organisms would not represent a significant proportion of the total local or regional species population. A minor adverse impact would be expected.

Noise associated with off-road training activities could adversely affect wildlife, including birds nesting near the area, which could disrupt normal behaviors or causing area avoidance during and following training events. The introduction of off-road vehicle training at FHL would disperse vehicle noise from existing roads into off-road areas; however, noise levels are expected to remain comparable to existing training levels and training activities in the area. Overall noise effects to wildlife would be minor.

Protected Species

Minor and moderate adverse effects to federally-threatened and endangered species are anticipated, and these would be consistent with the Programmatic BO (USFWS 2010). FHL would implement existing programs for federally protected species to monitor population status, evaluate disturbance threats and impacts, survey for potential new species locations, conduct pre-action surveys to adjust activities to minimize impacts, and evaluate and adapt protect measures as needed. In addition, FHL would adhere to conditions within the programmatic BO for monitoring and protection of protected species (refer to Section 3.3.1.5) and implement the FHL INRMP to maintain ecosystem integrity and quality. This includes developing Endangered Species Management Components per the INRMP and coordination with the USFWS to include new impacts from off-road vehicle maneuvers and impact control measures within an updated INRMP.

A REC would be completed prior to training approval, which considers protection of sensitive resources (e.g., SRMAs, federally protected species, priority species of concern, and migratory birds) and restricts certain activities, where applicable. Sensitive areas would be marked using orange traffic cones or areas otherwise demarcated (e.g. signs, Seibert stakes) prior to training events. In addition, units would be provided environmental education briefings prior to training events. This would include development of education materials for off-road vehicle maneuver units.

The potential for impacts to federally-threatened and endangered species would be as follows:

Arroyo toad. No off-road vehicle maneuvers are proposed within suitable upland or breeding habitat in this alternative. The primary maneuver corridor is located west of suitable habitat, in the Nacimiento River Valley, and off-road vehicle maneuvers in this area would not have direct

or indirect impacts on arroyo toads or their habitat. The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities in the vicinity of arroyo toad habitat, which could result in a minimal increase in the potential for arroyo toads to be killed on roads by vehicles. Coordination maps that identify federally protected resources are provided for battalion and brigade-level exercises. The impacts to this species are expected to be minor.

California condor. Due to rare sightings on FHL, proposed off-road vehicle maneuver training and the addition of one brigade-level exercise are not anticipated to alter this species' activities on FHL. No adverse effect on this species is expected.

Vernal pool fairy shrimp. Proposed off-road vehicle maneuvers in the primary maneuver corridor could impact an ephemeral pool that may support this species in training area 20. Soil erosion and sedimentation could degrade water quality in the pool. The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities in the vicinity of vernal pool fairy shrimp sites throughout the species' range on FHL. During training, pools at risk of disturbance would be marked for avoidance through the use of Seibert stakes, which would limit potential for impacts to the species. Coordination maps that identify federally protected resources are provided for battalion- and brigade-level exercises. The impact to this species is expected to be moderate.

Purple amole. Proposed off-road vehicle maneuvers in the primary maneuver corridor could impact the occurrence of purple amole located in training area 24. The occurrence in training area 24 is marked for avoidance through the use of Seibert stakes, and this avoidance measure would be continued. Ground disturbance and resulting soil erosion could directly and indirectly affect this species. The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities throughout the species range on FHL. Areas containing purple amole would be marked with Seibert stakes or Seibert signs for avoidance prior to training events, as practical. Coordination maps that identify federally protected resources are provided for battalion and brigade-level exercises. The impact to this species is expected to be moderate.

San Joaquin kit fox. Proposed off-road vehicle maneuvers in the primary maneuver corridor could result in direct harm and habitat degradation for this species. The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities, which could result in a minimal increase in the potential for kit foxes to be killed on roads by vehicles. However, the most recent kit fox sighting in the primary maneuver corridor was in 1995, and the most recent sighting in the secondary maneuver corridor was in 2000. Impacts to this species are expected to be minor.

Overall minor adverse effects to FHL priority species of concern and species with 90-day findings are anticipated. The potential for impacts to these species would be as follows:

Bald and golden eagles. Proposed off-road vehicle maneuvers in the primary maneuver corridor are not expected to affect these species. Eagle nests have typically been on hillslopes or forested areas that are not suitable for maneuver exercises. The addition of one brigade-level exercise could result in increased use of live-fire ranges, which could put eagles at greater risk of injury or mortality, however, eagle nests are avoided in the range coordination for live-fire exercises. A BGEPA incidental take permit is not currently required because training activities would not

directly or indirectly result in take. If training activity situations change and were to directly or indirectly lead to the potential for take, FHL would apply for a BGEPA permit.

San Antonio collinsia and yellow-flowered eriastrum. Proposed off-road vehicle maneuvers in the primary maneuver corridor and the addition of one brigade-level exercise is not expected to affect these species because the species typically occur on steeper slopes than maneuver exercises, and outside bivouacs, roads, and training sites. The impact to these species is expected to be minor.

Caper fruited tropidocarpum. Proposed off-road vehicle maneuvers in the primary maneuver corridor and the addition of one brigade-level exercise could result in ground disturbance and vegetation loss in occurrences of this species in training areas 20, 24, and 27. The impact to this species is expected to be minor to moderate.

San Benito Pentachaeta. This species is not known to occur in the primary maneuver corridor. The addition of one brigade-level exercise could result in a greater risk of disturbance to this species in training area 2 from bivouac sites and staging areas. The impacts to this species are expected to be minor.

Tri colored blackbird, Western spadefoot and Western pond turtle. Soil erosion and sedimentation associated with off-road vehicle maneuvers in the primary maneuver corridor and the addition of one brigade-level exercise could degrade water quality in potential aquatic habitat for these species, and result in a minor increase in the potential for spadefoot and pond turtle to be killed on roads by vehicles. Impacts to these species are expected to be minor.

Migratory birds. Proposed off-road vehicle maneuvers in the primary maneuver corridor are expected to result in short- and long-term minor effects from ground disturbance that could degrade breeding habitat, or cause mortality during training activities. The addition of one brigade-level exercise could result in increased use of live-fire ranges, roads and facilities that could cause disturbance from noise associated with training events. Any decrease in vegetation cover would result in direct effects on migratory bird species by potentially displacing adult or breeding birds.

FHL would continue to implement management practices described in the INRMP as well as the 2010 Programmatic BO as discussed in Section 3.3.1.6 that would limit impacts from off-road vehicle maneuvers. The species likely affected on FHL have broad distributions throughout FHL and California. The Proposed Action is not anticipated to result in a significant adverse effect on the population of a migratory bird species, and therefore consultation with USFWS under the MBTA is not required. If later it appears that the maneuvers may result in a significant adverse impact to a migratory bird population, the activity would immediately cease, until the USFWS is consulted about mitigation measures.

3.3.2.3 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Alternative 2 would result in potentially significant impacts to natural resources, however, the level of impacts could be reduced to less than significant. Potential types of impacts to biological resources under Alternative 2 would be similar to those described under Alternative 1; however, impacts would likely be more long-term and reoccurring with annual exercises, as well as affecting a greater geographical area with the addition of the secondary maneuver corridor.

Vegetation Communities and Wildlife

Annual off-road vehicle maneuver training would increase the potential for long-term reoccurring ground disturbance, which would increase the potential for direct impacts to vegetation and wildlife habitat, and indirect impacts to aquatic habitat from erosion if sites do not recover following training events. If unmitigated (lack of land restoration and revegetation), these activities could cause a substantial permanent net loss of primarily grassland habitat at the landscape scale. Unlike Alternative 1, this alternative would allow for off-road vehicle maneuvers to occur in the proposed secondary maneuver corridor as described in Chapter 2. On an annual basis, the option for training in both maneuver corridors would spread out the impacts, potentially decreasing annual intensity or allowing flexibility to close certain areas when additional time is needed for recovery.

In addition to the existing resource management measures described in 3.3.1.6, Alternative 2 would require the adoption of sediment and erosion control mitigations including a long-term land restoration and monitoring program for off-road vehicle maneuver training as outlined in Appendix D. This includes restoring barren or highly disturbed areas and rutted soils to a suitable vegetation coverage, and restricting rehabilitated areas from off-road vehicle maneuver and intensively used sites until recovery goals are achieved. These measures could be scaled in response to actual conditions to offset potentially significant adverse impacts caused by annual off-road vehicle maneuver training, and to maintain vegetation cover and habitat. FHL would continue to evaluate the type, extent, and location of training damage. FHL would also implement rapid response land rehabilitation projects at maneuver sites as needed.

> The intensity, severity, and types of resulting environmental impacts depend to a great extent upon the type of units involved in training, where training activities are concentrated, and the duration of the action:
>
> - Low impact activities generally do not disturb the vegetation or soils and require no rehabilitation.
> - Medium impact activities may cause some disturbance or change that may require minor rehabilitation or may recover over time without aid.
> - High impact activities typically cause noticeable change to the soils or vegetation of the area, which require timely attention to avoid or minimize long-term effects.
>
> Five basic management techniques can be used to minimize military training effects to the vegetation resources: (1) limit total use (2) redistribute use (3) modify kinds of uses (4) alter the behavior of use and (5) manipulate the natural resources for increased durability.

Restoration activities would be monitored for implementation and effectiveness and modified to best suit the needs of the installation, the affected vegetation community, and the form of training that caused the impact. FHL would continue to evaluate the successes of mitigation efforts and modify future efforts as needed, to reach and sustain biological resource management objectives while maintaining land sustainability for the training mission. These measures would reduce long-term impacts to less than significant. In some instances, mitigation measures could require years of effort (e.g., during drought years) and could be dependent on available funding to be fully and successfully implemented. Ultimate recovery rates would depend on the condition of the soil, training activities, and corresponding level of disturbance to vegetation and habitat. Similar to Alternative 1, this alternative restricts off-road vehicle maneuvers to the dry season, reducing the level of vegetation and habitat disrupted during large-scale training activities or from individually minor, but collectively significant, training activities.

Protected Species

Similar impacts to federally-protected species would occur under Alterative 2 as described under Alternative 1. Overall minor to moderate adverse effects to federally-threatened and endangered

species are anticipated, and these would be consistent with the Programmatic BO (USFWS 2010). Differences in impacts between Alternatives 1 and 2 are described below.

Arroyo Toad. In addition to impacts listed for Alternative 1, much of the proposed secondary maneuver corridor drains into the San Antonio River. Off-road vehicle maneuvers within the proposed secondary maneuver corridor would avoid habitat of arroyo toads. However, reoccurring off-road training activities within the proposed secondary maneuver corridor would increase the potential for indirect effects to arroyo toads such as sedimentation in the San Antonio River, which could adversely impact arroyo toad breeding habitat. Implementation of erosion and sediment control mitigations for off-road vehicle maneuvers as detailed in Appendix D would reduce impacts to this species from moderate to minor.

San Joaquin kit fox. Annual off-road vehicle maneuver training has the potential to result in long-term, minor impacts to habitat for the San Joaquin kit fox due to the risk of long-term degradation of grassland vegetation communities and potential introduction of non-native species. The impacts remain minor because off-road vehicle maneuver training is not proposed in training area 22 and the cantonment in the San Antonio River Valley where kit fox were most commonly sighted on FHL. Additionally, the implementation of the erosion and sediment control measures in Appendix D would reduce impacts to grassland habitat for kit foxes by restoring disturbed sites with native species.

San Benito pentachaeta. In addition to impacts listed in Alternative 1, this species occurs in the proposed secondary maneuver corridor. As feasible, this species would be marked for avoidance during military training. Impacts to this species are expected to be minor.

3.3.2.4 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 would result in potentially significant impacts to natural resources, however, the level of impacts could be reduced to less than significant. Under Alternative 3, the potential types of impacts to natural resources would be similar to those described under Alternatives 1 and 2. The addition of a fourth brigade conducting simultaneous training, and the addition of the impacts to the proposed secondary maneuver corridor, would increase the potential for significant impacts to natural resources described under Alternatives 1 and 2. Implementation of measures discussed under Alternative 2 would reduce impacts to natural resources to less than significant (i.e., minor to moderate impacts).

3.3.2.5 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Analysis of Alternative 4 at the programmatic level provides a framework and scope for subsequent tiered analysis of environmental impacts. Under Alternative 4, the potential types of impacts to natural resources would be similar to those described under Alternative 2. Off-road vehicle maneuver training, however, would not be restricted to the dry season and could occur at any period over the 360-day calendar year on an annual basis. The addition of up to four more off-road vehicle maneuver training exercises would also increase the potential for erosion and direct and indirect impacts to natural resources described under the other alternatives. An additional 1-4 brigades training per year, in addition to 3-4 brigades and 9 battalions under the No Action and Alternatives 1 through 3, increases the potential for impacts to protected species. Brigade and battalion-level exercises require multiple large bivouac sites and staging areas,

extensive on-road maneuvers to include crossing drainages, use of the tank trail and roads between Camp Roberts and FHL, and use of live-fire ranges and other training facilities. The proposed intensity and timing of training may limit land rehabilitation opportunities and the ability to rest sites to allow for vegetation regrowth and soil stabilization. Similar to Alternative 2, avoidance and protection measures and monitoring as described in Section 3.3.1.6 and in Appendix D would reduce adverse effects to natural resources. Additionally, off-road vehicle maneuvers could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain event) to minimize the impacts from rutting and vegetation loss. However, due to the intensity of brigade-level training and year-round off-road vehicle maneuver exercises proposed under Alternative 4, the adoption of measures outlined in Appendix D may not be sufficient to reduce impacts from significant levels. Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse effects under this alternative. Information gathered from monitoring described in Appendix D, and the soil trafficability model described in Section 3.5.2.3 would inform subsequent tiered NEPA analysis.

3.3.3 Cumulative Effects

Although off-road vehicle maneuver training has the potential to significantly impact vegetation and habitat at the landscape level, the reasonably foreseeable on- and off-post projects identified in Section 3.1.4 would not cumulatively add to significant adverse effects. On-post projects identified would result in limited disturbance in the cantonment area and near the airfield, which have high levels of existing activity. Construction would result in minor amounts of vegetation removal and habitat disturbance, and would be managed in accordance with existing installation plans (e.g., INRMP, Stormwater Pollution Prevention Plan [SWPPP], SPCC Plan, etc.). Training activities at Camp Roberts could have localized adverse impacts to natural resources within the post; however, Camp Roberts would manage and protect resources similarly to FHL, based on Federal regulatory requirements.

Limited off-post development projects were identified; therefore, it is assumed that land uses and management of lands surrounding FHL (primarily ranching and agricultural) would continue. Impact reduction measures identified in Section 3.3, Natural Resources, would aid in the reduction of long-term cumulative effects to vegetation on FHL from military training. Overall cumulative effects would be minor.

3.4 Cultural Resources

3.4.1 Affected Environment

The following section provides a general summary of FHL's cultural resources, with an emphasis on cultural resources occurring in the ROI to include the proposed maneuver corridors. The ROI for cultural resources is referred to as the "Area of Potential Effects" (APE), consistent with NHPA Section 106 review and FHL's ICRMP.

3.4.1.1 Fort Hunter Liggett Cultural Resource Management Program/Process for identification of Resources

"Cultural resources" is an umbrella term for many heritage-related resources defined in several Federal laws and executive orders. These include the NHPA (1966), the Archaeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the NAGPRA (1990).

The National Historic Preservation Act (NHPA) focuses on cultural resources such as prehistoric and historic sites, buildings and structures, districts, or other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. The NHPA uses the term "historic properties" to define "cultural resources." The term "historic property" is defined as is any prehistoric or historic district, site, building, structure, or object, and its associated artifacts, remains, features, settings, and records, that is either listed in or has been determined eligible for inclusion in the National Register of Historic Places.

To be designated as a historic property, the resource must be listed, or eligible for listing, in the National Register of Historic Places. The criteria (36 CFR 60.4 [a–d]) used to evaluate the significance of a resource are as follows:

- It is associated with events that have made a significant contribution to the broad patterns of American history;
- It is associated with the lives of past significant persons;
- It embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or
- It has yielded, or may be likely to yield, information important in history or prehistory.

Section 106 of the NHPA, as amended, requires the lead Federal agency with jurisdiction over a Federal undertaking (i.e., a project, activity or program that is funded by a Federal agency or that requires a Federal permit, license or approval) to consider effects on historic properties before that undertaking occurs. The Advisory Council on Historic Preservation published regulations for the NHPA in 36 CFR 800. By implementing Section 106, Federal agencies take into account the effects of a proposed undertaking on any historic properties situated within the APE and consult with the Advisory Council on Historic Preservation, SHPOs, federally-recognized Indian tribes, local governments and any other interested parties regarding the proposed undertaking and its potential

The area of potential effects (APE) is the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking" (36 CFR 800.16[d]).

effects on historic properties.

Under Section 110 of the NHPA, Federal agencies are required to establish programs to inventory and nominate cultural resources under their purview to the NRHP.

Identification and evaluation of cultural resources discovered on FHL has been conducted in accordance with provisions set forth in Sections 106 and 110 of the NHPA, and the implementing guidance found in 36 CFR Part 800, *Protection of Historic Properties*. Historic property evaluation to determine eligibility for inclusion in the NRHP is accomplished using established criteria and guidance provided in 36 CFR 60.4.

3.4.1.2 Archaeological, Architectural, and Historic Resources

FHL was established in 1940 as the Hunter Liggett Military Reservation in anticipation of training Soldiers for combat in the European theater of operations during World War II. Hunter Liggett Military Reservation began operations under the command of Camp Roberts to train Soldiers during World War II. In 1953, command was transferred to Fort Ord, and in 1975, the post was upgraded to FHL. FHL was a subinstallation of Fort Ord until November 1993 when the installation came under USARC. A detailed prehistoric and historic chronology of the area is provided in the 2008 ICRMP: Historic Properties Component (FHL 2008). A cultural timeline for prehistoric and historic chronology is presented in Figure 3.4-1.

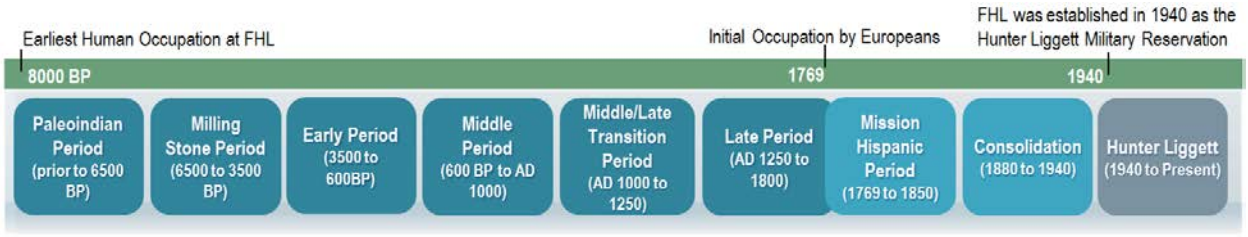


Figure 3.4-1. FHL Cultural Timeline

Approximately 47 percent of the installation has been inventoried for cultural resources. The extent of this coverage includes areas subject to regular installation activity and many areas with a high probability for containing cultural resources. The results of these studies provide the framework for understanding the cultural and historical development at the installation and the surrounding region. FHL has over 700 known archaeological sites. Some buildings and structures are over fifty years old, and three historic properties listed on the NRHP are part of the installation. Three other listed historic properties are immediately adjacent to FHL and one listed historic property is a private in-holding (FHL 2010b).

Most of the cultural resources identified at FHL are archaeological sites representing the remains of prehistoric villages, hunting camps, and food-processing stations (FHL 2010). Prehistoric site types include the remains of villages, bedrock milling sites, task-specific sites, rock shelters, rock art sites, chert quarries, and sparse lithic scatters. Historic site types include communities, ranches, mines, military sites, structural remains including those manufactured from adobe, refuse scatters, water management sites, privies, linear features, exotic vegetation, roads, trails, cemeteries, settings, and small-scale landscapes. Architectural resources include ranch buildings, military sites, water management infrastructure, bridges, and cemeteries.

The APE for the Proposed Action includes the proposed primary and secondary maneuver corridors (see Figures 2-3 and 2-4). FHL has surveyed 100 percent of the areas suitable for

proposed off-road vehicle maneuvers (e.g., those locations less than 30 percent slope in the proposed primary and secondary maneuver corridors). The areas identified for off-road heavy maneuver have been used historically for maneuver training at FHL since World War II. Surveys within the APE have identified 283 historic properties; one determined eligible for listing on the NRHP, one site determined ineligible, and FHL is managing the remaining 281 sites as potentially eligible until determinations of eligibility can be made through further investigation.

3.4.1.3 Native American Sacred Sites and Properties of Traditional and Religious Cultural Importance

The Native American Graves Protection and Repatriation Act (NAGPRA) requires consultation with culturally affiliated Native American tribes for the disposition of Native American human remains, burial goods, and cultural items recovered from federally-owned or controlled lands.

Resources of traditional, religious, or cultural significance to Native American tribes can include archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that Native Americans consider essential for the preservation of traditional culture.

FHL is the ancestral homeland of the Salinan Indians, a non-federally recognized tribe. Ethnohistoric documentation has identified numerous Salinan villages and traditional cultural places of importance within FHL. One property of cultural significance at FHL is currently listed on the NRHP, La Cueva Pintada (CA-MNT-256); this location, however, lacks suitable terrain for off-road vehicle maneuver training. More than 100 other archaeological sites might meet the criteria as defined by NHPA for properties of traditional religious and cultural importance upon completion of formal evaluation. In general, these are sites that consist of rock shelters, cupules, pictographs, traditional gathering locations, ceremonial landscapes, and burial grounds (FHL 2010).

There are no federally-recognized American Indian Tribes (Tribes) who have traditionally inhabited or used the lands within FHL (FHL 2010b).

3.4.1.4 Protection and Monitoring of Cultural Resources

FHL has established Section 106 process measures for the identification and evaluation of historic properties, and protection and monitoring of these properties.

If historic properties are present within an undertaking's APE and would be affected by the undertaking, and FHL's Standard Resource Protection Measures contained within the ICRMP cannot be implemented, then the procedures outlined in 36 CFR Part 800, *Protection of Historic Properties* will be followed regarding evaluation, determination of effects, review, and Section 106 consultation.

Protection measures include physical demarcation and delineation of historic properties (using coded flagging and/or other effective markings) as needed prior to an undertaking and avoidance of these areas during the implementation of an undertaking. Buffer zones are used where setting is an important attribute, and the proposed activity may have an effect on the setting's quality.

Monitoring is conducted, as necessary, by the FHL Cultural Resource Manager (CRM) to ensure that identified protection measures are effective. The CRM determines the schedule and requirements of any monitoring.

In the event of an unanticipated discovery during any training event, maintenance, or construction activity, the Army will, as soon as possible, terminate actions in the vicinity of the property, determine the geographic bounds of the property, and will take all reasonable measures to avoid or minimize harm to the property until consultation with the SHPO regarding the eligibility and effects of the undertaking can be determined.

3.4.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to cultural resources that could result from the No Action and Proposed Action alternatives. Impacts to cultural resources would be considered significant if they cause direct or indirect alteration of the characteristics that qualify a property for inclusion in the NRHP (may include physical destruction, damage, alteration, removal, change in use or character within setting, neglect causing deterioration, transfer, lease, sale), and fail to follow the existing the Section 106 process. Table 3.4-1 provides a comparison summary of the anticipated level of impacts by alternative.

Table 3.4-1. Summary of Cultural Resource Impacts

Alternative	Negligible	Minor[1]	Moderate	Potentially Significant
No Action		[x]		
Alternative 1		[x] ←	———	[x][1]
Alternative 2		[x] ←	———	[x][1]
Alternative 3		[x] ←	———	[x][1]
Alternative 4	Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse impacts under this alternative.			

[1]Minor impact rating would indicate "no adverse effects" under Section 106.

3.4.2.1 No Action Alternative – Continue Existing Mission and Training Operations

Selecting the No Action Alternative would result in minor adverse effects to cultural resources. Under the No Action Alternative, training activities would continue under current levels as described in Section 2.2.1, Continue Existing Mission and Training Operations. Cultural resource support for and from the CRM at FHL would continue under the No Action Alternative along with maintaining existing environmental conditions through current operational controls. Training activities would occur in accordance with existing procedures, and the introduction of off-road vehicle maneuvers under the Proposed Action would not occur. FHL would continue to manage and protect cultural resources in accordance with the ICRMP.

3.4.2.2 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 could result in potentially significant impacts to cultural resources.

Off-road vehicle maneuver training under Alternative 1, using both tracked and wheeled vehicles, is expected to occur within areas of the proposed primary maneuver corridor containing less than 30 percent terrain slope. As stated in Section 3.4.1.2, FHL has surveyed 100 percent of the proposed primary maneuver corridor containing less than 30 percent slope. This type of training has the potential to directly disturb surface and subsurface cultural features and/or materials, which could be crushed or displaced (horizontally and vertically) within the soil profile as vehicles cross the terrain. These vehicles also have the potential to impact aboveground historic structures and prehistoric architectural features that may be present as well. Soils erosion caused by off-road vehicle maneuvers could also indirectly impact historic properties. Erosion from the maneuver lanes could carry off-site and disturb (erode away) subsurface sites or compromise the stability of aboveground sites through scouring and eroding of foundations.

The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities. Use of existing roads and facilities would not adversely affect cultural resources. Additionally, bivouacking and any ground-disturbing activities would be conducted in previously surveyed locations. Impacts to historic properties would be avoided.

Direct adverse significant effects to historic properties would be avoided during the training request approval process (refer to Section 2.2.1.4 and 3.4.1.4). FHL would protect the sites within the APE that are eligible or potentially eligible by avoidance through physical demarcation in the field with a 33-foot (10-meter) buffer prior to training events that may result in damage to sites in order to prevent disturbance from off-road vehicle maneuvers and increased support and sustainment associated with exercises. Sites in the proposed primary maneuver corridor would be marked with methods such as Seibert stakes or large orange traffic cones (if the site is located in a paratrooper training drop zone). FHL would also protect sites through land use restrictions in SRMAs and Environmental Constraint Areas, such as Stoney Valley, in order to prevent damage to sites. Units would be provided cultural resource educational briefings and coordination maps prior to training events. This would include development of educational materials for off-road vehicle maneuver units.

The potential for indirect effects to historic properties from erosion of maneuver lanes would be least under Alternative 1, requiring off-road vehicle maneuvers for 2016 only. Training would be conducted over the dry season which would reduce erosion runoff from disturbed areas as compared to off-road training in the wet season. Following training, units would be required to restore disturbed sites; barren areas would be seeded and restricted from off-road vehicle maneuver and additional bivouac sites until acceptable vegetation coverage is established. These measures would avoid indirect adverse effects of erosion on historic properties.

The Army has concluded a finding of "no adverse effects" to historic properties resulting from off-road vehicle maneuver training at FHL (see Appendix B, Agency Coordination). This finding is based upon avoidance and protection measures outlined above, and the procedures described in Section 3.4.1.4 for the protection and monitoring of cultural resources.

3.4.2.3 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Alternative 2 could result in potentially significant impacts to cultural resources, however, the level of effects would be reduced to less than significant. Under Alternative 2, the potential types of impacts to historic properties would be similar to those described under Alternative 1.

Off-road vehicle maneuver training, however, would be conducted on an annual basis. Reoccurring training would increase the potential for erosion and indirect impacts to historic properties if training sites did not recover following training events and erosion occurs. Unlike Alternative 1, this alternative would allow for components of unit training, including off-road vehicle maneuver to occur in the proposed secondary maneuver corridor as described in Chapter 2. Therefore, the APE would include the proposed secondary maneuver corridor in addition to the proposed primary maneuver corridor. Similar to Alternative 1, FHL would protect the sites within the APE (including the proposed secondary maneuver corridor) that are eligible or potentially eligible by avoidance through physical demarcation in the field with a 33-foot (10-meter) buffer prior to training events. Demarcated sites, however, would require routine inspection and maintenance to ensure they are sufficiently marked prior to annual training events.

Similar to Alternative 1, avoidance and protection measures and monitoring as described in under Alternative 1 and Section 3.4.1.4 would minimize adverse effects to historic properties. Also similar to Alternative 1, this alternative restricts off-road vehicle maneuvers to the dry season, reducing the level of potential indirect and cumulative impacts to historical properties related to erosion. Under Alternative 2, FHL would avoid the potential significant effects from annual training by also adopting sediment and erosion control mitigations including a long-term land restoration and monitoring program for off-road vehicle maneuver training as outlined in Appendix D. This program would ensure indirect effects of erosion to historic properties, including the alteration of the characteristics that qualify a property for inclusion in the NRHP, are minimized.

3.4.2.4 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 could result in potentially significant impacts to cultural resources, however, the level of effects would be reduced to less than significant. Under Alternative 3, the potential types of impacts to historic properties would be similar to those described under Alternatives 1 and 2. The addition of a fourth brigade conducting simultaneous training, and the addition of the impact to the proposed secondary maneuver corridor, would increase the potential for erosion and indirect impacts to historic properties described under Alternatives 1 and 2. Similar to Alternative 2, avoidance and protection measures and monitoring as described under Alternative 1 and Section 3.4.1.4 and outlined in Appendix D would minimize adverse effects to historic properties.

3.4.2.5 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Analysis of Alternative 4 at the programmatic level provides a framework and scope for subsequent tiered analysis of environmental impacts. Under Alternative 4, the potential types of impacts to cultural resources would be similar to those described under Alternative 2. Off-road vehicle maneuver training, however, would not be restricted to the dry season and could occur at any period over the 360-day calendar year on an annual basis. The addition of up to four more off-road vehicle maneuver training exercises would also increase the potential for erosion and direct and indirect impacts to historic properties described under the other alternatives. An additional 1-4 brigades training per year, in addition to 3-4 brigades and 9 battalions under the No Action and Alternatives 1 through 3, increases the potential for impacts to historic properties.

Brigade and battalion-level exercises require multiple large bivouac sites and staging areas, extensive on-road maneuvers to include crossing drainages, use of the tank trail and roads between Camp Roberts and FHL, and use of live-fire ranges and other training facilities. The proposed intensity and timing of training may limit land rehabilitation opportunities and the ability to rest sites to allow for vegetation regrowth and soil stabilization. Similar to Alternative 2, avoidance and protection measures and monitoring as described in Section 3.4.1.4 and in Appendix D would reduce adverse effects to historic properties. Additionally, off-road vehicle maneuvers could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain event) reducing the level of potential indirect and cumulative impacts to historical properties related to erosion. However, due to the intensity of brigade-level training and year-round off-road vehicle maneuver exercises proposed under Alternative 4, the adoption of measures outlined in Appendix D may not be sufficient to reduce impacts from significant levels. Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse effects under this alternative. Information gathered from monitoring described in Appendix D, and the soil trafficability model described in Section 3.5.2.3 would inform subsequent tiered NEPA analysis.

3.4.3 Cumulative Effects

Other projects identified in Section 3.1.4 have the potential to adversely affect historic properties. Those activities occurring within Army lands (e.g., FHL and Camp Roberts) would be afforded protection measures outlined in their respective ICRMPs. Overall cumulative effects of these projects in combination with the Proposed Action alternatives would be minor.

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3.5 Geology and Soils

3.5.1 Affected Environment

The following section describes general conditions of geology and soils at FHL, with an emphasis on these resources within the ROI to include the proposed maneuver corridors.

3.5.1.1 Geology and Topography

The western part of FHL corresponds to the east slope of the Santa Lucia Range, and is dominated by steep hillsides. The southwestern boundary of FHL follows the crest of the Santa Lucia Range, along which elevations range from approximately 2,500 feet to 3,740 feet (762 to 1,140 meters) at Alder Peak, the highest point in the installation. The area from vicinity of the Nacimiento River to the east, comprising about three-fourths of FHL, is comprised by gently sloping to steep terrain intersected by flat to rolling river valleys (see Figure 3.5-1). The proposed primary maneuver corridor (Section 2.2.2.2) lies entirely within this area. The proposed secondary maneuver corridor lies mostly within this area, however, it is dominated by a more hilly terrain as shown on Figure 3.5-1. The northern portion of the proposed secondary maneuver corridor (training areas 1-3) has steep hillsides that generally flatten out to a level terrain in the southern portion surrounding the river valleys and floodplains of the San Antonio River. Table 3.5-1 provides acreage of slope classes within the proposed maneuver corridors.

Table 3.5-1. Soil Classes Within the Proposed Maneuver Corridors

Maneuver Corridor	Slope Class (percent)		
	0 to 15	15 to 30	>30[1]
Primary Maneuver Corridor (acres)	9,420	6,123	4,026
Secondary Maneuver Corridor (acres)	8,296	10,733	17,495

[1]Although within the maneuver corridor boundaries, areas with slopes greater than 30 percent are not considered suitable for off-road vehicle maneuvers (see Section 2.2.2.2).

Three different groups of pre-Quaternary rocks underlie FHL: The Salinan block, also known as the Salinian terrane or Sur series; the Franciscan complex; and late Cretaceous through late Tertiary sedimentary strata deposited in marine and non-marine basins along the Pacific margin of North America. The Salinian block underlies the northern part of FHL and includes Mesozoic crystalline intrusive rocks (granitoid plutons) and metamorphic rocks whose protoliths (original rocks prior to metamorphism) range in age from Precambrian to Mesozoic. The Franciscan complex underlies the southwestern part of FHL in the Santa Lucia Range. The Franciscan rocks are dominated by graywacke (Jurassic through Cretaceous) as well as chert and greenstone. Ultramafic rocks are also widely distributed throughout the Franciscan complex (California Geologic Survey 2010).

Late Cretaceous and younger sedimentary strata underlie the eastern two- thirds of the installation, including large parts of the proposed primary and secondary maneuver corridors. Subparallel northwest-trending belts of rocks are formed by Upper Cretaceous and Paleocene deposits of sandstone, shale and conglomerate, and the Miocene Monterey Formation. Medium to- coarse grained sandstone, conglomerate, mudstone and siltstone of marine origin up to 3,500 feet (1,067 meters) thick form an unnamed formation of Paleocene age (Durham 1965). The Vaqueros Formation of the early Miocene age consists primarily of marine sandstone, siltstone

and mudstone about 850 feet (259 meters) thick. The Monterey Shale formation overlies the Vaqueros formation, and consists of marine porcelaneous rocks, mudstone, chert dolomitic carbonate beds, concretions, shale, siltstone and sandstone. About three-fourths of the Monterey Shale formation is comprised by porcelanite and porcelaneous mudstone. The Monterey Shale ranges in thickness up to 6,600 feet (2,012 meters) (Durham 1965). Pliocene and Pleistocene marine sediment underlie much of the eastern third of FHL, except where covered by alluvial deposits associated with the San Antonio River. An unnamed formation consisting mostly of very fine-grained sandstone and diatomaceous mudstone of marine originates from the Pleistocene era. This unnamed formation as well as the Paso Robles Formation both overlie the Monterey Shale and are exposed south of the San Antonio River. The thickness of the Paso Robles Formation in the San Antonio River Valley varies from a few feet to more than 150 feet (46 meters). This formation is comprised mostly of non-marine, conglomerate, pebble conglomerate, conglomerate sandstone, and sandstone. (Durham 1965).

3.5.1.2 Soils

Soil orders are groups of soils in the broadest category of the current USDA soil taxonomy classification system (NRCS 1994). There are a total of 11 orders, differentiated by the presence or absence of diagnostic horizons.

Soil is defined as the unconsolidated mineral or organic parent material on the immediate surface of the earth formed by weathering and biological processes. Landscape position, vegetation, climate, time and parent material all play into how the soil forms. Two soil orders, Mollisols and Entisols, dominate the proposed primary and secondary maneuver corridors at FHL. Mollisols are soils with thick, dark top (A) horizons with a high base saturation (pH) that may or may not overlie developed subsoils (diagnostic horizons). Mollisols formed from hundreds of years of addition of organic matter to the top (A) horizon from grassland vegetation and dominate the proposed secondary maneuver corridor (54 percent), but are also widespread in the proposed primary maneuver corridor (30 percent). They formed on level to steeply sloped uplands in sedimentary rock residuum, primarily shale. The Entisols at FHL are soils without any profile development (diagnostic horizons) except for the top (A) horizon due to young geologic age and coarse mineral texture and shallow depth. They developed in level to steeply sloped uplands in sedimentary rock residuum, mostly sandstone and meta sandstone. Entisols are found throughout both proposed maneuver corridors. They are widespread in the proposed primary maneuver corridor (50 percent) and are also prevalent in the proposed secondary maneuver corridor (23 percent). Other soils orders found in the proposed primary and secondary maneuver corridors include Alfisols (7 and 6 percent, respectively), Inceptisoils (7 and 5 percent, respectively), Vertisols (2 and 3 percent, respectively) and Ultisols (1 percent combined).

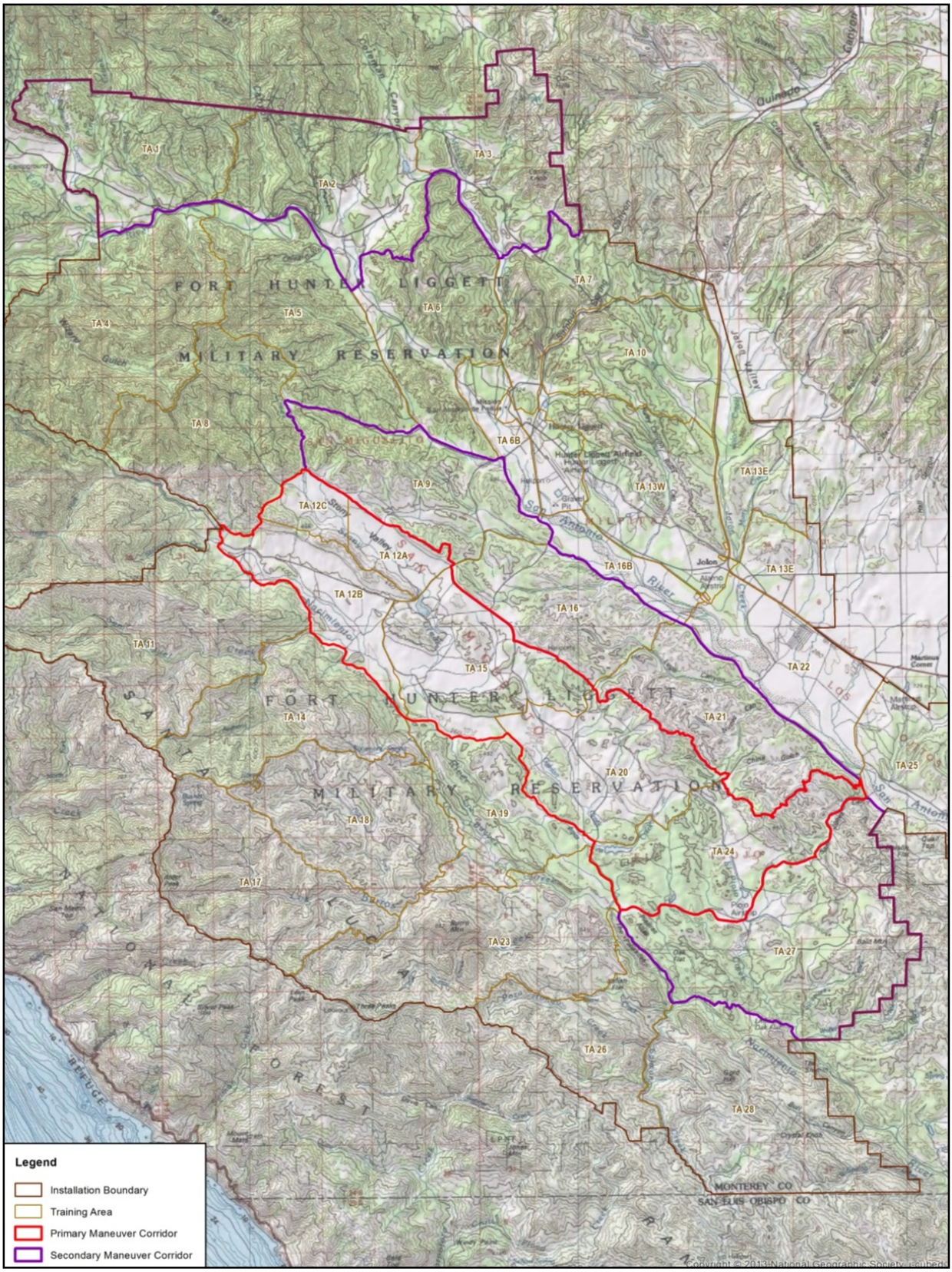

Figure 3.5-1. Topography Map of FHL

There are over 80 different types of soil units mapped in the proposed primary and secondary maneuver corridors at FHL. Appendix E lists all the map units and main attributes by soil order. Figure 3.5-2 illustrates the distribution of soils series and soil order throughout the two proposed maneuver corridors. The soils generally have a xeric soil moisture regime (moist cool winters/warm dry summers), and mixed or smectitic[3] mineralogy.

The **soil series** category is the most homogeneous category in the taxonomy used in the United States. As a class, a series is a group of soils or polypedons that have horizons similar in arrangement and in differentiating characteristics. The soils of a series have a relatively narrow range in sets of properties. (NRCS 1994)

Forty-two percent of the soils in the proposed primary maneuver corridor are mapped as Gaviota series or Gaviota-San Andreas complexes[4]. Gaviota (Entisols) are very shallow to shallow (6-20 inches), well drained loams formed in sandstone and meta sandstone residuum. San Andreas (Mollisols) are moderately deep (20-40 inches), well drained fine sandy loams formed in soft, weathered sandstone. Both the Gaviota and the Gaviota-San Andreas are on hills and mountainous upland. The slope varies from 15 to over 45 percent; however the majority of the soils are mapped as Gaviota-San Andreas complex, 15 to 30 percent slopes. Note that Gaviota-San Andreas are mapped as Entisols in Figure 3.5-2, but is actually a mix of Entisols and Mollisols (San Andreas).

Other widespread soils in the proposed primary maneuver corridor include the Chualar (8 percent) and Vista (7 percent) series, the Santa Lucia Series/Santa Lucia-Reliz association[5] (6 percent), and the Dibble (5 percent) and Sheridan (4 percent) series, and Psamments (4 percent) consociation[6]. Chualar (Mollisols) are deep, well drained sandy loams formed in alluvial material on alluvial fans and stream terraces. The slope varies from 0 to 9 percent. Vista (Inceptisols) are moderately deep, well drained sandy loams formed in decomposed granitic rock material on hills and mountainous upland. The slope varies from 15 to 75 percent, with the majority of the soils having 30 percent slope or greater. Santa Lucia (Mollisols) are moderately deep, well drained clay loams on uplands formed in material weathered from white shale containing some ash and some silicious and diatomaceous material. Reliz (Entisols) are shallow, somewhat excessively to excessively drained clay loams on uplands formed from acid shale. The Santa Lucia/Santa Lucia-Reliz association have slopes that varies from 30 to 75 percent slopes. Dibble (Alfisols) are moderately deep, well drained loams formed in material weathered from shale and sandstone on uplands with slopes primarily between 2 and 9 percent. Sheridan (Mollisols) are moderately deep, well drained sandy loams formed from residuum weathered from granite and schist on hillsides. Slopes vary from 5 to 75 percent with the majority of the soils being 30 percent or greater. Psamments (Entisols) are areas of undulating sandy, gravelly, and cobbly stratified sediments on floodplains. These areas have slopes less than 5 percent and are frequently flooded.

[3] Smectite clays are 2:1 layer silicates with very high cation exchange capacity (attracts interlayer cations) causing expansion and collapse of structure when wet (i.e. shrink-swell) (SSSA 2015).
[4] A complex is a map unit where two or more different soils are too small to be mapped separately at the scale of the soil survey (1;24:000) (NRCS 1994).
[5] An association is a map unit where two or more different soils can be mapped separately at the scale of the soil survey (1;24:000), but have been combined for other reasons.
[6] In a consociation, delineated areas are dominated by a single soil taxon (or miscellaneous area) and similar soils.

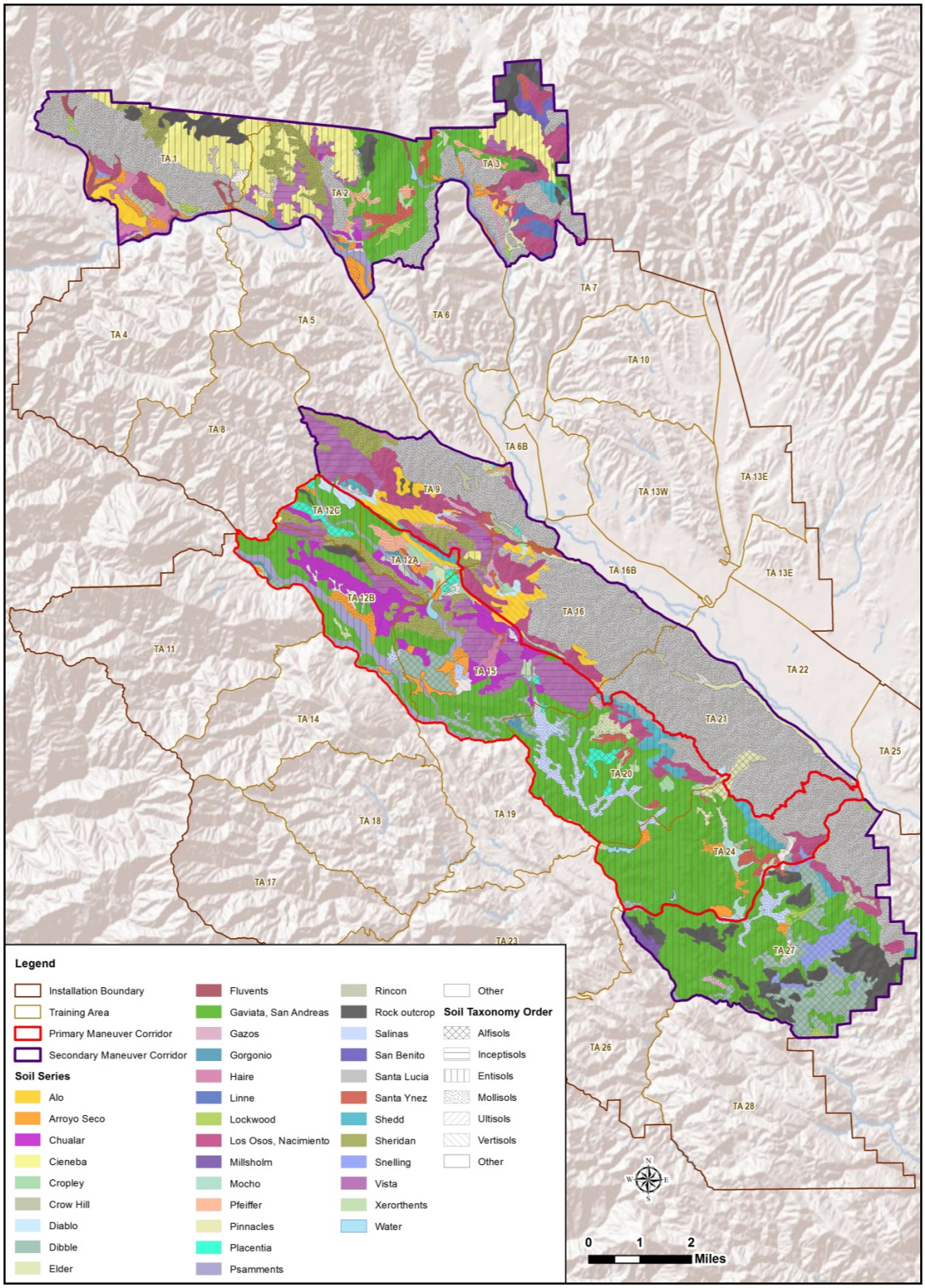

Figure 3.5-2. Soils Series and Taxonomic Orders within the Primary and Secondary Maneuver Corridors

Dominating soils in the proposed secondary maneuver corridor are Santa Lucia/Santa Lucia-Reliz association (36 percent), Gaviota/Gaviota-San Andreas complex (13 percent), Cieneba/Cieneba-Rock complex (7 percent), Los Osos (4 percent), Sheridan (4 percent), Vista (4 percent), and Dibble (4 percent) series. The soils are described above except for Cieneba/Cieneba-Rock Complex and Los Osos. Cieneba (Entisols) are very shallow to shallow, somewhat excessively drained sandy loams formed in weathered granite on hills and mountainous upland. Slopes are 30 to 75 percent. Rock outcrops are areas of exposed rock and provide rare habitats and permanent landscape features that can enhance military training. Large outcrops are important for California condors, peregrine falcons, and cultural resource features (FHL 2012). Cieneba/Cieneba-Rock is found almost exclusively in training areas 1, 2 and 3 in the northern area of FHL. Los Losos are moderately deep, well drained clay loams formed in weathered sandstone and shale in uplands with slopes from 15 to 75 percent slopes. About 30 percent of the Los Losos soils have slopes of less than 30 percent.

In summary, soils in the proposed primary and secondary maneuver corridors formed primarily from residuum weathered from sedimentary rocks associated with the Pliocene and Pleistocene marine sediments, metamorphic rocks associated with the Mesozoic Salinian Block, or in recent alluvium. The soils that formed from marine sedimentary rock residuum, in particular shale, tend to be high in montmorillic and other smectitic clays – highly active clays that swell when wet and shrink when dry. These types of soils are poorly suited for roads and buildings in general and for trafficability when wet. When thoroughly dry, these soils are hard and well suited for trafficability. These types of soils are categorized as Hydrologic Group D soils, and are discussed later in this chapter in Section 3.5.1.3, and displayed in Table 3.5-4 and Figure 3.5-4.

3.5.1.3 Erosion and Erosion Management

Soil is formed in place over hundreds, often thousands of years. At FHL, due to the xeric soil moisture regime (moist cool winters/warm dry summers) and the prevalent grassland vegetation within the proposed corridors, thick top horizons high in organic matter (see Section 3.5.1.2) have developed in the majority of the soils in the proposed maneuver corridors. When uncovered, soil particles and organic matter can become detached from the soil column by the impact of rain water or from the force of wind. When detached, soil particles can travel with the water in the form of overland flow to surface waters or in the air in the form of dust. At the moment the particles become suspended in the runoff or in the air, soil changes from being a natural resource supporting plant growth to being a pollutant – sediment or dust. Contamination of waterways by sediment affects water quality parameters such as turbidity, nutrient and organic content, dissolved oxygen, and aquatic fauna as discussed in Section 3.7, Surface Waters and Wetlands. Contamination of air by dust is discussed in Section 3.2 Air Quality and Greenhouse Gases. Soil erosion can be either natural or accelerated by man-made activities. While some of FHL soils are relatively stable and level, composed of medium textured particles, many of the soils are highly erosive, situated on steep slopes, and/or composed of small particles that become easily detached as discussed above.

Water erosion, Wind erosion, Compaction, Loss of Soil Structure

Soil erosion dynamics are usually predicted using the Universal Soil Loss Equation (USLE). In this equation, soil loss (factor T) can be estimated as a product of six factors; soil erodibility (factor K), rainfall/runoff erosivity (factor R), slope length (factor L), slope steepness (factor S),

cover management (factor C), and support practice (factor P). Analysis of erosion potential was performed using the U.S. Department of Agriculture (USDA) NRCS soils data from the Monterey County Soil Survey report (USDA 2015). The field survey was completed and published in 1978, and is listed as "update needed" status by the Davis, CA, NRCS regional office (NRCS 2013). The digital survey data is updated twice a year, however, a field survey has not been conducted since 1978. Certain limitations, therefore, exists in the available data which include a lack of soil erodibility (K factor) data (only one third of the soil map units within FHL have K factor values assigned). The lack of K factor values precluded a uniform analysis of erosion potential using the USLE. Therefore, this analysis focuses on soil loss factor T, wind erodibility groups, and hydrology groups (see Sections below) to determine erosion potential.

Soil Loss T Factor

Table 3.5-2 and Figure 3.5-3 show the distribution of soil erosion factor T in the proposed maneuver corridors. Appendix E shows the individual factor T value for each map unit.

Table 3.5-2. Soil Erosion Factor T

Maneuver Corridor	Erosion factor T [1]	Acres	Percent
Primary Maneuver Corridor	0	663	3
	1	8,232	42
	2	1,228	6
	3	4,289	22
	4	1,011	5
	5	4,146	21
Secondary Maneuver Corridor	0	3,568	10
	1	4,911	13
	2	15,917	44
	3	7,803	21
	4	1,491	4
	5	2,834	8

[1]The greater the Erosion factor T rating, the more resistant the soil productivity is to wind or water erosion.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur on a map unit without affecting crop productivity (e.g., vegetation growth and cover) over a sustained period. The rate is in tons per acre per year (T/A/Y). A soil with a T factor rating of 5 T/A/Y can tolerate 5 times as much erosion without a loss in productivity compared to a soil with a T factor rating of 1 T/A/Y. While crops are not growing on FHL, erosion factor T is a good indicator of the overall soil erosion tolerance, and of the effect of erosion on a soil's ability to support plant growth, and can be used for understanding the various soil units' capacity for supporting plant growth when training areas are rehabilitated and seeded after training activities.

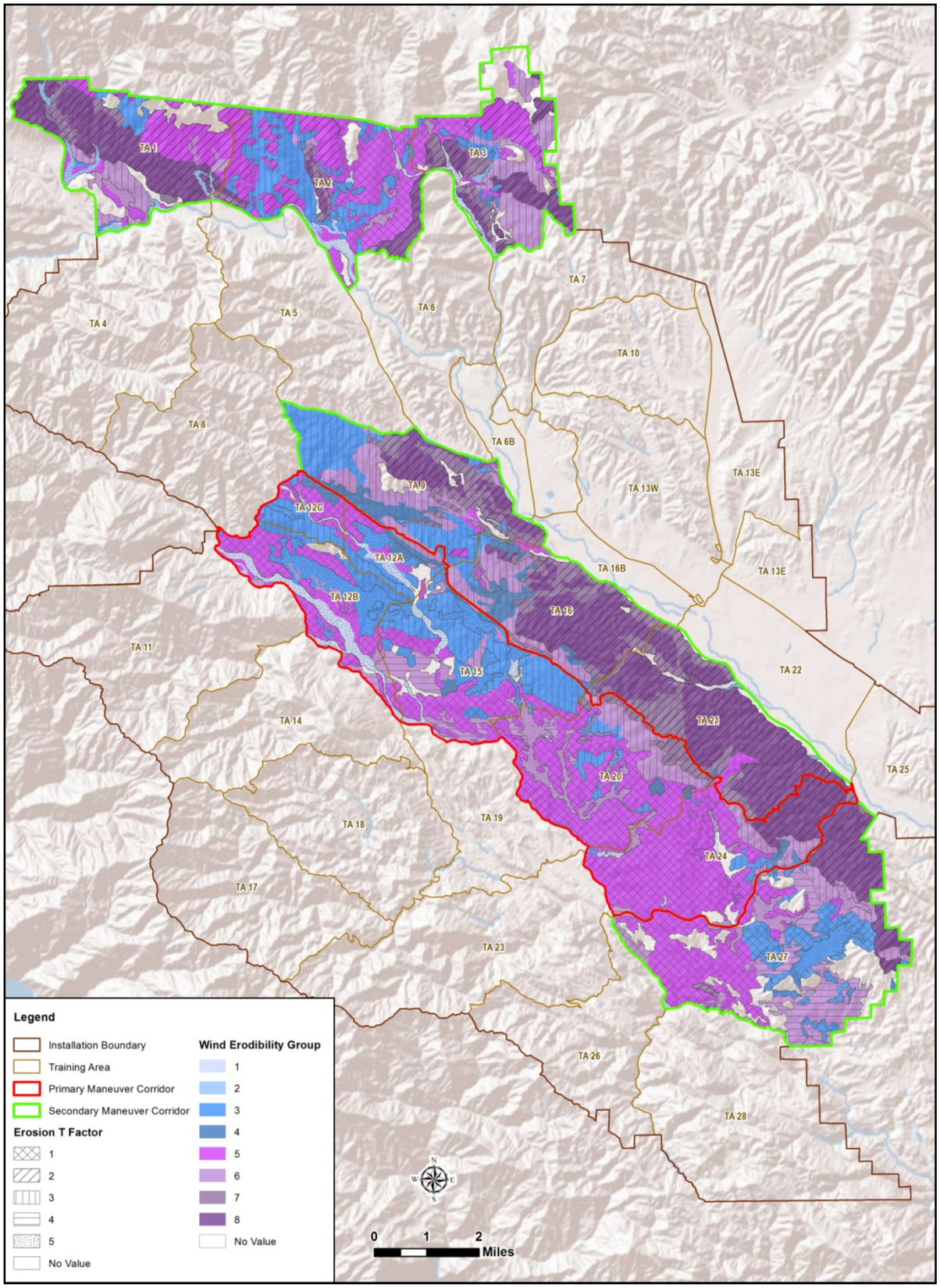

Figure 3.5-3. Soil Erodibility Factor T and Soil Wind Erodibility Groups

As shown in Table 3.5-2, the soil erosion tolerance is in general higher in the proposed primary maneuver corridor (26 percent belong to 4 or 5 T/A/Y factor T) compared to the proposed secondary maneuver corridor (12 percent belong to 4 or 5 T/A/Y factor T). However, 51 percent of the soils in the proposed primary maneuver corridor are rated as 2 T/A/Y or less, which indicate that almost half the soils in this corridor are not very tolerable to soil erosion. The secondary maneuver corridor has 67 percent of the soils rated as 2 T/A/Y or less. Erosion tolerable soils are most widespread in training areas 12A, 12B, 15, and 27. The least erosion tolerable are prevalent in training areas 16, 20, 21, 24, and 27.

Soil Erosion K Factor

Soil erosion factor K is a good indicator of a soil's susceptibility to sheet and rill erosion by water, and is one of the factors used in USLE. As previously explained, the Monterey County Soil Survey assigns K factors for about only a third of the soils in FHL which limits the use of K factor for determining soil erosion potential for this analysis. The K factor is shown in Appendix E for map units which have been assigned K values. Higher K values indicate higher susceptibility to water erosion.

Wind Erodibility Groups

Table 3.5-3 and Figure 3.5-3 show the distribution of wind erodibility groups in the proposed maneuver corridors. Appendix E shows the individual wind erodibility group value for each map unit.

Wind erodibility groups are assigned to soils based on their inherent susceptibility to wind erosion based on soil properties, primarily soil texture and structure. The group scale runs from Group 1 (being the most susceptible) to Group 8 (being the least susceptible). The soils on FHL are as follows (NRCS 2015):

- Group 1: Very fine sands, fine sands, sands, or coarse sands.
- Group 2: Loamy very fine sands, loamy fine sands, loamy sands, and loamy coarse sands; very fine sandy loams and silt loams.
- Group 3: Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- Group 4: Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
- Group 5: Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
- Group 6: Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
- Group 7: Noncalcareous silts; noncalcareous silty clays, noncalcareous silty clay loams, and noncalcareous clays.
- Group 8: Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Table 3.5-3. Soil Wind Erodibility Group

Maneuver Corridor	Wind Erodibility Group[1]	Acres	Percent
Primary Maneuver Corridor	NULL[2]	663	3
	1	854	4
	2	17	0
	3	4,521	23
	4	465	2
	5	8,844	45
	6	2,975	15
	7	398	2
	8	832	4
Secondary Maneuver Corridor	NULL[2]	3,568	10
	1	402	1
	2	333	1
	3	5,097	14
	4	894	2
	5	7,236	20
	6	5,567	15
	7	3,334	9
	8	10,094	28

[1] The greater the wind erodibility group rating, the more resistant the soil is to wind erosion.

[2]NULL indicates soil map units that have not been assigned a wind erodibility group.

Soils in the proposed primary maneuver corridor with a wind erodibility group value of 4 or less (more susceptible to wind erosion) constitute 29 percent of the total soils. Soils in the proposed secondary maneuver corridor with a wind erodibility group value of 4 or less (more susceptible to wind erosion) constitute 26 percent of the total soils. Due to the high number of rock fragments or rock outcrops, 28 percent of the soils in the proposed secondary maneuver corridor are shown not to be susceptible to wind erosion at all (group value of 8). Most of these areas are in areas of 30 percent or more slopes.

Hydrologic Groups

Table 3.5-4 and Figure 3.5-4 show the distribution of soil hydrologic groups in the proposed maneuver corridors. Appendix E shows the individual soil hydrologic group value for each map unit.

Table 3.5-4. Soil Hydrologic Groups

Maneuver Corridor	Hydrologic Group	Acres	Percent
Primary Maneuver Corridor	NULL[1]	663	3
	A	1,499	8
	B	2,420	12
	C	5,624	29
	D	9,363	48
Secondary Maneuver Corridor	NULL[1]	3,566	10
	A	1,466	4
	B	3,451	9
	C	14,665	40
	D	13,375	37

[1]Null indicates map units without assigned hydrologic groups.

Hydrologic Groups are based on estimates of runoff potential and permeability. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. (NRCS 2009):

- Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of vertical water transmission.
- Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of vertical water transmission.
- Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of vertical water transmission.
- Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of vertical water transmission.

A majority of the soils in both corridors are rated Group C or D indicating that most of the soils have slow infiltration rates when thoroughly wet which makes them highly susceptible to soil erosion during the wet season at FHL. Hydrology group D soils are limited by high clay content, in many cases montmorillic clays with high shrink-swell potential, which also affects the trafficability of mounted maneuvers (see *Soil Trafficability* discussion below).

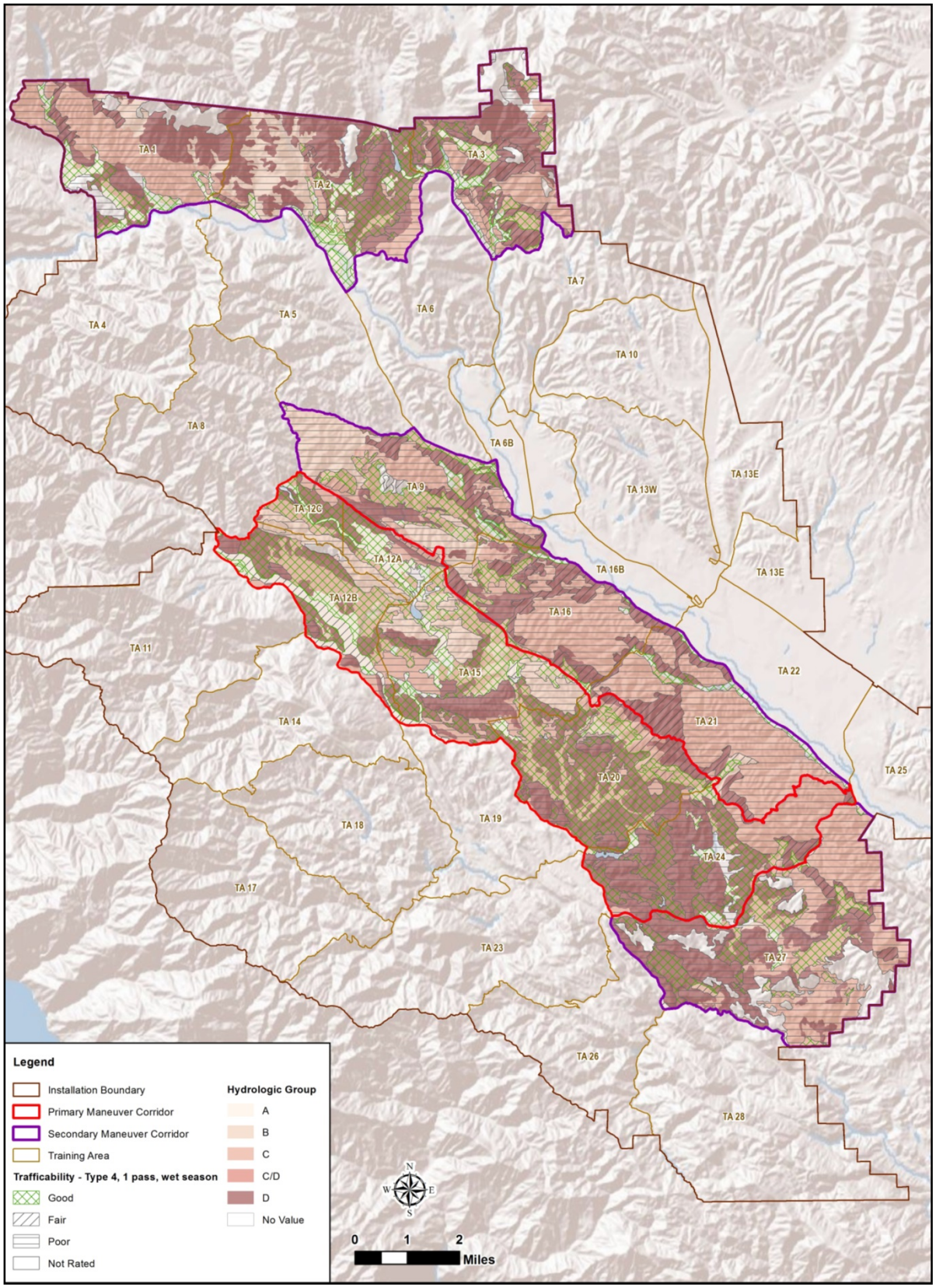

Figure 3.5-4. Soil Hydrologic Groups and Type 4 Military Vehicle Trafficability Suitability

Soil Trafficability

Table 3.5-5 and Figure 3.5-4 show the suitability for a single pass in the wet season with a type 4 military vehicle (e.g., medium-sized tanks, all-wheel-drive trucks and trailed vehicles with low contact pressures including Strykers, and tractors with high contact pressures). For this interpretation, trafficability[7] is the capacity of the soil to support these vehicles during wet periods (single pass). In general, a slight majority of the soils in the proposed primary maneuver corridor have good suitability, while the majority of the soils in the proposed secondary maneuver corridor have poor suitability. While the values in Table 3.5-5 only indicate suitability for a single pass, it is apparent that the soils in the proposed primary maneuver corridor are better suited for trafficability than those in the second maneuver corridor.

Table 3.5-5. Suitability for Type 4 Military Vehicle[1] Operations, Wet Season

Corridor	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Acres	Percent
Primary Maneuver Corridor	Good	10,591	54
	Fair	1,789	9
	Poor	6,948	36
	Not Rated	240	1
Secondary Maneuver Corridor	Good	7,508	21
	Fair	4,934	14
	Poor	21,687	59
	Not Rated	2,394	7

[1]Note: The Army categorizes soil trafficability for category types of vehicles. Military category types range from type 1 through 7 which include vehicle and equipment classes used by the military. As described above, the type 4 category covers a wide variety of vehicles often used for training and would be representative of off-road maneuver vehicles used at FHL, however, as described in Table 2-3, the military could use up to category type 5 vehicles which include Abrams and Bradleys which would further reduce areas suitable for trafficability as these equipment are heavier and have higher contact pressure. Category 6 and 7 are primarily highway vehicles and are not suitable for off-road vehicle maneuvers.

Dry soils provide a more stable surface for maneuvering and training, and in general have a higher strength (weight carrying capacity) as compared to wetter soils. As soil moisture approaches saturation, surface runoff also increases, and the probability for soil water erosion is heightened. Because many of the soils at FHL have mollic epipedons (top horizons), and contain smectitic clays, the stability as well as trafficability of the soils are highly connected with the soil moisture. At FHL, hot periods (frequently 90–100° F and higher) of low humidity (20 percent) typically begin in mid-May and occur with increasing frequency into mid-October. Lows of 32° F and less usually occur by mid-November, although freezes can occur earlier. Figure 3.5-5

[7] Trafficability estimates can be made from terrain data, such as topography data, and from data about soil and weather conditions. Military trafficability interpretations are based on procedures and criteria described in the Army Field Manual 5-430-00-1, *Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations – Road Design,* chapter 7, and are conservative estimates for use in operations planning.

depicts the relationship of precipitation data to the potential risk of saturated soils affecting trafficability.

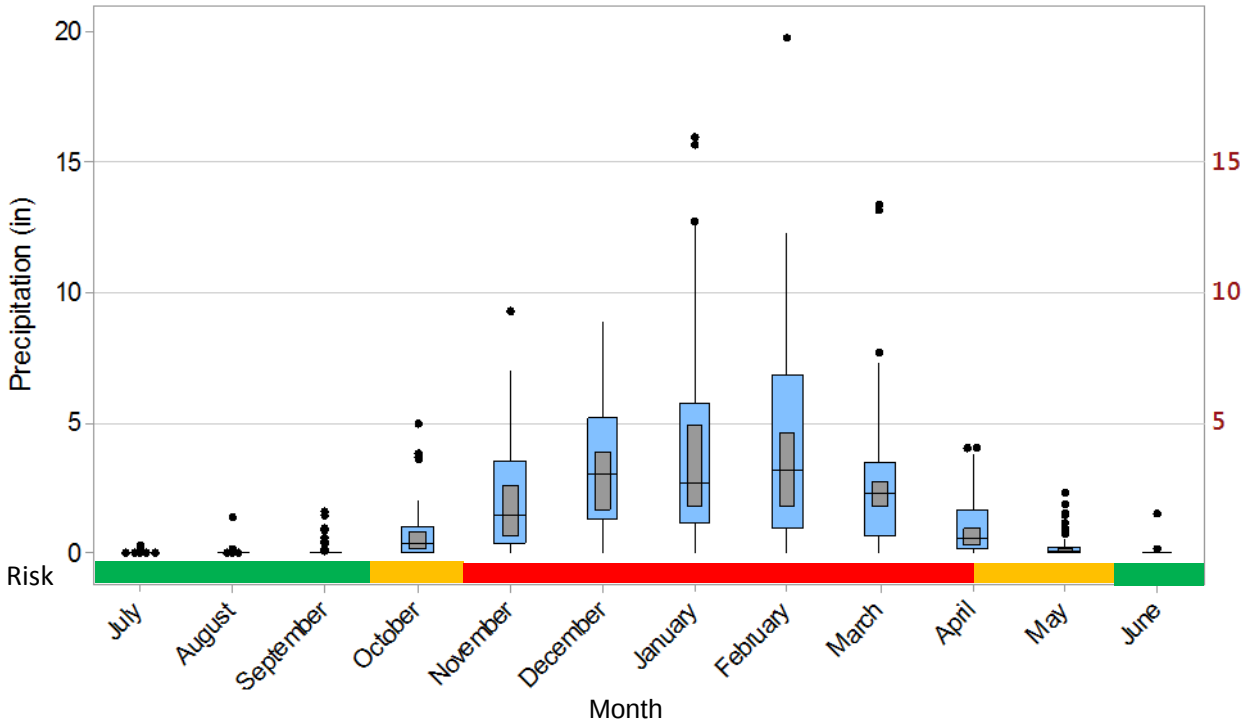

Figure 3.5-5. Risk of Saturated Soils Affecting Soil Trafficability

Source: FHL 2016 (precipitation data)
Figure notes: Blue boxes represent the statistical interquartile range; gray boxes represent the 95 percent confidence mean; black dots represent outliers. Red bars represent periods with greatest risk of saturated soils affecting soil trafficability, followed by orange bars representing moderate risk, and green bars representing periods with the lowest risk.

As shown in Figure 3.5-5, most rain falls November through March, representing the greatest risk of saturated soils affecting trafficability. The risk, however, is also increased in October, April, and May. October marks the start of the wet season, therefore, this month is at moderate risk of having saturated soil conditions as precipitation beings to add moisture into the soil. Additionally, the high risk period can extend into April with moderate risk extending through the month of May. Although measurable precipitation can end during the month of April, saturated subsurface soil conditions could extent into the month of May before the entire soil profile dries out.

These risk categories are evident by past observations at FHL. The relationship between soil moisture content in FHL soils containing smectitic clays and maneuver trafficability has been studied in the past and all valleys on FHL were categorized as "traffic precluded" between November and April due to low trafficability during this time (FHL 1979). Some areas (Lower Stony Valley and Patton area) were even precluded into June due slow dry out times for the soils (evapotranspiration). Soils with high shrink-swell potential may dry on the surface and appear solid, but will collapse if heavy vehicles are driven over them due to high soil moisture levels in

the lower soil horizons. The sticky clay makes it difficult to retrieve the vehicles, and additional soil disturbance can be caused by the retrieval efforts. Figure 3.5-6 shows a Stryker vehicle stuck on FHL in saturated soils. Extensive disturbance to the soils resulting from efforts to retrieve the Stryker from the soil is apparent.

Figure 3.5-6. Stryker Vehicle Stuck in Saturated Soils

In addition, the slope of the soil surface highly influences the stability of the soil. Steeper soils typically promote less water infiltration and more surface runoff. Figure 3.5-1 shows the general terrain and Figures 2-3 and 2-4, along with Table 3.5-1, show slope distribution (areas greater than 30 percent) in the two corridors, respectively.

3.5.1.4 Protection of Geology and Soils

The FHL INRMP oversees the integration of applicable environmental laws and regulations designed to protect natural resources, including soil resources. Ground disturbance from military training are rehabilitated through the ITAM program as a part of the SRP (see Section 2.2.1.5). FHL additionally conducts road and facility repairs that support soil stabilization. Specific BMP's implemented by FHL include the following:

- Erosion gully repair. FHL mechanically fills in or smooth out erosion gullies, thereby reducing or preventing further accelerated erosion. Gullies concentrate and accelerate water flow, increasing the energy of the water, causing detachment and off-site transportation of soil particles. Leveling out the gullies spreads out and slows down the flow of water, reducing the energy of the water and subsequent soil erosion.

- Rut repair. FHL mechanically regrades and levels ruts created by military vehicles during training. Tire or track ruts concentrate water flow, and increases erosion by the same mechanisms as described above. Ruts also have the potential of turning into gullies if left unattended. In addition, soils in ruts are often compacted by the focused weight of the vehicle, which makes it difficult for reestablishment of vegetation.
- Reseeding disturbed areas with native species. FHL repairs areas disturbed by military training and reseeds disturbed areas as practical. Vegetative cover is extremely important for soil stabilization and erosion control. Vegetative cover protects against both wind and water erosion by reducing the likelihood of detachment of individual particles from the soil from forces of wind or impacts of water drops from precipitation events.
- Low-water crossings. FHL repairs training damage and makes improvements to improve training sustainability, including consideration of low-water crossings to reduce disturbance to sensitive riparian soils and to reduce sedimentation and erosion (see Section 3.7.1.5).

The threat of soil pollution from accidental spills during training activities are reduced through the SPCC Plan which includes emergency contacts; response, notification, and reporting procedures; responsibilities of the Installation Response Team; clean-up resources; underground storage tank management; and required training.

Cleanup of hazardous waste or materials is conducted immediately, as safety permits, to prevent spread and further contamination. Cleanup can include minor actions such as mop-up or might require excavation of contaminated soils. Clean-up activities requiring soil excavation are reported to PWE for assessment of adverse effects on sensitive resources.

The FHL INRMP details the above soil protection measures as well as protection measures for rock outcrops. Rock outcrops on FHL are important wildlife habitats and affect water runoff and erosion. Protection measures include prohibition of unauthorized destruction, removal, movement, or use of boulders and rock formations; activities that could degrade the Palisades rock formation and other rock formations; and rappel activities are to be limited to authorized military training at appropriate sites approved to avoid degradation from bolts and erosion by Range Control and PWE (FHL 2012). FHL also prohibits using rock outcrops for live-fire targets.

3.5.2 Environmental Consequences

This section provides a discussion of the environmental impacts to geology and soils that would result from the No Action and Proposed Action alternatives. Impacts were primarily assessed by reviewing soil erodibility potential and determining the potential effects that training and operations would have on soils. Impacts on geology, topography, and soils would be considered significant if:

- The landscape could not be sustained for military training, or
- Excessive soil loss were to impair plant growth.

Table 3.5-6 provides a comparison summary of anticipated level of impacts by alternative.

Table 3.5-6. Summary of Geology and Soil Impacts

Alternative	Negligible	Minor	Moderate	Potentially Significant
No Action	[X]			
Alternative 1		[X]←—	[X][1]	
Alternative 2			[X] ←—	[X][1]
Alternative 3			[X] ←—	[X][1]
Alternative 4	Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse impacts under this alternative.			

[1]Impacts to soil resources could be reduced using impact reduction measures as defined for each alternative.

3.5.2.1 No Action Alternative – Continue Existing Mission and Training Operations

Under the No Action Alternative, there would be no change to current training as described in Section 2.2.1, Continue Existing Mission and Training Operations. Geology and soil resources would continue to be managed and protected through the FHL INRMP as described in Section 3.5.1.4. Direct effects to soils including compaction and loss of soil structure and vegetative cover, as well as indirect effects such as wind and water erosion from military training would continue to be managed in order to maintain the long-term sustainability and availability of lands for military use. Existing land and environmental management programs as described in Section 2.2.1.5 would continue.

3.5.2.2 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 would result in moderate impacts to soil resources; however, the level of impacts could be reduced to minor. The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities. Increased use would intensify the potential for soil disturbance in unimproved locations including increased potential for soil compaction, soil erosion, and soil pollution from accidental spills. These effects, however, would be managed through measures discussed in Section 3.5.1.4.

Direct impacts of off-road vehicle maneuver training includes loss of vegetative cover, soil compaction (increased bulk density), loss of soil structure and strength, disturbance of mollic epipedons (top soil horizons with high organic matter content), and accidental spills of hazardous materials (oils, fuels, solvents). Indirect impacts of off-road vehicle maneuver training include increased wind erosion from disturbed and bare soils, increased surface water runoff caused by decreased water infiltration due to compaction, and from soil particles exposed (from loss of vegetation and from disturbance) to precipitation events during or following training exercises. Soil not directly impacted by maneuvering, but downslope from disturbed areas, would also experience accelerated surface water erosion (due to higher flow) and from deposition of sediment from upslope areas. Erosion would also cause indirect impacts to nearby waterbodies

in the form of suspended sediment (see Section 3.7.2.2). Indirect impacts would include a loss of soil carbon (in the form of soil organic matter).

The types and extent of soil disturbances described above would vary based on the type of vehicle used for maneuvering. Each company could have up to 8 tracked vehicles (e.g., tanks and IFVs) and 4 Strykers (see Table 2-4). Heavy, tracked vehicle maneuvering causes a high degree of soil disturbance compared to that of the lighter, wheeled Stryker vehicles, however, Stryker vehicles can create more soil compaction and rutting.

Direct and indirect impacts associated with off-road vehicle maneuver training would be greater in areas with a low tolerance for erosion (low T-value); greater slopes (15-30 percent slopes); low trafficability; and mollic epipedons (Mollisols). Furthermore, soils with low wind erodibility group ratings that are disturbed when soils are dry during windy conditions are highly susceptible to wind erosion impacts. Soils with hydrologic groups C and D are susceptible to surface water erosion (refer to Sections 3.5.1.2 and 3.5.1.3 for more detailed discussion and locations of these soils).

As discussed in the Section 3.5.1.3, soils on FHL with high smectitic clay content (hydrologic group D) can become very sticky when wet. Under Alternative 1, maneuver training would take place during the dry season. Although precipitation would be minimal during training events conducted in the dry season and the potential for stormwater runoff, erosion, or rutting in the proposed maneuver corridors would be reduced, soils may not dry out until May or later when hot temperatures and little to no precipitation dominates (see Section 3.5.1.3 and Figure 3.5-5). If off-road training maneuvers are conducted early in the dry season before the soils are dry, or late in the season combined with early onset of the wet season, the potential and degree of direct and indirect impacts associated with soil disturbance would be greater.

Direct and indirect impacts to soil resources would be predominantly short-term since off-road vehicle maneuver training would only be executed in FY 16 under Alternative 1. Direct and indirect impacts have the potential to be moderate; however, by implementing ITAM measures as described in Section 3.5.1.4, impacts would be reduced to minor. Prior to training, FHL PWE would coordinate with trainers and units to identify maneuver lanes within the corridors that take into account slopes, erodible soils, and training mission objectives. This includes development of coordination maps for training units identifying areas of highly erodible soils and steep slopes. As part of the Proposed Action, off-road vehicle maneuvers would be restricted to areas containing less that 30 percent slope. FHL would also develop and distribute educational materials for off-road vehicle maneuver units. This would include development of education materials for off-road vehicle maneuver units.

Measures would also include grading and seeding disturbed areas soon after training to allow vegetation to return during the wet season and to reduce short and long-term soil erosion. FHL would continue to implement the Installation Spill Contingency Plan to manage and reduce potential impacts associated with accidental spills of hazardous materials (e.g., oil, fuels, and solvents) and would require units to properly maintain vehicles and equipment for reducing the potential for leaks. This includes conducting inspections to ensure refueling and maintenance sites have appropriate containment measures in place, and that spills are reported, cleaned, and contaminated waste disposed of properly.

This alternative restricts off-road vehicle maneuvers to the dry season, reducing the level of soil and vegetation cover disrupted during large-scale training activities or from individually minor, but collectively significant, training activities. Adverse effects to soils, however, could be further reduced by requiring vehicles to maximum use of established trails and range roads for administrative moves and road marches. Limiting the use of neutral steers would also reduce the level of vegetation cover loss and degree of soil compaction and erosion. Additionally, as needed, FHL would harden troop assembly areas to reduce levels of soil disturbance from assembly activities.

3.5.2.3 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Under Alternative 2, the potential types of impacts to soils would be similar to those described under Alternative 1; however, the potential exists for significant impacts as there would be long-term reoccurring off-road vehicle maneuver training. The level of impacts, however, could be reduced to less than significant. Alternative 2 would also include off-road vehicle maneuvers in the proposed secondary maneuver corridor. As illustrated in Section 2.2.2.2, the proposed secondary maneuver corridor contains less level land (30 percent slope or less), and trafficability is generally poor throughout most of the corridor (refer to Section 3.5.1.3). T-factor values within the proposed secondary maneuver corridor are also low, however, wind erodibility group values are generally favorable (less erosive) compared to the proposed primary maneuver corridor. Annual training would increase potential for reoccurring long-term impacts as compared to Alternative 1. Use of both the proposed primary and secondary maneuver corridors could relieve impacts to the proposed primary maneuver corridor, however, would also increase the potential for soil impacts as the proposed secondary maneuver corridor is prone to water erosion (low hydraulic group values, poor trafficability) and has less tolerance for soil erosion (low T-factor values) as compared to the proposed primary maneuver corridor (see Section 3.5.1.3).

The combined annual training of multiple off-road vehicle maneuver training activities under Alternative 2, and the time and ability of the land to recover could cause significant adverse effects to soil resources. This includes preventing a sustainable landscape for military training and the potential for excessive soil loss. Increased and repeated annual off-road vehicle maneuver training and potential maneuver training in the proposed secondary maneuver corridor could add long-term direct impacts such as compaction, loss of soil structure and strength, loss of vegetative cover and loss of soil carbon. Indirect impacts would be increased surface water runoff and sedimentation of nearby streams because of reduced infiltration (due to compaction from repeated maneuvering) and increased sediment from exposed soils (see Section 3.5.1.3). Indirect impacts could also include increased wind erosion from the greater number of training maneuver days, however, due to the soils being less conducive to wind erosion in the proposed secondary maneuver corridor, this is less likely to happen if the training were to be conducted in the second training maneuver corridor.

FHL would implement measures discussed under Alternative 1 to minimize adverse impacts to soils. Unlike Alternative 1, however, long-term reoccurring off-road vehicle maneuver training has the potential for significant impacts to soils. Under Alternative 2, FHL would avoid significant impacts through the adoption of sediment and erosion control mitigations including a long-term land restoration and monitoring program for off-road vehicle maneuver training as

outlined in Appendix D. Restoration activities would be monitored for implementation and effectiveness, and would be modified to best suit the needs of the installation, the affected soils, and the type of training that caused the impact. FHL would continue to evaluate the successes of mitigation efforts (reestablishment of vegetative cover, erosion control measures) and modify future efforts, if needed, to reach and sustain soil resource management objectives while maintaining land sustainability for the training mission. This would be used to identify methods and locations to reduce long-term disturbance to soil resources. As needed, FHL would also implement rapid response land rehabilitation projects at maneuver sites.

Increased monitoring efforts under Alternative 2 could include short and long-term vegetative cover analysis after training events. Monitoring the land after seeding would ensure that revegetation was successful or that corrective action would be taken to establish acceptable vegetation cover. Since there is a direct correlation between canopy cover and root mass, an example of 70 percent ground cover would ensure that vegetation has matured enough to have developed an acceptable root mass.

Similar to Alternative 1, this alternative restricts off-road vehicle maneuvers to the dry season. Avoidance and minimization efforts under Alternative 2 could also be increased by implementing a model for predicting trafficability based on soil type and moisture content. An early version of such a model was developed for FHL (FHL 1979), and could be used to reduce soil disturbance and erosion from maneuver activities. One of the input factors for the model was weather data, which has the possibility of reducing the likelihood of maneuver training occurring on saturated soils. In addition, if training events were to be scheduled later into the dry season, the likelihood of saturated soils would be greatly reduced.

3.5.2.4 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 would result in potentially significant impacts to soil resources. The potential types of impacts to soils and geology would be similar to those described under Alternatives 1 and 2, however, the addition of a fourth brigade conducting off-road vehicle maneuver training, and the addition of the impact to the proposed secondary maneuver corridor would increase the potential for soil disturbance and the potential for significant impacts to soils described under Alternatives 1 and 2. The level of impacts could be reduced to less than significant, similar to Alternative 2.

3.5.2.5 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Analysis of Alternative 4 at the programmatic level provides a framework and scope for subsequent tiered analysis of environmental impacts. Under Alternative 4, the potential types of impacts to soils and geology would be similar to those described under Alternative 2. Off-road vehicle maneuver training, however, would not be restricted to the dry season and could occur at any period over the 360-day calendar year on an annual basis. The addition of up to four more off-road vehicle maneuver training exercises would also increase the potential for erosion and direct and indirect impacts to soil resources described under the other alternatives. An additional 1-4 brigades training per year, in addition to 3-4 brigades and 9 battalions under the No Action and Alternatives 1 through 3, increases the potential for impacts to soil resources. Brigade and battalion-level exercises require multiple large bivouac sites and staging areas, extensive on-road

maneuvers to include crossing drainages, use of the tank trail and roads between Camp Roberts and FHL, and use of live-fire ranges and other training facilities. The proposed intensity and timing of training may limit land rehabilitation opportunities and the ability to rest sites to allow for vegetation regrowth and soil stabilization. Similar to Alternative 2, avoidance and protection measures and monitoring as described in Section 3.5.1.4 and in Appendix D would reduce adverse effects to soil resources. Additionally, off-road vehicle maneuvers could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain event) to minimize the impacts from rutting and reduce the level of erosion potential. However, due to the intensity of brigade-level training and year-round off-road vehicle maneuver exercises proposed under Alternative 4, the adoption of measures outlined in Appendix D may not be sufficient to reduce impacts from significant levels. Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse effects under this alternative. Information gathered from monitoring described in Appendix D, and the soil trafficability model described in Section 3.5.2.3 would inform subsequent tiered NEPA analysis.

3.5.3 Cumulative Effects

Although off-road vehicle maneuver training has the potential to cause significant impacts to soils, the reasonably foreseeable on- and off-post projects identified in Section 3.1.4 would not cumulatively add to significant adverse effects. On-post projects identified would result in temporary and limited disturbance to soils in the cantonment area and airfield, and permanent soil loss in areas of new facility construction. Construction would be managed in accordance with existing installation plans (e.g., INRMP, SWPPP, SPCC Plan, etc.) and appropriate approvals would be obtained. Temporarily disturbed areas would be restored following construction. Training activities at Camp Roberts could have localized adverse impacts to soil resources within the post; however, Camp Roberts would manage and protect resources similarly to FHL, based on Federal regulatory requirements and the SRP. Limited off-post development projects were identified; therefore, it is assumed that land uses and management of lands surrounding FHL (primarily ranching) would continue. Impact reduction measures identified in Section 3.5, Geology and Soils, would aid in the reduction of long-term cumulative effects to soils on FHL from military training.

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3.6 Transportation

3.6.1 Affected Environment

The following section provides a general description of transportation conditions within and surrounding FHL. The ROI includes public roadways and key access points within and near the installation, and roadways within FHL boundaries.

3.6.1.1 Regional Transportation

Access for virtually all traffic to the installation is via Jolon Road, a public roadway connecting with U.S. Highway 101 near King City, CA and again at Bradley, CA. Jolon Road is also a route for campers and boaters to reach the recreational areas on the San Antonio Reservoir, southeast of FHL. This traffic is heaviest on Fridays and Sundays, and particularly during summer months (FHL 2010). Access roads to FHL are shown on Figure 1-1.

Secondary access to the installation is provided by Nacimiento-Fergusson Road, originating at Highway 1 near the town of Lucia, CA, west of FHL. It is the only east-west connection between the central valley and the Pacific Coast between Monterey, CA (to the north) and Paso Robles, CA (to the south). The western entrance to the installation at Nacimiento-Fergusson Road experiences very little traffic. While it is the only access to the Pacific Coast, it is a low-volume road because of dangerous conditions (e.g., narrow road, sharp turns and switchbacks, and few guardrails). Interlake Road enters the southeastern portion of the installation and intersects Jolon Road approximately 5.7 miles southeast of the installation's main gate. The northwestern portion of the installation can be accessed via Del Venturi Road, which also provides public access to the Los Padres National Forest, wilderness areas, and to a small number of private holdings northwest of the installation (FHL 2010).

Open public access to the installation is generally permitted on Nacimiento-Fergusson and Del Venturi Roads. Monterey County maintains Jolon and Interlake roads and access to those roads is not controlled by the installation. All other roads within FHL are closed to public access without a permit issued by Range Control. Sources of civilian traffic (i.e., people not associated with the Army) include San Antonio Mission (historic church and regular worship services), public hunting and fishing, entertainment facilities (bowling alley and movie theater), and construction contractors. On-installation residents travel to the local communities of King City or Paso Robles for entertainment, dining, or shopping. King City is approximately 25 miles west from the FHL cantonment area; Paso Robles is approximately 40 miles to the south (FHL 2010).

Level of service (LOS) C is the standard for all local county roads in Monterey County, with the exception of those that serve community areas, in which an LOS D standard is allowed. LOS on local roads and highways near FHL is LOS C or better with the exception of Jolon Road several miles north of FHL between Highway 101 and San Lucas Road. This segment is LOS D and is projected to achieve LOS F by 2030 under current plans identified within the County General Plan without local improvements. This road segment is near King City, California, north of the cantonment area away from the main gate. In addition, Highway 101 between Central Avenue

> Level of service (LOS) is a qualitative measure of operating conditions within a traffic stream and their perception by motorists and passengers. LOS designations are used to describe the operating characteristics of the road network in terms of the level of congestion or delay experienced by traffic. Individual LOSs are designated by letters "A" for most favorable to "F" for least favorable, with each representing a range of conditions.

and Jolon Road (currently LOS C) is projected to reach an LOS E under 2030 buildout projections. This road segment is a small interchange off of Highway 101 near King City (Monterey County 2008).

3.6.1.2 Fort Hunter Liggett Roadway Network

FHL has approximately 700 miles of maintained roads and tank trails. Mission Creek Road, Del Venturi Road, and Infantry Road are important links in the installation's roadway network. Other unpaved roads provide access to training lands for maneuvers, operations, and fire control. With a few exceptions, roads outside of the cantonment area are limited to public access and require a permit for entry issued by Range Control (FHL 2004). Currently, FHL restricts all vehicles to installation road and tank trails.

The existing cantonment area roads are in good condition and adequately support current traffic loads, missions, and mission-support requirements; however, continued maintenance is required to avoid deterioration (FHL 2010). The installation's main gate is located on Jolon Road.

There is no railroad on FHL, therefore, no equipment is directly transported to FHL via rail. The nearest railhead is at Camp Roberts, to the southeast (see Figure 1-1). Air access to FHL is provided by Tusi Army Heliport and the Schoonover Airfield (FHL 2004).

3.6.1.3 Convoy Route between Camp Roberts

FHL is connected to Camp Roberts by an approximately 17-mile long unimproved tank trail (see Figure 1-1). The trail is a perpetual easement to the Army by the Monterey County Water Resources Agency. Although this tank trail is used year-round by the military to transport units and equipment between FHL and Camp Roberts, the majority of its use occurs in spring and summer. Typically, 10-15 vehicles per week use the trail; however, up to 120 vehicles per day may use the trail during peak usage. Units convoy in smaller groups (e.g., 6-8 vehicles), and are scheduled appropriately to prevent overcrowding of the route. Table 2-3 lists the various tracked and wheeled vehicles and equipment assigned to units training at FHL. Weight and dimensions of this equipment greatly vary. For example, an M1A2 Abrams tank weighs approximately 62.5 tons and is approximately 7.9 feet (2.4 meters) tall by 11.5 feet (3.5 meters) wide. Stryker vehicles, in comparison weigh approximately 18 tons and are 8.7 feet (2.6 meters) tall by 9 feet (2.7 meters) wide.

Units can arrive at FHL either (1) via railhead at Camp Roberts, and travel up the tank trail to the FHL cantonment area, or (2) on trailers or trucks via Highway 101 and Jolon Road. Typically, vehicle convoys are broken into groups of approximately 25 vehicles each, in which each vehicle travels approximately 15 feet (4.6 meters) away from the next vehicle. Convoy groups are scheduled with adequate time in between groups to limit congestion and overcrowding of roadways. Vehicles transported on public roadways abide by applicable California Department of Transportation (CALTRANS) width and weight restrictions. Units obtain applicable CALTRANS permits or approvals as needed prior to roadway convoys. FHL would notify media outlets and the public in advance of large planned convoy operations, identifying the route, anticipated times of operations and delay periods.

3.6.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to transportation resources that could result from the No Action and Proposed Action alternatives. Impacts were

primarily assessed by reviewing existing traffic conditions of public roadways and the existing convoy trail, and the types and frequency of activities that may require use of these roadways. Impacts to transportation would be considered significant if Army actions:

- Permanently reduce traffic conditions by more than two LOS at roads and intersections within the ROI.
- Exceed road capacity and design.

Table 3.6-1 provides a comparison summary of the anticipated level of impacts.

Table 3.6-1. Summary of Transportation Impacts

Alternative	Negligible	Minor	Moderate	Significant
No Action		[X]		
Alternative 1		[X]		
Alternative 2		[X]		
Alternative 3		[X]		
Alternative 4			[X]	

3.6.2.1 No Action Alternative – Continue Existing Mission and Training Operations

Selecting the No Action Alternative would result in minor adverse effects to transportation. Under the No Action Alternative, training activities would likely continue under current levels as described in Section 2.2.1, Continue Existing Mission and Training Operations. This alternative involves continuing existing training missions at FHL. Range training and maintenance activities would occur in accordance with existing procedures, including remaining on installation roads during training. FHL would continue its current use of roadways and convoy routes.

There are currently up to 1,500 vehicles per brigade training exercise, or up to 4,500 vehicles for three brigade training exercises per year that travel to FHL annually and use installation roads over the course of a 14 to 35 day brigade training event. In addition, as shown in Table 2-2, up to 280 vehicles could travel to FHL annually per battalion exercise, or at most 2,520 vehicles for all nine battalion exercises. Therefore, up to 7,020 vehicles per year could travel to FHL and use installation roads during training. This results in short-term increases in vehicle traffic on installation roads, local roads, and the tank trail between FHL and Camp Roberts during brigade training events as well as immediately prior to and following these events to allow for arrival and departure. No off-road training involving vehicles would occur at FHL.

There are no notable traffic or congestion problems in or around FHL. Roadways on FHL have few driving constraints with a low volume of traffic and a controlled environment. The existing cantonment area roads are in good condition and adequately support current traffic loads, missions, and mission-support requirements; however, upgrades and maintenance would be required over time as the mission and traffic load continues. Use of tracked military vehicles

could especially be damaging to asphalt roadways. Unit training and vehicle movement on the installation would continue to result in long-term adverse effects on installation roads which would be mitigated through continual maintenance, as necessary.

Military convoys en route to FHL would continue to have the potential to result in accidents on the road network (e.g., Jolon Road, Highway 101) leading to the installation. In addition, unit training and vehicle movement on the installation would continue to result in the potential for accidents between military and civilian vehicles. FHL would continue to coordinate with CALTRANS and adhere to notification practices in order to increase public awareness of convoy operations and limit conflicts with public use of highways and local roads as described in Section 3.6.1.3.

Training would continue to require short-term, temporary road closures of Del Venturi and Nacimiento Roads, which provide access to remote areas outside of the installation, including to private holdings, as well as to the coast. Road closures would last for approximately 30 minute intervals and then re-open. Posted signs indicate the potential for road closures prior to entering FHL.

3.6.2.2 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 would result in short-term, minor and temporary adverse impacts. Units would arrive in the cantonment area prior to traveling to the proposed primary maneuver corridor using installation roads, consistent with existing training. The type of impacts from convoy operations and on transportation infrastructure would be similar to the No Action Alternative; however would be temporarily increased during FY 16 with the addition of one brigade-level exercise.

Upon reaching the proposed primary maneuver corridor, off-road training using both tracked and wheeled vehicles would occur within the designated maneuver areas as defined in Section 2.2.2.2 and based on restrictions discussed in Section 2.2.1.4. Under Alternative 1, there could be up to 1,500 vehicles traveling to FHL and using installation roads over the course of a 14 to 35 day brigade training event, or up to 6,000 vehicles from all four brigade training events during FY 16. An additional 3,320 vehicles would also travel to FHL for battalion exercises during FY 16 (i.e., up to 200 vehicles per exercises for the four battalions incorporated into brigade training events, and up to 280 vehicles per exercise for the nine individual battalion events), for a total of 9,320 vehicles traveling to FHL per year under Alternative 1. This would be an increase in vehicles currently traveling to the installation during FY 16 (by one brigade and four battalions) compared to the existing levels which occurred in FY 14 and FY 15 described under the No Action Alternative.

The addition of one brigade-level exercise would result in increased use of roads and trails, which would increase potential for degradation of the transportation network within FHL and the convoy route. There would be temporary increases in traffic on local and installation roads during FY 16, particularly when units arrive and depart, compared to the No Action Alternative. Alternative 1 would not result in significant wear and tear or substantially change existing use of installation roads, and would be conducted in FY 16 only. Similar to the No Action Alternative, effects on installation roads would be mitigated through continual maintenance, as necessary. Long-term impacts on primary, secondary, and local public roadways would not occur from daily operations.

FHL would continue to coordinate with CALTRANS and adhere to notification practices in order to increase public awareness of convoy operations and limit conflicts with public use of highways and local roads as described in Section 3.6.1.3. Although roadways can support the convoy traffic, to reduce traffic conflicts, movements could be scheduled to avoid peak traffic periods. To increase public awareness of convoy operations, FHL could place intelligent signage along the convoy route to alert the traveling public on Highway 101 of planned convoy operations or those in progress, identifying the anticipated times of operations and potential delays, if any. In addition, FHL's federal police would force patrols, conduct speed checks and respond to accidents or safety concerns on FHL roadways.

3.6.2.3 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Alternative 2 would result in long-term, minor adverse impacts. Units would arrive and train in the proposed maneuver corridors, similar to Alternative 1; however, training would also be conducted in the proposed secondary maneuver corridor. The type of impacts from convoy operations and on transportation infrastructure would be comparable to the No Action Alternative levels (three brigades) and require sustained maintenance on installation and local roads, result in temporary increases in road or rail traffic, result in temporary closures of installation roads, and cause the potential for vehicle incidents. Similar to the No Action Alternative, there could be up to 1,500 vehicles traveling to FHL and using installation roads over the course of a 14 to 35 day brigade training event, or up to 4,500 vehicles per year from all three brigade training events. An additional 3,120 vehicles would also travel to FHL for battalion exercises (i.e., up to 200 vehicles per exercises for the three battalions incorporated into brigade training events, and up to 280 vehicles per exercise for the nine individual battalion events), for a total of 7,620 vehicles traveling to FHL per year. This would be an increase in vehicles currently traveling to the installation each year (by three battalions) compared to the existing levels which occurred in FY 14 and FY 15 described under the No Action Alternative.

FHL would continue to coordinate with CALTRANS and could implement impact reduction measures described under Alternative 1 to reduce potential for conflicts between convoys and other traffic, and promote awareness of convoy operations. Long-term impacts on primary, secondary, and local public roadways would not occur from daily operations.

3.6.2.4 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 would result in long-term, minor adverse impacts. Units would arrive and train in the proposed maneuver corridors, similar to Alternatives 1 and 2. Similar to Alternative 2, training would also be conducted in the proposed secondary maneuver corridor and would be conducted annually. The type of impacts from convoy operations and on transportation infrastructure would be comparable to the No Action Alternative; however, the addition of one brigade level exercise annually would increase the need for sustained maintenance on installation and local roads, result in temporary increases in road or rail traffic, result in temporary road closures of installation roads, and cause the potential for vehicle incidents.

Under Alternative 3, the addition of one brigade-level exercise would increase the number of vehicles traveling to and training on FHL each year to 9,320 vehicles, similar to as described under Alternative 1; however, vehicles would travel to FHL annually. This would result in

increases in traffic on local and installation roads as well as other traffic-related impacts (by one brigade and four battalions) when compared to existing conditions currently experienced under the No Action Alternative.

FHL would continue to coordinate with CALTRANS and could implement impact reduction measures described under Alternative 1 to reduce potential for conflicts between convoys and other traffic, and promote awareness of convoy operations. Long-term impacts on primary, secondary, and local public roadways would not occur from daily operations.

3.6.2.5 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Alternative 4 would result in long-term, moderate adverse impacts. Units would arrive and train in the proposed maneuver corridors, similar to the other Proposed Action alternatives. Similar to Alternatives 2 and 3, training would also be conducted in the proposed secondary maneuver corridor. The type of impacts from convoy operations and on transportation infrastructure would be comparable to the No Action Alternative and require sustained maintenance on installation and local roads, rail traffic, and cause the potential for vehicle incidents. Under Alternative 4, there could be up to 1,500 vehicles traveling to FHL and using installation roads over the course of a 14 to 35 day brigade training event, or up to 7,500 and 12,000 vehicles each year from between five and eight brigade training events. Between 3,620 and 8,620 additional vehicles would also travel to FHL for battalion exercises (i.e., up to 200 vehicles per exercises for the five to eight battalions incorporated into brigade training events, and up to 280 vehicles per exercise for the nine individual battalion events), for a total of 11,020 to 16,120 vehicles traveling to FHL per year. Impacts would be higher under Alternative 4 as there could be almost twice the amount of vehicle traffic compared to Alternatives 1 and 3 and over double the amount of traffic compared to Alternative 2. The potential for transportation impacts would increase (by up to 5 additional brigades and eight additional battalions) from FY 14 and FY 15 training levels as described under the No Action Alternative within this EA.

FHL would continue to coordinate with CALTRANS and could implement impact reduction measures described under Alternative 1 to reduce potential for conflicts between convoys and other traffic, and promote awareness of convoy operations. Because no long-term impacts on primary, secondary, and local public roadways would occur from daily operations, impacts to transportation under the Proposed Action would not be significant.

3.6.3 Cumulative Effects

The Proposed Action could occur concurrently with other proposed projects throughout the area, which could result in temporary increases in traffic on FHL roadways. Construction of projects identified in Section 3.1.4 would be concentrated in the cantonment area, away from the proposed maneuver corridors, and traffic impacts would occur only when military vehicles are staging in the cantonment or utilizing the wash rack. Military units transiting to the installation would utilize alternate entrances as construction vehicles traffic or the tank trail, limiting impacts to gate traffic. Long-term impacts to FHL roadways would be minor from combined usage of military vehicles and construction traffic.

Training activities at Camp Roberts would not have a direct cumulative effect on transportation within and surrounding FHL. The increased use of Camp Roberts by other military units,

however, could place additional strain on FHL roadways, convoy route, and public roadways if all of these units were to also train at FHL. As FHL does not foresee increases in training levels beyond those analyzed in the 2010 EA, and training at Camp Roberts by other military units does not directly translate into training of these units at FHL, cumulative effects would be less than significant.

Existing convoy routes and coordination with CALTRANS and the public would continue to mitigate potential adverse traffic impacts. LOS degradation concerns on surrounding roads would be reduced by implementation of projects and mitigation measures adopted in the 2010 Monterey County General Plan and through local planning by municipalities (Monterey County 2010). There are no other projects identified in Section 3.1.4 that when carried out with the Proposed Action would contribute to significant adverse cumulative effects to traffic and transportation. This includes all current and reasonably foreseeable activities on FHL, and uses adjacent to FHL, such as nearby agricultural activities. Therefore, the overall cumulative effects on transportation resources would be minor.

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3.7 Surface Waters and Wetlands

3.7.1 Affected Environment

The following section provides a general summary of surface waters and wetlands within FHL. The ROI for surface waters includes watersheds and state-designated stream segments associated with the proposed maneuver corridors. The ROI for wetlands includes USACE jurisdictional "waters of the U.S." and wetland resources within the proposed maneuver corridors.

3.7.1.1 Surface Waters

A **watershed** is a land area bounded by topography that drains water to a common destination. Watersheds drain, capture, filter, and store water and determine its subsequent release.

FHL is within the San Antonio River and Nacimiento River watersheds, which cover approximately 700 square miles (FHL 2012). These two rivers flow parallel through FHL, approximately 5 miles apart from the northwest to the southeast. The San Antonio River watershed on FHL includes all or major portions of the northeastern half of the installation. The headwaters for the San Antonio River are in the Cone and Junipero Serra Peaks. The San Antonio River flows for 25 miles through FHL. The headwaters for the Nacimiento River are in the Santa Lucia Range, south of Cone Peak. Water discharges through the man-made Lake Nacimiento and San Antonio Reservoir to the Salinas Valley Basin. Both rivers drain into the northwest-flowing Salinas River, which empties into Monterey Bay. FHL flow regimes are seasonal; the upper San Antonio River is fed by springs, while the lower portion has an intermittent flow. Much of the Nacimiento River is dry during summer months. Water features on FHL are depicted in Figure 3.7-1.

Both rivers are dammed to the southeast of FHL. The San Antonio River dam is 10 miles downstream from FHL, and the Nacimiento dam is approximately 10 miles downstream. The San Antonio Reservoir is at the lowest elevation of the installation at approximately 760 feet (232 meters) above mean sea level in the southeastern comer of the installation. The Nacimiento Reservoir is several miles south of the installation. The reservoirs are used for irrigation, flood control, and recreation. Numerous creeks exist on FHL, along with the Lake San Antonio shoreline and 14 impoundments that provide aquatic and riparian habitat. These impoundments are located throughout FHL in both watersheds.

As depicted in Figure 3.7-1, the proposed primary maneuver corridor is located in watersheds that primarily drain to the Nacimiento River. Portions of training areas within the proposed primary maneuver corridor are also located in the San Antonio River watershed; however, these areas primarily include slopes greater than 30 percent, the established slope threshold for off-road training. The secondary maneuver corridor areas are located in watersheds that primarily drain to the San Antonio River, with the exception of the proposed secondary maneuver corridor located in training area 27, which drains into the Nacimiento River. Stormwater runoff in the form of overland flow in these maneuver areas would drain to these respective waterbodies.

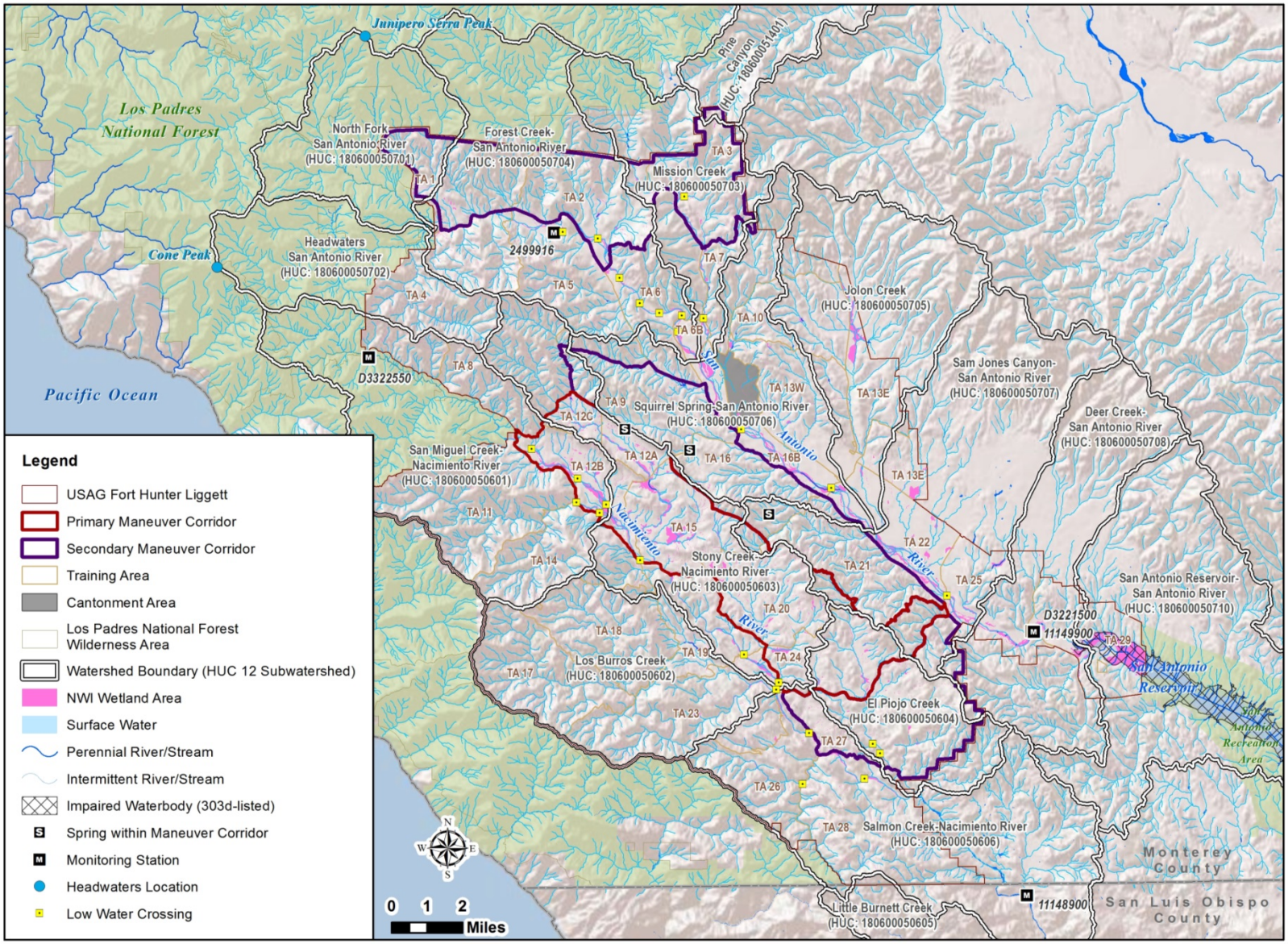

Figure 3.7-1. Surface Water Features and Wetlands at Fort Hunter Liggett, California

3.7.1.2 Wetlands and Vernal Pools

Wetlands. Wetlands are transitional areas between upland and aquatic systems that are saturated with water or covered by shallow water at some time during the growing season. In addition, they support hydrophytic (water tolerant) vegetation and have a substrate of hydric soils (Cowardin et al. 1979).

Wetlands are protected under Section 404 of the Clean Water Act (CWA) and EO 11900, *Protection of Wetlands*. In accordance with the CWA, FHL avoids disturbances to, or filling in, of potential wetlands to the greatest extent practicable. If necessary, FHL consults with the U.S. Army Corps of Engineers (USACE) for jurisdictional determination and possible permitting for unavoidable wetlands disturbance. Wetland management on FHL consists of all elements related to compliance with the CWA, Section 404, as well as applicable EOs, Army regulations, and state laws. The FHL wetlands management program adheres to provisions of the CWA to ensure protection from irresponsible and unregulated discharges of dredged or fill material that could permanently alter or destroy valuable water resources. The goal of the wetlands management program is no net loss of wetlands, which is in accordance with EO 11990 and the CWA (FHL 2012).

Wetlands on FHL are recognized by their relatively shallow, slow-moving or stationary water, or wet to moist soils with hydrophytic plants, generally found in landscape depressions. There are both jurisdictional and nonjurisdictional wetlands at FHL. Two rivers, the San Antonio and Nacimiento, and a network of tributaries throughout their respective watersheds, compose the majority of the jurisdictional waters and adjacent jurisdictional wetlands on the installation.

Wetlands on FHL fall into two broad categories, ephemeral wetlands and perennial wetlands. Ephemeral wetlands have two phases, a wet season phase that is dependent on fall and winter rains to fill pools and depressions, and a dry season phase brought about by a lack of rain in the summer. On FHL, ephemeral wetlands include vernal pools, wet meadows, and vernal swales. Perennial wetlands maintain some level of soil saturation or water throughout the year. Perennial wetlands on FHL include reservoirs/lakes, and freshwater marshes (FHL 2004).

Wetlands within the proposed primary and secondary maneuver corridors as identified by the USFWS National Wetland Inventory are shown in Table 3.7-1 and are shown on Figure 3.7-1. The majority of wetlands within the proposed maneuver corridors are temporary, seasonal, associated with intermittent streams (i.e., riverine wetlands), or otherwise only contain water during the wet season. Wetland boundaries are approximate.

Table 3.7-1. NWI Jurisdictional Waters within Maneuver Corridors

Feature	Primary Maneuver Corridor		Secondary Maneuver Corridor	
	Perennial[1] (acres)	Ephemeral or Intermittent[2] (acres)	Perennial[1] (acres)	Ephemeral or Intermittent[2] (acres)
Freshwater Emergent Wetland	0	595.0	.2	193.2
Freshwater Forested/Shrub Wetland	0	294.8	1.2	251.5
Freshwater Pond	3.2	19.7	30.2	16.9
Lake	57.8	0	0	0
Riverine	0	453.7	0	549.5
Total	**61**	**1,363.2**	**31.6**	**1,011.1**

Source: USFWS 2015

[1] "Perennial" indicates water or saturation is present within the feature for most of the year.

[2] "Ephemeral or Intermittent" indicates water or saturation is present within the feature, seasonally or following rainfall events.

Vernal Pools. Vernal pools are a special category of wetlands. Vernal pools are seasonal pools and are difficult to detect because of their often small size and seasonal inundation. These pools occur in limited environmental settings and contain sensitive species (see Section 3.3, Natural Resources). Vernal pools are sensitive to development, erosion, compaction, fill, and other disturbances.

3.7.1.3 Surface Water Quality

Surface water quality is dependent upon many factors including amount and timing of rainfall, retention, recharge, and runoff; soil conditions such as erodibility and recharge capacity; and influences by humans.

Surface water quality depends on seasonal flow regimes. Within this region of California, sediment loading of streams and rivers occurs in early winter as a result of heavy seasonal rains that wash large quantities of debris and sediments from the landscape. Generally, nutrients that have accumulated in the soil over summer can be transported into surface water by runoff and potentially leach into groundwater. During summer, rapid evaporation of surface waters can result in increased mineral concentrations and subsequent microbial blooms.

The Central Coast Regional Water Quality Control Board develops and enforces water quality objectives within the region to provide the highest water quality reasonably possible. Water quality objectives are considered to be necessary to protect those present and probable future beneficial uses of waterways and to protect existing high quality waters of the state. Specific water quality objectives for the major surface waters on or flowing through FHL are shown in Table 3.7-2.

Table 3.7-2. Surface Water Quality Objectives

Waterbody[1]	TDS (mg/L)	Cl (mg/L)	SO_4 (mg/L)	B (mg/L)	Na (mg/L)
Nacimiento River	200	20	50	0.2	20
San Antonio River	250	20	80	0.2	20

Source: Central Coast RWQCB 2011

[1]The Nacimiento and San Antonio Rivers have 12 and 14 RWQCB-designated beneficial uses, respectively, as designated by the RWQCB. Both rivers have the following beneficial uses: agricultural supply; cold freshwater habitat; commercial and sport fishing; freshwater replacement; groundwater recharge; municipal and domestic supply; rare, threatened, and endangered species; water contact recreation; non-contact water recreation; spawning, reproduction, and/or early development; warm freshwater habitat; and wildlife habitat. Also, the San Antonio River has designated beneficial uses for industrial service supply and migration of aquatic organisms

B = boron; Cl = chloride; mg/L = milligrams per liter; Na = sodium; SO_4 = sulfate; TDS = total dissolved solids

All inland surface waters are also subject to specific objectives for color; tastes and odors; floating material; suspended material; settleable material; oil and grease; bio stimulatory substances; sediment; turbidity; pH; dissolved oxygen; temperature; toxicity; pesticides; chemical constituents; other organics; and radioactivity. In addition, each beneficial use is prescribed certain water quality objectives for specific parameters or constituents. Water quality objects are detailed in the Water Quality Control Plan for the Central Coast Basin (Central Coast RWQCB 2011).

A **Total Maximum Daily Load (TMDL)** is a regulatory term in the U.S. Clean Water Act, describing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

Section 305(b) of the CWA requires states to assess and report the quality of their waterbodies. The Central Coast Regional Water Quality Control Board prepared the 2010 Integrated Report pursuant to Sections 303(d) and 305(b) of the CWA. Section 303(d) of the CWA (33 USC 1313(d)) requires states to classify waters that do not meet designated water quality standards as "impaired" waterbodies. Stream segments that do not fully support their classified uses are defined as impaired and placed on the Section 303(d) List of Impaired Waters. The San Antonio Reservoir and Nacimiento Reservoir are listed as impaired for Mercury (sources unknown), and the Nacimiento River is listed as impaired for metals (natural sources and surface mining); however a total maximum daily load (TMDL) is still needed for this waterbody (SWRCB 2010).

3.7.1.4 Water Quality Monitoring

USGS conducts annual surface water quality monitoring at one site along the Nacimiento River, just outside of the FHL installation boundary, and one site along the San Antonio River within the installation boundary. Both locations are located downstream of the proposed maneuver areas (see Figure 3.7-1). Data from these sources is generally limited, but provides a representation of FHL water quality leaving the installation and can be used to assess historical trends of sediment discharges from the major drainages of FHL. Monitoring data of suspended

sediment concentration[8], in particular, is important factor to consider within this EA as it can inform existing levels of erosion.

Additional water quality data is available on the USEPA STORET (STOrage and RETrieval) water quality database for one monitoring point each along the Nacimiento River (a location downstream of the proposed maneuver corridors) and San Antonio River (a location upstream of the proposed maneuver corridors) (see Figure 3.7-1). Data from these sources, however, is also limited and not directly comparable to USGS water quality monitoring. The USEPA STORET data measures conductivity (or specific conductance) which is a measure of a solution's ability to conduct electricity. Available data indicates generally low conductance in waterbodies entering the installation (typical freshwater streams range from 100 to 2,000 µS/cm) (SWRCB 2004). There are no water quality objectives for conductivity in the Central Coast Basin; however, conductance can be correlated with the amount of dissolved material in the water. High specific conductance indicates high dissolved-solids concentrations, which can affect the suitability of water for domestic, industrial, and agricultural use.

FHL monitors surface water as part of a stormwater monitoring program. Runoff is monitored at five points within the Cantonment area for petroleum, pH, volatile organic compounds, and total suspended solids. Points that are monitored for stormwater events are located on the San Antonio River at Nacimiento Road and at Sam Jones Road. FHL does not monitor stormwater quality for stormwater entering the Nacimiento River, as this is located away from the cantonment area and large areas of impervious surfaces. No other water quality monitoring data is collected for the Nacimiento River to establish baseline water quality.

The INRMP identifies the need to further define sediment and nutrient loads in the headwaters (northwest of FHL on U.S. Forest Service [USFS] lands, outside of installation influence) of both the San Antonio and Nacimiento rivers in order to assess whether military activities affect these parameters (FHL 2012). There is no water quality monitoring data available for dissolved solids in water bodies within or immediately downstream of FHL; however, as stated, suspended sediment concentrations can inform existing levels of erosion. Available data indicates generally low mean suspended sediment concentrations leaving the installation. Additional water quality monitoring is necessary to further quantify existing levels of erosion due to installation activities. Table 3.7-3 presents available water quality data for USGS monitoring stations since 2010. As data from USEPA monitoring stations is limited, the most recently available data is presented.

[8] Note: The Central Coast Regional Water Quality Control Board has set standards for TDS (refer to Table 3.7-2). Dissolved solids refer to any minerals, salts, metals, cations or anions dissolved in water. TDS is directly related to the purity of water and can comprise of inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter that are dissolved in water. The USGS measures suspended solids or sediments which are particles that are larger than 2 microns found in the water column; anything smaller than 2 microns (average filter size) is considered a dissolved solid. These solids include anything drifting or floating in the water, from sediment, silt, and sand to plankton and algae. Suspended solids are a significant factor in observing water clarity, the more solids present in the water, the less clear the water will be.

Table 3.7-3. Water Quality Data for Stream Monitoring Sites near FHL

Station ID	USGS 11148900 (Nacimiento River near Bryson, CA) - Downstream				USGS 11149900 (San Antonio River near Lockwood, CA) - Downstream				EPA D3221500 (San Antonio River near Lockwood, CA) - Downstream				EPA D3322550 (Nacimiento River near Jolon, CA) - Upstream				EPA 249916 (San Antonio River above Bear Canyon Circle) - Upstream			
Date Range	12/1/2010 – 12/1/2015				12/1/2010 – 12/1/2015				6/5/2000 – 6/6/2005				6/5/2000 – 6/6/2005				6/16/2011			
Statistics	# of samples	Min	Max	Mean	# of samples	Min	Max	Mean	# of samples	Min	Max	Mean	# of samples	Min	Max	Mean	# of samples	Min	Max	Mean
Temp (°C)	103	6	24.5	13.5	136	8	20	14.7	3	12	27	19	4	8	16		1	18.3	18.3	18.3
Instantaneous Discharge (cfs)	103	0.1	4,560	285	186	0	2,440	188	--	--	--	--	--	--	--	--	--	--	--	--
Suspended sediment concentration (mg/L)	90	1	199	6.7	66	>0.5	203	19.1	--	--	--	--	--	--	--	--	--	--	--	--
Specific conductance (µS/cm)	--	--	--	--	--	--	--	--	3	400	476	434.3	4	268	398		1	337.3	337.3	337.3
pH	--	--	--	--	--	--	--	--	2	7.7	8.2	8	3	7.7	8		1	7.46	7.46	7.46

Sources: USEPA 2015f; USGS 2015.

°C=degrees Celsius; cfs=cubic feet per second; mg/L=milligrams per liter; µS/cm=microsiemens per centimeter

As previously stated, the potential for sedimentation generally correlates to precipitation and with the ephemeral characteristics of these waterbodies, as these rivers typically do not flow during the dry season. The wet season typically begins around October or November, and continues through March or April. The majority of precipitation and primary times of river flow are observed during this period. Refer to Section 3.3, Natural Resources for further discussion of the dry and wet seasons.

3.7.1.5 Water Resource Management

FHL maintains and implements soil erosion controls measures for existing training as detailed in the INRMP that limit erosion and sedimentation of waterways on FHL (also refer to Section 3.5.1.4). Short- and long-term land rehabilitation efforts are programmed and planned for using the SRP, which limits long-term impacts to water resources at FHL by monitoring training activities and instituting projects to minimize training damage following training events (see Section 2.2.1.5). FHL implements BMPs to reduce impacts to water resources such as projects that provide erosion control for waterways, reduce safety hazards from gullies, and reseed disturbed areas.

Multiple low-water crossings currently exist within training areas of the proposed maneuver corridors. Low-water crossings allow vehicles to cross waterways at designated locations to minimize effects on the resources. FHL limits vehicle travel within 66 feet (20 meters) of streams and established crossings per FHL Regulation 350-2.

FHL pollution prevention measures include the SPCC Plan, and the industrial SWPPP, as detailed in the INRMP. FHL's SWPPP, however, is limited to activities within cantonment and tactical training base locations and does not apply to training activities. FHL is currently developing a stormwater master plan for the cantonment and tactical training base locations; no plans exist or are currently in development for the training areas.

3.7.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to surface water and wetlands that could result from the No Action and Proposed Action alternatives. Impacts to surface waters and wetlands would be considered significant if Army actions:

- Result in an excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs,
- Result in unpermitted direct impacts to waters of the U.S,
- Substantially affect surface water drainage or stormwater runoff, including floodwater flows, or
- Do not comply with policies, regulations, and permits related to wetlands conservation and protection.

Table 3.7-4 provides a comparison summary of the anticipated level of impacts.

Table 3.7-4. Summary of Surface Water and Wetland Impacts

Alternative	Negligible	Minor	Moderate	Potentially Significant
No Action	[X]			
Alternative 1			[X]	
Alternative 2			[X] ← [X][1]	
Alternative 3			[X] ← [X][1]	
Alternative 4	Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse impacts under this alternative.			

1. Impacts to surface waters and wetlands could be reduced using impact reduction measures as defined for each alternative.

3.7.2.1 No Action Alternative – Continue Existing Mission and Training Operations

Under the No Action Alternative, there would be no changes to current training at FHL as described in Section 2.2.1, Continue Existing Mission and Training Operations. Surface waters and wetlands would continue to be managed through the FHL INRMP and protected per Federal and state regulations and as described in Section 3.7.1.5. Indirect disturbances of erosion and sedimentation from military training would continue to be mitigated through the SRP efforts in order to maintain the long-term sustainability and availability of lands for military use. Existing land and environmental management programs as described in Section 2.2.1.5 would continue.

3.7.2.2 Alternative 1: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (One Training Year Only)

Alternative 1 would result in minor to moderate impacts to surface waters and wetlands. The addition of one brigade-level exercise would result in increased use of roads, bivouac sites, and other facilities. Increased use would increase the potential for impacts to surface waters and wetlands from soil erosion and pollution from accidental spills. These effects, however, would be managed through measures discussed in Section 3.7.1.5.

Impacts from off-road vehicle maneuvers would be concentrated in the Nacimiento River watershed, as the proposed primary maneuver corridor is located almost entirely within this area. The proposed primary maneuver corridor contains numerous and scattered drainages as depicted in Figure 3.7-1. Impact avoidance to these features would be unlikely. Direct impacts associated with operation of vehicles off-road include degradation of stream channels and banks during training maneuvers. Vehicles crossing drainages could modify drainage structures through erosion or compaction, resulting in increased erosion potential and impacts to water quality. However, similar to slope restrictions, stream channels with steeper banks would likely be avoided by vehicles during off-road vehicle maneuvers. Vehicles crossing wetland areas would result in disturbance to wetland vegetation (if present). Compaction and rutting of wetland soils could also occur and could alter wetland hydrology.

A REC would be completed prior to training approval, which considers protection of sensitive resources including riparian and wetland areas and restricts certain activities, where applicable. All off-road vehicular traffic (wheeled and tracked) would be prohibited within 66 feet (20 meters) of any stream or lake bed (wet or dry) unless approved by the Range Officer. Crossing of major surface waters would be restricted to designated low-water crossings. Figure 3.7-1 shows low-water crossings that are currently employed at FHL for these major surface waters. These low-water crossings would continue to be used during maneuvers to maintain streambank and streambed integrity and to reduce soil erosion and sedimentation near waterways. FHL would also restrict off-road vehicle maneuvers in wetland areas to the greatest extent practicable. Additionally, as needed, FHL would harden stream crossings to reduce levels of streambank and streambed disturbance.

Prior to training, FHL PWE would coordinate with trainers and units to identify maneuver lanes within the corridors that take into account protected resources including consideration of surface waters and wetlands, and training mission objectives. This includes development of coordination maps for training units identifying sensitive resource areas and restricted areas. As part of the Proposed Action, off-road vehicle maneuvers would be restricted to areas containing less that 30 percent slope. FHL would also develop and distribute educational materials for off-road vehicle maneuver units. This includes development of educational materials for off-road vehicle maneuver units.

Off-road vehicle maneuvers would result in areas of land disturbance both during and following training events which would increase the potential for indirect impacts such as sedimentation into adjacent waterways and wetlands. Exposed and compacted soils (refer to Section 3.5, Geology and Soils) would be more susceptible to erosion from wind erosion or stormwater runoff, which could indirectly impact surface waters and wetlands. Increased sedimentation and turbidity could increase nutrient and organic content and decrease dissolved oxygen levels. This would adversely affect aquatic life as described in Section 3.3, Natural Resources. As training would be restricted to a single year (FY 16) and conducted during the dry season only, the potential for stormwater runoff, water-induced erosion, or rutting in the proposed maneuver corridors is low. The *Soil Trafficability* discussion in Section 3.5.1.3 presents the relationship between precipitation and the level of risk for training in saturated soils. If off-road training maneuvers are conducted early in the dry season before the soils are dry, or late in the season combined with early onset of the wet season, the potential and degree of direct and indirect impacts associated with soil disturbance, stormwater runoff, water-induced erosion, or rutting described above would be greater.

Restoration activities requiring one acre or greater of soil disturbance would require submission of a Notice of Intent package under the California State Water Resources Control Board Construction General Permit Order 2009-0009-DWQ. This requires preparation of a project-specific SWPPP which includes BMPs proposed to protect stormwater runoff during site restoration activities.

Restoration prior to the start of the wet season and establishment of vegetation in disturbed areas would reduce the potential for erosion. As training would be conducted during FY 16 only, impacts are anticipated to be short-term.

Potential surface water contamination could occur due to accidental spills of hazardous materials associated with vehicles and equipment (e.g., oil, fuels, and solvents) during off-road vehicle maneuvers. FHL would continue to implement AR 200-1 and BMPs identified in the installation SPCC plan to manage and reduce potential impacts. Vehicles would be operated and maintained to minimize leaking fluids that could contaminate soils and waterbodies. Inspections would be conducted to ensure refueling and maintenance sites have appropriate containment measures in place, and that spills are reported, cleaned, and contaminated waste disposed of properly. A 300-foot (91-meter) buffer would also be maintained between refueling or vehicle and equipment maintenance areas and wetlands or waterways.

3.7.2.3 Alternative 2: Off-Road Vehicle Maneuver, and Three Brigade-Level Exercises (Yearly)

Alternative 2 could result in potentially significant impacts to surface waters and wetlands, however, the level of impacts would be reduced to less than significant. Under Alternative 2, the types of impacts to surface waters and wetlands would be similar to those described under Alternative 1; however, the potential exists for significant impacts as there would be long-term and reoccurring off-road vehicle maneuver training. Unlike Alternative 1, this alternative would also allow for components of unit training, including off-road vehicle maneuver to occur in the proposed secondary maneuver corridor as described in Chapter 2. As such, impacts would also occur in the San Antonio River watershed. Use of both the proposed primary and secondary maneuver corridors could relieve impacts to the proposed primary maneuver corridor, however, this use would also increase the potential for sedimentation as the proposed secondary maneuver corridor is prone to increased water erosion (see Section 3.5, Geology and Soils). Similar to the proposed primary maneuver corridor, the proposed secondary maneuver corridor contains numerous and scattered drainages as depicted in Figure 3.7-1. Impact avoidance to these features would be unlikely.

FHL would implement measures discussed under Alternative 1 to minimize adverse impacts to surface waters and wetlands. Unlike Alternative 1, however, repeated annual off-road vehicle maneuver training could add long-term stress to soil resources and increase the potential sedimentation into nearby surface waters and wetlands. Annual training could also create larger areas of compacted soils, which can decrease stormwater infiltration and increase stormwater peak flows, accelerating erosional forces and sedimentation. These reoccurring annual impacts from off-road vehicle maneuvers could result in significant adverse impacts to surface waters and wetlands due to increased potential for sediment levels and turbidity from soil erosion and stormwater runoff. These effects could exceed state goals for sediments in the Nacimiento and San Antonio River watersheds, could substantially affect surface water drainage and stormwater runoff, and could violate wetland protections through excessive sedimentation into wetlands.

The extent of impacts would depend on the intensity of training and the ability for the land to recover. In order to prevent significant impacts from repeated annual off-road training events, Alternative 2 would also require the adoption of sediment and erosion control mitigations including a long-term land restoration and monitoring program for off-road vehicle maneuver training as outlined in Appendix D. Restoration activities would be monitored for implementation and effectiveness, and would be modified to best suit the needs of the installation, the affected surface waters and wetlands, and the type of training that caused the impact. FHL would continue to evaluate the successes of mitigation efforts (including

streambank stabilization and runoff/sedimentation control) and modify future efforts, if needed, to reach and sustain water resources management objectives while maintaining land sustainability for the training mission. This would be used to identify methods and locations to prevent or repair sedimentation runoff into adjacent surface waters. As needed, FHL would implement rapid response land rehabilitation projects at maneuver sites.

Increased water quality monitoring could be implemented to further understand impacts to water quality from maneuver training and effectiveness of mitigation strategies. Specifically, appropriate water quality monitoring (e.g., monitoring of temperature, discharge [flow], TDS, and suspended sediment concentration,) should be established at sites along the San Antonio and Nacimiento Rivers to monitor the effectiveness of implementing measures in Appendix D. If an analysis of the water quality data shows degradation linked to off-road vehicle maneuver training, efforts outlined in Appendix D could be implemented or scaled in response to observed and measured conditions to avoid or reduce the potentially significant impacts that annual off-road vehicle maneuvers could have on water quality. This could include erosion control dams to slow stormwater runoff and impede sediment migration. Development of additional low-water crossings would occur, as necessary, based off of training needs. Use of established and designated crossings would reduce potential for widespread streambank and streambed disturbances, focusing off-road vehicle crossings at approved locations.

Similar to Alternative 1, training would be conducted during the dry season which would minimize soil rutting and erosion and indirect effects of sedimentation into adjacent surface waters.

3.7.2.4 Alternative 3: Off-Road Vehicle Maneuver, and Four Brigade-Level Exercises (Yearly)

Alternative 3 could result in potentially significant impacts to surface waters and wetlands, however, the level of impacts would be reduced to less than significant. Under Alternative 3, the potential types of impacts to surface waters and wetlands would be similar to those described under Alternatives 1 and 2. The addition of a fourth brigade conducting simultaneous training and the addition of the impacts to the proposed secondary maneuver corridor would increase the potential for significant impacts to surface waters and wetlands described under Alternatives 1 and 2. This would result in a slight increase in the potential for impacts to surface waters and wetlands; however, FHL would implement measures discussed under Alternative 2 to minimize adverse impacts to surface waters and wetlands to less than significant.

3.7.2.5 Alternative 4: Off-Road Vehicle Maneuver, and Five to Eight Brigade-Level Exercises (Yearly)

Analysis of Alternative 4 at the programmatic level provides a framework and scope for subsequent tiered analysis of environmental impacts. Under Alternative 4, the potential types of impacts to surface waters and wetlands would be similar to those described under Alternative 2. Off-road vehicle maneuver training, however, would not be restricted to the dry season and could occur at any period over the 360-day calendar year on an annual basis. The addition of up to four more off-road vehicle maneuver training exercises would also increase the potential for erosion and direct and indirect impacts to surface waters and wetlands described under the other alternatives. An additional 1-4 brigades training per year, in addition to 3-4 brigades and 9 battalions under the No Action and Alternatives 1 through 3, increases the potential for impacts

to surface waters and wetlands. Brigade and battalion-level exercises require multiple large bivouac sites and staging areas, extensive on-road maneuvers to include crossing drainages, use of the tank trail and roads between Camp Roberts and FHL, and use of live-fire ranges and other training facilities. The proposed intensity and timing of training may limit land rehabilitation opportunities and the ability to rest sites to allow for vegetation regrowth and soil stabilization. Similar to Alternative 2, avoidance and protection measures and monitoring as described in Section 3.7.1.5 and in Appendix D would reduce adverse effects to surface waters and wetlands. Additionally, off-road vehicle maneuvers could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain event) to minimize the impacts from rutting and vegetation loss. However, due to the intensity of brigade-level training and year-round off-road vehicle maneuver exercises proposed under Alternative 4, the adoption of measures outlined in Appendix D may not be sufficient to reduce impacts from significant levels. Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse effects under this alternative. Information gathered from monitoring described in Appendix D, and the soil trafficability model described in Section 3.5.2.3 would inform subsequent tiered NEPA analysis.

3.7.3 Cumulative Effects

Although off-road vehicle maneuvers at FHL has the potential to significantly impact water resources, the reasonably foreseeable on- and off-post projects identified in Sections 3.1.4 would not contribute to significant adverse effects. On-post projects identified would result in temporary and limited disturbance to soils in the cantonment area and airfield, which could result in temporary sedimentation of nearby waterways. As these projects are located within the San Antonio River watershed, impacts (if any) would be concentrated within this waterway. Construction would be managed in accordance with existing installation plans (e.g., INRMP, SWPPP, SPCC Plan, etc.) and appropriate approvals would be obtained. Although the construction of additional facilities could lead to additional impervious surfaces that could channel surface water, the Proposed Action alternatives do not involve construction, and thus no additional impervious surfaces would be created. FHL would continue to conduct stormwater monitoring within the cantonment area as discussed in Section 3.7.1.4 to monitor potential effects of the cantonment area on water quality, and would adjust management practices as necessary to limit impacts from increased stormwater flows.

Training at Camp Roberts has the potential to adversely affect water quality within the Salinas River, which is fed by the Nacimiento and San Antonio rivers that flow through FHL. Increased turbidity within the Nacimiento and San Antonio rivers, along with training at Camp Roberts could cumulative and adversely affect water quality in the Salinas River. Camp Roberts, however, would manage and protect resources similarly to FHL, based on Federal regulatory requirements and the SRP. This would reduce potential for adverse cumulative effects from activities occurring at Camp Roberts.

Cumulative impacts could occur due to past and present mining operations in the region, as well as increased sediment discharges from wildfire burn areas and stream bank erosion. Mining activities can degrade water quality due to chemicals leaching to waterbodies. Limited off-post development projects were identified; therefore, it is assumed that land uses and management of lands surrounding FHL (primarily ranching) would continue. Impact reduction measures identified in Section 3.7.1.5 would aid in the reduction of long-term cumulative effects to surface waters on FHL and within the Nacimiento and San Antonio Watershed from military training.

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4 Summary of Environmental Consequences

Table 4-1 provides a summary of the level of potential environmental impacts discussed within this EA. These conclusions are based on existing resource protection measures currently in place at FHL, along with proposed measures and mitigations to reduce impacts and avoid significance thresholds (see Tables 4-2 through 4-4). As shown in Table 4-1, Proposed Action 1 would result in minor impacts across all resources. Proposed Actions 2 and 3 could have potentially-significant impacts, however, significant thresholds would be avoided through mitigation (see table 4-4). Proposed Action 4 was analyzed at the programmatic level to provide a framework and scope for subsequent tiered analysis of environmental impacts. Impacts to several resource areas (natural resources, cultural resources, geology and soils, and surface water and wetlands) would require further analysis. Information collected through application of the soil trafficability model described in Section 3.5.2.3, and erosion and sedimentation reduction and monitoring efforts described in Appendix D, would inform subsequent tiered analysis.

Table 4-1. Comparison Summary of Potential Effects[1]

RESOURCE	ALTERNATIVES					CUMULATIVE EFFECTS
	No Action Alternative	Proposed Action 1	Proposed Action 2	Proposed Action 3	Proposed Action 4	
Air Quality and Greenhouse Gases	Minor	Minor	Moderate reduced to Minor	Moderate reduced to Minor	Moderate reduced to Minor	Minor
Natural Resources	Minor	Minor	Significant reduced to Moderate/ Minor	Significant reduced to Moderate/Minor	Follow-on NEPA analysis required[2]	Minor
Cultural Resources	Minor	Minor	Significant reduced to Minor	Significant reduced to Minor	Follow-on NEPA analysis required[2]	Minor
Geology and Soils	Minor	Minor	Significant reduced to Minor	Significant reduced to Minor	Follow-on NEPA analysis required[2]	Minor
Transportation	Minor	Minor	Minor	Minor	Moderate	Minor
Surface Water and Wetlands	Minor	Moderate/ Minor	Significant reduced to Moderate/ Minor	Significant reduced to Moderate/ Minor	Follow-on NEPA analysis required[2]	Minor

[1] Refer to Section 3.1 for a discussion of impact ratings.
[2] Follow-on NEPA analysis would be required to fully evaluate the potential for significant adverse effects under this alternative.

Table 4-2 summarizes existing operational and management controls, and resource protection measures that are currently in place at FHL. These measures benefit resources and would address some impacts potentially generated by the Proposed Action Alternatives.

Table 4-2. Summary of FHL Existing Resource Protection Measures[1]

Concern	Primary Resource(s) Affected	Existing Control/Description
Dust Generation	Air Quality	• Operational Control: Require vehicles to stay on established roads and trails unless conducting authorized training activities, and observe speed limits (maximum 25 mph unless otherwise posted). • Resource Protection: Implement dust control such as use of tackifiers or wetting surfaces prone to dust generation prior to dust-generating activities.
Invasive Species	Natural Resources	• Management Control: Implement the FHL Integrated Pest Management Plan and Invasive Species Management Plan to control and manage the spread of pests and invasive species at FHL. • Resource Protection: Reseed areas identified for land rehabilitation following training using an approved, site-specific seed mix (including native grasses and forbs) to reduce the potential establishment of invasive plant species. • Resource Protection: Require units to wash vehicles prior to leaving their home station in order to limit the spread of invasive species.
Disturbance of Sensitive Resources	Cultural Resources Natural Resources Surface Waters Wetlands	• Operational Control: Complete a REC prior to training approval, which considers protection of sensitive resources (e.g., SRMAs, historic properties, riparian areas and wetlands, federally protected species, priority species of concern, migratory birds) and restricts certain activities, where applicable. • Operational Control: Maintain maximum use of established trails and range roads for administrative moves and road marches. Operators will not create new trails when existing trails are available for use. • Operational Control: Provide units with environmental education briefings prior to training events. • Resource Protection: Prohibit off-road vehicular traffic (wheeled and tracked) within 66 feet (20 meters) of any stream or lake bed (wet or dry) unless approved by the Range Officer. • Resource Protection: Restrict vehicles from travel within sensitive natural and cultural resource areas marked with orange traffic cones or areas otherwise demarcated (e.g. signs, Seibert stakes). • Resource Protection: Mark protected areas with Seibert stakes or Seibert signs for avoidance prior to training events as practical (e.g., Seibert stakes mark the purple amole occurrence in training area 24 as off-limits to vehicles).
Contamination	Soils Surface Waters Wetlands	• Management Control: Implement the Installation Spill Contingency Plan to manage and reduce potential impacts associated with accidental spills of hazardous materials (e.g. oil, fuels, and solvents). • Operational Control: Require units to properly maintain vehicles and equipment for reducing leaks of oil, fuel and other fluids. Conduct inspections to ensure refueling and maintenance sites have appropriate containment measures in place, and that spills are reported, cleaned, and contaminated waste disposed of properly. • Resource Protection: Maintain 300 feet (91 meters) buffer between refueling, or maintenance of vehicles or equipment, and wetlands or waterways.

Table 4-2. Summary of FHL Existing Resource Protection Measures[1]

Concern	Primary Resource(s) Affected	Existing Control/Description
Federally-Protected Species	Natural Resources	• Resource Protection: Implement existing programs for federally protected species to monitor population status, evaluate disturbance threats and impacts, survey for potential new species locations, conduct pre-action surveys to adjust activities to minimize impacts, and evaluate and adapt protective measures as needed. • Resource Protection: Adhere to conditions within the programmatic BO for monitoring and protection of protected species (refer to Section 3.3.1.6) and implement the FHL INRMP to maintain ecosystem integrity and quality. Develop Endangered Species Management Components per the INRMP.
Habitat Degradation (including effects of erosion)	Air Quality (dust) Natural Resources Cultural Resources Soils Surface Waters Wetlands	• Resource Protection: Reseed areas identified for land rehabilitation following training using an approved, site-specific seed mix (including native grasses and forbs) to reduce habitat degradation. This includes repair and rehabilitation of existing erosion sites. • Operational Control: Require vehicles during training to follow approved routes and make use of existing roads and trails to reach their assigned training areas. This reduces operational footprints to and from training sites. • Operational Control: Provide environmental coordination with units to minimize impacts during aviation exercises, on-road maneuvers, bivouacs, and use of military training sites and facilities.
Protection of Aquatic Habitat and Water Quality	Natural Resources Surface Waters Wetlands	• Operational Control: Prohibit off-road vehicular traffic (wheeled and tracked) within 66 feet (20 meters) of any stream or lake bed (wet or dry) unless approved by the Range Officer. • Operational Control: Maintain 300 feet (91 meters) buffer between refueling or maintenance of vehicles or equipment and wetlands or waterways. • Operational Control: Maintain low-water crossings, and as practicable, restrict vehicle crossings of streams to these locations. • Resource Protection: Submit a Notice of Intent package under the California State Water Resources Control Board Construction General Permit Order 2009-0009-DWQ for site restoration activities involving soil disturbance of one or more acres of soil. This includes preparation of a project-specific SWPPP containing BMPs proposed to protect stormwater runoff during site restoration activities.
Protection of Historic Properties	Cultural Resources	• Resource Protection: Physically demarcate a 33-foot (10-meter) buffer around eligible or potentially eligible sites prior to training events that may result in damage to sites in order to prevent disturbance from on-road maneuvers, bivouacs, and use of military training sites and facilities. • Resource Protection: Protect sites through land use restrictions in Sensitive Resource Management Areas and Environmental Constraint Areas, such as Stoney Valley, in order to prevent damage to sites. • Resource Protection: Implement the FHL ICRMP, and include cultural resources protection in educational briefing s provided to units prior to training exercises.
Traffic Safety	Transportation	• Operational Control: Coordinate convoy movements from Camp Roberts to FHL on highway roads and large transportation events of vehicles to FHL with CALTRANS. • Operational Control: Notify media outlets and the public in advance of large planned convoy operations, identifying the route, anticipated times of operations and delay periods.

Table 4-2. Summary of FHL Existing Resource Protection Measures[1]

Concern	Primary Resource(s) Affected	Existing Control/Description
		• Operational Control: Continue FHL's federal police force patrols speed checks and response to accidents or safety concerns on FHL roadways.
Traffic Congestion	Transportation	• Operational Control: Schedule movements to avoid peak traffic periods to the extent possible. • Operational Control: Place intelligent signage along the convoy route to alert the traveling public on Highway 101 of planned convoy operations or those in progress, identifying the anticipated times of operations and potential delays, if any.

[1]Measures apply to all Alternatives.

BMP = best management practice; BO = biological opinion; CALTRANS = California Department of Transportation; FHL = Fort Hunter Liggett; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; mph = miles per hour; REC = Record of Environmental Consideration; SRMA = Sustainable Resource Management Area; SWPPP = Stormwater Pollution Prevention Plan

Table 4-3 identifies proposed operational and management controls that could be enacted by FHL to reduce impacts potentially generated by the Proposed Action Alternatives. Proposed controls include new actions as well as increases in existing efforts. FHL would increase the level of effort associated with activities as noted to support off-road vehicle maneuvers and the increase in intensity and frequency of training events. For example, adding acreage within the maneuver corridor would increase the amount of land area needing resource protection, such as avoidance staking and rehabilitation such as reseeding. Increasing the frequency of training events would require additional environmental reviews and inspections, additional troop training events, and additional inspections.

Table 4-3. Summary of Proposed Resource Protection Measures to Reduce Disturbance

Concern	Primary Resource(s) Affected	Description of Proposed Mitigation	Mitigative Effect	Alternative
Dust	Air Quality	• Resource Management: Restore disturbed areas and reestablish vegetation cover following off-road training events and additional bivouac sites.	Restoring the land quickly reduces wind and water erosion.	1 through 4
		• Resource Management: Monitor and evaluate dust control strategies over time based on applicability and effectiveness.	Analyzing the effectiveness of dust control strategies would aid FHL in focusing on those strategies proven most beneficial for prevention of wind-borne erosion.	2 through 4
Spread and Proliferation of Invasive Species	Natural Resources	• Operational Control: Include in notifications to units that vehicle washing prior to leaving home station is required to limit spread of invasive species, and vehicle washing at the close of exercises on FHL is required.	Cleaning of equipment reduces the potential spread of invasive plant species from off-road vehicle maneuvers and to prevent transport of species off-site.	1 through 4

Table 4-3. Summary of Proposed Resource Protection Measures to Reduce Disturbance

Concern	Primary Resource(s) Affected	Description of Proposed Mitigation	Mitigative Effect	Alternative
		• Operational Control: Consider placement of rumble plates at key locations to reduce transport of soils and mud.	Rumble plates would reduce the potential for spreading of invasive species by dislodging plant parts and seeds.	1 through 4
Soil Disturbance	Natural Resources Soils Surface Waters Wetlands	• Operational Control: Minimize the use of neutral steer turns by units (i.e., a turn during which one of the tank's tracks moves forward while the other moves in reverse, allowing the vehicle to turn on the spot).	Limiting the use of neutral steers would reduce the levels of vegetation loss, and the degree of soil compaction and soil erosion.	1 through 4
		• Management Control: Develop a model for predicting trafficability based on soil type and moisture content using weather data.	Use of predictive modelling could reduce the possibility of off-road vehicle maneuver training occurring on saturated soils, reducing erosion and indirect effects, and enhanced planning capabilities for units.	2 through 4
		• Resource Protection: As needed, harden troop assembly areas and stream crossings.	Use of hardened assembly areas and stream crossings would reduce the intensity and extent of disturbance from assembly area activities and stream crossings.	1 through 4
		• Resource Protection: Identify highly erodible soil types and their locations. As feasible, limit soil disturbing activities at those locations or implement protective soil erosion BMPs.	Identification and avoidance of highly erodible soils would reduce adverse effects of off-road vehicle maneuvers and soil erosion.	1 through 4
		• Resource Protection: Plan off-road vehicle maneuvers for areas with less than 30 percent slopes.	Off-road vehicle maneuvers in lower sloped areas would reduce levels of disturbance from erosion.	1 through 4
Protection of Sensitive Resources	Natural Resources (federally protected species) Cultural Resources	• Management Control: Update INRMP and ICRMP in coordination with cooperators in order to include new impacts from off-road vehicle maneuvers and impact control measures.	Implementation of updated INRMP and ICRMP considering potential effects from off-road vehicle maneuvers and impact control measures would help ensure continued protection of these resources.	1 through 4

Table 4-3. Summary of Proposed Resource Protection Measures to Reduce Disturbance

Concern	Primary Resource(s) Affected	Description of Proposed Mitigation	Mitigative Effect	Alternative
		• Operational Control: Coordinate with units and the installation to identify maneuver lanes within the corridors that take into account protected resources, slopes, erodible soils, and training mission objectives.	Consideration of protected resources and environmental constraints during the field exercise planning stage would help avoid and minimize impacts to these resources from off-road vehicle maneuver training.	1 through 4
		• Operational Control: Develop educational materials for off-road vehicle maneuver units.	Educational materials would help Soldiers further understand and identify resource avoidance and protection measures while training in the field.	1 through 4

FHL = Fort Hunter Liggett; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan

Table 4-4 identifies proposed operational and management controls and resource protection measures that would be enacted by FHL to reduce potentially-significant impacts generated by the Proposed Action Alternatives. These measures are currently not in place at FHL.

Table 4-4. Summary of Proposed Mitigations for Off-road Vehicle Maneuvers to Reduce Potentially Significant Impacts

Concern & Related Resource Significant Thresholds	Description of Proposed Mitigation	Mitigative Effect	Alternative
Effects of Erosion[1]: ***Natural Resources***: Substantial permanent net loss of habitat at the landscape scale ***Cultural Resources***: Alteration of the characteristics that qualify a property for inclusion in the NRHP ***Soils***: The landscape could not be sustained for military training, and excessive soil loss were to impair plant growth ***Surface Water***: Result in an excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs.	• Operational Control: Minimize off-road vehicle maneuver training to the extent practicable when soil moisture conditions are not favorable. Planned exercises would be compatible with wet season conditions when feasible.	Training activities could be restricted or reduced by the Commander during this period if the soils are saturated (e.g., after a rain event) to minimize soil rutting and effects of erosion.	4[2]
	• Management Control: Implement a program to assess the effectiveness of mitigation measures and the FHL environmental review process, and to implement adaptive management. Conduct site rehabilitation, and distribution and monitoring surveys for protected species locations in the proposed maneuver corridors and locations where increases in training would occur.	A program evaluating effectiveness of mitigation measures and the FHL review process would allow FHL to continually evaluate mitigation actions and adaptively manage to observed conditions and desired results.	2 through 4

Table 4-4. Summary of Proposed Mitigations for Off-road Vehicle Maneuvers to Reduce Potentially Significant Impacts

Concern & Related Resource Significant Thresholds	Description of Proposed Mitigation	Mitigative Effect	Alternative
	• Management Control: Adopt sediment and erosion control mitigations including rapid response and long-term land rehabilitation and monitoring program for off-road vehicle maneuver training as outlined in Appendix D. This includes restoring barren or highly disturbed areas and rutted soils to a suitable vegetation coverage, and restricting rehabilitated areas from off-road vehicle maneuver and intensively used sites until recovery goals are achieved.	A long-term land rehabilitation and monitoring plan would complement FHL's ITAM program by prescribing measures to mitigate significant resource impacts from off-road vehicle maneuvers including: 1) reduction of potential for wind-borne dust, 2) restoring and maintaining habitat, 3) reduction of potential for adverse indirect adverse effects to the integrity of historic properties, and 4) reduction of potential for water erosion and sedimentation into surface waters and wetlands.	2 through 4
Protection of Federally-protected resources: ***Cultural Resources***: Disturbance to cultural resources sites.	• Resource Protection: Physically demarcate[3] a 33-foot (10-meter) buffer around identified sites (eligible or potentially eligible) prior to training events that may result in damage to sites in order to prevent disturbance from off-road vehicle maneuvers and increased support and sustainment associated with exercises.	Installation of protection measures would ensure these sensitive sites are avoided during training.	1 through 4
Water Quality: ***Surface Water***: Excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs.	• Management Control: Establish monitoring sites upstream, within, and downstream of maneuver areas along the San Antonio and Nacimiento Rivers.	Analyzing the effectiveness of sediment and erosion prevention and control through water quality monitoring would aid FHL in focusing on those strategies proven most beneficial for prevention of water-induced erosion and water quality degradation (sedimentation) from training events. FHL could scale BMPs and impact reduction measures based on monitoring data as appropriate.	2 though 4

[1]Although the Proposed Action would not result in significant impacts to air quality and wetlands, these resource areas would benefit from implementation of this mitigation measure by reducing potential for erosion (dust generation and sedimentation into wetlands).

[2]Alternatives 1 through 3 propose off-road vehicle maneuver training during the dry season only as defined in Sections 2.2.2.4 through 2.2.2.6, respectively.

[3]Specific cultural resources protection measures including signage, stakes, cones, fences, boulders, capping, or hardening would be selected based on training needs, type of site, and effectiveness as determined by professional judgement, Army experience, and monitoring and consultations with the SHPO.

BMP = best management practice; FHL = Fort Hunter Liggett; ITAM = Integrated Training Area Management

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5 List of Acronmys

Acronym	Definition
^{o}C	Celsius
^{o}F	Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AC	Active Component
ANG	Air National Guard
APE	area of potential effects
AQCR	air-quality control region
AR	Army Regulation
ARFOGEN	Army Force Generation
ARNG	Army National Guard
ASV	Armored Security Vehicles
ATFP	Army Total Force Policy
BACT	Best Available Control Technology
BCT	brigade combat team
BDE	brigade
BMP	best management practice
BN	battalion
BO	Biological Opinion
BSA	battalion support areas
CAA	Clean Air Act
CALTRANS	California Department of Transportation
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CONOPS	concept of operations
CRM	Cultural Resources Manager
CWA	Clean Water Act
DoD	Department of Defense
DPTMS	Directorate of Plans, Training, Mobilization, and Security
E	endangered

Acronym	Definition
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FHL	Fort Hunter Liggett
FNSI	Finding of No Significant Impact
FTX	field training exercise
FY	Fiscal Year
GIS	geographic information systems
HAP	hazardous air pollutants
IBCT	Infantry Brigade Combat Team
ICRMP	Integrated Cultural Resources Management Plan
IFV	infantry fighting vehicle
IMCOM	Installation Management Command
INRMP	Integrated Natural Resource Management Plan
IPR	in progress reviews
ITAM	Integrated Training Area Management
km	kilometer
LOS	level of service
MACT	Maximum Achievable Control Technology Standards
MAGTF	Marine Air-Ground Task Force
MBUAPCD	Monterey Bay Unified Air Pollution Control District
METL	Mission Essential Task List
MICLIC	Mine Clearing Line Charge
MP	Military Police
MRAP	Mine-Resistant Ambush Protected
NAAQS	National Ambient Air Quality Standards
NAGRPA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOA	Notice of Availability
NO_X	oxides of nitrogen
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards
NWI	National Wetlands Inventory

Acronym	Definition
O_3	ozone
OPORDS	products, operations orders
PERP	Portable Equipment Registration Program
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
ppm	parts per million
PTE	potential to emit
PWE	Directorate of Public Works Environmental
RC	Reserve Component
REC	Record of Environmental Consideration
RFMSS	Range Facility Management Support System
ROI	region of influence
RONA	record of non-applicability
RTLP	Range and Training Land Program
SAR	Species at Risk
SE	state endangered
SHPO	State Historic Preservation Office
SIP	state implementation plan
SME	subject matter expert
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SRM	Sustainable Readiness Model
SRMA	Sustainable Resource Management Area
SRP	Sustainable Range Program
SSC	state species of concern
SWPPP	Stormwater Pollution Prevention Plan
T	threatened
T/A/Y	tons per acre per year
TMDL	total maximum daily load
tpy	tons per year
TRI	Training Requirement Integration
UAV	unmanned aerial vehicle
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USAPHC	U.S. Army Public Health Command
USAR	U.S. Army Reserve
USARC	U.S. Army Reserve Command
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture

Acronym	Definition
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USLE	Universal Soil Loss Equation
USMC	U.S. Marine Corps
VEC	Valued Environmental Component

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Appendix A – Relevant Laws, Regulations, and Other Requirements

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Fort Hunter Liggett is guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental, natural, and cultural resources management and planning. These include, but are not limited to, the following:

Federal Statutes

- American Indian Religious Freedom Act of 1978 (42 U.S. Code [USC] 1996)
- Archeological Resources Protection Act of 1979 (16 USC 470aa-470mm)
- Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668c)
- Clean Air Act (CAA) (42 USC 7401 et seq., as amended)
- Clean Water Act of 1977 (CWA) and the Water Quality Act of 1987 (WQA) (33 USC 1251 et seq., as amended)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9601, et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986)
- Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451-1464)
- Endangered Species Act of 1973 (ESA) (16 USC 1531–1543)
- Farmland Protection Policy Act of 1981 (7 USC 4201 et seq., as amended)
- Fish and Wildlife Coordination Act (16 USC 661, et seq.)
- Migratory Bird Treaty Act (16 USC 701, et seq.)
- National Environmental Protection Act (NEPA) (42 USC 4321–4370h)
- National Historic Preservation Act (NHPA) of 1966 (54 USC 306108)
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- Noise Control Act of 1972 (42 USC 4901–4918)
- Pollution Prevention Act of 1990 (42 USC 13101-13109)
- Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901)
- Safe Drinking Water Act (SDWA) of 1974 (42 USC 300f)
- The Sikes Act (16 USC 670a-670o, 74 Stat. 1052)
- Toxic Substances Control Act (TSCA) (15 USC 2601 et seq., as amended)

Regulations

- Council on Environmental Quality (CEQ) Regulations for Implementing National Environmental Policy Act (NEPA) (40 Code of Federal Regulations [CFR] Parts 1500–1508)
- Environmental Effects of Army Actions (32 CFR Part 651)
- Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*
- AR 405-70, *Utilization of Real Property*

- Protection of Historic Properties (36 CFR Part 800)

Executive Orders

- EO 11514, *Protection and Enhancement of Environmental Quality* (as amended by EO 11991)
- EO 11593, *Protection and Enhancement of the Cultural Environment*
- EO 11988, *Floodplain Management*
- EO 11990, *Protection of Wetlands*
- EO 12088, *Federal Compliance with Pollution Control Standards*
- EO 12372, *Intergovernmental Review of Federal Programs*
- EO 12580, *Superfund Implementation*
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
- EO 13007, *Indian Sacred Sites*
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- EO 13112, *Invasive Species*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*
- EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*
- EO 13287, *Preserve America*
- EO 13327, *Federal Real Property Asset Management* (amended by EO 13423)
- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*

EO 13423 revoked previous EOs pertaining to sustainability and "greening". CEQ guidance, however, instructs agencies to maintain activities and practices implemented under the revoked EOs until additional guidance for implementing EO 13423 is provided (CEQ, 2007). The revoked EOs pertaining to this NEPA analysis include the following:

- EO 13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*
- EO 13123, *Greening the Government Through Efficient Energy Management*
- EO 13148, *Greening the Government Through Leadership in Environmental Management*

These authorities are addressed in various sections throughout the Environmental Assessment when relevant to particular environmental resources and conditions. The full text of the laws, regulations, and EOs is available on the Defense Environmental Network & Information Exchange website at http://www.denix.osd.mil.

Appendix B – Agency Coordination

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State Historic Preservation Officer Consultation

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON FORT HUNTER LIGGETT
BUILDING 238 CALIFORNIA AVENUE
FORT HUNTER LIGGETT, CA 93928-7000
NOVEMBER 18, 2015

REPLY TO ATTENTION OF

IMHL-PWE

Julianne Polanco
State Historic Preservation Officer
Office of Historic Preservation
Department of Parks and Recreation
1725 23rd Street, Suite 100
Sacramento, CA 95816

RE: Heavy Vehicle Maneuver Training at Fort Hunter Liggett, Monterey County, California

Dear Ms. Polanco,

The US Army Garrison at Fort Hunter Liggett (FHL) plans to create two large off-road Heavy Vehicle Maneuver Training Corridors to support military training (Figures 1 and 2). The two areas consist of approximately 33,000 acres of relatively flat landscape along the Milpitas valley and the Nacimiento River valley in southern Monterey County. This activity is an undertaking pursuant to 36 CFR §800.16(y). In accordance with 36 CFR §800.5(c), we are writing to request your concurrence with our determination that there will be no effects to historic properties as a result of this undertaking.

The US Army proposes to add heavy vehicle combat maneuver exercises to the current training being conducted at Fort Hunter Liggett. The additional training is needed to implement the Army Total Force Training Policy requiring both combat support and combat units from different branches of the Army to train together in realistic scenarios. Currently, FHL conducts a variety of training with Army Reserve combat support units, Army combat units, and Army National Guard units, but off-road Heavy Maneuver has not been part of the exercises. At FHL the Army would add the off-road Heavy Maneuver component which could include tracked vehicles, such as M1A2 Abrams Tanks and M2/M3 Bradley Fighting Vehicles; wheeled vehicles including Strykers and Medium Tactical Vehicles; and Engineer equipment including bulldozers and excavators (Table 2). Exercises would include travel across landscapes and trenching for establishing tank fighting positions, as well as obstacle breaching exercises. FHL has identified a primary maneuver corridor and a secondary maneuver corridor with landscapes suitable for off-road heavy maneuvers.

The Area of Potential Effect (APE) is shown in attached Figures 3 and 4. The areas identified for off-road Heavy Maneuver have been used historically for maneuver training at Fort Hunter Liggett since WWII. Although it has not been used in the last ten years for maneuver, the Army proposes to reinstate maneuver training in these areas.

The APE was surveyed for historic properties (Figures 5-6), and 283 of cultural resources were identified (Appendix A). Within them, one site has been determined eligible for listing on the National Register of Historic Places, one site has been determined ineligible, and 281 are being managed as potentially eligible until determinations of eligibility can be made through further investigation (see Table 1). Future work to obtain determinations of eligibility for these sites may require subsurface investigation, through consultation with CA SHPO.

Adverse impacts to historic properties from off-road Heavy Maneuver can occur by causing soil disturbance to sites with surface and subsurface features. Impact can also affect above ground fragile features, such as remains of historic structures, or affect sites indirectly through increased erosion. All sites within the maneuver area have been evaluated for potential impacts. All sites at risk that are eligible or potentially eligible, will be protected by avoidance, through physical demarcation in the field with a 10 meter buffer. Sites in the Maneuver Corridors will be marked with Seibert stakes, or with large orange traffic cones if the site is located in a paratrooper training drop zone (Figure 8). Additionally, a land monitoring and restoration program will be implemented by the Installation to repair disturbed landscapes after the exercises, and prevent activity related erosion to sites and other sensitive resources. All eligible and potentially eligible sites will be avoided, and erosion will be monitored and mitigated to avoid indirect and cumulative effects. The US Army has concluded that there will be no adverse effects to historic properties resulting from off-road Heavy Vehicle Maneuver Training at Fort Hunter Liggett.

The National Historic Preservation Act (36 CFR §800.3(f)) requires that interested parties and federally recognized tribes be consulted regarding undertakings. There are no federally recognized tribes for this portion of Monterey County. FHL is the ancestral homeland of the Salinan/Xolon Indians, a non-federally recognized tribe. The FHL list of interested parties and local tribal members have been solicited for their comments (Attachment B).

We look forward to your response. Should you have any questions regarding our efforts, please contact me at 831 386-2791 or Lisa Cipolla, FHL Cultural Resources Manager, at 831 386-2520.

Sincerely,

Gary Houston
Environmental Division Chief
US Army Garrison Fort Hunter Liggett

Enclosures

2

*Note: Attachments have been excluded from the EA Appendix due to sensitive materials.

Appendix C - Air Supporting Documentation

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EMISSION CALCULATIONS

C-1. Emissions from Off-Road Vehicle Maneuvers

Fugitive Dust from Unpaved Roads[1]				
E=k(s/12)^a(w/3)^b				
Constant	**$PM_{2.5}$**	**PM_{10}**		
k	0.15	1.5		
a	0.9	0.9		
b	0.45	0.45		
S	10	10		
Distance	37.2	miles	(4.65 miles/day x 8 days)	
4 MANEUVER COMPANIES - CONSTRAINED VALIDATION TRAINING SCENARIO (120 Vehicles)				
Vehicle Type	**Vehicle Weight (tons)**	**Totals per Off-Road Vehicle Maneuver Event**	**$PM_{2.5}$ Emissions (tons)**	**PM_{10} Emissions (tons)**
LMTV	10.3	4	0.0165	0.1650
HEMTT	19.4	4	0.0219	0.2194
HMMV	2.7	16	0.0361	0.3613
M1126 Stryker ICV	18.2	52	0.2771	2.7712
M1A2	69.5	20	0.1948	1.9479
M3A3	30.5	24	0.1614	1.6136
	Total Per Exercise	120	**0.7078**	**7.0783**
SINGLE MANEUVER COMPANY SCENARIO (30 Vehicles)				
Vehicle Type	**Vehicle Weight (tons)**	**Totals per Off-Road Vehicle Maneuver Event**	**$PM_{2.5}$ Emissions (tons)**	**PM_{10} Emissions (tons)**
LMTV	10.3	1	0.0041	0.0412
HEMTT	19.4	1	0.0055	0.0548
HMMV	2.7	4	0.0090	0.0903
M1126 Stryker ICV	18.2	13	0.0693	0.6928
M1A2	69.5	5	0.0487	0.4870
M3A3	30.5	6	0.0403	0.4034
	Total Per Exercise	30	**0.1770**	**1.7696**
Alternative	**# OF 4 CO CONSTRAINED VALIDATION SCENARIOS/YR**	**# OF SINGLE COMPANY SCENARIOS/YR**	**$PM_{2.5}$ (TPY)**	**PM_{10} (TPY)**
1	1	3	1.2	12.4
2	1	8	2.1	21.2
3	1	9	2.3	23.0
4 (Minimum)	1	10	2.5	24.8
4 (Maximum)	1	13	3.0	30.1

Source: USEPA 1995.

[1]Note: Off-road emission factors derived from AP 42 Sections 13.2.2 Equation 1a E=k(s/12)a(W/3)b where E = size-specific emission factor (lb/VMT) W = mean vehicle weight (tons) s = surface material silt content (%) (AP-42 Sections 13.2.2, Table 13.2.2-3) k,a,b = empirical constants (AP-42 Sections 13.2.2, Table 13.2.2-2)
Note: Emissions represent uncontrolled conditions without dust control measures or mitigation.

Fugitive emissions from land disturbance and induced wind erosion were considered as outlined in *AP 42, Fifth Edition, Volume I: Section 13.2.5 Industrial Wind Erosion*. This may have included fugitive emissions for wind erosion from land from the time of disturbance to the time of recovery after being reseeded. The assumptions outlined in the AP-42 are reflective of wind erosion of coal overburden stockpile after being mechanically disturbed, and are conservative when compared to maneuvers training at FHL (e.g. once disturbed, partially exposed graded soils, and varying topography). Using the conservative assumptions as outlined in AP-42, the *calculated friction [wind] velocity* was below the *threshold friction [wind] velocity*; therefore, ongoing erosion emissions are not expected (see Table C-2).

C-2. Friction vs. Threshold Velocity for Determination of Potential for Wind Erosion

Metric	Velocity	Units
Maximum Wind Gust	23.60	m/s
Fastest Mile Wind Speed	12.48	m/s
Calculated Friction Velocity (u*)	0.66	m/s
Threshold Friction Velocity (ut)	1.02	m/s

Sources: USEPA 1995 and WRCC 2016.

References

USEPA. 1995. Compilation of Air Pollutant Emission Factors, AP-42, 5th edition, Vol. I: Stationary Point and Area Sources. Available online: <http://www.epa.gov/ttnchie1/ap42/>. Accessed November 2015.

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Appendix D - Sediment and Erosion Control Mitigations for Off-Road Vehicle Maneuver Training

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TABLE OF CONTENTS

Acronym	Definition
°F	Fahrenheit
AR	Army Regulation
BLM	Bureau of Land Management
BMP	best management practice
CDFW	California Department of Fish and Wildlife
CWA	Clean Water Act
EA	Environmental Assessment
EO	Executive Order
FHL	Fort Hunter Liggett
GIS	Geographic Information Systems
GPS	Global Positioning System
INRMP	Integrated Natural Resource Management Plan
ITAM	Integrated Training Area Management
NRCS	Natural Resources Conservation Service
PWE	Directorate of Public Works Environmental
RTLP	Range and Training Land Program
RWQCB	Regional Water Quality Control Board
SRP	Sustainable Range Program
SWPPP	Stormwater Pollution Prevention Plan
T/A/Y	tons per acre per year
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USLE	Universal Soil Loss Equation

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1 Introduction

This appendix was prepared in support of the Army Total Force Training Environmental Assessment (EA) at Fort Hunter Liggett (FHL). As demonstrated within the EA document, off-road vehicle maneuvers have the potential to adversely affect soil stability at FHL.

The level of soil disturbance is proportional to training intensity and distribution of off-road vehicle maneuvers. Other factors such as site-specific soil properties, weather conditions during the time of training, and the effective restoration of training areas following activities influence the likelihood for erosion and sediment potential.

This appendix was developed to offer effective ways to identify areas prone to erosion and provide a standardized general approach in implementing erosion and sediment control management for the proposed primary and secondary maneuver corridors at FHL. It is intended that this appendix will be used to supplement FHL's Training Area Management program (see Section 1.2).

1.1 Soil Management Goals at Fort Hunter Liggett

In October 2012, FHL, in coordination with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW), completed an Integrated Natural Resources Management Plan (INRMP). The plan was prepared in accordance with the provisions of the Sikes Act (16 U.S.C. 670a et seq.) and Army Regulation 200-1 (AR 200-1), *Environmental Protection and Enhancement*. AR 200-1 states that the INRMP will be used to plan the management of soil resources across the entire installation and outlines the following soils management strategies and policies:

- Keeping soil erosion from water within tolerance limits as defined in soil surveys prepared by the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) or as required by Final Governing Standards or host nation authorities.
- Protecting wetlands and waterways from sediment pollution and meeting water quality compliance limits.
- Minimizing the impact of land uses on soil erosion and sedimentation when and where possible, to include:
    1. Locating physically intensive land disturbing activities on the least erodible soils;
    2. Using climatic and seasonal changes in soil erosion as a factor in scheduling intensive mission operations and real property management activities;
    3. Identifying and rehabilitating land disturbed by operations and real property management activities; and
    4. Incorporating best management practices regarding the control of sediment or pollution laden stormwater runoff.

This plan incorporates these management strategies and policies.

1.2 Training Area Management

The main drivers for training area management are road and facility maintenance, environmental stewardship and compliance, and land rehabilitation and monitoring. FHL has over 700 miles of

maintained roads, as well as culverts, bridges, low-water fords, dams, and training facilities, such as targets, firing points, buildings, parking areas, and bivouac sites. Maintenance requirements vary based on weather, training loads, age of facilities, and other factors. Environmental stewardship and compliance is described in more detail in the INRMP, the Spill Prevention, Control, and Countermeasure Plan, and other plans. Environmental review of training activities is conducted as described in the INRMP.

Short- and long-term land rehabilitation efforts are programmed and planned for using the Army's Integrated Training Area Management (ITAM) planning gates and cycles. ITAM is a part of the Army's Sustainable Range Program (SRP) and provides Army range officers with the capabilities to manage and maintain training lands and support mission readiness. ITAM integrates the mission requirements derived from the Range and Training Land Program (RTLP) with environmental requirements and environmental management practices. ITAM also establishes policies and procedures to achieve optimum, sustainable use of training and testing lands by implementing uniform land management program. The FHL ITAM program is implemented through the Range Complex Master Plan where land rehabilitation and other projects are submitted for approval, funding, and implementation. Additionally, FHL conducts rapid response land rehabilitation in response to bivouac sites and engineer training activities.

1.3 Regulatory Programs/Permits

Beyond Army requirements discussed in Section 1.1, the following Federal and state regulatory programs and permits are applicable to FHL:

1.3.1 Construction General Permit

Current guidelines under California's Stormwater Construction General Permit (Order 2009-0009-DWQ), require all construction activities resulting in land disturbances equal to or greater than one acre, or sites smaller than one acre that are part of a larger development to develop a Stormwater Pollution Prevention Plan (SWPPP). Current SWPPP guidelines are on-line at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/constpermits.shtml. This permit could be required for some land rehabilitation efforts.

1.3.2 Clean Water Act (CWA) Sections 401 and 404

Under Section 401 of the CWA, FHL is required to apply for water quality approval and certification by the State Water Resources Control Board for wetland or in-stream construction, operation, and maintenance activities. FHL is subject to CWA Section 404 permitting for physical disturbances or filling of wetlands and disturbances of perennial and intermittent streams. Section 404 gives the U.S. Army Corps of Engineers (USACE) primary regulatory responsibility over these areas. Most proposed activities (e.g., filling, dredging, or clearing of ditches) in streams (perennial and intermittent) or wetlands require an Individual Section 404 permit or a permit under the Nationwide Permit Program. This permit could be required for construction or improvement of low-water crossings to enhance training capabilities.

1.4 Erosion Sources

1.4.1 Intensive Training Areas

A component of Army Total Force Integration at FHL involves establishing designated areas for off-road vehicle maneuver training, the "primary" and "secondary" maneuver corridors. These areas were selected using site selection criteria including larger continuous areas of available training lands containing less than 30 percent slope. Figures 1 and 2 contain a map of existing training areas and the two proposed maneuver corridors.

Proposed training within these locations can lead to soil compaction, soil rutting, and loss of vegetative cover from equipment and foot traffic. Excessive soil compaction can impede root growth and limit the amount of soil utilized by plant roots, which is vital for water and nutrient uptake. Soil compaction can also decrease stormwater infiltration and increase stormwater peak flows, accelerating erosional forces and sedimentation. Furthermore, soil disturbances have the potential to further degrade training area sustainability by exposing soils and accelerating erosion. Compacted soils and increased run-off of surface waters during storm events also has the potential to accelerate stream erosion. This phenomena can be accelerated in areas of streambank disturbance where vegetation cover is lacking.

1.4.2 Existing FHL Road Network and BMPs

Typically, road-related erosion is caused by a lack of stabilization of the soils comprising the road surface and shoulder, embankment and cut-slope areas and the flow of stormwater runoff over these areas. Erosion of these areas can be particularly significant when stormwater runoff becomes concentrated. Erosion from roadway areas can result in sedimentation and a lessening of the conveyance capacity of drainage facilities such as swales, ditches, and culverts.

Roadway erosion in dry weather is also a concern, as frequently traveled dirt or unstabilized roads can cause dust and aerial deposition of sediment into adjacent streams or land areas where it may ultimately be conveyed to a water course during the next storm. Figures 1 and 2 show locations of primary roads and existing low-water crossings at FHL. Multiple established low-water crossings currently exist within the maneuver corridors.

1.4.3 Wildland Fire Management Areas

Due to the risk of wildfires ignited by climatic and training factors, including lightning, weaponry, vehicles, and pyrotechnics, FHL actively conducts preventative fire measures. Fire activities are implemented through the FHL Integrated Wildland Fire Management Plan. Though due diligence is exercised while conducting these activities, the potential for erosion and sedimentation exists. Primary sources and causes of erosion from fire activities include sheet and rill erosion along unprotected ground cover areas.

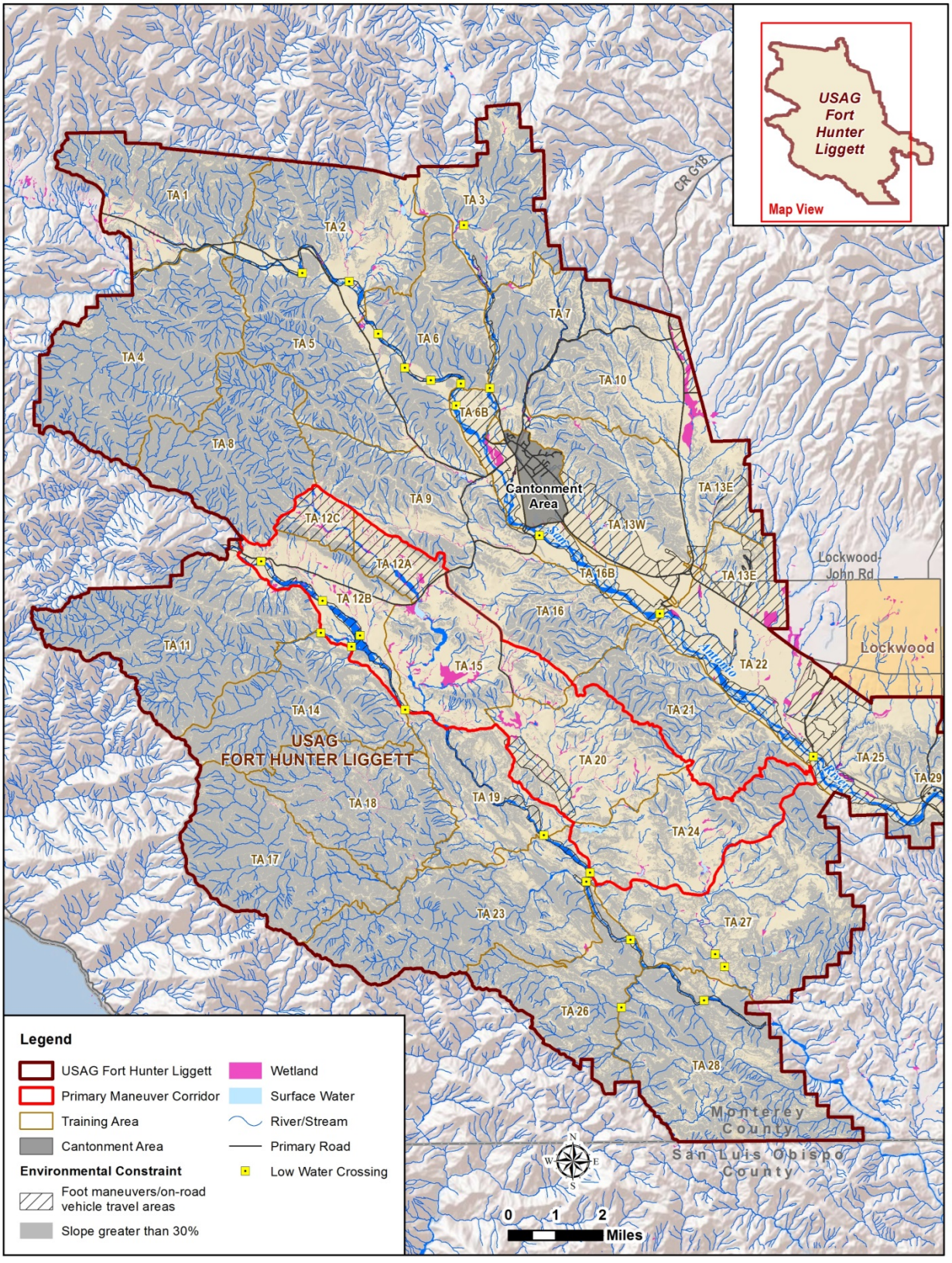


Figure 1. Primary Maneuver Corridor at Fort Hunter Liggett, CA

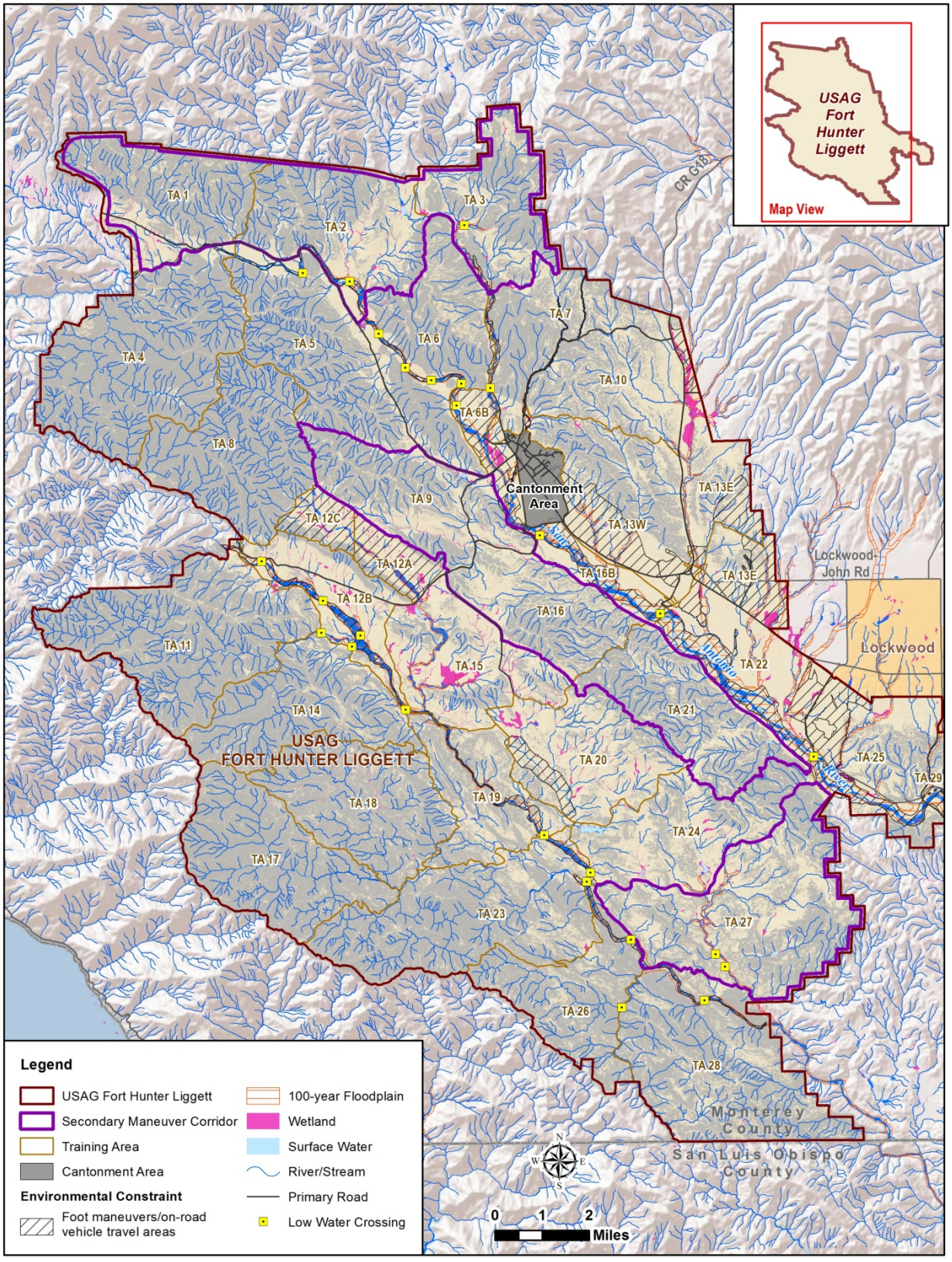


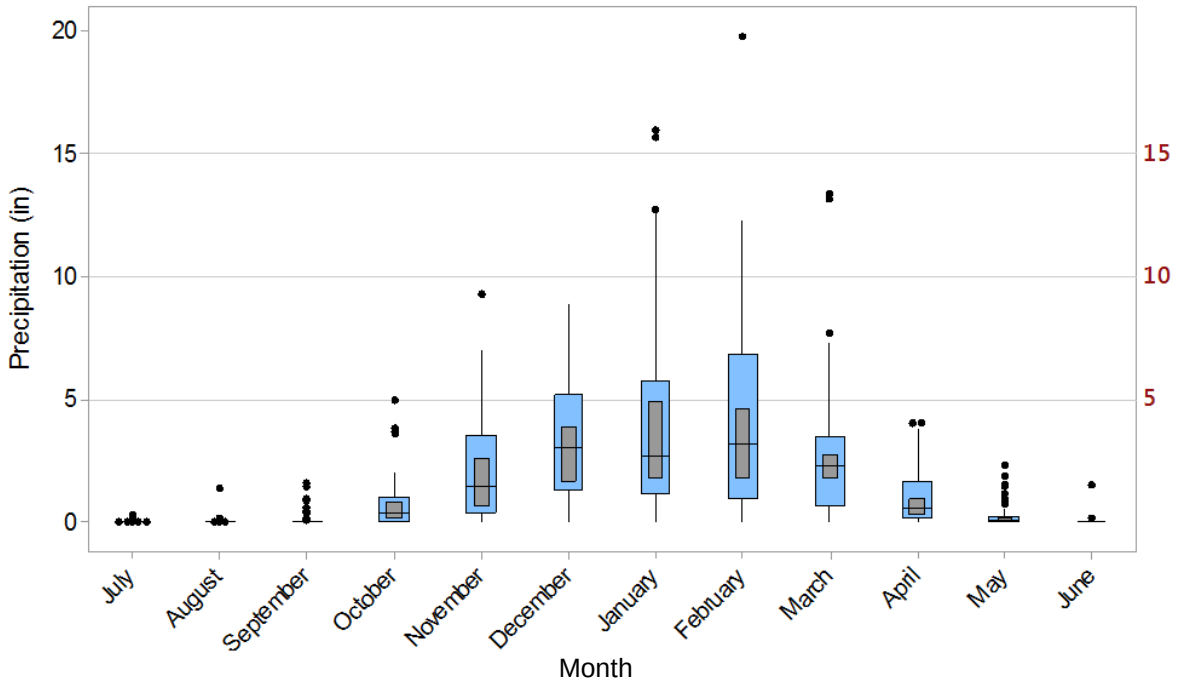
Figure 2. Secondary Maneuver Corridor at Fort Hunter Liggett, CA

1.5 Climate

FHL has a Mediterranean climate characterized by warm, dry summers and mild, wet winters. Summer fog is uncommon, but coastal fog occasionally reaches the coast ridge area. Because rainstorms come from the west, rainfall is higher in the western portion of the installation, to include the proposed primary and secondary maneuver corridors, and at higher elevations. In 55 years of climate data collected in the cantonment area, temperature varied from a record minimum of 7°F (-14°C) in December, to a record maximum of 116°F (47°C) in July. Twenty-four-hour variations in temperature of 50°F (10°C) are not uncommon year-round; average temperature ranges from 45°F (7°C) in December to 73°F (23°C) in July (FHL 2004).

The Regional Water Quality Control District defines the wet season as 1 October – 30 April, and the annual rain-year is from 1 July through 30 June. Based on data collected at the FHL cantonment, 97 percent of average annual rainfall occurs during this wet season, and the average annual rainfall is over 19 inches per year. Rainfall totals are higher in the Nacimiento Valley than in the FHL cantonment, however, timing of rainfall is similar. The first seasonal rains may begin as early as August and September, but typically begin in October. Average monthly rainfall peaks in January (Figure 3). Actual timing and intensity of rainfall is highly variable, with monthly rainfall during the wet season varying from lows of 0 inches to a high of 19 inches in a single month. Annual rainfall has varied from a low of 6 inches to a high of 47 inches. Severe drought conditions persisted through 2015, for the fourth consecutive year.

Figure 3. Average Monthly Precipitation 1960-2015



Source: FHL 2016
Figure notes: Blue boxes represent the statistical interquartile range; gray boxes represent the 95 percent confidence mean; black dots represent outliers.

Though the cumulative amount and timing of rain needed to saturate soils is not known, the risk of saturated soils greatly increases as the wet season progresses. This puts training activities that

occur during and soon after the wet season at higher risk of being adversely affected by saturated soils and storm water runoff, and puts soils and vegetation at greater risk of disturbance from off-road vehicle maneuvers. Though October falls within the rainy season, conditions are typically very dry at the onset of rainfall; October rainfall exceeded 3 inches and would have resulted in saturated soils and stormwater runoff in 4 of 55 years of data collected. Average rainfall amounts in April are only slightly higher than October, but conditions are typically wet at the onset of April rainfall.

The amount and timing of fall and winter rains are critical for plants and wildlife, including game animals and sensitive species. The growing season follows the onset of the wet season as soon as conditions are warm and moist enough for plant growth. This change in precipitation and water availability initiates germination of stored seed. As a result, revegetation efforts should begin at or before the onset of the annual wet season. The onset of the growing season can be delayed by low temperatures. This affects natural vegetation growth as well as revegetation efforts. Rapid spring growth commences with warming conditions in late winter or early spring. Rapid growth continues for a short time until soil moisture is exhausted, which is typically associated with the end of the wet season.

1.6 Soils

Figure 4 illustrates the distribution of soils series by soil order throughout the two proposed maneuver training corridors. Two soil orders, Mollisols and Entisols, dominate the primary and secondary maneuver corridors at FHL. Mollisols are soils with thick, dark top (A) horizons with a high base saturation (pH) that may or may not overlie developed subsoils (diagnostic horizons). Mollisols formed from hundreds of years of addition of organic matter to the top (A) horizon from grassland vegetation and dominate the secondary maneuver corridor (54 percent), but are also widespread in the primary maneuver corridor (30 percent). They formed on level to steeply sloped uplands in sedimentary rock residuum, primarily shale. The Entisols at FHL are soils without any profile development (diagnostic horizons) except for the top (A) horizon due to young geologic age and coarse mineral texture and shallow depth. They developed in level to steeply sloped uplands in sedimentary rock residuum, mostly sandstone and meta sandstone. Entisols are found throughout both training corridors. They are widespread in the primary maneuver corridor (50 percent) and are also prevalent in the secondary maneuver corridor (23 percent). Other soils orders found in the training corridors include Alfisols (7 and 6 percent, respectively), Inceptisoils (7 and 5 percent, respectively), Vertisols (2 and 3 percent, respectively) and Ultisols (1 percent combined). The soils generally have a xeric soil moisture regime (moist cool winters/warm dry summers), and mixed or smectitic[1] mineralogy. Section 3.5.1.2 of the Army Total Force Training Integration EA further describes the other soils within the proposed maneuver corridors.

[1] Smectite clays are 2:1 layer silicates with very high cation exchange capacity (attracts interlayer cations) causing expansion and collapse of structure when wet (i.e. shrink-swell) (SSSA, 2015).

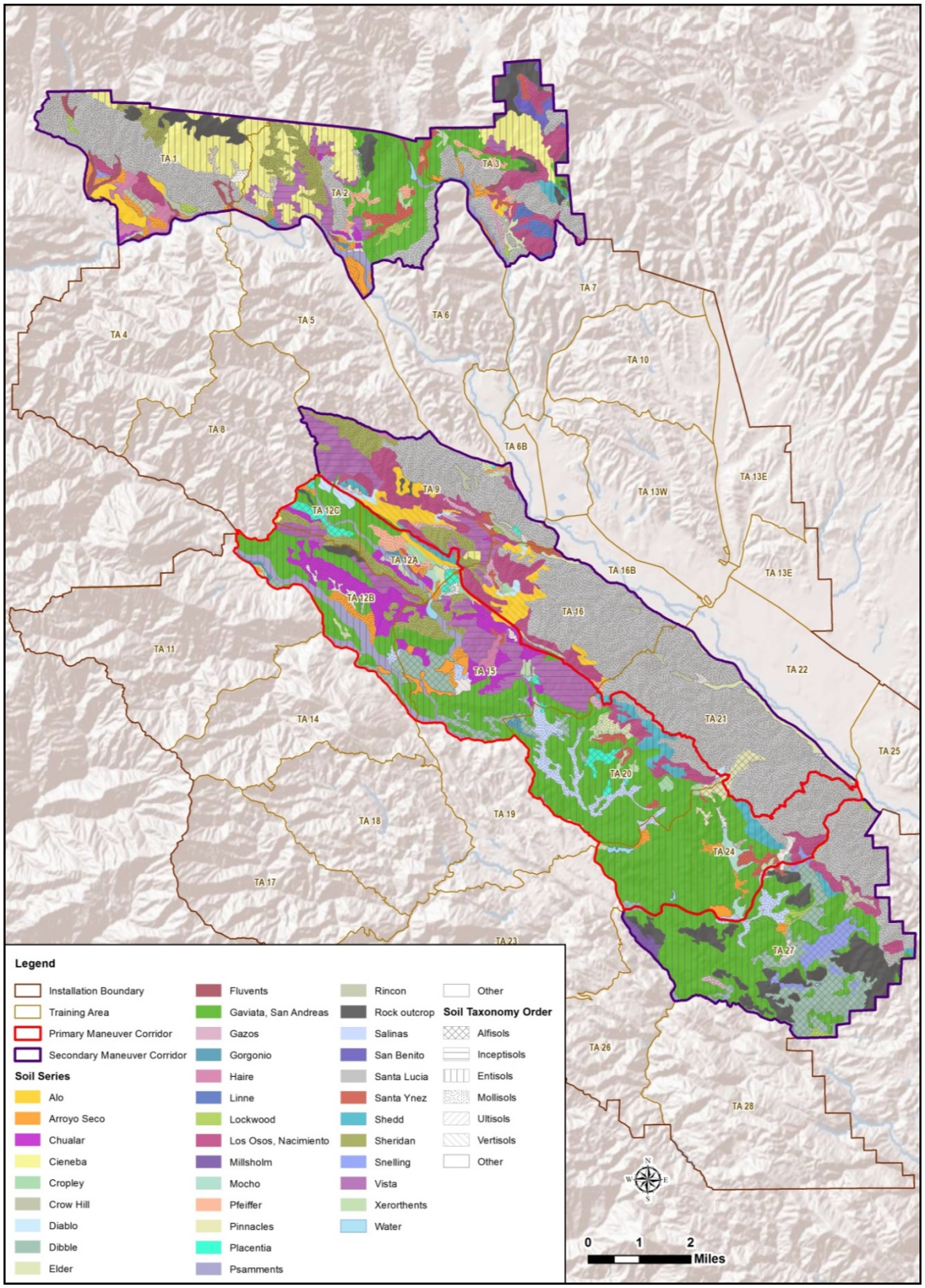


Figure 4. Soils Series and Taxonomic Orders within the Primary and Secondary Maneuver Corridors

1.6.1 Erosion and Erosion Management

Soil is formed in place over hundreds, often thousands of years. At FHL, due to the xeric soil moisture regime (moist cool winters/warm dry summers) and the prevalent grassland vegetation within the proposed maneuver corridors, thick top horizons high in organic matter have developed in the majority of the soils in the maneuver corridors. When uncovered, soil particles and organic matter can become detached from the soil column by the impact of rain water or from the force of wind. When detached, soil particles can travel with the water in the form of overland flow to surface waters or in the air in the form of dust. At the moment the particles become suspended in the water runoff or in the air, soil changes from being a natural resource supporting plant growth to being a pollutant – sediment or dust. Soil erosion can be either natural or accelerated by man-made activities. While some of FHL soils are relatively stable and level, composed of medium textured particles, many of the soils are highly erosive, situated on steep slopes, and/or composed of small particles that become easily detached.

The FHL INRMP oversees the integration of applicable environmental laws and regulations designed to protect natural resources, including soil resources. Ground disturbance from military training are rehabilitated through the ITAM program as a part of the SRP (see Section 2.2.1.5). FHL additionally conducts road and facility repairs that support soil stabilization. Specific BMP's implemented by FHL include:

- **Erosion gully repair.** FHL mechanically fills in or smooth out erosion gullies, thereby reducing or preventing further accelerated erosion. Gullies concentrate and accelerate water flow, increasing the energy of the water, causing detachment and off-site transportation of soil particles. Leveling out the gullies spreads out and slows down the flow of water, reducing the energy of the water and subsequent soil erosion.
- **Rut repair.** FHL mechanically regrades and levels ruts created by military vehicles during training. Tire or track ruts concentrates water flow, and increases erosion by the same mechanisms as described above. Ruts also have the potential of turning into gullies if left unattended. In addition, soil in ruts are often compacted by the focused weight of the vehicle, which makes it difficult for reestablishment of vegetation.
- **Reseeding disturbed areas with native species.** FHL repairs areas disturbed by military training and reseeds disturbed areas when practical. Vegetative cover is extremely important for soil stabilization and erosion control. Vegetative cover protects against both wind and water erosion by reducing the likelihood of detachment of individual soil particles from forces of wind or impacts of water drops from precipitation events.
- **Low water crossings.** FHL repairs training damage and makes improvements to improve training sustainability, including consideration of low water crossings to reduce disturbance to sensitive riparian soils and to reduce sedimentation and erosion.

2 Programmatic Planning

Planning is vital as a first step in addressing programmatic or site-specific erosion and sedimentation problems in the proposed primary and secondary maneuver corridors. Planning should set objectives, or desired outcomes based on a continuous process of research and decision making. Erosion and sediment control planning involves identifying existing or potential problems, analysis and development of objectives, prioritization, implementation strategies, and desired outcomes.

The FHL INRMP addresses the need for the development of an Erosion and Sediment Control Manual that would aid in meeting required regulations and soil management policies mandated by Federal and state regulations. The manual would be included in the INRMP as a component plan and would aid FHL Environmental Staff in establishing a protocol to mitigate soil erosion and help restore eroded and compacted sites as a means of minimizing stormwater runoff and sedimentation. To accomplish this, the following key planning objectives identified in the INRMP have been incorporated into this appendix for managing and mitigating erosion potential within the proposed primary and secondary maneuver corridors at FHL:

- A review of critical slopes on FHL and identification of highly erodible soil types (Section 1.6)
- An analysis of applicable Federal, state, and local regulatory requirements for erosion and sediment control (Sections 1.1 and 1.3)
- The identification of erosion and sedimentation as well as best management practices (BMP) applicable to FHL and Army Total Force Training Integration activities (Chapter 4)
- A description of how to select, install, and maintain erosion-control measures and to establish protocols for revegetation of disturbed areas (Chapter 4)
- A periodic review of BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on FHL (Section 2.4)

2.1 Programmatic Priorities

> Erosion is the process by which soil particles become detached by water, wind, or gravity and are transported from their original location.
>
> Geologic erosion, in this Appendix, is a natural process that occurs primarily by water, and secondarily by wind, and causes little damage unless assisted by human activity.

The first priority of this Appendix is to prevent erosion. A next step is to determine, if possible, whether existing erosion is natural geologic erosion, or accelerated by human disturbance. Accelerated erosion is caused by the removal of surface cover, increased imperviousness and surficial runoff, exposure of more erodible soil, and uncontrollable runoff flowing through the targeted management area. Accelerated erosion can be summarized as natural erosion magnified by human activities. If human activities have accelerated erosion above natural system conditions, it should be determined whether erosion is still active, or if soil loss has run its course and has stabilized.

Factors taken into consideration when determining the appropriate conditions for implementing erosion control BMPs should be based on the seriousness of the degradation and the potential impact to FHL's training activities and natural resources. Potential impacts to training areas and natural resources should be prioritized as follows, based on the following considerations:

- Safety, such as for emergency or military vehicle access on unpaved roads
- Operational actions that accelerate erosion and sedimentation and compromise the function and composition of ecosystems
- Impaired habitat used by federally listed species or species of concern at FHL
- Volume of potential soil loss
- Potential impacts on high-value facilities or crucial training areas
- Damage to training lands (based on interference with training activities or loss of training lands)
- Cost effectiveness of the control measure

2.2 Funding

The Directorate of Public Works Environmental Division (PWE) and the natural resources program manager at FHL are responsible for annual coordination with the USFWS and CDFW, requesting Army funds for INRMP implementation, and documenting implementation actions. The Directorate of Plans, Mobilization and Training at FHL are responsible for requesting ITAM funding from the Army's Sustainable Range Program, and implementing the ITAM program. Mitigation efforts presented within this appendix depend on funding of Directorate of Public Works (DPW), PWE, and ITAM programs, which may fluctuate between funding periods.

2.3 Regional and Interagency Coordination

The purpose of Regional and Interagency Coordination is to improve the effectiveness of coordination and partnership between Federal and state agencies and land management stakeholders. Benefits of coordination include the pooling of resources, technical expertise, programmatic support for solving problems, and the procurement of funding to more effectively plan and implement resource management activities. Coordination including, but not limited to

with the USFWS, the CDFW, and the Regional Water Quality Control Board (RWQCB) could be investigated to tap into technical expertise regarding land management within the proposed primary and secondary maneuver corridors.

2.4 General Principles

To succeed in preventing and controlling soil erosion, there are a set of general principles that should be followed. The first step should be to identify the cause of soil erosion. Identification of the problem can be a significant effort, but is necessary in addressing the source of the problem rather than applying a temporary fix. For instance, controlling sedimentation in wetland areas originating from erosion upstream would only address sedimentation and not the actual source of erosion.

To select the most effective BMPs for a project, there are several factors that should be taken into consideration, including:

1. Identifying the Objective – It is important to clearly identify objectives at the initialization of any training event. The main objective regarding training within the primary and secondary maneuver corridors relating to this appendix is to remain below thresholds of significance for natural and cultural resources, soils and surface waters and wetlands, and to maintain land sustainability. This includes sustaining the military training landscape along with management of natural and cultural resources. Specifically regarding sediment and erosion control and prevention of significant impacts, soil disturbances from training should not a) cause a substantial net loss of habitat at the landscape scale, b) alter characteristics of historic properties protected under the National Register of Historic Places, c) unable to sustain the landscape for military training, d) cause excessive soil loss which impairs plant growth, e) results in an excess sediment load in San Antonio and Nacimiento Rivers, affecting impaired reservoirs, or f) violates policies, regulations, and permits related to wetlands conservation and protection.
2. Monitoring Program – Monitoring helps identify and prioritize problematic areas before they become significant issues, saving time, and resources. Monitoring is used to gage the effectiveness of implemented erosion and sediment control BMPs to improve and adjust BMP implementation approaches. A thorough long-term monitoring program for the proposed maneuver corridors would be implemented to gain a better understanding of the effects of off-road vehicle maneuvers to soil stabilization at FHL. The following information would be collected as part of monitoring efforts:
    - *Climatic factors during training*. Was training conducted during a dry period? What were the condition of soils during training? How did soils respond to training events?
    - *Land disturbance following training events* (e.g., rutting, vegetative cover loss, streambank disturbances). How many acres of training area was disturbed and to what severity? Have roads, culverts, and low-water crossings remained intact? Were drainages affected by off-road vehicle maneuvers? Recordation of locations

by activity should be conducted in locations experiencing higher amounts of degradation.

- *Restoration response*. What types of restoration methods were employed following training? How effective were these measures at restoring the land and stabilizing the site?
- *Long-term sustainability.* Are lands effectively recovering from training events? How long does it take for a site to recover? How does repeated training events over time affect soil productivity and vegetation composition (e.g. invasive species)? How is water quality being affected?

3. Continual Review of Feasible BMP Types (refer to Chapter 4 of this Appendix). This includes evaluation and selection to determine feasible erosion control and sedimentation BMP types based on funding and individual site problems and training event components.

This information will aid in assessing the effectiveness of BMPs to control and reduce sediment and erosion control from Army Total Force Training integration activities within the proposed primary and secondary maneuver corridors and prevent significant adverse effects from erosion on natural resources, cultural resources, soils, and surface water and wetland resources. Tracking of the effectiveness will facilitate adaptive management and better BMP implementation decisions. These general principles are incorporated into FHL's Training Area Management program (see Section 1.2).

3 Prevention BMPs

Prevention BMPs are land management strategies implemented to protect existing resources supportive of programmatic priorities as identified in Section 2.1. This Chapter describes recommended prevention BMP activities.

3.1 Dedicated Staff

The erosion prevention and sediment control manager ensures coordination, oversight, consistency with programmatic priorities, and implementation of the program.

3.2 Implementation

The policies of this appendix should be fully implemented under the management of the designated erosion prevention and sediment control manager. To ensure compliance, a copy of this appendix and verbal conveyance of the requirements in it should be distributed to all trainers, installation staff, and contractors responsible for activities within the primary and secondary maneuver corridors that have the potential for soil disturbance and accelerated erosion and sedimentation. All earth moving activities, including training operations, are required to review and comply with the specifications of this manual. In addition to general guidance in this manual, all soil disturbing activities must follow guidelines in the other pertinent regulations identified in Section 1.2.1.

3.3 Training Activities

Training activities should be rotated frequently to distribute the impact and provide recovery time for vegetation.

3.4 Identification of Soil Types and Erosion Potential

Identification of highly erodible soil types is fundamental to the management of erosion and sediment control. A Geographic Information Systems (GIS) analysis was performed using USDA NRCS and site critical slopes data to determine where highly erodible soils were located within the proposed maneuver corridors. Soil erosion dynamics are usually predicted using the Universal Soil Loss Equation (USLE). In this equation, soil loss (factor T) can be estimated as a product of six factors; soil erodibility (factor K), rainfall/runoff erosivity (factor R), slope length (factor L), slope steepness (factor S), cover management (factor C), and support practice (factor P). Analysis of erosion potential was performed using USDA NRCS soils data from the Monterey County Soil Survey report (USDA, 2015). The field survey was completed and published in 1978, and is listed as “update needed” status by the Davis, CA, NRCS regional office (NRCS, 2013). The digital survey data is updated twice a year; however, a field survey has not been conducted since 1978. Certain limitations, therefore, exists in the available data which include a lack of soil erodibility (K factor) data (only one third of the soil map units within FHL have K factor values assigned). The lack of K factor values precluded a uniform analysis of erosion potential using the USLE. Therefore, this analysis focuses on soil loss factor T, wind erodibility groups, and hydrology groups (see sections below) to assess erosion potential.

3.4.1.1 Water and Wind Erosion

Soil Loss T Factor

Table 1 and Figure 5 shows the distribution of soil erosion factor T in the maneuver corridors. Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur on a map unit without affecting crop productivity (e.g., vegetation growth and cover) over a sustained period. The rate is in tons per acre per year (T/A/Y). A soil with a T factor rating of 5 T/A/Y can tolerate 5 times as much erosion without a loss in productivity compared to a soil with a T factor rating of 1 T/A/Y. While crops are not growing on FHL, erosion factor T is a good indicator of the overall soil erosion tolerance, and of the effect of erosion on a soil's ability to support plant growth. This factor can be used for understanding the various soil units' capacity for supporting plant growth when training areas are rehabilitated and seeded after training activities. As shown in Table 1, the soil erosion tolerance is in general higher in the primary maneuver corridor (26 percent belong to 4 or 5 T/A/Y factor T) compared to the secondary maneuver corridor (12 percent belong to 4 or 5 T/A/Y factor T). However, 51 percent of the soils in the primary maneuver corridor are rated as 2 T/A/Y or less, which indicate that almost half the soils in this corridor are not very tolerable to soil erosion. The secondary maneuver corridor has 67 percent of the soils rated as 2 T/A/Y or less. Erosion tolerable soils are most widespread in TA's 12A, 12B, 15, and 27. The least erosion tolerable are prevalent in TA's 16, 20, 21, 24, and 27.

Table 1. Soil Erosion Factor T

Maneuver Corridor	Erosion T factor	Acres	Percent
Primary Maneuver Corridor	0	663	3
	1	8,232	42
	2	1,228	6
	3	4,289	22
	4	1,011	5
	5	4,146	21
Secondary Maneuver Corridor	0	3,568	10
	1	4,911	13
	2	15,917	44
	3	7,803	21
	4	1,491	4
	5	2,834	8

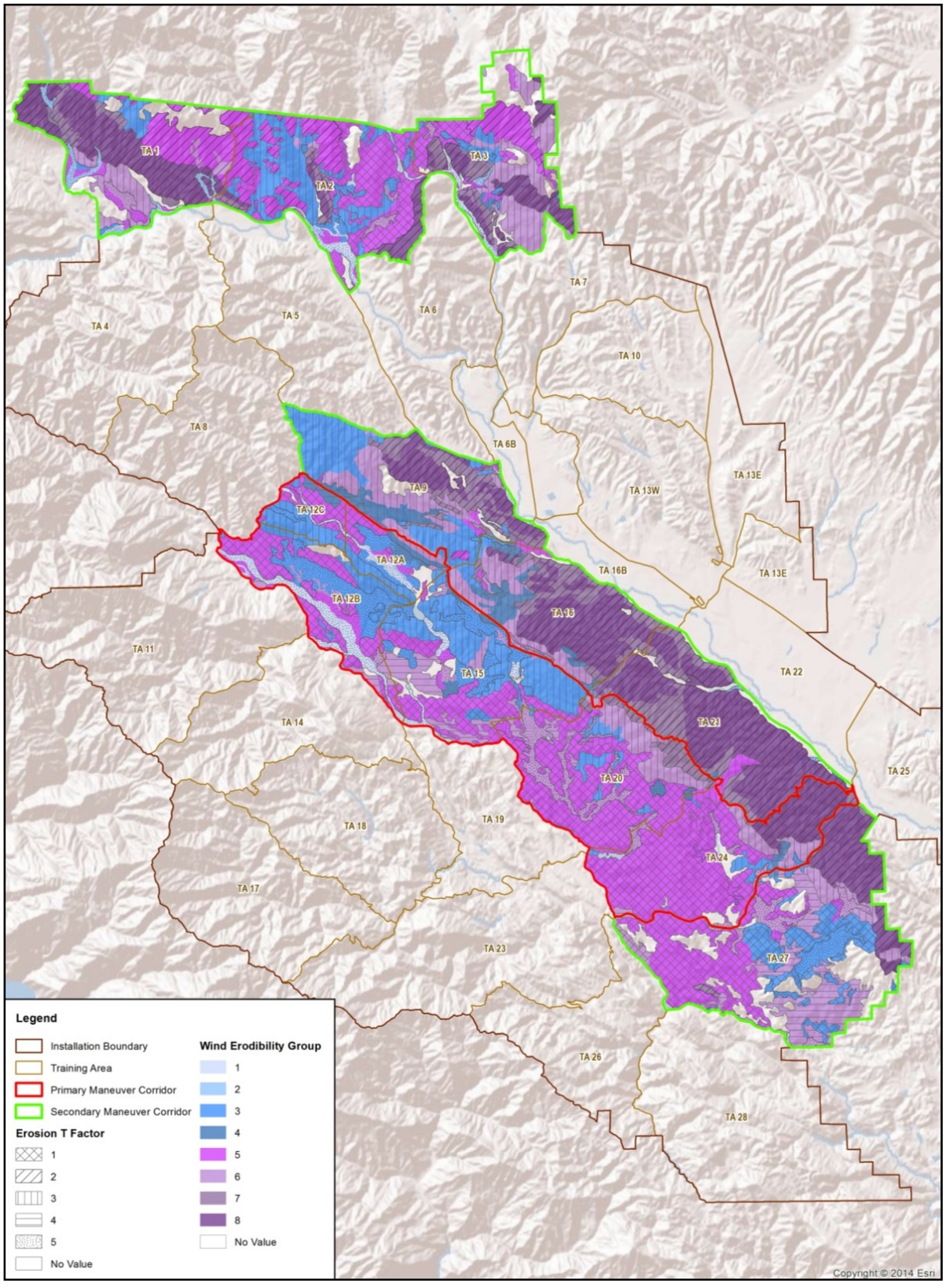


Figure 5. Soil Erodibility Factor T and Soil Wind Erodibility Groups

Wind Erodibility Groups

Table 2 and Figure 5 show the distribution of wind erodibility groups in the maneuver corridors. Wind erodibility groups are assigned to soils based on their inherent susceptibility to wind erosion based on soil properties, primarily soil texture and structure. The group scale runs from Group 1 (being the most susceptible) to Group 8 (being the least susceptible). The soils on FHL are as follows (NRCS, 2015):

- Group 1: Very fine sands, fine sands, sands, or coarse sands.
- Group 2: Loamy very fine sands, loamy fine sands, loamy sands, and loamy coarse sands; very fine sandy loams and silt loams.
- Group 3: Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- Group 4: Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
- Group 5: Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
- Group 6: Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
- Group 7: Noncalcareous silts; noncalcareous silty clays, noncalcareous silty clay loams, and noncalcareous clays.
- Group 8: Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Table 2. Soil Wind Erodibility Group

Maneuver Corridor	Wind Erodibility Group	Acres	Percent
Primary Maneuver Corridor	NULL[1]	663	3
	1	854	4
	2	17	0
	3	4,521	23
	4	465	2
	5	8,844	45
	6	2,975	15
	7	398	2
	8	832	4
Secondary Maneuver Corridor	NULL[1]	3,568	10
	1	402	1
	2	333	1
	3	5,097	14
	4	894	2
	5	7,236	20

Table 2. Soil Wind Erodibility Group

Maneuver Corridor	Wind Erodibility Group	Acres	Percent
	6	5,567	15
	7	3,334	9
	8	10,094	28

[1]NULL indicates soil map units that have not been assigned a wind erodibility group

Soils in the primary maneuver corridor with a wind erodibility group value of 4 or less (more susceptible to wind erosion) constitute 29 percent of the total soils. Soils in the secondary maneuver corridor with a wind erodibility group value of 4 or less (more susceptible to wind erosion) constitute 26 percent of the total soils. Due to the high number of rock fragments or rock outcrops, 28 percent of the soils in the secondary maneuver corridor are shown not to be susceptible to wind erosion at all (group value of 8). Most of the group value of 8 locations are in areas of 30 percent or more slopes.

Hydrologic Groups

Table 3 and Figure 6 show the distribution of soil hydrologic groups in the maneuver corridors. Hydrologic Groups are based on estimates of runoff potential and permeability. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. (NRCS, 2009):

- Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of vertical water transmission.
- Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of vertical water transmission.
- Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of vertical water transmission.
- Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of vertical water transmission.

Table 3. Soil Hydrologic Groups

Maneuver Corridor	Hydrologic Group	Acres	Percent
Primary Maneuver Corridor	NULL[1]	662.69	3
	A	1,498.79	8
	B	2,419.50	12
	C	5,623.58	29
	D	9,363.46	48
Secondary Maneuver Corridor	NULL[1]	3,565.66	10
	A	1,466.31	4
	B	3,451.20	9
	C	14,664.89	40
	D	13.375.44	37

[1]NULL indicates map units without assigned hydrologic groups.

A majority of the soils in both corridors are rated Group C or D indicating that most of the soils have slow infiltration rate when thoroughly wet which makes them highly susceptible to soil erosion during the wet season at FHL. Hydrology group D soils are limited by high clay content, in many cases montmorillic clays with high shrink-swell potential, which also affects the trafficability of mounted maneuvers (see *Soil Trafficability* discussion below).

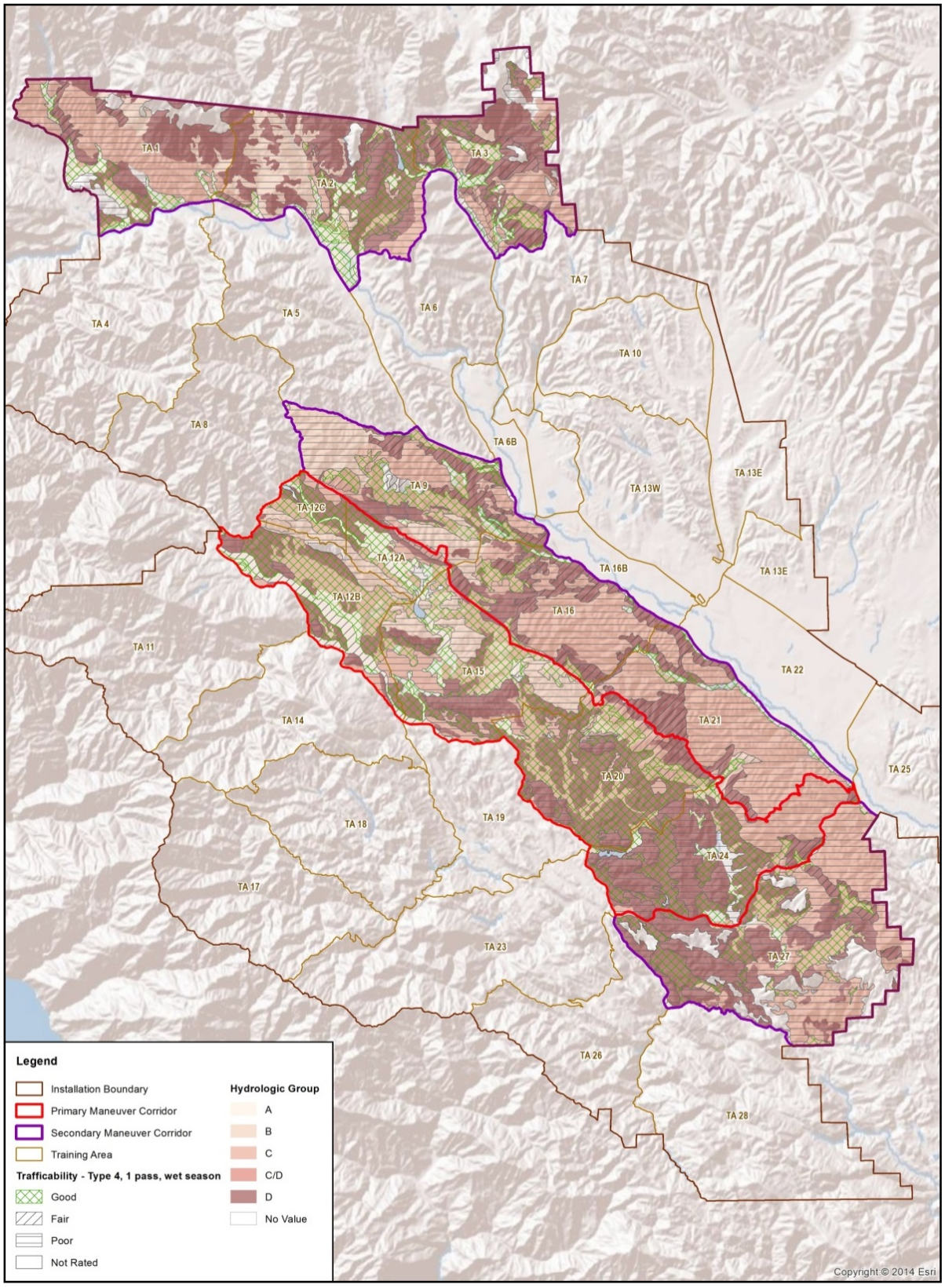


Figure 6. Soil Hydrologic Groups and Type 4 Military Vehicle Trafficability Suitability

Soil Trafficability

Table 4 and Figure 6 show the suitability for a single pass in the wet season with a type 4 military vehicle (e.g., medium-sized tanks, all-wheel-drive trucks and trailed vehicles with low contact pressures including Strykers, and tractors with high contact pressures). For this interpretation, trafficability[2] is the capacity of the soil to support these vehicles during wet periods (single pass). In general, a slight majority of the soils in the primary maneuver corridor have good suitability, while the majority of the soils in the secondary maneuver corridor have poor suitability. While the values in Table 3.5-5 only indicate suitability for a single pass, it is apparent that the soils in the primary maneuver corridor are better suited for trafficability than those in the second maneuver corridor.

Table 4. Suitability for Type 4 Military Vehicle[1] Operations, Wet Season

Corridor	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Acres	Percent
Primary Maneuver Corridor	Good	10,591	54
	Fair	1,789	9
	Poor	6,948	36
	Not Rated	240	1
Secondary Maneuver Corridor	Good	7,508	21
	Fair	4,934	14
	Poor	21,687	59
	Not Rated	2,394	7

[1]Note: The Army categorizes soil trafficability for category types of vehicles. Military category types range from type 1 through 7 which include vehicle and equipment classes used by the military. As described above, the type 4 category covers a wide variety of vehicles often used for training and would be representative of off-road maneuver vehicles used at FHL. As described in Table 2-5, however, the military could use up to category type 5 vehicles which include Abrams and Bradleys which would further reduce areas suitable for trafficability as these equipment are heavier and have higher contact pressure. Category 6 and 7 are primarily highway vehicles and are not suitable for off-road vehicle maneuvers.

Dry soils provide a more stable surface for maneuvering and training, and in general have a higher strength (weight carrying capacity) as compared to wetter soils. As soil moisture approaches saturation, surface runoff also increases, and the probability for soil water erosion is heightened. Because many of the soils at FHL have mollic epipedons (top horizons), and contain smectitic clays, the stability as well as trafficability of the soils are highly connected with the soil moisture. At FHL, hot periods (frequently 90–100° F and higher) of low humidity (20 percent) typically begin in mid-May and occur with increasing frequency into mid-October. Lows of 32° F and less usually occur by mid-November, although freezes can occur earlier. Most rain falls December through March (NPS, 2007). It is apparent that the probability of soil disturbance and erosion, is

[2] Trafficability estimates can be made from terrain data, such as topography data, and from data about soil and weather conditions. Military trafficability interpretations are based on procedures and criteria described in the Army Field Manual 5-430-00-1, *Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations – Road Design*, chapter 7, and are conservative estimates for use in operations planning.

therefore, greatly increased in the wet season, typically from October through April before the soil dries out. The relationship between soil moisture content in FHL soils containing smectitic clays and maneuver trafficability has been studied in the past and all valleys on FHL were categorized as "traffic precluded" between November and April due to low trafficability during this time (FHL, 1979). Some areas (Lower Stony Valley and Patton area) were even precluded into June due slow dry out times for the soils (evapotranspiration). Soils with high shrink-swell potential may dry on the surface and appear solid, but will collapse if heavy vehicles are driven over them due to high soil moisture levels in the lower soil horizons. The sticky clay makes it difficult to retrieve the vehicles, and additional soil disturbance can be caused by the retrieval efforts. Figure 7 shows a Stryker vehicle stuck on FHL in saturated soils. Extensive disturbance to the soils resulting from efforts to retrieve the Stryker from the soil is apparent.

Figure 7 Stryker Vehicle Stuck in Saturated Soils

3.5 Monitoring

A monitoring system to determine the success of control and restoration efforts and to identify new areas needing work within the maneuver corridors would be implemented (see Section 2.4 regarding establishment of a monitoring program). The current FHL SWPPP covers the cantonment area and tactical training base locations and establishes a Pollution Prevention Team responsible for implementation of SWPPP requirements including water quality monitoring. Specific requirements of the monitoring program include monthly visual observations for authorized/unauthorized non-stormwater discharges on days with and without precipitation, bi-annual stormwater sampling and analysis (July-December and January-June), annual evaluation of BMPs, and annual reporting.

Monitoring for the maneuver area would help identify and prioritize problematic areas before they become significant issues. Specific items that would be monitored include:

1) impacts to and sustainability of the maneuver trail system;
2) impacts to drainage systems and streambanks;
3) protection success of off-limit areas; and,
4) overall training land sustainability based on quality of vegetation and soils in the maneuver corridors (the sustainment goal is to maintain or improve vegetation cover and composition as well as soil erosion potential)

Long-term monitoring of the sustainability of the maneuver corridors, conducted by qualified personnel, would include the following elements:

1) Prior to training, surveys would be conducted to establish baseline soil conditions and vegetation cover and composition. Such surveys could be random in nature, and stratified by soil, slope, and general vegetation types.
2) After training, surveys would be conducted to establish the distribution, type, and intensity of training land disturbance within the maneuver corridors. This can be achieved through remote sensing, the Directorate of Plans, Mobilization and Training training area use spatial database, field surveys, and Global Positioning System (GPS) information supplied by the trainers.
3) The number of disturbed areas restored each year would be based on need and available resources. Criteria for determining whether a disturbed area would need rest or restoration to support continued use include: accessibility, depth and extent soil disturbance, amount of remaining vegetation cover, potential for future erosion problems, and likelihood of continued use.
4) Success of restoration projects would be evaluated through pre- and post-restoration monitoring. Vegetative cover and composition, amount of bare ground, and extent and depth of erosion features would be analyzed. Monitoring would continue seasonally from one to three years after restoration, as necessary. Monitoring objects, including desired sampling confidence, would be established and would determine the number and types of surveys needed.

In addition to monitoring restoration areas, disturbed sites not planned for restoration, as well as unaffected sites, would be monitored, using the same criteria as above.

3.6 Education and Outreach

The development of an education and outreach program targeting the units training at FHL and addressing erosion and sediment control practices should be implemented to help prevent erosion and sedimentation. This should include briefing of units prior to training regarding sensitive areas and effective methods for erosion control following training events.

3.7 Regional Collaboration

To gain insight into regional efforts and resources being used to address erosion and sediment control and to increase staff knowledge related to erosion and sediment control management, participation in regional erosion control and watershed management programs and organizations is recommended.

4 Specific BMPs

Specific BMPs are on-the-ground physical measures and practices used to prevent erosion and reduce sedimentation.

As stated within the EA document, training activities, particularly off-road vehicle maneuvers using tracked and wheeled vehicles have the potential to disturb soil conditions and increase erosion and sediment potential. In order to maintain levels below the threshold of significance (see Identify the Objective, Section 2.4 of this Appendix), a list of specific BMPs have been identified to reduce impacts. Table 5 provides types of sediment and erosion control based on the following objectives:

- **Temporary Soil Stabilization** – these measures consists of preparing the soil surface and applying temporarily control devices to stabilize soil following training events. Use of temporary measures are more important during the rainy season or wet periods to prevent off-site migration of soils.
- **Temporary Sediment Control** – these measures includes use of temporary physical devices to intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped. They can be effective both during training and immediately following activities to protect points of entry and sediment conveyance to surface waters and wetlands.
- **Wind Erosion Control** – this temporary measure includes the application of dust suppression measures to prevent off-site migration of soils from wind. They can be effective both during training and immediately following activities to prevent or reduce detachment and dispersion of soils by wind.
- **Permanent Sediment Control** – involves construction of more permanent devices within the landscape to control and manage runoff. These devices are typically part of a greater Stormwater Pollution Prevention Plan/Stormwater Management Plan and a long-term strategy for reducing sedimentation and protection of water quality.
- **Training Management** – involves management of training scheduling and training area use to maintain training land sustainability. This includes allowing land to recover from previous training events before scheduling new intensive (e.g. off-road vehicle maneuver) training activities.

Table 5. Sediment Control Measures Implementation Guidance

BMP Name	Description	Cost
Temporary Soil Stabilization		
Seeding	Seeding typically consists of applying a seed mixture and fertilizer and stabilizing emulsion to protect exposed soils from erosion by water and wind.	$1,900-$4,000/acre
Mulching	Mulching consists of applying a mixture of shredded wood fiber or straw mix and a stabilizing emulsion or tackifier with seeding equipment which temporarily protects exposed soil from erosion by rainfall or wind.	$1,700-4,000/acre

Table 5. Sediment Control Measures Implementation Guidance

BMP Name	Description	Cost
Geotextiles/ Erosion Control Blankets	Involves placement of geotextiles, mats, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water. More effective on steep slopes and where plant development is slow.	$2,200-$40,000/acre
Temporary Sediment Control		
Silt Fence	Temporary linear sediment barriers of permeable fabric designed to intercept the flow of sediment-laden sheet flow runoff. They are useful in locations adjacent to streams and wetlands.	$7/linear foot
Fiber Rolls	Fiber rolls consist of wood excelsior, rice or wheat straw, or coconut fibers that are rolled or bound into a tight tubular roll and placed on the toe and face of slopes to intercept runoff, reduce flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff.	$20-30/ 25-foot roll
Straw Bale or Sand Bag Barriers	These barriers are temporary linear sediment barriers consisting of straw bales or sand bags, designed to intercept and slow sediment-laden sheet flow runoff.	Straw Bale:$5 – 7 each Sand Bag: $1.50 – 2.50/bag
Wind Erosion Control		
Wind Erosion Control	Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion forces of wind. Typically only effective for a few hours or days.	Highly variable
Permanent Sediment Control		
Low-water Crossings	Establishment and maintenance of low water crossings to reduce streambank and streambed impacts. Training activities should restrict vehicle movement across drainage features to designated low-water crossings.	$45-95/square foot
Stormwater Management Devices	Establishment of stormwater control basins, vegetated swales, and velocity dissipation devices (e.g., check dams). These structures are designed to intercept, divert and convey surface run-off to prevent erosion. These features would serve to control and treat stormwater runoff in intensively used training areas.	Basins: highly variable Swales: $15 to $55/foot Velocity Dissipation Device: $150/device
Training Management		
Scheduling	Rotation of training lands and closure of specific sites until site restoration goals are achieved.	Not applicable
Time of Year Restrictions	Restriction of certain training activities during the rainy season.	Not applicable
Buffers	Maintenance of vegetative buffers and restriction of intensive training activities in areas prone to erosion, steep slopes or within 100 feet of water and wetland resources.	Variable costs associated with maintenance

Table 5. Sediment Control Measures Implementation Guidance

BMP Name	Description	Cost
Maintenance and Inspection	Review of training locations prior to and following training events to prescribe appropriate erosion and sediment control measures. This includes ensuring sediment and erosion control devices are properly installed and maintained along with the continued maintenance of existing road and trail networks. In general, planning maintenance in the dry season reduces the potential of damage to roads and lands in wet weather from maintenance activities and heavy machinery in saturated conditions.	Highly variable, requirement for funding at ITAM-level
Monitoring	This includes establishing goals for recovery and sustainment, developing a long-term monitoring strategy for evaluating the effectiveness of measures implemented and parameters such as water quality, and taking corrective action as necessary.	Highly variable, requirement for funding at ITAM-level

Sources: California Stormwater Quality Association, 2009; .State of California, Department of Transportation, 2003.
BMP=best management practice; ITAM = Integrated Training Area Management

4.1 Maneuver Corridor Use

4.1.1 Corridor Characteristics

FHL identified two areas for proposed establishment of maneuver corridors within the installation occurring in the Nacimiento Valley and Upper San Antonio Valley (Milpitas). Maneuvers would be conducted in either the primary or secondary maneuver corridors. These corridors were selected because they provide suitable terrain for off-road vehicle maneuver lanes. These areas were used until the early 2000's for off-road vehicle maneuver exercises. The corridors and suitable training activities within each as follows:

- The primary maneuver corridor lies within the main valley of the Nacimiento River and includes suitable locations within training areas 12, 15, 20, and 24. FHL has designated this area as the 'primary' corridor as it encompasses the largest contiguous areas for maneuver lane training (approximately 79 square kilometers [31 square miles]). The relatively gently-sloping main valley (approximately 63 square kilometers [24 square miles]) provides areas with suitable terrain for off-road vehicle maneuvers (<30 percent slope and open vegetation communities) and would not pose an incompatible land use to existing training assets.

  Suitable training activities include medium and heavy unit off-road vehicle maneuver training requiring expansive open terrain; air assault and airborne; convoy training; engineer mobility, countermobility, survivability, and general engineering operations; and sustainment operations. Medium and heavy units require large open areas to conduct most offensive and defensive operations in areas that simulate current operating environment conditions in theatres of war.

- The secondary maneuver corridor is situated within the foothill valleys of the Nacimiento Valley and the Milpitas Valley and includes suitable locations within training areas 1, 2, 3, 9, 16, 21, and 27. Although total acreage within the secondary maneuver corridor

boundaries is greater (approximately 147 square kilometers [59 square miles]), FHL has designated this area as 'secondary' because it provides smaller areas non-contiguous from each other with suitable terrain, totaling approximately 77 square kilometers (30 square miles).

Suitable training activities include light and limited medium infantry maneuver and tactical training, support battalion base of operations, and land navigation. These activities are well-suited in this terrain due to the availability of cover and concealment for light maneuver operations and base/assembly area establishment. Light infantry units are often placed in areas with constrictive, close terrain in wartime operating environments. Limited squad to platoon level medium infantry units could train in the more open areas that have suitable terrain.

4.1.2 Sensitive Receptors

Beyond the sensitive (erodible) soil mapping in Section 3.4, other sensitive receptors within the proposed maneuver corridors are defined within the Army Total Force Training EA and include federally protected species and their habitats, historic properties, and surface waters and wetlands (Sections 3.3, 3.4, 3.7 of the EA, respectively).

4.2 Disturbed Areas Revegetation

Disturbed areas include any site in the proposed maneuver corridors that lacks adequate vegetative cover to stabilize erosion due to off-road vehicle maneuvers. Reestablishment of vegetation in disturbed areas is the most effective method of soil stabilization. In disturbed areas where successful natural revegetation has not occurred, manual seeding can achieve desired results. Manual seeding, due to the high benefit cost and the potential for non-native vegetation to interfere with native species in the seeding process, should be considered very carefully. Prior to making a decision to implement manual seeding or allow additional time for natural processes to re-establish vegetation, consider:

- Site soil types and slopes.
- History of the site and health of the seedbank. Does the site have sufficient seeds in the soil or neighboring area to revegetate, or have intense burning activities depleted seeds and attracted exotic invasive vegetation?
- Is there sufficient time for the site to naturally revegetate following the rainy season because native species can be slow growing?
- Is the site a regulatory concern such as impacts to threatened or endangered species or wetlands?
- Site use—is the site heavily used for training?

After evaluating these considerations and determining that manual seeding is best, it should determine whether the site is to be restored or rehabilitated. Restoration should include the use of a diverse mixture of only native plant species to restore site conditions back to historic appearance and function. Rehabilitation is the repair of disturbed areas using native and non-native plant species to create a stable plant community protective of erosion and invasive plant species. When comparing restoration to rehabilitation, factors such as training activities in targeted area, timing,

presence of protected species, and cost play an integral role. Native grasses and shrubs require more time to establish, are more costly, and do not hold up well to the pressures of ground disturbance (training exercises). Restoration may be necessary if restoring habitat supportive of threatened and endangered species, or restoring areas impaired with invasive plant species. Rehabilitation should be used in areas that were impaired and dominated by non-native grasses before site impact or fire.

After deciding whether a project will be restored, or rehabilitated, consider these guidelines when reseeding:

Seed Selection

To select seeds for rehabilitating or restoring disturbed areas, the development of a plant species suitability list for erosion control is needed. The list should include minimum seeding rates, seed designation (restoration or rehabilitation), grow rate, and minimum rainfall requirements. The following sources can be used to aid in the development of the list:

- NRCS Ecological site descriptions are at: http://www.nrcs.usda.gov/technical/efotg/
- The Fire Effects Information System provides information on fire and recovery potential for many plants: http://www.fs.fed.us/database/feis/
- The NRCS "VegSpec" is an expert system that aids technical specialists or managers in making decisions on what to plant at specific sites by integrating NRCS soils, plants, and climate databases to select adapted plants including those native to the US for seed in rehabilitation and restoration projects: http://www.plants.usda.gov

Seed Mixes

Mixes are important to establish long term erosion control. Mixes usually contain an annual grass for temporary ground cover during the first year, while perennial vegetation becomes established in the following 2-3 years. Seed mix should be obtained locally, preferably from FHL, to ensure genetic integrity. Mixes provide plant species diversity, supportive of healthy grassland habitat. Commercial seed collectors normally have a wide variety of seeds to choose from and can be purchased premixed. When buying a mix, make sure that the species selected are suitable for erosion control and can grow in the project area (see Seed Selection above). If buying individual species and making a customized mix, make sure the species are compatible. Seeds purchased through a commercial seed collector should be pure live seed to make sure that the seed has been tested and cleaned.

Site Preparation

The preparation of the site is important for creating favorable conditions for germination and growth of seeds. Recommended BMPs for site preparation are:

- Before planting, make sure that the site is at final grade.
- Erosion control practices should be implemented on the site if the potential exists for erosion in the seeded area. These may include, but are not limited to silt fences to protect the perimeter of the site from run-on and diversion dikes or swales to divert runoff away from the site, dependent on site conditions.
- Soil tests should be conducted to determine pH and nutrient content.

- The site surface should be roughened horizontally along project site slopes to allow seeds to settle. It is not recommended to roughen surfaces where erosion control blankets or hydro-seeding will be implemented.
- Amendments to soil should be applied as needed based on soil test results. If mulch is needed to amend the soil, apply only carefully selected mulch material. Mulches from chipping of landscape waste are unacceptable because they introduce invasive exotic plants to wildland areas.
- A seedbed of 3-5 inches should be prepared with the top 3-4 inches consisting of topsoil. The seedbed should be firm, but not compacted and be free of large dirt clods and stones. Ripping and pitting, harrowing, and disking should be used to loosen the soil to create a seed bed unless hydroseeding will be used. Seeds should be planted immediately after the seedbed is prepared.

Seeding Methods and Rates

The optimum seeding periods for FHL installation is from late fall to spring. If seeding cannot be completed in that time frame, then seeding should be done as soon as possible after those dates.

- Seeding drills have been used for wildland applications for decades and are readily available. Newer agricultural drills can be set for depth and seeding rate and adjusted for the species used but are not as readily available and are expensive. Drilling is not recommended for rocky areas with steep slopes.
- Broadcasting of seed can be done using a hand crank seed spreader at the recommended seeding rate. Seeds should be covered using by chain-dragging or by lightly raking. Seeds should be covered at a depth of 2-3 times their diameter.
- Hydroseeding can be done very quickly over large areas and needs little to no site preparation.
- Seeded sites should be closed for a minimum of one growing season, or until the site conditions have been established to support ground disturbances.

The determination of appropriate seeding rates is an important aspect in ensuring beneficial and cost effective reseeding. Local plant material specialists or appropriate literature should be consulted. The Bureau of Land Management (BLM) national seed coordinator is also a good resource for reseeding rates and other seed questions as needed. General guidelines given by the BLM are:

- USDA drilled seeding rates for large seeded species pure live seed is 20 seeds per square foot.
- Broadcast or aerial seeding is recommended at the rate of 60 to 80 seeds per square foot (double the drilled rate).
- Aerial or broadcast seeding rates should not be higher than proven successful and cost effective.
- If multiple seed applications are planned, the rate per treatment should be lowered so that it doesn’t exceed 80 seeds per square foot.

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Appendix E – FHL Soils

Table E-1 lists the detailed soil properties mapped by Natural Resource Conservation Service (NRCS) for soils within the proposed primary and secondary maneuver corridors at Fort Hunter Liggett.

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Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
Primary Maneuver Corridor														
AaC	Alo silty clay, 2 to 9 percent slopes	24.7	Alo	0 to 15	Vertisols	3	86	4	D			0	Poor	Good
AaD	Alo silty clay, 9 to 15 percent slopes	11.0	Alo	0 to 15	Vertisols	3	86	4	D	.28	.28	33	Poor	Good
AaE	Alo silty clay, 15 to 30 percent slopes	79.1	Alo	15 to 30	Vertisols	3	86	4	D			0	Poor	Good
AsB	Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes	336.1	Arroyo Seco	0 to 15	Mollisols	5	56	5	A	.10	.20	25	Good	Good
AsC	Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes	8.8	Arroyo Seco	0 to 15	Mollisols	5	56	5	A	.10	.20	25	Good	Good
AvB	Arroyo Seco gravelly loam, 2 to 5 percent slopes	36.2	Arroyo Seco	0 to 15	Mollisols	5	48	6	A	.17	.37	25	Good	Good
AyD	Ayar silty clay, 5 to 15 percent slopes	51.8	Ayar	0 to 15	Vertisols	4	86	4	C			0	Good	Good
CbA	Chualar loam, 0 to 2 percent slopes	84.7	Chualar	0 to 15	Mollisols	5	86	3	C	.32	.32	15	Good	Good
CbB	Chualar loam, 2 to 5 percent slopes	973.8	Chualar	0 to 15	Mollisols	5	86	3	C	.32	.32	15	Good	Good
CbC	Chualar loam, 5 to 9 percent slopes	417.0	Chualar	0 to 15	Mollisols	5	86	3	C	.32	.32	15	Good	Good
Cd	Cieneba-Rock outcrop complex, 50 to 75 percent slopes, cool MAAT, MLRA 15	8.2	Cieneba	over 45	Entisols	2	56	5	D			0	Poor	Poor
Cg	Clear Lake clay, sandy substratum, drained, 0 to 1 percent slopes, MLRA 14	49.2	Clear Lake	0 to 15	Vertisols	5	86	4	D	.24	.24	37	Poor	Poor
CnA	Cropley silty clay, 0 to 2 percent slopes	210.2	Mocho	No value		0						0	Poor	Good
CnC	Cropley silty clay, 2 to 9 percent slopes, MLRA 14	153.2	Cropley	0 to 15	Vertisols	5	86	4	C	.28	.28	34	Poor	Good
DaC	Danville sandy clay loam, 2 to 9 percent slopes	54.0	Danville	0 to 15	Mollisols	5	48	6	C	.17	.24	40	Good	Good
DbD	Diablo clay, 9 to 15 percent slopes	95.7	Diablo	0 to 15	Vertisols	4	86	4	C			0	Poor	Good
DcC	Dibble loam, 2 to 9 percent slopes	848.9	Dibble	0 to 15	Alfisols	4	48	6	C			0	Poor	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
DdF	Dibble silt loam, 30 to 50 percent slopes	14.3	Dibble	30 to 45	Alfisols	4	48	6	C			0	Poor	Fair
EaA	Elder sandy loam, 0 to 2 percent slopes, MLRA 14	231.8	Arroyo Seco	No value		0						0	Good	Good
EbC	Elder very fine sandy loam, 2 to 9 percent slopes	139.3	Elder	0 to 15	Mollisols	3	86	3	B			0	Good	Good
Fa	Fluvents, stony	12.3	Fluvents	0 to 15	Entisols	5	134	2	A	.02	.05	9	Good	Good
GdF	Gaviota sandy loam, 30 to 75 percent slopes, MLRA 15	51.8	Gaviota	over 45	Entisols	1	86	3	D			0	Poor	Poor
GeE	Gaviota-San Andreas complex, 15 to 30 percent slopes	5411.4	Gaviota	15 to 30	Entisols	1	56	5	D			0	Good	Good
GeG	Gaviota-San Andreas complex, 30 to 75 percent slopes	2,768.8	Gaviota	over 45	Entisols	1	56	5	D			0	Poor	Poor
GfF	Gazos silt loam, 30 to 50 percent slopes	25.2	Gazos	30 to 45	Mollisols	2	38	7	C			0	Fair	Fair
GkB	Gorgonio sandy loam, 0 to 5 percent slopes	112.3	Gorgonio	0 to 15	Mollisols	5	56	5	A	.10	.20	10	Good	Good
HaE	Haire loam, 15 to 30 percent slopes	75.4	Haire	15 to 30	Ultisols	3	48	6	D	.37	.37	8	Good	Good
LeC	Lockwood channery loam, 2 to 9 percent slopes, MLRA 14	38.2	Elder	No value		0						0	Good	Good
LeD	Lockwood shaly loam, 9 to 15 percent slopes	9.9	Lockwood	0 to 15	Mollisols	5	38	7	B	.15	.28	18	Good	Good
Mg	Metz complex	5.2	Metz	0 to 15	Entisols	5	134	2	B	.28	.28	10	Good	Good
MhG	Millsholm loam, 15 to 65 percent slopes, MLRA 15	0.0	Millsholm	over 45	Inceptisols	1	48	6	D	.28	.28	15	Poor	Poor
NaD	Nacimiento silty clay loam, 9 to 15 percent slopes	13.8	Nacimiento	0 to 15	Mollisols	3	48	6	C			0	Good	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
NaE	Nacimiento silty clay loam, 15 to 30 percent slopes, MLRA 15	170.8	Nacimiento	15 to 30	Mollisols	3	48	6	C	.32	.32	28	Good	Good
NaF	Nacimiento silty clay loam, 30 to 50 percent slopes, MLRA 15	147.5	Nacimiento	30 to 45	Mollisols	3	48	6	C	.37	.37	25	Good	Fair
NbF	Nacimiento-Los Osos complex, 30 to 50 percent slopes, MLRA 15	145.3	Los Osos	30 to 45	Mollisols	3	48	6	D			0	Fair	Fair
NbG	Nacimiento-Los Osos complex, 50 to 75 percent slopes, MLRA 15	13.4	Nacimiento	over 45	Mollisols	3	48	6	C	.24	.24	33	Poor	Poor
Pa	Pacheco clay loam, MLRA 14	77.6	Pacheco	0 to 15	Mollisols	5	48	6	C	.24	.24	26	Good	Good
PdC	Pfeiffer fine sandy loam, 2 to 9 percent slopes	139.4	Pfeiffer	0 to 15	Mollisols	5	86	3	A			0	Good	Good
PdD	Pfeiffer fine sandy loam, 9 to 15 percent slopes	0.1	Pfeiffer	0 to 15	Mollisols	5	86	3	A			0	Good	Good
PkE	Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes	107.4	Pinnacles	15 to 30	Alfisols	3	56	5	B	.10	.15	10	Good	Good
PkF	Pinnacles coarse sandy loam, very gravelly subsoil variant, 30 to 50 percent slopes	11.8	Pinnacles	30 to 45	Alfisols	3	56	5	B	.10	.15	10	Fair	Fair
PnC	Placentia sandy loam, 2 to 9 percent slopes, MLRA 14	249.2	Placentia	0 to 15	Alfisols	3	86	3	C	.20	.20	19	Good	Good
PnD	Placentia sandy loam, 9 to 15 percent slopes	112.9	Placentia	0 to 15	Alfisols	3	86	3	D	.32	.32	10	Good	Good
Ps	Psamments and Fluvents, frequently flooded	765.0	Psamments	0 to 15	Entisols	5	220	1	A	.02	.02	3	Fair	Fair
RaC	Rincon clay loam, 2 to 9 percent slopes, MLRA 14	13.7	Rincon	0 to 15	Alfisols	5	48	6	C	.28	.28	31	Good	Good
Rc	Rock outcrop-Xerorthent association	98.6	Rock outcrop	over 45		0						0	Not Rated	Not Rated
SbA	Salinas clay loam, 0 to 2 percent slopes, MLRA 14	661.8	Salinas	0 to 15	Mollisols	5	48	6	C	.37	.37	26	Good	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
ScE	San Andreas fine sandy loam, 15 to 30 percent slopes	24.9	San Andreas	15 to 30	Mollisols	3	86	3	B			0	Good	Good
SfF	Santa Lucia channery clay loam, 30 to 50 percent slopes, MLRA 15	362.6	Santa Lucia	30 to 45	Mollisols	2	38	7	D	.05	.17	0	Fair	Fair
Sg	Santa Lucia-Reliz association	831.9	Santa Lucia	over 45	Mollisols	2	0	8	C			0	Poor	Poor
ShC	Santa Ynez fine sandy loam, 2 to 9 percent slopes	79.5	Santa Ynez	0 to 15	Mollisols	3	56	5	D	.15	.32	18	Good	Good
ShD 2	Santa Ynez fine sandy loam, 5 to 15 percent slopes, eroded	183.8	Santa Ynez	0 to 15	Mollisols	3	86	3	D	.32	.32	18	Good	Good
Sm G3	Shedd silt loam, 30 to 75 percent slopes, severely eroded	186.8	Shedd	over 45	Entisols	3	48	6	C			0	Poor	Poor
SnF 2	Shedd silty clay loam, 30 to 50 percent slopes, eroded	390.9	Shedd	30 to 45	Entisols	3	48	6	C			0	Fair	Fair
SoD	Sheridan coarse sandy loam, 5 to 15 percent slopes	69.7	Sheridan	0 to 15	Mollisols	3	86	3	B			0	Good	Good
SoE	Sheridan coarse sandy loam, 15 to 30 percent slopes, MLRA 15	147.9	Sheridan	15 to 30	Mollisols	3	86	3	B			0	Good	Good
SoG	Sheridan coarse sandy loam, 30 to 75 percent slopes	519.7	Sheridan	over 45	Mollisols	3	86	3	B			0	Poor	Poor
SpD	Snelling-Greenfield complex, 5 to 15 percent slopes	23.0	Snelling	0 to 15	Alfisols	5	86	3	C	.28	.28	10	Good	Good
SrC	Sorrento clay loam, 2 to 9 percent slopes, MLRA 14	23.4	Sorrento	0 to 15	Mollisols	5	48	6	C	.28	.28	26	Good	Good
VaD	Vista coarse sandy loam, 5 to 15 percent slopes	145.5	Vista	0 to 15	Inceptisols	3	86	3	B			0	Good	Good
VaE	Vista coarse sandy loam, 15 to 30 percent slopes	201.2	Vista	30 to 45	Inceptisols	3	86	3	B			0	Good	Good
VaG	Vista coarse sandy loam, 30 to 75 percent slopes	980.1	Vista	over 45	Inceptisols	3	86	3	B			0	Poor	Poor

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
Vb	Vista-Rock outcrop complex	57.1	Vista	over 45	Inceptisols	3	86	3	B			0	Not Rated	Not Rated
W	Water	83.9	Water	No value		0						0	Not Rated	Not Rated
Xb	Xerorthents, sandy	88.7	Xerorthents	30 to 45	Entisols	5	220	1	A	.10	.10	3	Fair	Fair
Xd	Xerorthents, dissected	101.2	Xerorthents	over 45	Entisols	5	48	6	C	.32	.32	23	Poor	Poor
Secondary Maneuver Corridor														
AaC	Alo silty clay, 2 to 9 percent slopes	74.0	Alo		Vertisols	3	86	4	D			0	Poor	Good
AaD	Alo silty clay, 9 to 15 percent slopes	125.7	Alo		Vertisols	3	86	4	D	.28	.28	33	Poor	Good
AaE	Alo silty clay, 15 to 30 percent slopes	276.2	Alo		Vertisols	3	86	4	D			0	Poor	Good
AaF	Alo silty clay, 30 to 50 percent slopes	221.4	Alo		Vertisols	3	86	4	D			0	Poor	Fair
Af	Aquic Xerofluvents	0.0	Clear Lake			0						0	Not Rated	Not Rated
AsA	Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes	22.5	Arroyo Seco		Mollisols	5	56	5	A	.10	.20	25	Good	Good
AsB	Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes	181.5	Arroyo Seco		Mollisols	5	56	5	A	.10	.20	25	Good	Good
AsC	Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes	230.9	Arroyo Seco		Mollisols	5	56	5	A	.10	.20	25	Good	Good
AvB	Arroyo Seco gravelly loam, 2 to 5 percent slopes	2.6	Arroyo Seco		Mollisols	5	48	6	A	.17	.37	25	Good	Good
AyD	Ayar silty clay, 5 to 15 percent slopes	8.3	Ayar		Vertisols	4	86	4	C			0	Good	Good
AyF	Ayar silty clay, 30 to 50 percent slopes	22.4	Ayar		Vertisols	4	86	4	C			0	Fair	Fair

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
Ba	Badland	1.9	Badland			0			D			0	Not Rated	Not Rated
CaD	Chamise shaly loam, 9 to 15 percent slopes	14.5	Chamise		Mollisols	5	38	7	C	.17	.28	20	Good	Good
CbA	Chualar loam, 0 to 2 percent slopes	8.8	Chualar		Mollisols	5	86	3	C	.32	.32	15	Good	Good
CbB	Chualar loam, 2 to 5 percent slopes	93.0	Chualar		Mollisols	5	86	3	C	.32	.32	15	Good	Good
CbC	Chualar loam, 5 to 9 percent slopes	25.9	Chualar		Mollisols	5	86	3	C	.32	.32	15	Good	Good
CcG	Cieneba fine gravelly sandy loam, 30 to 75 percent slopes	1285.8	Cieneba		Entisols	2	56	5	D			0	Poor	Poor
Cd	Cieneba-Rock outcrop complex, 50 to 75 percent slopes, cool MAAT, MLRA 15	1248.9	Cieneba		Entisols	2	56	5	D			0	Poor	Poor
CnA	Cropley silty clay, 0 to 2 percent slopes	16.7	Mocho			0						0	Poor	Good
CnC	Cropley silty clay, 2 to 9 percent slopes, MLRA 14	30.8	Cropley		Vertisols	5	86	4	C	.28	.28	34	Poor	Good
DaC	Danville sandy clay loam, 2 to 9 percent slopes	7.8	Danville		Mollisols	5	48	6	C	.17	.24	40	Good	Good
DbD	Diablo clay, 9 to 15 percent slopes	134.2	Diablo		Vertisols	4	86	4	C			0	Poor	Good
DbF	Diablo clay, 30 to 50 percent slopes	0.9	Diablo		Vertisols	4	86	4	C			0	Poor	Fair
DcC	Dibble loam, 2 to 9 percent slopes	14.7	Dibble		Alfisols	4	48	6	C			0	Poor	Good
DdB	Dibble silt loam, 9 to 15 percent slopes	76.5	Dibble		Alfisols	4	48	6	C			0	Poor	Good
DdE	Dibble silt loam, 15 to 30 percent slopes	32.5	Dibble		Alfisols	4	48	6	C			0	Poor	Good
DdF	Dibble silt loam, 30 to 50 percent slopes	1201.4	Dibble		Alfisols	4	48	6	C			0	Poor	Fair
EaA	Elder sandy loam, 0 to 2 percent slopes, MLRA 14	126.8	Arroyo Seco			0						0	Good	Good
EbC	Elder very fine sandy loam, 2 to 9 percent slopes	50.6	Elder		Mollisols	3	86	3	B			0	Good	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
Fa	Fluvents, stony	297.2	Fluvents		Entisols	5	134	2	A	.02	.05	9	Good	Good
GdF	Gaviota sandy loam, 30 to 75 percent slopes, MLRA 15	1001.4	Gaviota		Entisols	1	86	3	D			0	Poor	Poor
GeE	Gaviota-San Andreas complex, 15 to 30 percent slopes	1871.9	Gaviota		Entisols	1	56	5	D			0	Good	Good
GeG	Gaviota-San Andreas complex, 30 to 75 percent slopes	1890.6	Gaviota		Entisols	1	56	5	D			0	Poor	Poor
GfE	Gazos silt loam, 15 to 30 percent slopes	74.0	Gazos		Mollisols	2	38	7	C			0	Good	Good
GfF	Gazos silt loam, 30 to 50 percent slopes	155.7	Gazos		Mollisols	2	38	7	C			0	Fair	Fair
GkB	Gorgonio sandy loam, 0 to 5 percent slopes	57.9	Gorgonio		Mollisols	5	56	5	A	.10	.20	10	Good	Good
GmD	Greenfield fine sandy loam, 9 to 15 percent slopes	27.9	Greenfield		Alfisols	5	86	3	A	.10	.15	4	Good	Good
HaE	Haire loam, 15 to 30 percent slopes	254.7	Haire		Ultisols	3	48	6	D	.37	.37	8	Good	Good
JbG	Junipero sandy loam, 30 to 75 percent slopes	60.8	Junipero		Mollisols	3	56	5	B			0	Poor	Poor
Jc	Junipero-Sur complex	0.1	Junipero		Mollisols	3	56	5	B	.15	.32	15	Poor	Poor
LbE	Linne-Diablo complex, 15 to 30 percent slopes	162.2	Linne		Mollisols	3	48	6	C			0	Good	Good
LdA	Lockwood loam, 0 to 2 percent slopes	34.6	Lockwood		Mollisols	5	48	6	C	.32	.32	18	Good	Good
LdC	Lockwood loam, 2 to 9 percent slopes	118.3	Lockwood		Mollisols	5	48	6	C	.32	.32	18	Good	Good
LeA	Lockwood channery loam, 0 to 2 percent slopes, MLRA 14	4.5	Lockwood		Mollisols	5	38	7	B	.20	.37	23	Good	Good
LeC	Lockwood channery loam, 2 to 9 percent slopes, MLRA 14	322.6	Elder			0						0	Good	Good
LeD	Lockwood shaly loam, 9 to 15 percent slopes	89.6	Lockwood		Mollisols	5	38	7	B	.15	.28	18	Good	Good
LhE	Lopez shaly loam, 15 to 30 percent slopes	26.9	Lopez		Mollisols	1	0	8	D	.10	.28	23	Good	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
Lm D	Los Osos clay loam, 9 to 15 percent slopes	23.6	Los Osos		Mollisols	3	48	6	D	.28	.28	30	Good	Good
LmE	Los Osos clay loam, 15 to 30 percent slopes, MLRA 15	232.3	Alo			0						0	Poor	Good
LmF	Los Osos clay loam, 30 to 50 percent slopes, MLRA 15	398.3	Los Osos		Mollisols	3	48	6	D			0	Poor	Fair
Lm G	Los Osos clay loam, 50 to 75 percent slopes, MLRA 15	172.2	San Benito			0						0	Poor	Poor
Mf	Metz fine sandy loam	15.9	Metz		Entisols	5	86	3	B	.37	.37	10	Good	Good
Mg	Metz complex	35.7	Metz		Entisols	5	134	2	B	.28	.28	10	Good	Good
Mh G	Millsholm loam, 15 to 65 percent slopes, MLRA 15	120.6	Millsholm		Inceptisol s	1	48	6	D	.28	.28	15	Poor	Poor
NaD	Nacimiento silty clay loam, 9 to 15 percent slopes	73.1	Nacimiento		Mollisols	3	48	6	C			0	Good	Good
NaE	Nacimiento silty clay loam, 15 to 30 percent slopes, MLRA 15	453.5	Nacimiento		Mollisols	3	48	6	C	.32	.32	28	Good	Good
NaF	Nacimiento silty clay loam, 30 to 50 percent slopes, MLRA 15	501.0	Nacimiento		Mollisols	3	48	6	C	.37	.37	25	Good	Fair
NaG	Nacimiento silty clay loam, 15 to 75 percent slopes, MLRA 15	114.3	Alo			0						0	Fair	Fair
NbF	Nacimiento-Los Osos complex, 30 to 50 percent slopes, MLRA 15	1,088.0	Los Osos		Mollisols	3	48	6	D			0	Fair	Fair
NbG	Nacimiento-Los Osos complex, 50 to 75 percent slopes, MLRA 15	222.0	Nacimiento		Mollisols	3	48	6	C	.24	.24	33	Poor	Poor
PdC	Pfeiffer fine sandy loam, 2 to 9 percent slopes	85.6	Pfeiffer		Mollisols	5	86	3	A			0	Good	Good
PdD	Pfeiffer fine sandy loam, 9 to 15 percent slopes	158.2	Pfeiffer		Mollisols	5	86	3	A			0	Good	Good
PkE	Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes	33.1	Pinnacles		Alfisols	3	56	5	B	.10	.15	10	Good	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
PkF	Pinnacles coarse sandy loam, very gravelly subsoil variant, 30 to 50 percent slopes	92.3	Pinnacles		Alfisols	3	56	5	B	.10	.15	10	Fair	Fair
PnC	Placentia sandy loam, 2 to 9 percent slopes, MLRA 14	15.1	Placentia		Alfisols	3	86	3	C	.20	.20	19	Good	Good
Ps	Psamments and Fluvents, frequently flooded	320.0	Psamments		Entisols	5	220	1	A	.02	.02	3	Fair	Fair
RaC	Rincon clay loam, 2 to 9 percent slopes, MLRA 14	20.0	Rincon		Alfisols	5	48	6	C	.28	.28	31	Good	Good
RaD	Rincon clay loam, 9 to 15 percent slopes, MLRA 14	163.0	Rincon		Alfisols	5	48	6	C	.32	.32	25	Good	Good
Rc	Rock outcrop-Xerorthent association	2,322.4	Rock outcrop			0						0	Not Rated	Not Rated
SaA	Salinas loam, 0 to 2 percent slopes, MLRA 14	44.0	Salinas		Mollisols	5	48	6	C	.32	.32	20	Good	Good
SbA	Salinas clay loam, 0 to 2 percent slopes, MLRA 14	148.2	Salinas		Mollisols	5	48	6	C	.37	.37	26	Good	Good
ScE	San Andreas fine sandy loam, 15 to 30 percent slopes	125.7	San Andreas		Mollisols	3	86	3	B			0	Good	Good
ScG	San Andreas fine sandy loam, 30 to 75 percent slopes	34.6	San Andreas		Mollisols	3	86	3	B			0	Poor	Poor
SfD	Santa Lucia shaly clay loam, 2 to 15 percent slopes	189.1	Santa Lucia		Mollisols	2	0	8	C			0	Good	Good
SfE	Santa Lucia channery clay loam, 15 to 30 percent slopes, MLRA 15	236.8	Crow Hill			0						0	Good	Good
SfF	Santa Lucia channery clay loam, 30 to 50 percent slopes, MLRA 15	2,995.5	Santa Lucia		Mollisols	2	38	7	D	.05	.17	0	Fair	Fair
Sg	Santa Lucia-Reliz association	9,877.9	Santa Lucia		Mollisols	2	0	8	C			0	Poor	Poor
ShC	Santa Ynez fine sandy loam, 2 to 9 percent slopes	259.9	Santa Ynez		Mollisols	3	56	5	D	.15	.32	18	Good	Good
ShD	Santa Ynez fine sandy loam, 9 to 15 percent slopes	181.9	Santa Ynez		Mollisols	3	86	3	D	.28	.28	30	Good	Good
ShD 2	Santa Ynez fine sandy loam, 5 to 15 percent slopes, eroded	18.7	Santa Ynez		Mollisols	3	86	3	D	.32	.32	18	Good	Good

Table E-1. Soil Properties by Soil Unit within the Proposed Primary and Secondary Maneuver Corridors

Mapping Symbol	Map Unit	Acres	Component Name	Slope Class	Taxonomy Order	Erosion T-Factor	Wind Erobility Group	Wind Erodibility Index	Hydrologic group	Soil Erosion Kw-Factor	Soil Erosion Kf-Factor	Cation Exchange	Rating for Suitability for Military Operations Type 4, 1 Pass, Wet Season	Rating for Suitability for Military Operations Type 4, 50 Passes, Wet Season
ShE	Santa Ynez fine sandy loam, 15 to 30 percent slopes	9.7	Santa Ynez		Mollisols	3	86	3	D	.32	.32	18	Good	Good
Sm G3	Shedd silt loam, 30 to 75 percent slopes, severely eroded	145.3	Shedd		Entisols	3	48	6	C			0	Poor	Poor
SnF 2	Shedd silty clay loam, 30 to 50 percent slopes, eroded	83.6	Shedd		Entisols	3	48	6	C			0	Fair	Fair
SoD	Sheridan coarse sandy loam, 5 to 15 percent slopes	6.3	Sheridan		Mollisols	3	86	3	B			0	Good	Good
SoE	Sheridan coarse sandy loam, 15 to 30 percent slopes, MLRA 15	39.8	Sheridan		Mollisols	3	86	3	B			0	Good	Good
SoG	Sheridan coarse sandy loam, 30 to 75 percent slopes	1375.7	Sheridan		Mollisols	3	86	3	B			0	Poor	Poor
SpD	Snelling-Greenfield complex, 5 to 15 percent slopes	425.2	Snelling		Alfisols	5	86	3	C	.28	.28	10	Good	Good
Ss	Sur-Junipero complex	89.8	Sur		Mollisols	2	48	6	B			0	Poor	Poor
TbB	Tujunga fine sand, 0 to 5 percent slopes	19.8	Tujunga		Entisols	5	250	1	A	.10	.10	2	Good	Good
VaE	Vista coarse sandy loam, 15 to 30 percent slopes	110.1	Vista		Inceptisols	3	86	3	B			0	Good	Good
VaG	Vista coarse sandy loam, 30 to 75 percent slopes	1238.7	Vista		Inceptisols	3	86	3	B			0	Poor	Poor
Vb	Vista-Rock outcrop complex	47.9	Vista		Inceptisols	3	86	3	B			0	Not Rated	Not Rated
W	Water	21.5	Water			0						0	Not Rated	Not Rated
Xb	Xerorthents, sandy	62.4	Xerorthents		Entisols	5	220	1	A	.10	.10	3	Fair	Fair
Xd	Xerorthents, dissected	87.5	Xerorthents		Entisols	5	48	6	C	.32	.32	23	Poor	Poor