Draft

Environmental Assessment

Addressing Implementation of a Net Zero Program

at

Fort Hunter Liggett, California

Prepared by

HDR

August

2014

COVER SHEET

DRAFT
ENVIRONMENTAL ASSESSMENT
ADDRESSING IMPLEMENTATION OF A NET ZERO PROGRAM
AT
FORT HUNTER LIGGETT, CALIFORNIA

Responsible Agencies: U.S. Army Reserve Command, U.S. Army Garrison Fort Hunter Liggett, California, and U.S. Army Corps of Engineers, Mobile District.

Affected Location: U.S. Army Garrison Fort Hunter Liggett, California.

Proposed Action: Fort Hunter Liggett (FHL) proposes to implement a net zero program for energy, water, and waste at the installation.

Report Designation: Draft Environmental Assessment (EA) Addressing Implementation of Net Zero Program at Fort Hunter Liggett, California.

Abstract: FHL proposes to implement a net zero program for energy, water, and waste at the installation. The Proposed Action consists of the implementation of a series of policies, procedures, best management practices, and proposed projects, some of which are possibly related or interconnected, that would be necessary for FHL to become net zero for energy, water, and waste.

This EA has been prepared to evaluate the Proposed Action and the No Action Alternative. Areas that are considered in the impacts analyses include noise, land use, air quality, geological resources, water resources, biological resources, threatened and endangered species, cultural resources, socioeconomics and environmental justice, infrastructure, traffic and transportation systems, and hazardous materials and wastes.

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EXECUTIVE SUMMARY

This Environmental Assessment (EA) has been prepared for U.S. Army Garrison Fort Hunter Liggett (FHL), California to identify and assess the potential environmental impacts associated with implementing a net zero program for energy, water, and waste at FHL.

Purpose and Need

The purpose of the Proposed Action is to implement a net zero program for energy, water, and waste at FHL. FHL's net zero program would integrate sustainability principles into the management and operation of the installation by changing various behaviors, processes, and technologies. Implementation of a net zero program would decrease demand and consumption, increase efficiencies, optimize land use, and expand self-sufficient management of energy, water, and waste to ensure continued access to these resources.

The need for the Proposed Action is to enhance energy and water security at FHL; to allow for predictable and potentially reduced operational costs; to manage natural resources appropriately; and to fulfill Federal, Department of Defense, and U.S. Army energy and sustainability goals, mandates, and objectives. Implementation of a net zero program at FHL is necessary for the installation to maximize its operational capability to support its mission, increase quality of life, preserve future options for management and operation of the installation, provide financial benefits, and ensure compatibility with the local community.

Summary of Proposed Action

The Proposed Action is to implement a net zero program for energy, water, and waste at FHL. The Proposed Action would require FHL to make every fiscally prudent effort to reduce the installation's overall consumption of energy and water, and disposal of solid waste in landfills to an effective rate of zero. This requires an assessment of resource requirements against the increased constraints on energy and water supplies and disposal methods. Evaluation against this benchmark identifies opportunities for reduction, re-purposing, recycling and composting, and energy recovery.

The Proposed Action consists of the implementation of a series of net zero projects (i.e., proposed programs, policies, procedures, best management practices [BMPs], and construction projects), some of which are possibly related or interconnected, that could be implemented to change behaviors, processes, and technologies to achieve net zero. The Proposed Action is generally regarded as supportive of FHL's mission and an environmentally beneficial strategy designed to reduce energy and water use and waste generation.

The proposed net zero projects are conceptual and could be implemented in various combinations to achieve net zero at FHL. Although specific net zero projects have not been selected or designed, it is likely that a majority of the proposed projects would be on previously disturbed land in the cantonment area.

Summary of Environmental Consequences and Mitigation Measures

This EA contains a comprehensive evaluation of the existing conditions and potential environmental consequences of the Proposed Action and the No Action Alternative. Implementation of the Proposed Action would not affect cultural resources (resources of Traditional, Religious, or Cultural significance to Native American Tribes) or environmental justice. Long-term, beneficial effects on land use, air quality,

geological resources, water resources, biological resources, threatened and endangered species, socioeconomics, infrastructure, and hazardous materials and wastes would be expected. Resources that could be adversely affected by the Proposed Action include noise, land use, air quality, geological resources, water resources, biological resources, threatened and endangered species, cultural resources (architectural resources [i.e., historic buildings] and archaeological resources), traffic and transportation systems, and hazardous materials and wastes. In all instances, effects on these resources are expected to be negligible to minor in significance. Use of common BMPs and other minimization measures identified in FHL management plans, would help minimize effects on water resources, biological resources, and threatened and endangered species. Under the No Action Alternative, FHL would FHL would continue to implement projects related to net zero energy, water, and waste if they are required by other mandates or identified in other documents. While the No Action Alternative would result in associated adverse effects, no significant direct or indirect effects would occur.

The potential for cumulative effects on the environment was evaluated by reviewing other projects in the vicinity of the FHL that could affect the same environmental resources as the Proposed Action. Although some cumulative effects could occur, they are expected to be negligible to minor in significance. Implementation of the No Action Alternative would not result in a change in current conditions or how energy, water, and waste are managed at FHL; therefore, continued management under existing mandates could result in long-term, adverse cumulative effects on the quality of the human or natural environment when compared to the Proposed Action.

Table ES-1 summarizes the potential effects of the Proposed Action and the activities that could be conducted during implementation to avoid or minimize these effects. Identified effects were determined to be insignificant based on evaluation criteria presented for significant effects. Some practices to minimize effects would be required by Federal or state regulations. Most of these requirements are currently followed at the installation.

Table ES-1. Summary of Potential Environmental Consequences Associated with the Proposed Action

Resource Area	Proposed Action	No Action
Noise	Short- and long-term, minor, adverse effects would be anticipated. Short-term effects would be expected from increases in noise during construction activities associated with net zero energy, water, and waste projects. Long-term effects could be expected from increases in noise from operation of a WTE facility.	No new adverse effects would be anticipated.
Land Use	Long-term, beneficial effects would be anticipated from the repurposing of the WWTP spray field and the existing Transfer Station to more productive uses, and the freeing up of landfill capacity. The Proposed Action would not affect the viability of existing land uses or the continued use and occupation of any areas, and it would be consistent with the FHL RPMP.	No new adverse effects would be anticipated.
Air Quality	Short-term, minor, adverse effects would be anticipated from generation of airborne dust and other pollutants during construction of net zero projects. Long-term, beneficial effects would result from an overall net decrease in criteria pollutants and GHGs due to reduction in use of fossil-fuel-based electricity, JP8, and propane. Emissions from the Proposed Action would not exceed the major source thresholds or the GHG threshold; and it would not contribute to a violation of any air regulations.	No new adverse effects would be anticipated.
Geological Resources	Short- and long-term, minor, adverse effects on geological resources would occur from compaction, disturbance, and erosion of soil during construction of net zero projects. Long-term, minor, beneficial effects would be anticipated due to FHL reducing its dependency on fossil fuels that would decrease its contribution to the depletion of non-renewable energy resources, and reducing impervious surfaces and modifying landscaping to assist with aquifer recharge and decrease of storm water runoff and associated erosion. Soil testing, special project design, and BMPs can minimize soil limitations and effects from erosion and sedimentation.	No new adverse effects would be anticipated.

Resource Area	Proposed Action	No Action
Water Resources	Short- and long-term, negligible to minor, adverse and beneficial effects could occur from implementation of net zero projects. Construction and other ground-disturbing activities could temporarily increase runoff, erosion, and sedimentation, thereby decreasing water quality. Use of LID features, ESCP, and other BMPs would minimize effects. Installation and operation of GSHPs could result in short- and long-term, adverse effects on groundwater quality. Long-term, beneficial effects on water quantity and quality would be anticipated from FHL's reduced water consumption, decrease of impervious surfaces and recharge of aquifers, and improved secondary wastewater treatment and discontinuation of use of the spray field. Proposed recycling, mulching, and composting programs could result in short- and long-term, negligible, indirect, adverse effects due to soil compaction and associated sedimentation of surface waters from heavy equipment used during construction and operation.	No new adverse effects would be anticipated.
Biological Resources	Short- and long-term, negligible to minor, indirect and direct, adverse effects on wetlands, vegetation, and wildlife species would be anticipated. Runoff, erosion, and sedimentation associated with construction activities and possible replacement of existing landscaping with xeric species, and runoff and surface flow of graywater could result in adverse effects on wetlands. Adverse effects on vegetation and migratory birds could occur from net zero projects sited in undeveloped areas. Increased noise, vehicular traffic, and human presence associated with construction and, possibly, operation of some net zero projects could result in negligible, indirect, adverse effects on wildlife. Beneficial effects on wetlands, vegetation, and wildlife could occur from the decrease of impervious surfaces and recharge of aquifers, and modified management of waste materials by increasing the quality and quantity of water flow into wetland areas and improvement of habitat.	No new effects would be anticipated.
Threatened and Endangered Species	Short-term, adverse effects on arroyo toad could result from noise and human presence associated with construction and operation of net zero water and waste projects. No effects would be anticipated if project sites are in previously developed areas. No effects to negligible, adverse effects on arroyo toad, California condor, San Joaquin kit fox, vernal pool fairy shrimp, purple amole, and bald eagle would be anticipated. There would be no direct alteration of vernal pools. Long-term, indirect, beneficial effects on arroyo toad, California condor, San Joaquin kit fox, vernal pool fairy shrimp, and bald eagle could occur from net zero water and waste projects due to potential improvements to habitat quality.	No new effects would be anticipated.

Resource Area	Proposed Action	No Action
Cultural Resources	Short- and long-term, adverse effects on historic properties would be anticipated due to implementation of some net zero energy and water projects depending on the type of project and proposed location. Work on or near older buildings has the potential to alter the viewshed, or introduce noise and vibration that would be considered an indirect, adverse effect. Short- and long-term, indirect and direct, adverse effects on archaeological resources could result from construction or demolition associated with some net zero energy projects. Adverse impacts could be reduced or avoided by limiting activities to previously disturbed land, through careful site selection and compatible design, and consultation with the SHPO.	No new effects would be anticipated.
Socioeconomics and Environmental Justice	Short-term, minor, beneficial effects on employment would be anticipated during construction and other work activities associated with the net zero projects. Indirect, beneficial effects would result from the increase in payroll tax revenues, purchase of materials and other goods and services in the area, and cost savings on energy utility bills and solid waste disposal and hauling tipping fees. No effects on income and housing would be expected. The Proposed Action would not result in effects on minority, low-income, or youth populations because it is unlikely off-installation areas would experience adverse effects.	Long-term, adverse effects would be anticipated.
Infrastructure	Long-term, moderate, beneficial effects on infrastructure would be anticipated from implementation of a net zero program. All policies, procedures, BMPs, and projects proposed under the Proposed Action are designed to improve the energy, water, and waste management infrastructure of FHL.	Long-term, adverse effects would be anticipated.
Traffic and Transportation Systems	Short-term, minor, adverse effects would occur due to increased vehicular traffic from construction activities. Long-term, negligible, adverse effects would occur from minute increases in traffic from operation and maintenance activities. The Proposed Action would not result in permanent road closures or widespread traffic congestion, and would have no appreciable effect on air, rail, or public transportation.	No new effects would be anticipated.

Resource Area	Proposed Action	No Action
Hazardous Materials and Wastes	Short-term, minor, adverse effects would be anticipated from work activities associated with the Proposed Action, and long-term, minor, beneficial effects from implementation of net zero projects. Net zero energy projects would reduce dependence on fossil fuels, thereby lessening the potential for a release to the environment; and could remove ACMs and LBP during energy efficiency upgrades and remove PCB-containing equipment during electrical infrastructure modernization. Net zero water projects would reduce water consumption and the amount of water and wastewater needing treatment resulting in reduced hazardous materials and wastes needed for and generated during these processes. Net zero waste projects such as green procurement and recycling programs would reduce the generation of hazardous wastes. No effects on FHL's active DERP sites would be anticipated.	No new effects would be anticipated.

1. Purpose of and Need for the Proposed Action

This Environmental Assessment (EA) addresses the proposal by Fort Hunter Liggett (FHL) to implement a net zero program for energy, water, and waste at the installation. In accordance with the Army net zero vision, FHL would need to produce as much renewable energy on the installation as it needs to meet total energy demand; limit the consumption of freshwater resources; and reduce, reuse, and recover waste streams to "become net zero" for energy, water, and waste.

This EA has been prepared to comply with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] Section 4321−4347); the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508); the Army's NEPA regulation (32 CFR Part 651), *Environmental Analysis of Army Actions* (Army Regulation [AR] 200-2); and Department of Defense (DOD) Instruction 4715.9, *Environmental Planning and Analysis*.

This EA is tiered to, and incorporates by reference, the *Final Programmatic Environmental Assessment for Army Net Zero Installations* (U.S. Army 2012). The Army Net Zero Programmatic EA analyzed the potential environmental impacts of implementing the Net Zero Initiative at U.S. Army installations. This EA is also programmatic in nature, and analyzes the potential impacts of implementing a net zero program at FHL. Project- and site-specific NEPA documentation will be prepared for the individual FHL net zero projects when they are more fully developed and designed in the future.

1.1 Introduction

1.1.1 Net Zero Initiative

The U.S. Army Net Zero Initiative was announced in October 2010. The Net Zero Initiative is a holistic strategy that supplements existing sustainable practices and incorporates emerging best practices in construction and community development to manage energy, water, and waste at Army installations. The cornerstone of the Net Zero Initiative is the Net Zero Hierarchy, which consists of five interrelated steps: reduction, re-purpose, recycling and composting, energy recovery, and disposal. The Net Zero Hierarchy applies differently to energy, water, and waste; therefore, alternate versions of the Net Zero Hierarchy were developed to communicate these differences (see **Figure 1-1**). Together, the hierarchies identify an overall net zero approach that is consistent across all U.S. Army installations, but that can be customized to allow each installation to develop unique solutions in accordance with their specific circumstances. Following are general descriptions of the five steps in the Net Zero Hierarchy.

- **Reduction** includes maximizing energy efficiency in existing facilities, implementing water-efficiency practices, and eliminating generation of unnecessary waste.
- **Re-purposing** involves diverting or capturing energy, water, or waste for a secondary purpose through limited processing.
- **Recycling and composting** involves management of the solid waste stream, development of closed-loop systems to reclaim water, or cogeneration where two forms of energy (i.e., heat and electricity) are created from one source.
- **Energy recovery** occurs from converting unusable waste to energy, renewable energy, or geothermal water sources; and water reuse through development of alternate water supplies.
- **Disposal** of waste, construction of renewable energy projects, and recharging aquifers is the final step of the Net Zero Hierarchy, and should be the last resort after all other energy, water, and waste strategies have been fully implemented.

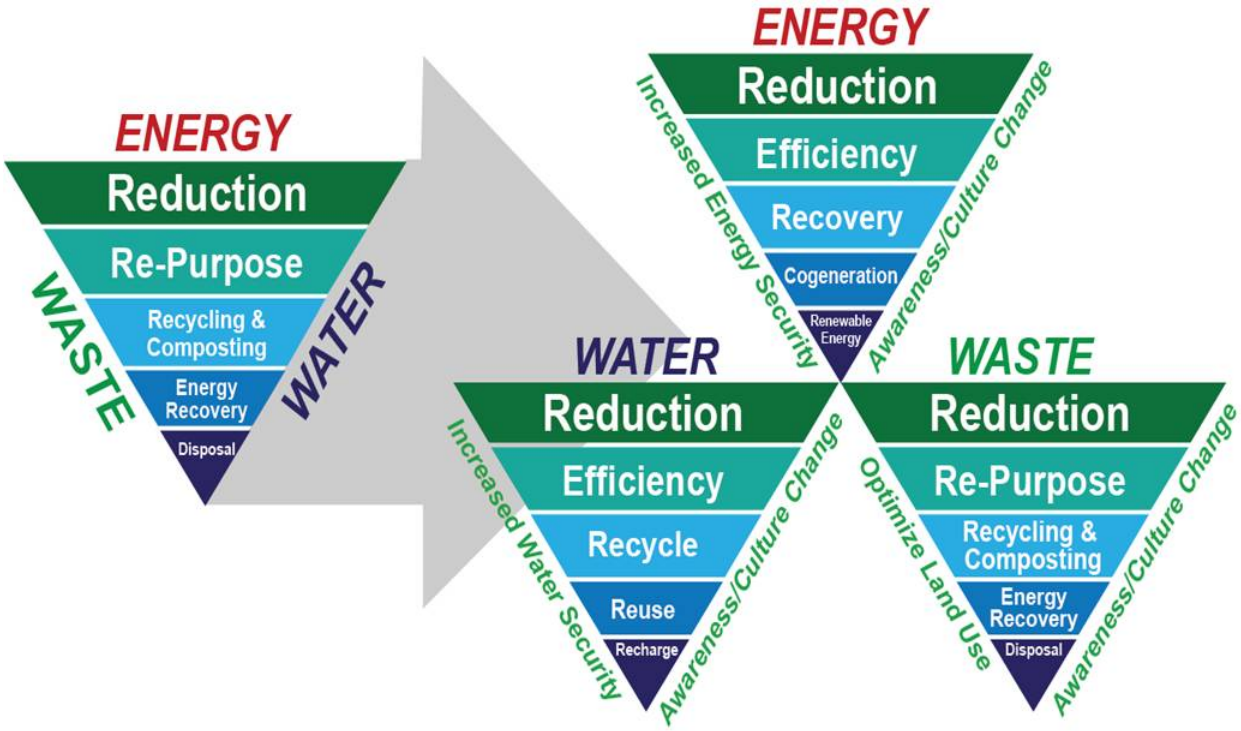


Figure 1-1. Net Zero Hierarchy

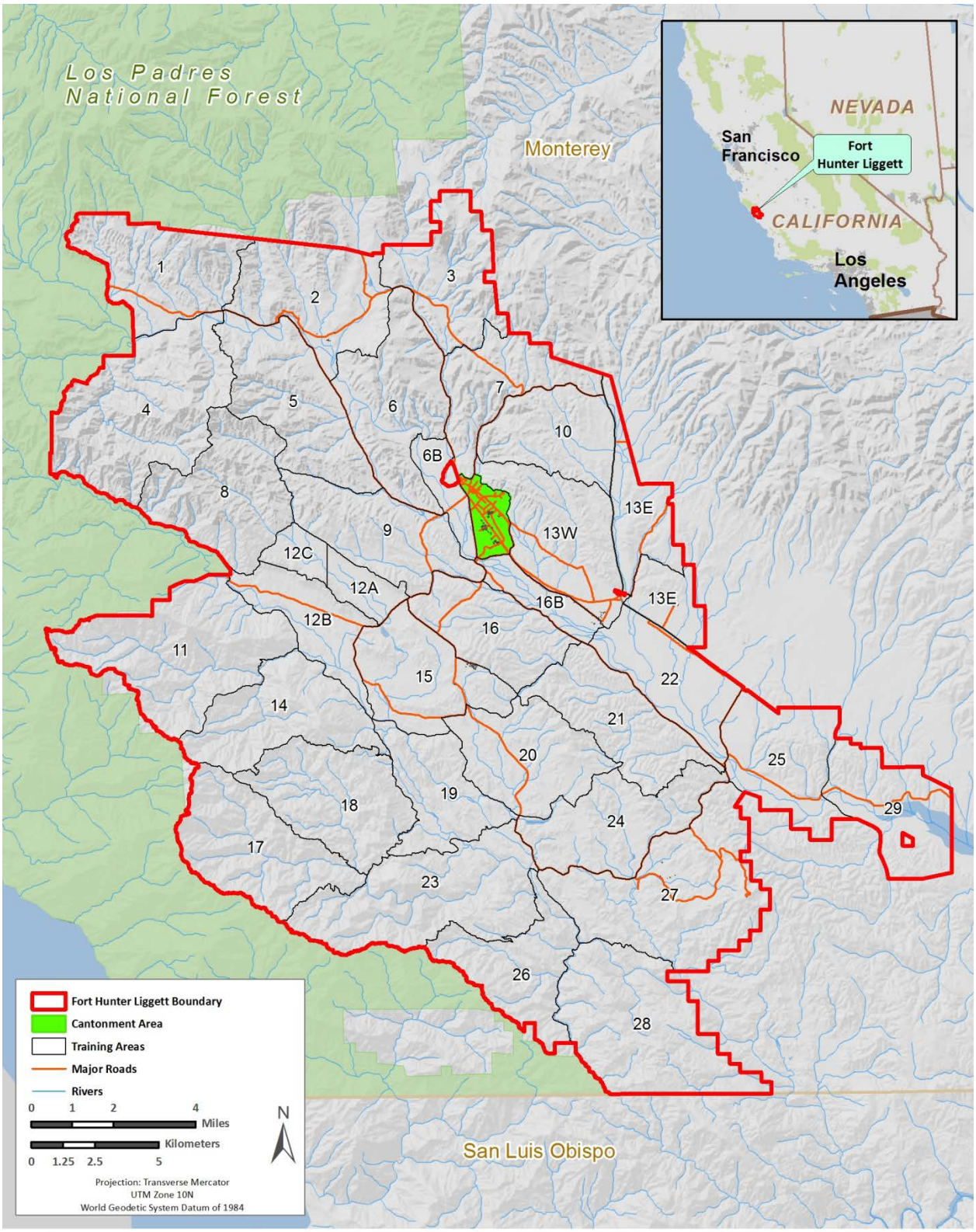
In April 2011, the U.S. Army identified 17 net zero pilot installations to serve as model communities for sustainability and quality of life. These pilot installations serve as test beds to identify lessons learned and best practices to be implemented at other U.S. Army installations. FHL was identified as a net zero pilot installation for energy (i.e., net zero energy installation [NZEI]) and waste. While FHL has been designated a pilot NZEI and net zero waste installation, it has also proposed to become net zero for water.

1.1.2 Fort Hunter Liggett Background

FHL is in Monterey County, California, approximately 25 miles southwest of King City (see **Figure 1-2**). Generally, the installation is bounded on the north by Los Padres National Forest and private lands, on the east by the foothills of the Santa Lucia Mountains, on the south by the Monterey/San Luis Obispo county line, and on the west by approximately 55 miles of Los Padres National Forest. The installation encompasses approximately 162,000 acres and provides year-round access to a vast array of training ranges and other facilities for Combat Support and Combat Service Support units of the U.S. Army Reserve (USAR), active U.S. Army units, and active and reserve units of all branches of the U.S. military and other government agencies.

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 assets and logistical support to training units.

The total population of FHL, including those assigned to or working at the installation, in fiscal year (FY) 2013 was approximately 1,100 military and civilian personnel of which 400 people resided on FHL (FHL 2013a). These FHL personnel work for installation support and the major military tenant organizations or are personnel dependents. Year-round training activities brought 26,227 personnel to the installation in 2013 for a total of 624,882 person days (FHL 2013b).



Source: ESRI Streetmap 2010

Figure 1-2. Location Map of Fort Hunter Liggett

FHL maintains 342 buildings with approximately 1.4 million square feet (ft^2) of space, including operational and training facilities such as 28 classrooms; bed space capable of housing almost 1,800 personnel in housing units, barracks, and hotels; warehouses, offices, and community support facilities; and paved and graveled parking lots, recreational fields, parks, and open space areas. The approximate 1,000-acre cantonment area is in the center of the installation and contains a combination of permanent and temporary structures for housing, administration, classroom training, maintenance, and storage.

Energy. Energy consumption at FHL includes use of electricity including that from solar resources, propane, and jet propellant 8 (JP8). Propane and JP8 are for generators and furnaces that are primarily used for space and water heating, and miscellaneous uses such as cooking.

Water. FHL receives its potable water supply from four wells located on the installation. In FY 2011, FHL used 99 million gallons of potable water (FHL 2013a). FHL does not have a non-potable water supply.

Waste. FHL conducts many operations and activities that generate solid waste, including training, industrial, commercial, residential, administrative, and recreational operations. In 2011, FHL generated 1,402 tons of solid waste, of which 1,139 tons were disposed of at landfills and 263 tons were diverted (i.e., recycled) representing a 19 percent diversion rate (not including construction and demolition debris) (FHL 2013a).

1.2 Purpose and Need

The purpose of the Proposed Action is to implement a net zero program for energy, water, and waste at FHL. The program was developed based on the U.S. Army net zero vision of appropriately managing natural resources through use of the Net Zero Hierarchy. FHL's net zero program would integrate sustainability principles into the management and operation of the installation by changing various behaviors, processes, and technologies. Implementation of a net zero program would decrease demand and consumption, increase efficiencies, optimize land use, and expand self-sufficient management of energy, water, and waste to ensure continued access to these resources.

The need for the Proposed Action is to enhance energy and water security at FHL; to allow for predictable and potentially reduced operational costs; to manage natural resources appropriately; and to fulfill Federal, DOD, and U.S. Army energy and sustainability goals, mandates, and objectives. Implementation of a net zero program at FHL is necessary for the installation to maximize its operational capability to support its mission, increase quality of life, preserve future options for management and operation of the installation, provide financial benefits, and ensure compatibility with the local community.

1.3 Scope of the Analysis

The scope of the analysis consists of the range of actions, alternatives, and impacts to be considered. The scope of the Proposed Action and the range of alternatives considered in this EA are presented in detail in **Section 2**. In accordance with CEQ regulations, the No Action Alternative has been analyzed to provide the baseline against which the environmental impacts of implementing the action alternatives can be compared. This EA identifies appropriate best management practices (BMPs) that are not already included in the Proposed Action.

This EA analyzes the potential impacts of implementing a net zero program for energy, water, and waste at FHL and the associated series of potential net zero projects. Environmental impacts of a general net zero program and potential projects at U.S. Army installations were addressed generally in the *Final*

Programmatic Environmental Assessment for Army Net Zero Installations (U.S. Army 2012), and are incorporated herein by reference. Individual net zero projects at FHL will be addressed in separate NEPA documentation as the projects are identified or are more fully developed in the future.

1.4 Summary of Key Environmental Compliance Requirements

1.4.1 National Environmental Policy Act

NEPA (42 U.S.C. Sections 4321–4347) is a Federal statute requiring the identification and analysis of potential environmental impacts associated with proposed Federal actions before those actions are taken.

AR 200-1, *Environmental Protection and Enhancement*, states that the U.S. Army will comply with applicable Federal, state, and local environmental laws and regulations, including NEPA. The Army's implementing regulation for NEPA is 32 CFR Part 651, *Environmental Analysis of Army Actions* (AR 200-2).

1.4.2 Regulations and Policies Associated with Army Net Zero Initiative

The Army Net Zero Initiative and FHL's net zero program for energy, water, and waste support compliance with several Federal mandates and statutes such as those in the Energy Policy Act of 2005 (EPAct05); the Energy Independence and Security Act (EISA) of 2007; Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*; EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*; and DOD policies. **Appendix A** and **Table A-1** provide more information on these statutes and mandates.

1.4.3 Integration of Other Environmental Statutes and Regulations

This EA examines potential effects of the Proposed Action and alternatives on 12 resource areas: noise, land use, air quality, geological resources, water resources, biological resources, threatened and endangered species, cultural resources, socioeconomics and environmental justice, infrastructure, traffic and transportation systems, and hazardous materials and wastes. These 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 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 in the text of this EA.

1.4.4 Interagency Coordination and Public Involvement

Through a prescribed interagency coordination process, FHL will notify relevant Federal, state, and local agencies; and federally recognized tribes of the Proposed Action and provide them sufficient time to make known their environmental concerns specific to the action. Agency responses will be incorporated into the EA. FHL will coordinate with such agencies as the U.S. Environmental Protection Agency (USEPA); U.S. Fish and Wildlife Service (USFWS); State Historic Preservation Officer (SHPO); and other Federal, state, and local agencies. The coordination process will provide FHL the opportunity to cooperate with and consider state and local stakeholder views in implementing the Federal proposal.

Appendix B will include all coordination letters and responses. A Notice of Availability (NOA) for the EA and Draft Finding of No Significant Impact (FNSI) will be published in *The Monterey County Herald*, *Salinas Californian*, *King City Rustler*, *Greenfield News*, *Soledad Bee*, and *Gonzales Tribune*. This is

done to solicit comments on the Proposed Action and involve the local community in the decisionmaking process. Upon receipt, public comments will be incorporated into the analysis and included in the EA.

1.5 Organization of this Document

Section 1 contains background information on FHL and the Army Net Zero Initiative, the purpose of and the need for the Proposed Action, the scope of the EA analysis, a summary of applicable regulatory requirements, and an introduction to the organization of the EA. **Section 2** provides a description of the Proposed Action, and **Section 3** describes alternatives to the Proposed Action. **Section 4** provides a general description of the environmental resources and baseline conditions that could be affected by the Proposed Action and the No Action Alternative. **Section 5** presents an analysis of the environmental consequences for the Proposed Action and No Action Alternative. **Section 6** includes an analysis of the potential cumulative effects. **Section 7** provides conclusions and recommendations. **Section 8** contains a list of the preparers of this EA. **Section 9** lists the references used in the preparation of the document. **Section 10** includes abbreviations and acronyms that are used throughout this document.

Appendix A includes descriptions of applicable laws, regulations, policies, and planning criteria. **Appendix B** will include a copy of the coordination letter mailed to the agencies and other stakeholders for this action, the distribution list, and any public comments/responses to the letter that are received. **Appendix C** includes detailed descriptions of renewable energy technologies that could be implemented by FHL to achieve net zero. **Appendix D** consists of a Record of Non-Applicability (RONA) to the General Conformity Rule for the Proposed Action.

2. Description of the Proposed Action

2.1 Detailed Description of the Proposed Action

The Proposed Action is to implement a net zero program for energy, water, and waste at FHL. The Proposed Action would require FHL to make every fiscally prudent effort to reduce the installation's overall consumption of energy and water, and disposal of solid waste in landfills to an effective rate of zero. This requires an assessment of resource requirements against the increased constraints on energy and water supplies and disposal methods. Evaluation against this benchmark identifies opportunities for reduction, re-purposing, recycling and composting, and energy recovery.

The Proposed Action consists of the implementation of a series of net zero projects (i.e., proposed programs, policies, procedures, BMPs, and construction projects), some of which are possibly related or interconnected, that could be implemented to change behaviors, processes, and technologies to achieve net zero. The Proposed Action is generally regarded as supportive of FHL's mission and an environmentally beneficial strategy designed to reduce energy and water use and waste generation.

FHL's net zero program and the associated potential energy, water, and waste projects that are proposed in this EA were identified in the following documents:

- Comprehensive Energy and Water Master Plan (August 2010) (FHL 2010)
- Net Zero Waste Installation Plan (March 2013) (FHL 2013a).

The proposed projects identified in the following sections are conceptual and could be implemented in various combinations to achieve net zero at FHL. Although specific net zero projects have not been selected or designed, it is likely that a majority of the proposed projects would be on previously disturbed land in the cantonment area.

2.1.1 Energy

FHL has been selected as a pilot NZEI and FHL's overall net zero energy goal as an NZEI is to produce as much renewable energy at FHL as it uses annually. FHL would first reduce its energy demand by making behavioral changes and by maximizing energy conservation and efficiency in existing facilities, which is the most cost-effective method. FHL would then look for opportunities to divert waste energy (typically thermal energy) such as boiler stack or building exhaust to a secondary purpose allowing for an energy transfer (i.e., recovery). This step is interrelated with the next step of cogeneration in which two forms of energy (e.g., heat and electricity) would be created from one source. The final step would be development of renewable energy generation projects to meet the remaining energy demand.

Potential net zero energy projects that FHL could implement are described in the following sections.

Reduction. Reduction of energy use at FHL would require institutional behavioral changes by making individuals aware of energy costs, introducing new energy use habits, and continually identifying methods to reduce energy demand. FHL would need to identify opportunities for procedural, behavioral, process, or operational energy-saving actions that rely on engaging the attention and creativity of personnel at the installation. These opportunities could take many forms, including the following:

- *Identification of potential energy demand reduction.* Estimation of potential energy use reductions (in energy units and dollars) through personnel actions, process changes, and

improvements to mission execution would allow people to relate the reductions to their individual and collective behavior.

- *Creation of teams to identify energy saving actions.* Establishment of teams (grouped by functional area) throughout the installation to identify methods to minimize energy use permanently could generate new and unique methods for reducing energy usage. These methods could take many forms such as keeping thermostats and refrigerators at the most energy-efficient temperature settings, turning lights off when leaving rooms, ensuring vents are not obstructed, and sharing printers and fax machines among groups of people.
- *Development of a plan for long-term energy reduction.* Preparation and implementation of a plan for ongoing awareness of and improvements to reducing energy demand would engage people's creativity on a continuing basis. Some components of the plan could include development of an energy awareness campaign that would focus attention on energy use and integrate it into installation planning and training; creation of competitions, contests, and other incentives to elicit new energy reduction ideas; and establishment of military/civilian leadership and personnel teams to continue developing energy conservation methods.

Efficiency. Energy efficiency is the use of technology that requires less energy to perform the same function. Energy-efficiency projects are typically the most cost-effective type of energy investment. Following are potential energy-efficiency projects:

- *Use of Energy-Efficient Designs/Measures in New Construction.* FHL recently developed a Real Property Master Plan (RPMP) that guides the siting and design of up to 2 to 3 million ft^2 of new development capacity. New construction typically increases an installation's energy use; however, by building all new structures as efficiently as possible, FHL would benefit from new facilities with a reduced energy demand. New buildings and buildings with major renovations could be designed and constructed to be high performance buildings. Some energy-efficiency methods that could be employed include constructing new buildings to meet or exceed American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 100-2006 or passive building standards; and achieving Leadership in Energy and Environmental Design (LEED) certification. Some specific design strategies to make buildings more efficient include use of narrow structures and cool roof materials that reduce energy load, and inclusion of electrical sensors and meters that can directly and indirectly reduce user demand of energy. In accordance with EO 13514, all Federal buildings are mandated to be net zero by 2030. If demolition of older, less energy-efficient buildings accompanies construction of new buildings, additional energy savings could be realized.
- *Lighting Retrofits.* FHL proposes to upgrade the installation's lighting by replacing a majority of the lighting fixtures with high-efficiency fixtures.
- *Energy Management Control System.* Energy management control systems (EMCSs) for buildings are computer-based systems used remotely to control and monitor electrical and mechanical equipment such as power systems; heating, ventilation, and air conditioning (HVAC); and lighting. FHL has proposed installation of an EMCS and smart meters on buildings within the cantonment area.
- *Improved Secondary Wastewater Treatment.* Improved secondary treatment at the FHL wastewater treatment plant (WWTP) would make the energy-intensive process of pumping, filtering, and treating water more efficient. It would also negate the need to spray treated wastewater periodically on the spray field, which requires a large pumping load and extensive maintenance.

- *Photovoltaic System EMCS.* FHL currently has 2 megawatts (MW) (i.e., a unit of power [rate of doing work or rate at which energy is converted] equal to 1 million watts) of photovoltaic (PV) power in operation under the Energy Conservation Investment Program (ECIP). Future phases under the ECIP would install two PV systems for an additional 2 MW of solar power. An EMCS could be included in one of these phases to control and monitor the PV systems, and to determine how the systems are interacting with the off-installation utility grid system.
- *Federal Energy Decision System Assessment Technologies.* Implementation of a Federal Energy Decision System (FEDS) Assessment) at FHL could determine the energy savings potential of various energy-efficiency technologies, such as improvements to building envelopes and HVAC, and solar hot water (SHW).

Other proposed projects that could increase FHL's energy efficiency include the purchase of solar-powered and Energy Star® products when replacing existing equipment.

Recovery. Energy recovery and cogeneration, which recovers heat from the electricity generation process for increased overall efficiency, are interrelated processes. FHL has not proposed any energy recovery projects that would allow the installation to re-purpose thermal waste energy.

Cogeneration. A waste-to-energy (WTE) facility is a cogeneration project because it would generate electricity and heat from the conversion of unusable or unrecyclable waste through gasification. Electricity would be the primary output, while the heat produced during gasification could be converted into steam that would be reused in the gasification process. Installation of a WTE facility at FHL could occur. See **Appendix C** for additional general information on the process of converting waste to energy by gasification.

Renewable Energy. Several renewable energy technologies could be appropriate to meet FHL's energy demand after identification of energy use reductions through conservation, energy efficiency, and energy capture projects. Following are some of these renewable energy projects:

- *Photovoltaic Systems.* PV panels convert the solar energy from sunlight directly into electricity, and can be mounted on the ground or rooftops (see **Appendix C** for additional information on PV systems). FHL has excellent solar resources (FHL 2010). The installation currently has 2 MW of ECIP-funded PV systems installed on elevated carports over the Equipment Concentration Site (ECS) yard in the cantonment area. In addition to generating energy, these PV systems also provide shade for the vehicles and equipment parked underneath them. Two additional phases of ECIP-funded PV systems (1 MW each) have been programmed or planned. The third phase is proposed to be installed in the ECS yard, and the location of the fourth phase is unknown. The most likely locations for additional PV systems are at electrical meters at the various Pacific Gas and Electric (PG&E) service connections across the installation, on building rooftops, and in parking lots and open spaces. Using current technologies, each 1 MW of PV system occupies approximately 6 acres of land.
- *Solar Ventilation Preheat.* Solar ventilation preheat (SVP), or transpired solar collectors, uses metal siding perforated with small holes to heat building ventilation air during heating season. The sun heats a metal plate mounted to the south side of a building. Fans draw the heat through the holes into the ventilation air where it is distributed through the building. SVP is most effective in cold, sunny climates on buildings with large ventilation requirements (e.g., industrial buildings with open indoor spaces). Possible locations for SVP at FHL include maintenance buildings and shops. See **Appendix C** for additional information on SVP.
- *Solar Hot Water*. SHW systems consist of solar collectors to capture the sun's heat and tanks to store the hot water for future use. The solar collectors act as heat sources, and heat exchangers

heat potable water that is circulated by pumps. Typical SHW systems are installed on roofs of buildings, and provide 40 to 70 percent of water heating requirements. SHW can also be used for low temperature heating needs. Possible locations for SHW systems at FHL include, but are not limited to, the outdoor swimming pool, gym, dining facility (DFAC), barracks (Buildings 205, 207, 208, 229, and 230), housing units, and other buildings. See **Appendix C** for additional information on SHW systems.

- *Ground Source Heat Pumps.* Ground source heat pumps (GSHPs) use the constant temperature of the earth as a heat source (in the winter) and sink (in the summer). A series of fluid-filled (water or a water-antifreeze mixture) pipes are buried in the ground. A pump circulates the fluid through subsurface pipes to nearby buildings. In the winter when the subsurface temperature is warmer than the colder ambient air, the fluid absorbs heat from the surrounding soil and transfers it to buildings for space or water heating. In the summer, the subsurface temperature is cooler than the warm ambient air and the fluid transfers heat from buildings into the soil to provide space cooling. The specific locations and number of bore fields that might be needed at FHL and size of the loop have not yet been determined. See **Appendix C** for additional information on GSHPs.
- *Daylighting.* Daylighting is the process of installing skylights or other openings in buildings to allow natural sunlight to provide interior lighting during the daytime. A complete daylighting system would include apertures (e.g., skylights, windows, and light shelves) to admit and distribute sunlight; and a controller to regulate artificial light, as necessary, to maintain the desired level of light for the interior building space. Possible locations where daylighting could be implemented at FHL include new construction and buildings scheduled for major renovations, including warehouses, maintenance shops, and other buildings for which penetrating the roof would not have significant costs.

For FHL to fully become net zero for energy and implement the proposed renewable energy projects, it might also need to develop grid energy storage options, which could include use of batteries, hydrogen storage, and fuel cells. An energy storage system would allow FHL to produce solar power during the day, store it, and then use the power at nighttime when the PV systems are no longer generating power. In addition to allowing FHL to become fully net zero for energy, an energy storage system would provide FHL the ability to use all of the energy produced by the various proposed distributed generation sources, and provide energy security for a subset of critical facilities, including as part of a microgrid. A microgrid is a localized grouping of energy generation, storage, and loads that would normally operate though connection to the central utility grid. Because generation, storage, and end uses are all connected to a microgrid, it is able to function autonomously if it ever became disconnected from the central utility grid and, therefore, would provide FHL with energy security.

FHL could also modernize its electrical distribution system, including placing overhead electric distribution lines underground, and facilitate the installation of other net zero energy projects.

2.1.2 Water

The overall net zero goal for water is to limit the consumption of freshwater resources, and return water back to the same watershed so as to not affect the quantity and quality of the groundwater and surface water. This net zero water strategy balances water availability and use to ensure sustainable water supply in the future. The first steps in achieving net zero water are similar to those for net zero energy. The installation must reduce the amount of water it uses by making behavioral changes and by maximizing water conservation and then water efficiency in existing facilities and processes. Recycling involves the reclamation of water through development of closed-loop systems. Installations must then investigate opportunities to capture and re-purpose “waste” water for a secondary purpose with limited processing.

The final step is to recharge aquifers or develop alternate water sources. Potential net zero water projects that FHL could implement are described in the following sections.

Reduction. Water conservation is any behavior change or use of a device, technology, or improved design or process (including improvements to water distribution systems) that results in less water use or loss. By educating users on effective ways to reduce their water demand, personnel are able to become involved in meeting net zero water goals. The following water conservation projects could be implemented to reduce water use at FHL.

- Promote water conservation at the workplace. Include water conservation tips in the employee orientation manual.
- Promote water conservation in organization newsletters, on bulletin boards, and by example.
- Evaluate current metering of potable water use in all buildings at FHL, particularly facility audit group and high-consuming buildings. For those buildings and areas not currently metered, install meters where practicable to determine water usage by building and by process. Similar to energy metering, metering for water can help personnel monitor their water use and become aware of maintenance issues such as leaks.
- Support projects that would lead to an increased use of reclaimed wastewater for irrigation and other uses.
- Conduct a survey, including who the water users are and how much water they use, to establish a water baseline for the installation, which would help to strengthen water management decisionmaking.
- Implement water-related action items identified in the *Comprehensive Energy and Water Master Plan* (August 2010) including completing a water leakage survey and implementing identified leak repairs, reducing irrigation demand for existing buildings, and instituting a water awareness program (FHL 2010).
- Reduce or eliminate landscape irrigation in new development through use of xeriscaping or low water demand landscaping.
- Modernize/update the sewer line from cantonment area to Blackjack training site.
- Promote the use of products that provide a waterless car wash.

A reduction in water use can also be accomplished by implementing water efficiency measures, which are discussed in the following paragraph. Together water conservation and efficiency are the main components of integrated water resources management that allow for comprehensive reductions in water use.

Efficiency. Water efficiency is a tool of water conservation that results in more efficient water use (i.e., requires less water to perform the same function) and, therefore, reduces water demand. The value and cost-effectiveness of a water efficiency measure must be evaluated in relation to its effects on the use and cost of other natural resources (e.g., energy or chemicals). The following projects could be implemented at FHL to use water more efficiently.

- A majority of military family housing and temporary lodging facilities have been updated to include ultra-low-flush toilets. Continue replacing toilets with ultra-low-flush models as each building is remodeled.

- The 8 temporary lodging facilities and 60 rooms in the 5 barracks have been upgraded with water-efficient faucets and showerheads. Continue replacing faucets and showerheads with water-efficient versions as each building is remodeled.
- Use of efficient and low-flow fixtures in all new development.
- Install evapotranspiration-based controllers to reduce landscaping water use.
- Purchase Water Wise products when replacing current equipment.

Recycle. Recycling through implementation of closed-loop or recirculation systems would reduce water demand. The following water-recycling projects could be implemented at FHL.

- Evaluate the use of rainwater collection systems (i.e., rainwater catchments) at military family housing and all new development to decrease use of potable water for irrigation.
- Use recycled, treated water at the tactical vehicle washrack.

Reuse. Water reuse projects in which "waste" discharge water could be treated and reused for other processes, would reduce the need for potable water. The water could be used for processes that do not require potable water such as landscape irrigation, dust control, soil compaction, toilet flushing, and possibly at the tactical vehicle washrack. The following water reuse projects could be implemented at FHL.

- Implement graywater recycling during which water from showers, sinks, and dishwashing and laundry facilities would be captured, treated, and reused for other non-potable water uses such as landscape irrigation.
- Install improved secondary treatment at the existing WWTP, which could be elevated over the existing lagoons.

Recharge. The final net zero water step is ensuring the sustainability of current and future water supplies to an installation. This can be accomplished by development of alternate water supplies and recharging the aquifer. Large areas of impervious surfaces prevent infiltration of storm water and strain the installation's storm sewer system. By increasing pervious surfaces (e.g., trees, swales, and landscaped areas), FHL can recharge the aquifer, and help offset installation water consumption. Development of alternate water supplies could require construction of new infrastructure or modification of existing infrastructure. FHL has not proposed the development of alternate water supplies; however, the following projects could be implemented to facilitate the recharge of aquifers.

- Reduce impervious surfaces, and include pervious surfaces in new development to increase water infiltration and reduce runoff.
- Use green roofs in new development.
- Implement strategies identified in the FHL RPMP to facilitate infiltration and recharge of the aquifer, including maintenance of existing trees, planting new trees based on the Landscape Design Standards and siting designs, adding planting strips, and siting parks and courtyards with infiltration basins at various locations within the cantonment area.

2.1.3 Waste

FHL is a net zero waste pilot installation and it has prepared the *Net Zero Waste Installation Plan* to identify and assess net zero waste projects. This plan focuses on FHL's pollution prevention program,

which emphasizes the prevention of waste generation through source reduction rather than "end-of-pipe" treatment (i.e., disposal) and the Integrated Solid Waste Management Plan (ISWMP). FHL's pollution prevention program and ISWMP mirror the U.S. Army net zero waste vision in which FHL would reduce, reuse, recycle, and recover waste streams by converting them to usable resources with zero solid waste landfilling on an annual basis.

The *Net Zero Waste Installation Plan* identified opportunities that could be implemented to assist FHL in becoming net zero for waste, and these opportunities were evaluated further to develop specific projects. These opportunities and proposed projects are presented in the following sections.

Reduction. The first step is to avoid or eliminate the generation of unnecessary waste by considering the waste stream during purchasing. Waste generation could be reduced by modifying purchasing practices to implement a sustainable or green procurement program. Green procurement includes the purchasing of products, goods, and services that are recyclable or contain recycled content materials. Other methods of waste source reduction include implementation of "take-back" provisions in furniture and equipment purchases; and establishment of contracts or management actions to refurbish or extend the lifecycle of furniture, equipment, and other goods.

The following green procurement opportunities were identified as likely to assist in the waste source reduction at FHL:

- Develop a green procurement policy and plan.
- Include green procurement requirements in all contracts.
- Implement contracts for the recycling of textiles.
- Install recycled content carpet and use of a carpet take-back program.
- Reduce purchases that contain excessive packaging or buy in bulk.
- Buy products that are made with compostable materials (e.g., snack food packaging and utensils).
- Develop a tracking system to determine if appropriate products and services were considered.
- Implement green procurement awareness training for procurement personnel.

Four specific green procurement projects were developed as follows:

- Develop a green cleaning products checklist to be used by the janitorial contractor.
- Develop a green procurement purchase blacklist to encourage the purchase of approved items.
- Purchase and use reusable vehicle motor oil filters.
- Purchase and use precleaner air filters.

Re-Purpose. After implementing source reduction measures, FHL would look for opportunities to divert waste to a secondary purpose with limited processing. FHL currently manages programs to reuse some materials; however, several additional opportunities to reuse waste materials have been identified at FHL and include the following:

- Collect and reuse sawdust generated by operations and maintenance shops for cleanup of petroleum, oil, and lubricant (POL)-related spills.
- Evaluate the procedures for the management of excess equipment and materials from training operations, including identification of storage space until the excess items could be reissued to other units or recycled. If storage space is not available, then an economic analysis could be developed to support the need for the construction of storage facilities dedicated to the storage of excess training supplies.

- Evaluate alternative uses for the approximately 42,000 excess bales of cellulose insulation. One use that could be investigated is its use as a filter medium at the WWTP.
- Purchase and use a glass crusher to manage glass containers that are not recycled. The crushed glass can be used as an aggregate substitute.
- Implement programs for the reuse of consumer clothing (i.e., clothing from military and civilian personnel). If clothing is not reusable, make available to installation shops as clean-up rags to prevent it from possibly being disposed of in refuse bins and becoming part of the installation's waste stream.
- Evaluate expansion of the existing rag laundering program used by ECS 170.

FHL could implement the following two specific projects to reuse waste materials:

- Encourage the use of refillable water bottles.
- Purchase and install a food digester at the DFAC and use finely ground or liquefied food waste as a soil amendment.

Recycling and Composting. The third step in achieving net zero waste includes maximizing the reclamation of recyclable and compostable materials. FHL currently recycles various materials, but there are several limiting factors preventing additional recycling options at FHL. These factors include the installation's remote location and the distance to available recycling vendors, the lack of available space protected from the elements to accumulate recyclable materials prior to resale to a vendor, and limited funding available to support identified related projects. Due to transportation costs, most recycling vendors are unwilling to pay for FHL's recycling commodities, but they could provide a pickup service for a fee. In FY 2012, Waste Management provided a pickup service for source separated cardboard and commingled/mixed recyclables at FHL.

FHL had a diversion rate of 19 percent in FY 2011, but implementation of a net zero waste program would increase their solid waste diversion rates through more aggressive recycling and composting to meet Federal diversion goals. The U.S. Army has committed to meeting the environmental goals for nonhazardous solid waste diversion identified in the *DOD Strategic Sustainability Performance Plan, FY 2011*. These goals include the diversion of 50 percent of nonhazardous solid waste streams and of 60 percent of construction and demolition debris diverted from the waste stream by FY 2015 and through FY 2020.

Several opportunities for more aggressive recycling have been identified at FHL. These opportunities include the following:

- Implement the Qualified Recycling Program (QRP) and update the QRP Business Plan.
- Update information packets provided to personnel staying at billeting to include information on recycling.
- Increase market value of commodities by separating recyclables at the point of generation, thereby reducing the need for downstream separation of the various types of recyclables by potential recycling vendors.
- Utilize a data collection spreadsheet created for the recording of construction and demolition debris that has been diverted.
- Relocate and install the vertical baler from the existing Transfer Station to the Recycling Center (Building 338) to facilitate recycling of cardboard.

FHL could implement the following recycling projects to increase its solid waste diversion rate:

- Initiate the separation, collection, and recycling of batteries (e.g., alkaline, nickel-cadmium, and lithium).
- Establish a beverage container redemption center.
- Establish a wood recycling program.
- Evaluate the implementation of a mulching or composting operation.
- Implement a cell phone recycling program.
- Develop continuity binders for recycling equipment used in the shops.

Energy Recovery. The fourth step in the net zero waste process is to assess opportunities to convert unusable waste to energy. Waste that cannot be cost-effectively "avoided," re-purposed, recycled, or composted could be disposed of via waste-to-energy (WTE) technologies. As discussed in **Section 2.1.1**, FHL could install a WTE facility. The existing Transfer Station and the processes currently conducted at the Transfer Station (i.e., temporary collection and storage of nonrecyclable bulk wastes and some recyclable materials) could be consolidated with the Recycling Center at an undetermined lcoation, and the WTE facility could be sited in the same location to allow for a consolidated, comprehensive waste management and recycling area. Waste materials could be transported to the Recycling Center/Transfer Station where all recyclable materials would be removed and other materials, including those that are not able to become feedstock for the WTE facility, could be processed for reuse or disposal.

Disposal. The final step after all other waste mitigation strategies have been fully exercised, is disposal of any remaining waste in a landfill. FHL has not proposed changes to its current waste disposal practices.

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3. Alternatives to the Proposed Action

Under NEPA, reasonable alternatives to the Proposed Action must be considered in an EA. Considering alternatives helps to avoid unnecessary impacts and allows analyses of reasonable ways to achieve the stated purpose. To warrant detailed evaluation, an alternative must be reasonable. To be considered reasonable, an alternative must also be "ripe" for decisionmaking (i.e., any necessary preceding events have taken place), affordable, capable of implementation, and satisfactory with respect to meeting the purpose of and the need for the action. The following discussion identifies alternatives considered by the USAR and whether they are reasonable and, hence, subject to further detailed evaluation in this EA.

3.1 Screening Criteria

Screening criteria were used to develop the Proposed Action and evaluate potential alternatives. The alternative must meet the following criteria:

- Cost-effective and of appropriate scale for the installation
- Sustainable and fully support the mission of FHL
- Not result in adverse impacts on adjacent areas other than to enhance FHL's relationship with the surrounding community
- Enable FHL to produce as much renewable energy on the installation as it uses annually
- Enable FHL to limit the consumption of freshwater resources
- Enable FHL to reduce, reuse, and recover waste streams through conversion to usable resource with zero solid waste landfilling.

3.2 Alternatives Considered for Further Detailed Analysis

The alternatives considered for detailed analysis in the EA include the Proposed Action and the No Action Alternative.

3.2.1 Proposed Action

The Proposed Action is the implementation of a net zero program for energy, water, and waste at FHL. This program would consist of an as yet undecided series of policies, procedures, BMPs, and proposed projects. The potential net zero energy, water, and waste projects were described in **Section 2**.

3.2.2 No Action Alternative

CEQ regulations specify the inclusion of the No Action Alternative in the alternatives analysis of any NEPA document (40 CFR Part 1502.14). The No Action Alternative can also provide a baseline of the existing conditions against which potential environmental and socioeconomic impacts of the Proposed Action and alternative actions can be compared.

Under the No Action Alternative, FHL would not implement the Proposed Action and thereby would not implement a net zero program for energy, water, and waste at FHL to reduce overall consumption of energy and water resources and disposal of solid waste in landfills beyond those policies and procedures that are currently in place. Taking no action would not comply with the need for the action, which is to enhance energy and water security at FHL; allow for predictable and potentially reduced operational costs; appropriately manage natural resources; and fulfill Federal, DOD, and U.S. Army energy and

sustainability goals, mandates, and objectives. FHL would continue to implement projects related to net zero energy, water, and waste if they are required by other mandates or identified in other documents.

3.3 Alternatives Considered but Eliminated from Detailed Analysis

Because the Proposed Action is to implement a net zero program and this EA is programmatic in nature, FHL did not eliminate any net zero projects. The net zero projects identified in **Section 2** are all viable projects that could be implemented in various combinations in order for FHL to achieve net zero for energy, water, waste.

4. Affected Environment

This section describes the environmental resources and conditions most likely to be affected by the Proposed Action and provides information to serve as a baseline from which to identify and evaluate environmental consequences likely to result from implementation of the Proposed Action. Baseline conditions represent current conditions. In compliance with NEPA, CEQ guidelines, and 32 CFR Part 651, as amended, the description of the affected environment focuses on those resources and conditions potentially subject to impacts.

Two environmental resource areas have been omitted from detailed analysis in this EA. The bases for exclusion of these resource areas are outlined in the following paragraphs.

Airspace Management and Safety. None of the projects associated with the Proposed Action are within designated airspace, nor would implementation of these projects involve activities that would impact designated airspace or military aircraft operations conducted within designated airspace. Accordingly, airspace management and safety has been omitted from detailed analysis in this EA.

Health and Safety. Construction site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. Occupational Safety and Health Administration and the USEPA issue standards that specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits with respect to workplace stressors. Construction workers are exposed to safety risks from the inherent dangers at any construction site. Any contractors used for the Proposed Action would be required to establish and maintain safety programs at the construction site. The implementation of a net zero program for energy, water, and waste would not expose members of the general public to increased safety risks. Therefore, assuming construction protocols are followed and implemented, the Proposed Action would not introduce new or unusual safety risks to workers, FHL personnel, or the general public. Any construction, demolition, or renovations associated with the Proposed Action would result in identical, non-significant impacts on health and safety.

4.1 Noise

4.1.1 Definition of the Resource

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, the distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's quality of life, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighted" denotes the adjustment of the frequency range to what the average human ear can sense when experiencing an audible event. A-weighted decibel (dBA) is used to characterize sound levels that can be sensed by the human ear. Sounds encountered in daily life and their dBA levels are provided in **Table 4-1**.

Table 4-1. Common Sounds and Their Levels

Outdoor	Sound Level (dBA)	Indoor
Motorcycle	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998

Sound levels, resulting from multiple single events, are used to characterize noise effects and can be measured with the Day-Night Average Sound Level (DNL). DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10:00 p.m. to 7:00 a.m.). DNL is a useful descriptor for noise because it averages ongoing yet intermittent noise, and it measures total sound energy over a 24-hour period. In addition, the Equivalent Sound Level (L_{eq}) is often used to describe the overall noise environment. L_{eq} is the average sound level in dB.

The Noise Control Act of 1972 (Public Law [P.L.] 92-574) directs Federal agencies to comply with applicable Federal, state, and local noise control regulations. In 1974, the USEPA provided information suggesting continuous and long-term noise levels in excess of 65 dBA DNL are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. The California statewide noise ordinance called the Noise Control Act (California Health and Safety Code, Division 28) regulates nuisance noise sources without specific not-to-exceed sound levels or time-of-day restrictions. Monterey County Noise Control Ordinance (County Code Chapter 10.60) prohibits the operation of any device within 2,500 feet of any occupied residential dwelling that produces a noise level exceeding 85 dBA at a distance of 50 feet from the source.

4.1.2 Existing Conditions

Existing sources of noise within the FHL cantonment area include local road traffic, aircraft overflights, and natural noises such as leaves rustling and bird vocalizations. Beyond the cantonment area, the noise environment consists primarily of aircraft and outdoor range training operations. Elevated ambient noise levels are present around the Tusi Army Heliport (AHP) and training ranges, including the hand grenade familiarization course, the multipurpose machine gun range, and the light demolition range (FHL 2012a). Background noise levels (L_{eq} and DNL) were estimated for the surrounding areas using the techniques specified in the American National Standard *Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with an observer present* (ANSI 2003). The noise-sensitive areas (NSAs) at FHL include residential uses, child development center, auditorium/theater, and chapel. The estimated existing sounds levels at these uses, which are categorized as very quiet suburban or rural residential land use category, would be 45 dBA DNL and the L_{eq} would be 43 dB (daytime) and 37 dB (nighttime) (ANSI 2003).

4.2 Land Use

4.2.1 Definition of the Resource

Land use refers to the planned development of property to achieve its highest and best use. Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent areas. Tools supporting land use planning include written master plans, management plans, and zoning regulations. In the civilian sector, land use planning guides the type and extent of allowable land use in an effort to control and limit growth; maintain and improve social, cultural, and physical amenities; promote a stable economy; supply adequate housing; ensure the availability of necessary public services and utilities; preserve agricultural lands; maintain scenic areas; and protect specially designated or environmentally sensitive areas. Except for economic growth considerations, these concepts apply to U.S. Army land use planning whose purpose is to identify the principal kinds of facilities and activities to be found in particular areas on installations (Canter et al. 2007).

The location and extent of a proposed action should be evaluated to determine the potential effects on a project site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include historical and existing land use at the project site, land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its permanence.

4.2.2 Existing Conditions

FHL encompasses approximately 162,000 acres. The FHL cantonment area, which occupies slightly more than 1,000 acres, is in the east-central portion of the installation. Currently, most development in the cantonment area is concentrated in the northern, central, and southwestern portions. The eastern portion of the cantonment area is undeveloped areas and not actively used, while other undeveloped areas are available for light outdoor training. There is a wide range of building types, ages, and conditions in the cantonment area.

The FHL RPMP is a master planning document that provides a strategy for guiding future development of the installation's cantonment area through siting and design of future projects and land uses. Design principles, including sustainable building planning principles that encourage energy and water efficient designs, are integrated in the RPMP. The RPMP divides the cantonment area into three districts: Hacienda Heights (northernmost district for housing and public facilities), Blackhawk Hills (central district for a training campus with barracks and classroom facilities), and Mission Valley (southernmost district for industrial uses). Specific land uses identified in the RPMP include approximately 170 new housing units in Hacienda Heights; 2.1 million ft^2 of new administrative/training facilities, including 260,000 ft^2 of barracks and the Operational Readiness Training Complex (ORTC), in Blackhawk Hills; and more than 700,000 ft^2 of industrial/training facilities and expansion of the WWTP in Mission Valley (FHL 2012b).

There are multiple land uses present in the cantonment area, including mission-related uses and support functions. Administration uses (i.e., offices) are located throughout the cantonment area, but primarily in two areas. One area on Infantry Road is collocated with classroom training and supply/logistics uses, and another area is along Route Tampa between Tusi AHP to the west and maintenance uses to the east. Maintenance uses (i.e., shops for unit- and installation-level maintenance and repair) are scattered throughout the northern, central, and southern portions of the cantonment area, including a large area extending on both sides of Route Tampa (i.e., ECS). Supply/logistics uses (i.e., supply, warehousing, and distribution operations) occupy a small area on the east-central side of the cantonment area adjacent to a family housing area that is collocated with outdoor recreation uses. Family housing, unaccompanied housing, the medical/dental clinic, outdoor recreation facilities, and other community support facilities

(e.g., DFAC, physical fitness center, chapel, fire station, and military police station) are located in the northern and central portions of the cantonment area.

All land at FHL, except for the cantonment area and Mission San Antonio de Padua (a California mission adjacent to the northwest of the cantonment area), is considered part of a training area. FHL contains 34 training areas; 4 training areas (6B, 7, 13W, and 16B) are adjacent to the cantonment area (see **Figure 1-1**). FHL also has several aviation training areas, including Tusi AHP in the southwestern portion of the cantonment area, and Schoonover Airfield, which is approximately 1.5 miles southeast of the cantonment area. In addition, the Medivac Airfield, a small, infrequently used landing pad for helicopters, is in the west-central portion of the cantonment area. There are five tactical landing zones at FHL, including Schoonover Airfield, and more than 20 drop zones. The closest landing zone to the cantonment area is Jackhammer landing zone, a helicopter tactical landing zone southeast of the cantonment area that also serves as a personnel and equipment drop zone.

4.3 Air Quality

4.3.1 Definition of the Resource

Air pollution is the presence in the atmosphere of contaminants (e.g., dust, fumes, gas, mist, odor, smoke, or vapor) in quantities, characteristics, or duration such as to be injurious to humans, animals, or plants. Air quality as a resource incorporates several components that describe the levels of overall air pollution within a region, sources of air emissions, and regulations governing air emissions.

4.3.2 Existing Conditions

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), oxides of nitrogen (NO_x), 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. While each state has the authority to adopt standards stricter than those established under the Federal program, the State of California adopted slightly stricter standards for 24-hour PM_{10} and O_3 (CARB 2013).

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 Proposed Action) is within the North Central Coast Intrastate AQCR (40 CFR Part 81.160), and the Monterey Bay Unified Air Pollution Control District (MBUAPCD). The USEPA has designated Monterey County as in attainment for all criteria pollutants, while CARB has designated it as nonattainment for PM_{10} (USEPA 2013a, CARB 2012). Because the facility is located in an attainment area for the NAAQS General Conformity requirements do not apply. A RONA is provided in **Appendix D**.

The USEPA monitors levels of criteria pollutants at sites in each region throughout California. **Table 4-2** shows the monitored concentrations of criteria pollutants at a monitoring location closest to FHL. Although the nearest monitoring station has exceeded the NAAQS for O_3, the USEPA has determined that Monterey County is outside the area where this exceedance applies. However, the values have been included for reference purposes.

Table 4-2. National Ambient Air Quality Standards and Monitored Data

Pollutant	NAAQS	Monitored Data
CO		
1-hour [a] (ppm)	35	0.7
8-hour [a] (ppm)	9	0.3
NO_2		
1-hour (ppb)	100	36.0
O_3		
8-hour [b] (ppm)	0.075	0.08
SO_2		
1-hour [a] (ppb)	75	7.0
3-hour [a] (ppm)	0.5	No Data
$PM_{2.5}$		
24-hour [c] (µg/m^3)	35	19
Annual Arithmetic Mean [d] (µg/m^3)	12	5.7
PM_{10}		
24-hour [a] (µg/m^3)	150	44

Source: 40 CFR Parts 50.1-50.12, USEPA 2014

Key: ppm = parts per million, µg/m^3 = micrograms per cubic meter, NO_2 = nitrogen dioxide

Notes:

a. Not to be exceeded more than once per year.

b. The 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations over each year must not exceed 0.075 ppm.

c. The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 35 µg/m^3.

d. The 3-year average of the weighted annual mean $PM_{2.5}$ concentrations must not exceed 12.0 µg/m^3.

Table 4-3 lists FHL's 2011 facilitywide air emissions from all significant 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. FHL's diesel-powered portable equipment is also registered with State of California under the Portable Equipment Registration Program.

Greenhouse Gases and Climate Change. Greenhouse gases (GHGs) 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 GHGs 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 GHGs (or heat-trapping gases) to the atmosphere. Whether or not rainfall will increase or decrease from adding GHG to the atmosphere remains difficult to project for specific regions (USEPA 2013b, IPCC 2007). FHL average high temperature is 85.2 degrees Fahrenheit (°F) (29.6 degrees Celsius [°C]) in the hottest month of August, and an average low temperature of 36.1 °F (2.3 °C) in the coldest month of December. FHL has average annual precipitation of 12.3 inches (31.2 centimeters) per year. The wettest month of the year is February with an average rainfall of 2.7 inches (6.9 centimeters) (Idcide 2014).

Table 4-3. Annual Air Emissions for FHL (2011)

Pollutant	Emissions (tons per year)	
	Potential to Emit	Actual Emissions
NO_x	44.8	2.6
SO_2	4.3	0.5
CO	22.0	1.3
Volatile organic compounds (VOCs)	38.3	0.2
Fine particulate matter ($PM_{2.5}$/PM_{10})	12.9	0.2
Hazardous air pollutants	0.43	0.0024
Carbon dioxide (CO_2e) *	12,649	2,604

Source: CARB 2012, FHL 2012c

Note: * Expressed as CO_2 equivalents.

EO 13514 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 GHG emissions from both their direct and indirect activities. The DOD has committed to reduce GHG emissions from non-combat activities 34 percent by 2020 (DOD 2010). In addition, the CEQ recently released draft guidance on when and how Federal agencies should consider GHG 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_2 equivalent (CO_2e) emissions from a Federal action (CEQ 2010).

4.4 Geological Resources

4.4.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. These resources typically are described in terms of geology, topography and physiography, soils, and geologic hazards.

Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Topography and physiography pertain to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types, in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential, affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

Geologic hazards are defined as a natural geologic event that can endanger human lives and threaten property. Examples of geologic hazards include earthquakes, landslides, rock falls, ground subsidence, and avalanches.

4.4.2 Existing Conditions

FHL is situated in the Coast Ranges geologic province. The geology underlying the installation is composed of three distinct groups of rocks reflecting different origins. These rock groups include the Salinian block, the Franciscan complex, and sedimentary deposits formed at marine and nonmarine basins along the Pacific margin. The Salinian block underlies the northern portion of FHL and is composed of crystalline intrusive and metamorphic rocks, ranging in age from the Mesozoic Era (i.e., 248 to 65 million years ago) to the Precambrian Eon (i.e., 4.5 billion to 543 million years ago). The Franciscan complex underlies the southwestern portion of FHL and is composed of greywacke formed during the Mesozoic Era along a subduction zone. The sedimentary deposits underlie the eastern and central portions of the installation, including the cantonment area, and are composed of sandstone, shale, and conglomerates that were deposited from the late Cretaceous to Quaternary Eras (i.e., 100 to 2.5 million years ago) (NPS 2007).

Elevations at FHL range from approximately 760 feet above mean sea level (msl) at the upper end of the San Antonio Reservoir to 3,740 feet above msl at Alder Peak in the southwestern portion of the installation. The cantonment area and some training ranges are in the San Antonio and Nacimiento Valleys, which range from 900 to 1,300 feet above msl and are characterized as having gentle slopes. The northern and western portions of FHL are along the coastal ridge and are characterized as having high-elevation, steep terrain (FHL 2007).

More than 130 soil types and 57 soil series are mapped at FHL. Some of these soil types are classified as prime farmland soils or farmland soils of statewide importance. The steep highlands in the western portion of the installation are composed of shallow soils indicative of the underlying metamorphic and greywacke parent material. Soils in the eastern and central portions of the installation consist of alluvial terrace soils derived from marine sedimentary rocks (NPS 2007). The soil types in the cantonment area mainly consist of the soil series Arroyo Seco gravely sandy loam, which exists in the north, central, and southern areas of the cantonment area. The eastern portion of the cantonment area contains a variety of soil types, largely consisting of Chamise shaly loam and San Andreas fine sandy loam (NRCS 2013).

Numerous faults underlie FHL, including the Jolon, Nacimiento, and Rinconada faults and several smaller faults. These faults trend subparallel to the San Andreas Fault. The Rinconada Fault and the Nacimiento Fault control the geomorphology and hydrology of the installation, specifically the northwestern trend of the San Antonio River and the Nacimiento River (NPS 2007).

Earthquake hazard maps show the levels of horizontal shaking that have a 2 in 100 chance of being exceeded in a 50-year period. Shaking is expressed as a percentage of the force of gravity (percent g) and is proportional to the hazard faced by a particular type of building. In general, little or no damage is expected at values less than 10 percent g, moderate damage could occur at 10 to 20 percent g, and major damage could occur at values greater than 20 percent g. The 2008 United States National Seismic Hazards Map shows that the region of FHL has a seismic hazard rating of 32 to 48 percent g interval (USGS 2008). Thus, major damage to buildings could occur as a result of seismic activity.

Fossil fuels are created by natural geological processes over spans of millions of years. Common fossil fuels include coal, petroleum, and natural gas, which are mined from geological strata and used by humans to provide energy. Fossil fuel reserves are currently being depleted at a much faster rate than they are being created. Fossil fuels are the primary sources for energy at FHL.

4.5 Water Resources

4.5.1 Definition of the Resource

Water resources are natural and man-made sources of water that are available for use by and for the benefit of humans and the environment. Hydrology consists of the redistribution of water through the processes of evapotranspiration, surface runoff, and subsurface flow. Hydrology results primarily from temperature and total precipitation that determine evapotranspiration rates, topography that determines rate and direction of surface flow, and soil and geologic properties that determine rate of subsurface flow and recharge to the groundwater reservoir.

Groundwater. Groundwater consists of subsurface hydrologic resources, and exists in the saturated zone beneath the Earth's surface in pore spaces and fractures, and includes aquifers. It is an essential resource that functions to recharge surface water and is used for drinking, irrigation, and industrial processes.

Surface Water. Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale.

Waters of the United States are defined within the Clean Water Act (CWA), as amended, and jurisdiction is addressed by the USEPA and the U.S. Army Corps of Engineers (USACE). These agencies assert jurisdiction over (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) nonnavigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-around or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries. Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredge or fill into waters of the United States including wetlands. Encroachment into waters of the United States and wetlands requires a permit from the state and the Federal government. **Section 4.6** provides a discussion of wetlands and wetlands at FHL that could be affected by the Proposed Action.

Storm Water. Storm water systems help to direct and manage untreated water resources. The National Pollutant Discharge Elimination System (NPDES) Stormwater Program regulates storm water discharges from three potential sources: municipal separate storm sewer systems, construction activities, and industrial activities. In California, the NPDES program is administered by the State Water Resources Control Board (SWRCB), and NPDES permits are authorized by Section 402 of the CWA and Section 13370 of the California Porter-Cologne Water Quality Control Act. Storm water discharges from all construction activity at FHL greater than 1 acre (43,559 ft^2) are regulated under Construction General Permit No. CAS000002 (SWRCB Order No. 2009-0009-DWQ amended by 2010-0014-DWQ and 2012-0006-DWQ). The Construction General Permit requires construction site owners and operators that disturb one or more acres of land to use BMPs to ensure that soil disturbed during construction activities does not pollute nearby water bodies.

Section 438 of the EISA (42 U.S.C. Section 17094) establishes into law new storm water design requirements for Federal projects with a footprint greater than 0.1 acre (5,000 ft^2). Under these EISA design requirements, predevelopment site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Siting and project design will incorporate storm water retention and reuse technologies such as bioretention areas, permeable pavements, cisterns/recycling, and green roofs to the maximum extent technically feasible. Post-construction analyses will be conducted to evaluate the effectiveness of the as-built storm water reduction features.

Floodplains. Flood zones are areas of low-level ground present along rivers, stream channels, or coastal waters that are subject to periodic or infrequent inundation due to rain or melting snow. Risk of flooding typically hinges on local topography, the frequency of precipitation events, and the size of the watershed above the flood zone. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA). Federal, state, and local regulations often limit flood zone development to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety.

EO 11988, *Flood Zone Management*, requires Federal agencies to determine whether a proposed action would occur within a flood zone. This determination typically involves consultation of FEMA Flood Insurance Rate Maps (FIRMs), which contain enough general information to determine the relationship of the project area to nearby flood zones. EO 11988 directs Federal agencies to avoid flood zones unless the agency determines that there is no practicable alternative.

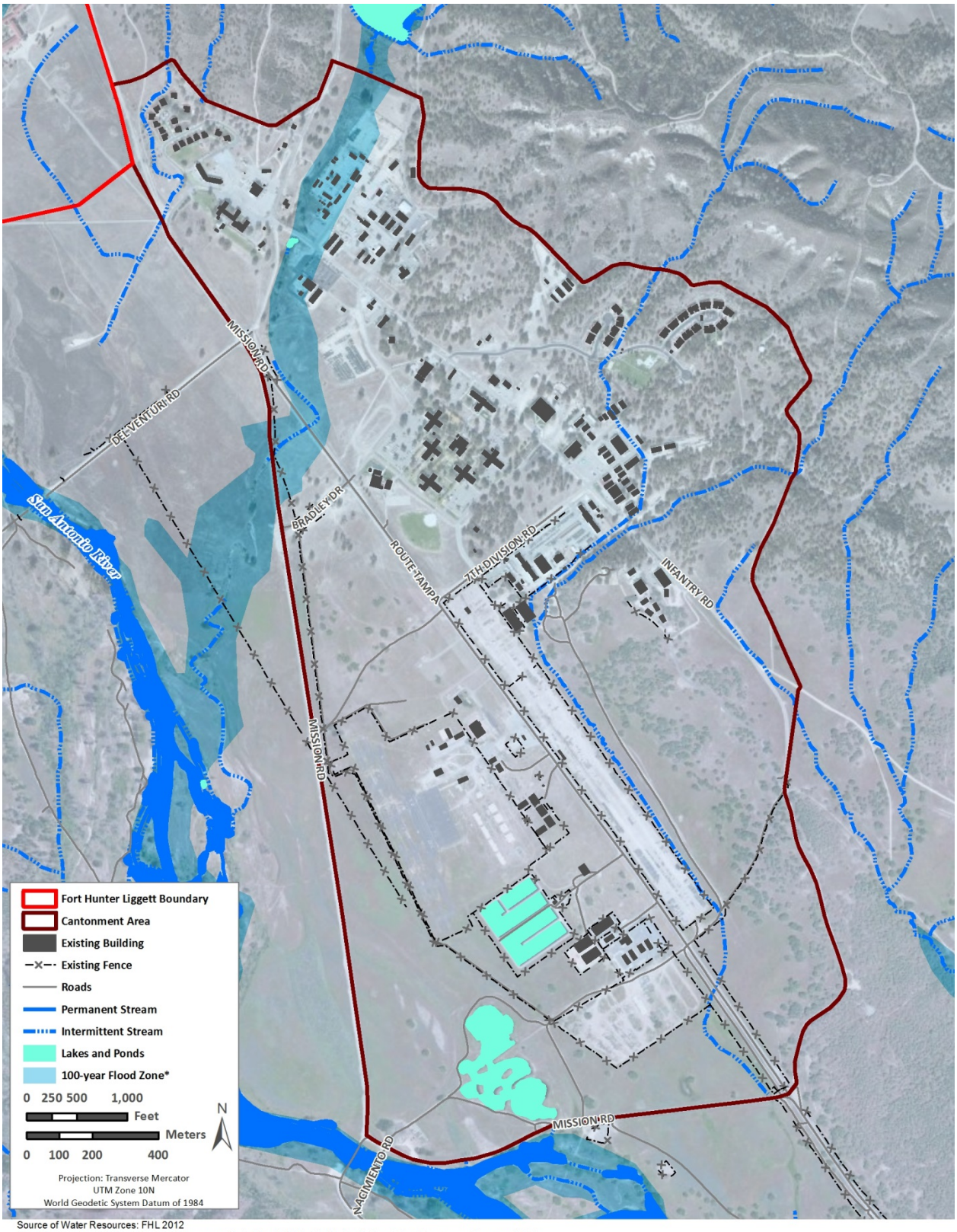
4.5.2 Existing Conditions

Groundwater. Two aquifers underlie FHL, flowing to the southeast following the geologic structure of the Coast Ranges. The Jolon Fault separates the Jolon-Lockwood groundwater basin to the east from the Mission-San Antonio Basin to the west and prevents mixing of the two basins (NPS 2007). None of the described aquifers are sole-source providers (USEPA 2013c). Groundwater for domestic consumption is derived from three wells tapped into the basins that are located on FHL outside of the cantonment area. In FY 2011, FHL used 99 million gallons of potable water (FHL 2013a). Current water demand at FHL is approximately 0.23 million gallons per day (MGD) or 12.3 percent of the collective water pumping capacity of the three main groundwater wells (USACE 2007).

A hydrocarbon-contaminated groundwater plume associated with a building adjacent to 7th Division Road (Building 258) extends approximately 2,200 feet to the south and southwest. Groundwater in the vicinity of the plume has been encountered at depths of 12 to 45 feet below ground surface (USACE 2012). This contaminated groundwater plume could affect drinking water supplies which are drawn from groundwater. A second hydrocarbon-contaminated groundwater plume is located in the vicinity of Building 194 (FHL 2011a). See **Section 4.12** for discussion of hazardous wastes.

Surface Water. FHL is within the Salinas River watershed, which covers 4,600 square miles, with tributaries including the Arroyo Seco, Nacimiento, San Antonio, and Estrella rivers (USACE 1987). The two major watercourses flowing through FHL are the San Antonio River and the Nacimiento River (see **Figure 4-1**). The two rivers are parallel drainages that flow approximately 5 miles apart from the northwest to the southeast. The San Antonio River watershed on FHL includes all or major portions of the cantonment area and the eastern half of the installation. The headwaters for the San Antonio River are in the Cone and Junipero Serra Peaks. The river runs 25 miles through FHL (NPS 2007). The headwaters for the Nacimiento River are in the Santa Lucia Range, south of Cone Peak. The river flows along the western installation boundary for approximately 15 miles. 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.

Storm Water. Storm water drains by sheet flow to various natural drainage channels in the less developed portions of FHL as there are no man-made storm water handling systems in these areas. FHL's cantonment area can be characterized as sloping terrain including mildly sloping hills. In the cantonment area, storm water runoff is collected and transported by an extensive man-made storm water drainage network that transports storm water to the San Antonio River outside the cantonment area. There is no pretreatment of storm water discharge. See **Section 4.10.2** for more information on the storm water drainage network in the cantonment area.



Source of Water Resources: FHL 2012
* FEMA map service represents Flood Insurance Rate Map (FIRM) data for the National Flood Insurance Program (NFIP)

Figure 4-1. Water Resources in the Fort Hunter Liggett Cantonment Area

Floodplains. Flood zones at FHL occur adjacent to rivers and major creeks. The FEMA FIRMs for Monterey County, California, classify the majority of the cantonment area as within Zone X (minimal flooding). The northern portion of the cantonment area is primarily within Zone X, but is divided by a small area classified as Zone A, which corresponds to the Sulphur Spring Canyon Creek. The areas surrounding the San Antonio River to the south and west of the cantonment area are also Zone A. Zone A surrounds streams and rivers and is likely to flood occasionally with prolonged or sufficient precipitation (FEMA 2009a, FEMA 2009b, FEMA 2009c).

4.6 Biological Resources

4.6.1 Definition of the Resource

This section describes the existing conditions of biological resources potentially affected by the Proposed Action. It provides a description of the wetlands, vegetation, and wildlife anticipated to occur near the net zero projects identified in the Proposed Action. Wildlife, vegetation, and wetland resources provide aesthetic, recreational, and socioeconomic benefits to society. Species and habitats addressed in this section include those that are not listed as threatened or endangered by the Federal government or a California agency. Federally listed and state-listed threatened and endangered species are addressed in **Section 4.7**.

Wetlands. Wetlands are important transitional lands between terrestrial and aquatic systems, and are typically found along streams, rivers, springs, ponds, and drainage ditches. These habitats are periodically inundated with water.

Wetlands are protected as a subset of "waters of the United States" under Section 404 of the CWA, which regulates the discharge of dredged or fill material into navigable and interstate waters, including tributaries of those waters and adjacent wetlands. The term "waters of the United States" has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats, including wetlands. The term "wetland" used herein, is defined using USACE conventions. The USACE has jurisdiction to protect wetlands under Section 404 of the CWA as defined as areas inundated or saturated by surface or groundwater sufficient to support vegetation that is adapted to life in saturated soil conditions (USACE 1987).

EO 11990, *Protection of Wetlands* (May 24, 1977), directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands. The Federal government operates on a policy of "no net loss" of wetlands, meaning that operations and activities shall avoid the net loss of size, function, or value of wetlands.

There are both jurisdictional and nonjurisdictional wetlands. Jurisdictional wetlands are special aquatic sites that have a hydrological connection to jurisdictional waters of the United States. All jurisdictional waters of the United States are regulated by the USACE, under the oversight of the USEPA or state equivalents (e.g., SWRCB in California). Typically, only the placement of fill into jurisdictional wetlands is regulated. Fill can be defined as nearly anything being placed into a wetland on a long-term basis. Unregulated wetlands are those that do not have a hydrologic connection to jurisdictional waters of the United States. Such wetlands might still be occupied by federally listed species and regulated by the USFWS.

Many states have local regulations governing wetlands and their transition areas; however, these regulations do not apply to military installations such as FHL. In some states, including California, the USEPA review of wetland permits has been delegated to a state agency (e.g., SWRCB in California) and could require additional measures for permit certification. Any proposed installation development that involves excavating, digging, or dumping in a drainage, wetland, vernal pool, or pond could be regulated and a permit could be required depending on the nature and location of the activity.

Migratory Birds. The Migratory Bird Treaty Act of 1918 (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. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent overutilization. The DOD is subject to the provisions of the MBTA, statutory and regulatory requirements associated with the Migratory Bird Permits, Take of Migratory Birds by the Armed Forces (DOD/MBTA rule; 72 Federal Register [FR] 8931), and the Memorandum of Understanding between DOD and the USFWS to Promote the Conservation of Migratory Birds (71 FR 51580) in protecting migratory birds.

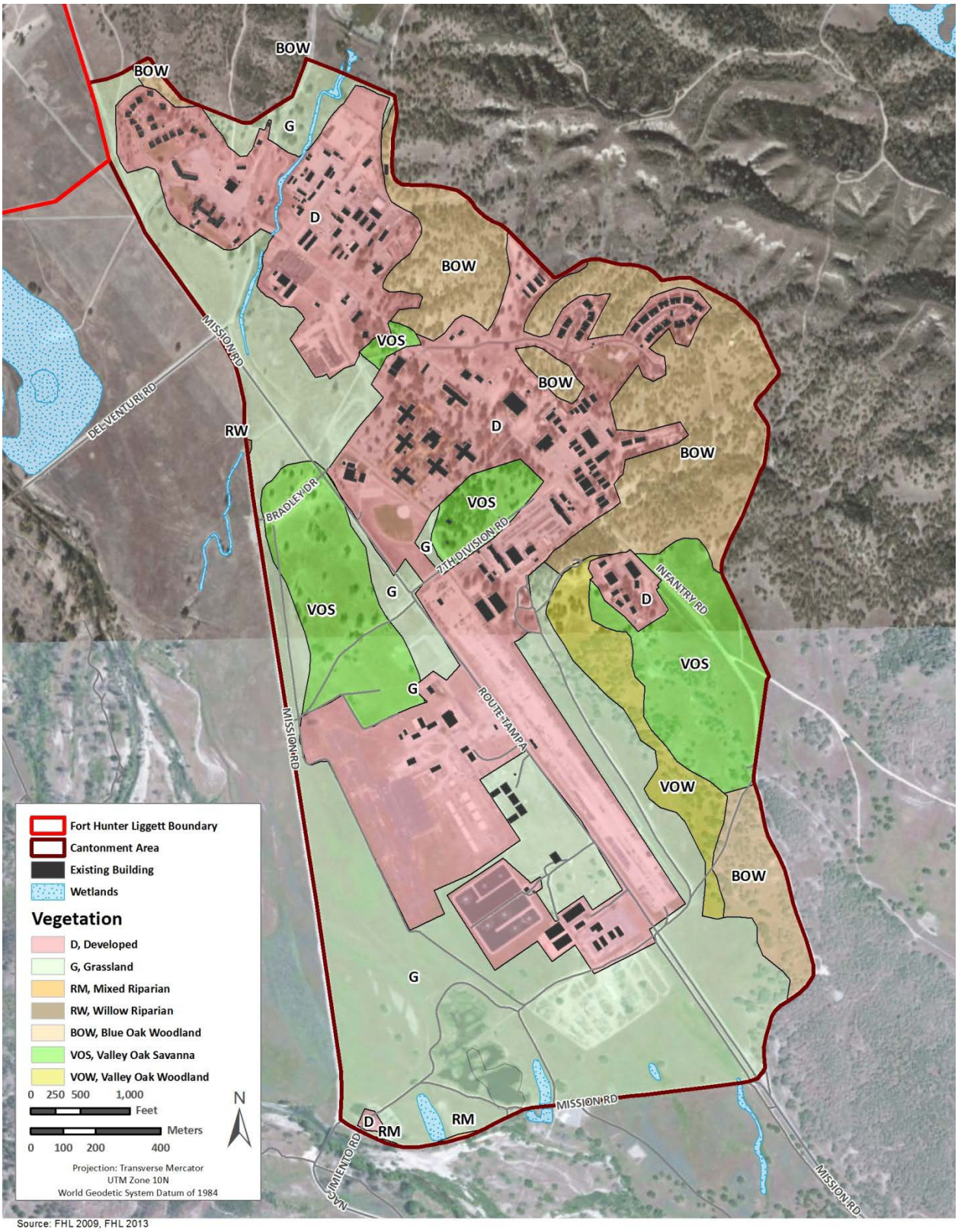
4.6.2 Existing Conditions

Wetlands. There are approximately 800 acres of both jurisdictional and non-jurisdictional wetlands on FHL (FHL 2011b) of which approximately 44 acres (5.5 percent of wetlands on FHL) are in the cantonment area (FHL 2013c). Two rivers, the San Antonio and Nacimiento, and a network of tributaries throughout their respective watersheds, compose the majority of the jurisdictional waters on the installation (see **Figure 4-2**). A majority of the wetlands in the cantonment area are in the southern portion of the cantonment area. Jurisdictional and non-jurisdictional wetlands exist at FHL and are either ephemeral or perennial. Isolated wetlands, such as vernal pools, that have no hydrological connection to a river occur on the installation and are generally not jurisdictional. However, if an isolated wetland supports threatened or endangered species habitat it may be regulated by the USFWS.

Vernal pools are a special category of wetlands. Vernal pools, which are seasonally filled pools that could contain sensitive species, occur in limited environmental settings and are sensitive to development, erosion, compaction fill, and other disturbances. These seasonal pools are difficult to detect because of their often small size and seasonal inundation, but they support zooplankton, phytoplankton, and macroinvertebrates. The federally listed threatened vernal pool fairy shrimp (*Branchinecta lynchi*) was found in 65 vernal and seasonal pools on FHL in 2000 (FHL 2011b). Vernal pools occur in the southern portion of the cantonment area (see **Figure 4-3**). See **Section 4.7** for more information on vernal pool fairy shrimp.

Vegetation. Generally, plant communities at FHL include chaparral, oak woodlands, oak savannas, grasslands, riparian areas, and seasonal and perennial wetlands. 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 (CDFW 2013).

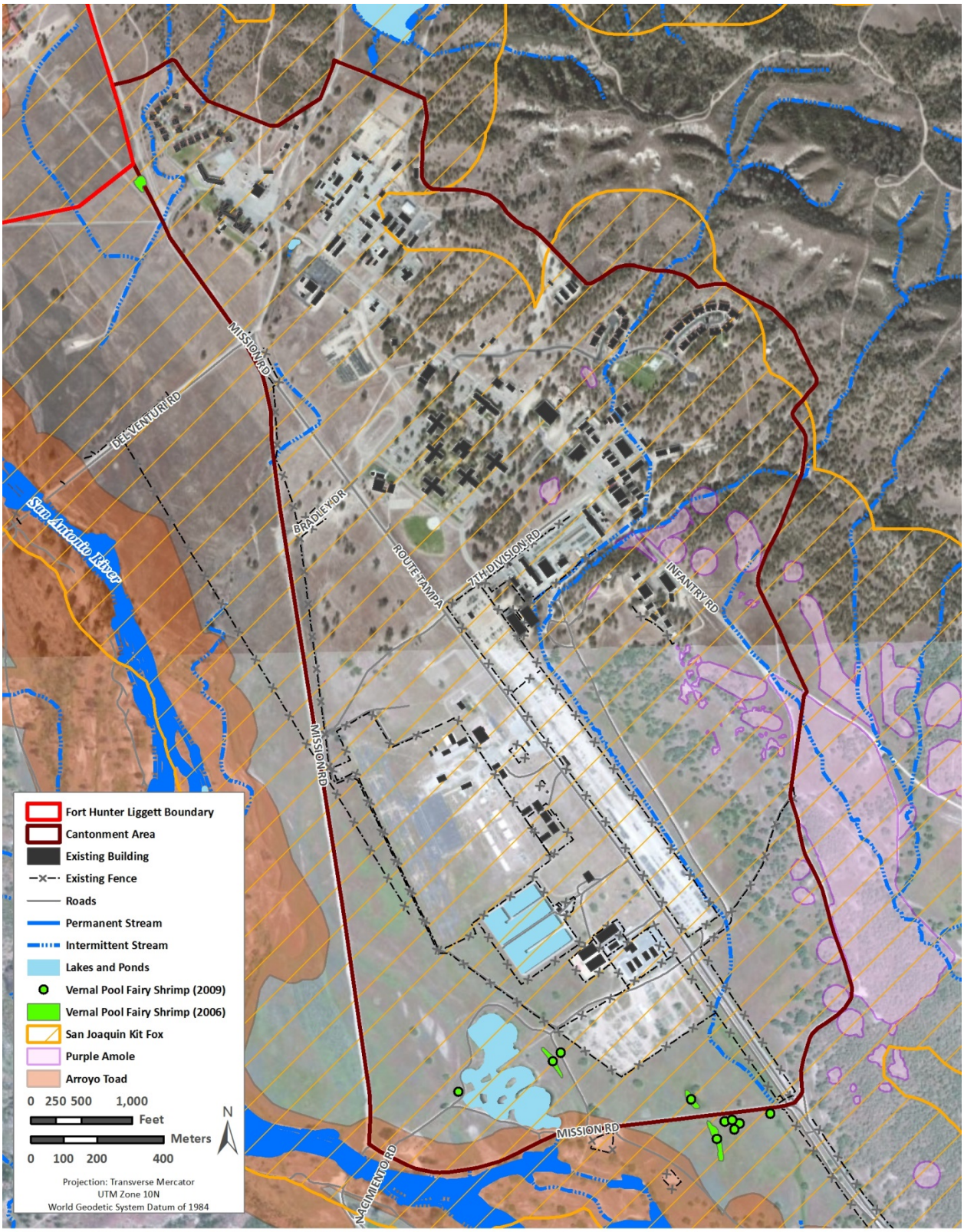
Riparian communities at FHL consist of alluvial woodlands composed of sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*), and willow (*Salix* sp.) found along rivers and streams (FHL 2011b). Riparian communities cover an estimated 3 percent of FHL, and less than 1 percent of the cantonment area. The two riparian communities located in the cantonment area are willow riparian and mixed riparian (see **Figure 4-2**). Other common riparian vegetation species include mule fat (*Baccharis salicifolia*); willow species (*Salix laevigata*, *S. lasiolepis*, *S. gooddingii*, and *S. exigua*); and herbaceous understory species including rushes (*Juncus* spp.), spikerushes (*Eleocharis* spp.), sedges (*Carex* spp.), and nut sedges (*Cyperus* spp.).



Source: FHL 2009, FHL 2013

Note: New projects have been developed in the cantonment area and are not depicted in this figure.

Figure 4-2. Vegetation Types and Wetlands in the Fort Hunter Liggett Cantonment Area



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 4-3. Federally Listed Species Known to Occur in the Fort Hunter Liggett Cantonment Area

Oak communities (e.g., woodlands, forests, and savannas) are the most widespread vegetation type on FHL, covering an estimated 46 percent of the installation (FHL 2011b) and approximately 28 percent of the cantonment area. Valley oak (*Quercus lobata*) woodland and savanna communities are the most common oak community in the cantonment area, covering approximately 14 percent of the cantonment area. Valley oaks are the largest of the California oak species and are frequently found growing in deep alluvial soils of valley bottoms, forming savannas with a grassland understory. Even though valley oaks cover a relatively large area in the cantonment area, they are considered a rare vegetation community by the CNDDB (CDFW 2013). Blue oak (*Q. douglassii*) communities are the next most prevalent of the oak communities in the cantonment area, covering approximately 14 percent.

Approximately 31 percent of the cantonment area is covered by grasslands. Grasslands are typically found on open, level, or moderately sloped areas. Grasslands in the cantonment area are primarily nonnative annual grasses with potential for pockets of occasional native bunch grasses. In general, native grasslands are estimated to compose approximately 2 to 5 percent of existing grasslands on FHL and include native species such as purple needlegrass (*Nassella pulchra*), nodding needlegrass (*N. cernua*), annual hairgrass (*Deschampsia danthonioides*), smallflower melic (*Melica imperfecta*), and Sandberg bluegrass (*Poa secunda*). Nonnative grasslands are dominated by soft brome (*Bromus hordeaceus*), and include other species such as ripgut brome (*B. diandrus*), compact brome (*B. madritensis*), and two species of wild oat (*Avena* spp.). Yellow star-thistle (*Centaurea solstitialis*), a noxious exotic forb, is also found in nonnative grasslands and has spread to an estimated 20,000 acres of FHL (FHL 2011b).

Wildlife. The varied plant composition at FHL combined with the relatively undeveloped nature of the installation is reflected in a richness of animal species. More than 300 animal species have been described for FHL, including 223 bird species (NPS 2007).

Mammal species expected to be found in or near the cantonment area and other possible net zero project sites include the California ground squirrel (*Spermophilus beecheyi*), tule elk (*Cervus elaphus nannodes*), California mule deer (*Odocoileus hemionus californicus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), deer mouse (*Peromyscus maniculatus*), and kangaroo rat (*Dipodomys* spp.) (FHL 2013c).

Migratory Birds. 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 at FHL, including in the cantonment area, 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 2007).

4.7 Threatened and Endangered Species

4.7.1 Definition of the Resource

The Endangered Species Act (ESA) of 1973 established a Federal program to conserve, protect, and recover imperiled species and their habitats. The ESA specifically charged Federal agencies with the responsibility of using their authority to conserve federally listed species. All Federal agencies must ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally listed species or result in adverse impacts on those species or their the designated critical habitat. The Secretary of the Interior, using the best available scientific data, determines which species are listed as endangered, threatened, candidates for listing, or proposed for listing.

Federally endangered species are those identified by the USFWS as being in danger of extinction throughout all or a significant portion of their range (ESA Section 3[6]). Federally threatened species are those identified by USFWS as likely to become endangered in the near future (ESA Section 3[19]).

States might have their own laws for protecting plants and animals they consider threatened or endangered. State-listed species are those identified as threatened or endangered by the State of California. The California Endangered Species Act (CESA) (Fish and Game Code Sections 2050, et seq.) generally parallels the main provisions of the Federal ESA and is administered by the California Department of Fish and Wildlife (CDFW). Unlike the Federal ESA, the CESA gives the same protection to listed plants as it does listed animals, and gives candidate species protection as well. Any action must not jeopardize the continued existence of any endangered or threatened species, or result in destruction or adverse modification of essential habitat (CERES 2007).

The CDFW is authorized to issue permits for the incidental take of CESA-listed species of plants and animals as long as the guidelines identified in Fish and Game Code Section 2081 are met. An incidental take permit is required for any project that might impact state-listed species or their habitat.

Species listed as threatened or endangered under the ESA (federally listed species) and state-listed species that have potential to be affected by implementation of the Proposed Action are discussed in this section.

4.7.2 Existing Conditions

This section is based on information in the FHL Integrated Natural Resources Management Plan (INRMP), data from the CNDDB, the USFWS Endangered Species Web site (http://www.fws.gov/endangered/), and other available documents. The FHL INRMP outlines management actions taken to conserve natural resources for military training and ecosystem integrity. Management actions can include restoration efforts in degraded sites; control of noxious weeds; monitoring for presence, absence, or population trends of a resource; and implementation of land use regulations (FHL 2011b).

Federal Threatened or Endangered Species

Four federally listed endangered species and four federally listed threatened species have the potential to occur within or near FHL (see **Table 4-4**). Potential habitat for all of these federally listed species occurs at FHL. Species that potentially occur in or near the cantonment area include the arroyo toad (*Bufo californicus*), California condor (*Gymnogyps californianus*), San Joaquin kit fox (*Vulpes macrotis mutica*), vernal pool fairy shrimp, and purple amole (*Chlorogalum purpureum* var. *purpureum*). **Figure 4-3** identifies the occurrences (for vernal pool fairy shrimp only) and potential habitat of federally listed species that are in the general vicinity of the cantonment area. California red-legged frog (*Rana aurora draytoni*) and least Bell's vireo (*Vireo bellii pusillus*) are not known to occur at FHL and no impacts are expected to occur in habitats where these species occur; therefore they are not discussed further in this EA.

Arroyo Toad. Arroyo toads breed, forage, and aestivate in sandy soils along the San Antonio River, and could be present in the sandy and non-sandy upland areas in the cantonment area. Arroyo toad breeding areas are adjacent to the southern cantonment area boundary (see **Figure 4-3**). Additionally, cantonment area storm water runoff drains to the San Antonio River and into arroyo toad habitat (USFWS 2010). Arroyo toads are nocturnal and dependent on streams and floodplain landforms within 250 meters from the active channel (Mitrovich et al. 2011).

Table 4-4. Federal and State Threatened and Endangered Species Potentially Occurring at Fort Hunter Liggett

Scientific Name	Common Name	Federal Status	State Status
Ambystoma californiense	California tiger salamander	T	-
Branchinecta lynchi	Vernal pool fairy shrimp	T	-
Bufo californicus	Arroyo toad	E	-
Chlorogalum purpureum var. purpureum	Purple amole	T	CEQA
Gymnogyps californianus	California condor	E	E
Rana aurora draytoni	California red-legged frog	T	-
Vireo bellii pusillus	Least Bell's vireo	E	E
Vulpes macrotis mutica	San Joaquin kit fox	E	T

Source: FHL 2011b, NPS 2007

Key: E = Endangered; T = Threatened; CEQA = Meet the criteria for listing as described in Section 15380 of the California Environmental Quality Act (CEQA) Guidelines; N/A = not applicable.

California Condor. The California condor is the largest bird in North America, weighing approximately 22 pounds, with an average wing span of approximately 9.5 feet. Releases of captive young California condors continue in Los Padres National Forest and Pinnacles National Monument to the north and northeast of FHL, respectively. 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 (USFWS 2010).

San Joaquin Kit Fox. Surveys for the San Joaquin kit fox continue annually at FHL in suitable habitat, with the most recent sightings in 2000 when two individuals were sighted separately on the same night near Training Area 22, which is approximately 3.25 miles southeast of the cantonment area (USFWS 2010, FHL 2011b). Prior to that, isolated adults were seen in 1995 in both the San Antonio and Nacimiento valleys, and from 1970 to 1990 there were infrequent dens documented with San Joaquin kit foxes and pups in the San Antonio Valley on FHL (FHL 2009). Potential habitat for the San Joaquin kit fox can be found in the San Antonio River Valley, which includes the cantonment area and training areas close to the cantonment area (see **Figure 4-3**).

Vernal Pool Fairy Shrimp. The vernal pool fairy shrimp is a small freshwater crustacean (0.12 to 1.5 inches long). Vernal pool fairy shrimp have been detected in 65 pools at FHL (Clark 2014). Occupied vernal pools are identified in **Figure 4-3**.

Purple Amole. The purple amole is a perennial species of the Agave family with dark blue to deep purple flowers that bloom May through June. See **Figure 4-3** for specific locations of purple amole near the cantonment area.

Species Protected By Other Federal Laws or State-Listed Threatened or Endangered

The following three state-listed threatened species and one state-listed endangered species are either known or have the potential to occur on or near FHL:

- Santa Lucia mint *(Pogogyne clareana)* - state-listed endangered
- Bald eagle *(Haliaeetus leucocephalus)* - state-listed threatened
- Swainson's hawk *(Buteo swainsoni)* - state-listed threatened
- Bank swallow *(Riparia riparia)* - state-listed threatened.

Of these four species, bald eagle, Swainson's hawk, and bank swallow could pass through the Proposed Action area; however, there are no known nesting sites for Swainson's hawk and bank swallow at FHL (FHL 2013c). Because Swainson's hawk and bank swallow are not likely to occur in the Proposed Action area or on FHL, these species are not discussed further in this document. Santa Lucia mint is not known to occur in or near the cantonment area or any known net zero project sites outside of the cantonment area; therefore, it is not discussed further in this document.

Bald Eagle. The bald eagle was federally delisted on July 9, 2007. The bald eagle continues to be a state-listed species and is protected by the Bald and Golden Eagle Protection Act and the MBTA. FHL supports three bald eagle nesting pairs (Clark 2013). Two pairs nest in the San Antonio Valley approximately 3 miles east and 7 miles southeast of the cantonment area.

There are 79 species that are state-listed as endangered or threatened, candidates, species of special concern, or species not listed but considered listed according to the California Environmental Quality Act (CEQA). There are 32 "species of special concern," which are species, subspecies, or distinct populations native to California that are of conservation concern. There are two "candidate species," or species that the CDFW has recognized as being under review for addition to the state list as either endangered, threatened, or a species of special concern. 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. **Table 4-5** lists the full complement of state-sensitive species for California.

Table 4-5. State Special Status Species

Scientific Name	Common Name	State Status
Plants		
Abies bracteata	bristle cone fir	CEQA
Aristocapsa insignis	Indian Valley spineflower	CEQA
Baccharis plummerae ssp. *glabrata*	San Simeon baccharis	CEQA
Calochortus weedii var. *vestus*	late-flowering mariposa lily	CEQA
Calycadenia micrantha	small flowered calycadenia	CEQA-eligible
Calycadenia truncata ssp. *microcephala*	Snow Mountain calycadenia	CEQA
Calycadenia villosa	dwarf calycadenia	CEQA
Camissonia hardhamiae	Hardham's evening-primrose	CEQA
Castilleja densiflora ssp. *obispoensis*	Obispo Indian paintbrush	CEQA
Caulanthus coulteri var. *lemmonii*	Lemmon's jewelflower	CEQA
Chlorogalum purpureum var. *purpureum*	purple amole	CEQA
Chorizanthe rectispina	one-awned spineflower	CEQA
Clarkia jolonensis	Jolon clarkia	CEQA
Collinsia antonina	San Antonio collinsia	CEQA
Delphinium umbraculorum	umbrella larkspur[2]	CEQA
Didymodon norrissi	Norris' beard moss	CEQA-eligible
Eriastrum luteum	yellow-flowered eriastrum	CEQA
Fritillaria viridea	San Benito fritillary	CEQA
Galium californicum ssp. *luciense*	Cone Peak bedstraw	CEQA
Galium hardhamiae	Hardham's bedstraw	CEQA
Juglans hindsii	Northern California black walnut	CEQA-eligible

Scientific Name	Common Name	State Status
Plants (continued)		
Layia heterotricha	pale-yellow layia	CEQA
Malacothamnus davidsonii	Davidson's bushmallow	CEQA
Malacothamnus palmeri var. *involucratus*	Palmer's bushmallow	CEQA-eligible
Monardella palmeri	Palmer's monardella	CEQA
Navarretia nigelliformis ssp. *radians*	shining navarretia	CEQA
Navarretia prostrate	prostrate navarretia	CEQA
Pentachaeta exilis ssp. *aeolica*	slender pentachaeta	CEQA
Plagiobothrys uncinatus	hooked popcorn-flower	CEQA
Pogogyne clareana	Santa Lucia mint	E
Senecio aphanactis	rayless ragwort	CEQA
Sidalcea hickmanii ssp. *hickmanii*	Hickman's checkerbloom	CEQA
Streptanthus albidus ssp. *peramoenus*	most beautiful jewel-flower	CEQA
Streptanthus morrisonii	Morrison's jewel flower	CEQA
Triteleia ixioides ssp. *cookii*	Cook's triteleia	CEQA
Tropidocarpum capparideum	caper-fruited tropidocarpum	CEQA
Fish		
Lavinia symmetricus subditus	Monterey roach	SSC
Amphibians		
Rana boylei	foothill yellow-legged frog	SSC
Scaphiopus hammondii	western spadefoot toad	SSC
Taricha torosa	Coast Range newt	CEQA-eligible
Reptiles		
Clemmys marmorata pallida	western pond turtle	SSC
Phrynosoma coronatum frontale	coast horned lizard	SSC
Birds		
Accipiter cooperi	Cooper's hawk	SSC
Accipiter striatus	sharp-shinned hawk[1]	SSC
Aechmophorus occidentalis	western grebe[1]	C
Agelaius tricolor	tricolored blackbird[2]	SSC
Aquila chrysaetos	golden eagle[1]	SSC
Asio flammeus	short-eared owl	SSC
Asio otus	long-eared owl[1]	SSC
Athene cunicularia	burrowing owl	SSC
Buteo regalis	ferruginous hawk	SSC
Butteo swainsoni	Swainson's hawk	T
Circus cyaneus	northern harrier[1]	SSC
Cypseloides niger	black swift	SSC
Dendroica petechia brewsteri	yellow warbler[1]	SSC
Elanus leucurus	white-tailed kite	Protected
Eremophila alpestris actia	California horned lark	SSC
Falco columbarius	merlin	SSC
Falco mexicanus	prairie falcon[1]	SSC

Scientific Name	Common Name	State Status
Birds (continued)		
Falco peregrines	peregrine falcon	Delisted
Haliaeetus leucocephalus	bald eagle	E
Icteria virens	yellow-breasted chat[1]	SSC
Lanius ludovicianus	loggerhead shrike	SSC
Larus californicus	California gull	SSC
Pandion haliaetus	osprey	SSC
Pelecanus erythrorhynchos	American white pelican	SSC
Phalacrocorax auritus	double-crested cormorant	SSC
Progne subis	purple martin[1]	SSC
Riparia	bank swallow	T
Strix occidentalis	California spotted owl	SSC
Mammals		
Antrozous pallidus	pallid bat	C
Bassariscus astutus	ring-tailed cat	Protected
Cervus canadensis nannodes	tule elk	Protected
Corynorhinus townsendii pallescens	pale big-eared bat	SSC
Felis concolor	mountain lion	Protected
Neotoma fuscipes luciana	Monterey dusky-footed woodrat	SSC
Perognathus inornatus psammophilus	Salinas pocket mouse	SSC
Sorex ornatus salaries	Monterey ornate shrew	SSC
Taxidea taxus	American badger	SSC

Notes:
1 Present during breeding season.
2 On or very near FHL.

Key:
E = State Endangered
T = State Threatened
C = State Candidate Species
CEQA = Meet the criteria for listing as described in Section 15380 of the CEQA Guidelines.
CEQA-eligible = Species that are eligible for, but not yet listed by, the state as threatened or endangered. These species are given the same protection as those species officially listed by state or Federal governments.
SSC = Species of Special Concern is a species, subspecies, or distinct population native to California which is of conservation concern.
Protected = Fully protected species may not be taken or possessed at any time, and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation.

4.8 Cultural Resources

4.8.1 Definition of the Resource

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

The 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. Such resources might provide insight into the cultural practices of previous civilizations or they might retain cultural and religious significance to modern groups. Resources judged important under criteria established in the NHPA are considered eligible for listing in the National Register of Historic Places (NRHP). These are termed "historic properties" and are protected under the NHPA. 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.

Typically, cultural resources are subdivided into archaeological sites (i.e., prehistoric or historic sites containing physical evidence of human activity but no structures remain standing); architectural sites (i.e., buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance); and sites of traditional, religious, or cultural significance to Native American tribes.

Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., projectile points and bottles). *Architectural resources* include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to warrant consideration for the NRHP. More recent structures, such as Cold War-era resources, might warrant protection if they are of exceptional importance or if they have the potential to gain significance in the future. *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.

4.8.2 Existing Conditions

FHL was established in 1940 in anticipation of training soldiers for combat in the European theater of operations during World War II. The area chosen for the training site consisted of more than 200,000 acres of local ranch lands between the Salinas River Valley divide and the Pacific Ocean. The terrain varied from level valleys bordered by gentle hills to steep, rugged mountains that have since provided opportunities for realistic training and defense technology testing. FHL was a sub-installation of Fort Ord until November 1993 when the installation came under U.S. Army Reserve Command. A detailed prehistoric and historic chronology of the area is provided in the 2003 *Integrated Cultural Resources Management Plan* (ICRMP) (FHL 2003). At present, the installation encompasses approximately 162,000 acres and provides a vast array of training ranges and other facilities year-round for the USAR, and training opportunities for other services and government agencies.

One NRHP-listed cultural resource (CA-MNT-940H) occurs within the existing cantonment area and one NRHP-listed cultural resource (CA-MNT-100H) shares a common border with the existing cantonment area. The Milpitas Ranch House, aka "Hacienda" (CA-MNT-940H), was built in 1929–30 for publishing magnate William Randolph Hearst, Jr. to serve as headquarters for his Milpitas Ranch. The structure was designed by renowned California architect Julia Morgan and is a notable example of Spanish Colonial Revival-style architecture. The house later served as a military headquarters and nearby buildings were used as barracks, storage facilities, maintenance buildings, and housing. Site CA-MNT-100H is the Mission San Antonio de Padua. The Mission, founded in 1771, was the third Spanish mission established in California and is adjacent to the cantonment area (FHL 2003).

To date, more than 100 cultural resources studies in history, archaeology, architectural history, and ethnography have been conducted at FHL. The first extends back to the late 19th century with the

architectural survey of Mission San Antonio de Padua (CA-MNT-100H). Since then, numerous other cultural resources studies have been conducted that provide the framework for understanding the cultural and historical development of FHL and the surrounding region. As of 2013, approximately 45 percent of FHL and 100 percent of the cantonment area have been inventoried for cultural resources. The extent of this coverage includes all areas subject to regular base activity and all areas with a high probability for containing cultural resources. All activities within or near the regulated area north of Historic Mission San Antonio de Padua are undertaken per NHPA Section 106 and Section 2851 National Defense Authorization Act for FYs 1992 and 1993 (FHL 2003).

Archaeological Resources. No archaeological sites are located within the cantonment area.

Architectural Resources. The largest concentration of buildings and structures at FHL occurs within the cantonment area. No permanent buildings were constructed on FHL by the U.S. Army until 1975. Prior to this, FHL functioned as a military reservation and built only temporary structures. The U.S. Army made use of existing buildings to serve as headquarters, barracks, storage facilities, maintenance buildings, and housing. Milpitas Ranch House/Hacienda is the only NRHP-eligible or -listed site within the cantonment area. The Mission San Antonio de Padua is listed in the NRHP and is adjacent to the cantonment area (FHL 2003).

Resources of Traditional, Religious, or Cultural Significance to Native American Tribes. No traditional cultural properties or American Indian sacred sites are currently listed on the NRHP at FHL.

4.9 Socioeconomics and Environmental Justice

4.9.1 Definition of the Resource

Socioeconomics. Socioeconomics is the relationship between economics and social elements such as population levels and economic activity. There are several interrelated and nonrelated factors that can be used as indicators of economic conditions for a geographic area, such as demographics, median household income, percentage of families living below the poverty level, employment, unemployment rates, and housing data. Data on employment identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on industrial, commercial, and other sectors of the economy provide baseline information about the economic health of a region.

The geographical area in which a majority of the socioeconomic effects of a proposed action and alternatives would occur is defined as the Region of Influence (ROI). The ROI is considered a primary effect area because it receives direct and indirect economic benefits from installation operations due to residency distribution of employees, and the location of businesses providing goods and services to installation personnel and their dependents.

Environmental Justice and Protection of Children. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, pertains to environmental justice issues and relates to various socioeconomic groups and the disproportionate impacts that could be imposed on them. This EO requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that each Federal agency "(a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

Consideration of environmental justice concerns includes race, ethnicity, poverty status, and age of populations in the vicinity of a proposed action. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the EOs. For purposes of this analysis, minority populations include populations of racial minority (i.e., any race other than white alone) and of Hispanic or Latino origin (i.e., ethnicity) within the ROI. Low-income populations include families living below the poverty level, according to income data estimated in the U.S. Census 2006–2010 American Community Survey.

The environmental justice ROI is considered to have a disproportionately high percentage of low-income or minority residents if the percentage of persons characterized as a low-income or minority population within the ROI is either greater than 50 percent, or is disproportionately higher than either encompassing county.

4.9.2 Existing Conditions

Socioeconomics. For the purpose of this EA, the two largest cities near the installation, King City in Monterey County and the City of Paso Robles[1] in San Luis Obispo County, were determined to be the socioeconomic ROI. Data for other geographic levels (e.g., county and state) were also analyzed for comparison purposes.

The populations of King City and the City of Paso Robles grew 16 percent and 22.6 percent, respectively, from 2000 to 2010, while the growth rate of the State of California over the same time period was 9.9 percent. See **Table 4-6** for 2000 and 2010 population data (U.S. Census Bureau 2000, U.S. Census Bureau 2010a).

Table 4-6. Population (2000 and 2010)

Location	2000	2010	Percent Change
King City	11,094	12,874	16.0
Paso Robles	24,297	29,793	22.6
Monterey County	401,762	415,057	3.3
San Luis Obispo County	246,681	269,637	9.3
California	33,871,648	37,253,956	9.9

Source: U.S. Census Bureau 2000, U.S. Census Bureau 2010a

The construction industry employed between 6.3 percent and 7.9 percent of the workforces in the City of Paso Robles and Monterey and San Luis Obispo counties, and 2.6 percent in King City. The largest industry group in the City of Paso Robles and in Monterey and San Luis Obispo counties and second largest in King City is the educational services, healthcare, and social assistance industry, while the agriculture, forestry, fishing and hunting, and mining is the largest industry group in King City and second largest in Monterey and San Luis Obispo counties (U.S. Census Bureau 2010b).

In November 2013, the unemployment rates in Monterey and San Luis Obispo counties were 6.0 percent and 8.8 percent, respectively. Over the past 10 years, the highest monthly unemployment rates in Monterey and San Luis Obispo counties were in 2010 (17.7 percent and 10.4 percent, respectively), and the lowest rates were in 2006 (4.5 percent and 3.5 percent, respectively) (BLS 2014).

[1] The official full name of the City of Paso Robles is El Paso de Robles.

Environmental Justice and Protection of Children. The area around FHL is rural and does not contain any substantial communities. The closest cities to FHL are King City in Monterey County, approximately 25 miles northeast of the installation, and the City of Paso Robles in San Luis Obispo County, approximately 40 miles southeast of the installation. Therefore, for the purposes of this EA, the socioeconomic ROI also made up the environmental justice ROI.

Based on 2010 U.S. Census data, 2.1 percent of the King City population were a racial minority and 87.5 percent were Hispanic or Latino. In the City of Paso Robles 22.5 percent of the residents were a racial minority and 34.5 percent of the population were Hispanic or Latino (see **Table 4-7**) (U.S. Census Bureau 2010a). The racial minority and Hispanic or Latino populations in King City were higher than those of Monterey County and California.

Table 4-7. Minority and Low-Income Characteristics (2010)

Race and Origin	King City	Paso Robles	Monterey County	San Luis Obispo County	California
Total Population	12,874	29,793	415,057	269,637	37,253,956
Percent Under 5 Years of Age	10.8	7.8	7.8	4.9	6.8
Percent Over 65 Years of Age	5.9	13.4	10.7	15.2	11.4
Percent White	47.9	77.7	55.6	82.6	57.6
Percent Black or African American	1.2	2.1	3.1	2.1	6.2
Percent American Indian and Alaska Native	2.7	1.0	1.3	0.9	1.0
Percent Asian	1.3	2.0	6.1	3.2	13.0
Percent Native Hawaiian and Other Pacific Islander	0.1	0.2	0.5	0.1	0.4
Percent Other Race	42.3	13.1	28.3	7.3	17.0
Percent Two or More Races	4.5	3.9	5.1	3.8	4.9
Percent Hispanic or Latino	87.5	34.5	55.4	20.8	37.6
Estimated Median Household Income	$49,722	$57,459	$59,271	$57,365	$60,883
Estimated Percent of Families Living Below Poverty	13.7	8.6	10.6	5.9	10.2

Sources: U.S. Census Bureau 2010a, U.S. Census Bureau 2010b
Note: Hispanic and Latin denote a place of origin.

The median household income for King City ($49,722) was lower than that of Monterey County ($59,271), while the City of Paso Robles's median household income ($57,459) was approximately equal to that of San Luis Obispo County ($57,365) (U.S. Census Bureau 2010b). The percentages of families living below the poverty level in King City (13.7 percent) and the City of Paso Robles (8.6 percent) were slightly higher than each city's encompassing county (10.6 percent in Monterey County and 5.9 percent in San Luis Obispo County) (see **Table 4-7**) (U.S. Census Bureau 2010b).

4.10 Infrastructure

4.10.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "urban" or developed. Both availability and capacity of infrastructure to support population growth and development are essential to the economic growth of an area.

4.10.2 Existing Conditions

Energy. Electric, propane, and liquid fuels are the primary sources of energy at FHL. Electrical power is provided to FHL by PG&E. PG&E owns and operates the single 12-kilovolt distribution line that feeds the cantonment area up to the installation's main electric meter. FHL operates and maintains the overhead and underground primary and secondary distribution lines that branch out to serve the buildings of the cantonment area (FHL 2010). FHL does not have a centralized gas distribution system. Propane is delivered to the installation by Northern Energy (a corporation) and is stored in aboveground storage tanks (ASTs) outside of each structure for use in heating applications. JP8 is the fuel source for the five boilers that provide heat and hot water to the barracks. The JP8 is stored in storage tanks that are approximately 1,000 gallons in size and filled by pumper trucks using JP8 purchased by FHL for use in military vehicles and training applications. Other liquid fuels, including diesel and gasoline, are used at the installation to power military vehicles and equipment (USACE 2007).

Water. Water infrastructure consists of three interrelated components: potable water, wastewater, and storm water.

FHL receives its potable water supply from four groundwater wells located on the installation (three wells outside the cantonment area and one well within the cantonment area). The collective water-pumping maximum of these groundwater wells is 1.872 MGD, and the current water demand is approximately 0.23 MGD or 12.3 percent of the collective water pumping capacity of the three main groundwater wells. Water is treated at the wellhead and pumped into two ASTs with capacities of 1,000,000 and 200,000 gallons from which approximately 14 miles of water service piping transports water to and throughout the cantonment area (USACE 2007). In FY 2011, FHL used 99 million gallons of water (FHL 2013a). FHL does not have a non-potable water supply.

FHL operates a WWTP with 1 MGD capacity and approximately 8 miles of sanitary sewer mains within the cantonment area (USACE 2007). Under current operating conditions, approximately 10 percent of the WWTP's capacity is utilized. In FY 2013, the WWTP processed 17 million gallons of wastewater influent and discharged 10 million gallons of treated wastewater (FHL 2013a). The WWTP is considered a secondary treatment facility, which uses aerated treatment lagoons and settling basins to treat wastewater. The WWTP does not use chlorine injection. Typically, liquid wastewater is allowed to evaporate from the WWTP lagoons during low flow periods; however, during periods of increased flow, water discharged from the secondary lagoon is pumped to an isolated, secure 105-acre spray field for evapotranspiration. Solids in the wastewater are allowed to settle in the settling basins and are removed as necessary (USACE 2007). The removed sewage sludge is tested, and, if it meets USEPA requirements, is applied as a soil amendment. Sewage sludge that does not meet USEPA requirements is transported off-installation to a disposal facility. Sanitary sewer service is not present outside of the cantonment area. All wastewater generated outside of the cantonment area must be either transported to and discharged at appropriate locations within the cantonment area or discharged into onsite septic systems.

In the FHL cantonment area, storm water is collected and transported to the San Antonio River by a man-made storm water drainage network. The storm water drainage network consists of a combination of ditches, grassy swales, overland flow, short culverts, limited curb and gutters, and incidental storage areas such as adjacent open space and recreational fields (FHL 2012d). The drainage system includes approximately 4,000 linear feet of channels and approximately 20 inlets with catch basins, which are owned and maintained by FHL (USACE 2007). Observed flooding of buildings has been limited primarily to flooding from Sulphur Springs Creek on the west side of the cantonment area, which is consistent with the FEMA floodplain (see **Section 4.5.2** and **Figure 4-1**). Substantial ponding occurs fairly frequently in the baseball field along Mission Road, and road flooding occurs at various locations in the cantonment area (FHL 2012d). Additionally, some drainage swales are prone to erosion. Man-made storm water handling systems are not present in less-developed portions of the installation. Storm water drains by sheet flow to various natural drainageways in these areas.

Waste. Solid waste is generated at FHL from day-to-day activities. Most solid waste is generated during late spring and early summer when the installation's population swells with training activities. Municipal solid waste is collected at the curbside from 84 military family housing residences by a contractor on a weekly basis. Solid waste from industrial, administrative, and commercial sources and barracks and temporary housing are collected by a contractor from dumpsters associated with each facility. Industrial wastes include refuse from maintenance shops such as cardboard, pallets, metals, and other materials. Wood pallets and crates used for shipping are either picked up by the local vendor or disposed of at off-installation facilities. In 2011, FHL generated 1,402 tons of solid waste, of which 1,139 tons were disposed of at landfills and 263 tons (i.e., 19 percent), were recycled (FHL 2013a). Landfilled material is transported to an off-installation landfill (Johnson Canyon Landfill via the transfer station at King City Municipal Landfill), which has permitting capacity to handle 9,000 tons of solid waste per day and is expected to reach capacity in 2043 (SVSWA 2000).

FHL has established a QRP and recycles cardboard, paper (e.g., office paper, newspaper, magazines, paperboard), type 1 and type 2 plastic bottles, glass (used for beverages and food), metal (aluminum cans, steel/tin cans, wire, copper, and brass), and scrap metal (i.e., industrial generated ferrous and nonferrous scrap) (FHL 2013a). Management of the recycling program primarily occurs at the Recycling Center (Building 338), although some activities occur at the Transfer Station, which is adjacent to Gravel Pit Pond outside of the southern end of the cantonment area.

FHL also generates various special wastes (i.e., wastes that cannot be disposed of as general refuse and need special care), including aerosol cans, asbestos-containing material (ACM), batteries, electronic waste, fluorescent lamps, industrial fluids, paint-related waste, POL-related waste, tires, and WWTP-related waste. FHL manages these wastes in accordance with appropriate regulations, which generally include collection and processing by the hazardous waste handler. Some of these special wastes, including lead acid batteries, antifreeze, used oil, and tires, are recycled.

Construction and demolition debris currently is either reprocessed using portable crushing and screening plants and reused on other projects or transported to an off-installation facility for recycling. FHL does not currently use composting or mulching operations to manage vegetative waste, and vegetative waste is allowed to decay in place or is landfilled.

4.11 Traffic and Transportation Systems

4.11.1 Definition of the Resource

Traffic and transportation resources are defined as the nearby roadways, transportation infrastructure, and other modes of transportation that could be affected by a proposed action.

4.11.2 Existing Conditions

Transportation throughout FHL is achieved mainly via road and street networks and pedestrian walkways. Regional access to the installation is provided by U.S. Highway 101 (U.S. 101) 13 miles to the east, and Interstate (I)-5 60 miles to the east. State routes that provide access to the area include California Highway 1, and local roads (Jolon Road and Mission Road) provide direct access to the installation.

The average annual daily traffic (AADT) is the average number of vehicles traveling along a roadway each day. Level of Service (LOS) is a measure of the operational conditions on a roadway or at an intersection. LOS ranges from A to F, with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays). LOS A, B, or C are typically considered good operating conditions. **Table 4-8** outlines the routes near the proposed sites and in the area, their AADT, and their estimated existing LOS. U.S. 101 is already congested during peak traffic periods (i.e., LOS D).

Table 4-8. Existing AADT and LOS on Nearby Roadways

Roadway	AADT (vehicles per day)	One-Way Peak Hour Volume (V) (vehicles per hour)	Volume to Capacity Ratio (V/C)	Estimated Existing LOS
U.S. 101	15,209	821	0.48	D
California Highway 1	3,245	350	0.21	B
Jolon Road	2,194	237	0.14	B

Source: TAMC 2014, ITE 2003

Route Tampa serves as a primary collector within the cantonment area for secondary roads extending into the other developed areas on FHL, including 7th Division Road, Bradley Drive, and Sulphur Spring Road running west to east; and Infantry Road and Mission Road running north to south. FHL has an access control point between Mission Road and Route Tampa on Bradley Drive. Tertiary unpaved roads and trails extend from developed areas of the cantonment area into the field training areas. The existing roadway network is in good condition and adequately supports current traffic and mission support requirements; however, continued maintenance is required to avoid deterioration (USACE 2007).

Air, Rail, and Public Transportation. Tusi AHP and Schoonover Airfield are on FHL. Other nearby airports includes Paso Robles and Salinas Municipal Airports, and San Jose International Airport, the closest international airport that is 105 miles to the north of FHL and has 369 operations per day (AirNav 2013). The closest Amtrak station is 40 miles to the southeast in the City of Paso Robles. Public transportation is provided by Monterey-Salinas Transit, with daily service from FHL to Salinas, approximately 70 miles north of the installation (MST 2014).

4.12 Hazardous Materials and Wastes

4.12.1 Definition of the Resource

Hazardous materials are defined by 49 CFR 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions" in 49 CFR Part 173.

Hazardous waste is defined by the Resource Conservation and Recovery Act (RCRA) at 42 U.S.C. Section 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These hazardous wastes are called universal wastes and their associated regulatory requirements are specified in 40 CFR Part 273.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include ACMs, polychlorinated biphenyls (PCBs), and lead-based paint (LBP). The USEPA is given authority to regulate these special hazardous substances by the Toxic Substances Control Act at Title 15 U.S.C. Chapter 53. The USEPA has established regulations regarding asbestos abatement and worker safety under 40 CFR Part 763 with additional regulation concerning emissions (40 CFR Part 61). Whether from lead abatement or other activities, depending on the quantity or concentration, the disposal of the LBP waste is potentially regulated by the RCRA at 40 CFR 260. The disposal of PCBs is addressed in 40 CFR Parts 750 and 761.

Evaluation of hazardous materials and wastes focuses on the storage, handling, use, transport, and disposal of these substances. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well-being of wildlife species, botanical habitats, soil systems, and water resources. In the event of a release of hazardous materials or wastes, the extent of contamination varies based on the contaminant and the type of soil, topography, and water resources.

4.12.2 Existing Conditions

FHL uses, handles, and stores hazardous materials and petroleum products, which include pesticides, oils, lubricants, cleaners, hydraulic fluids, liquid fuels (i.e., JP8, gasoline, and diesel), and propane. These hazardous materials and petroleum products are stored in appropriate storage infrastructure, including ASTs and underground storage tanks, scattered across the installation.

FHL also generates various hazardous wastes including aerosol cans, ACMs, batteries, electronic waste, fluorescent lamps, industrial fluids, paint-related waste, POL-related waste, tires, and WWTP-related waste. FHL manages these wastes in accordance with appropriate regulations, which generally include collection and processing by the installation's hazardous waste handler. Some of these special wastes, including lead acid batteries, antifreeze, used oil, and tires, are recycled.

The Defense Environmental Restoration Program (DERP) provides for the cleanup of DOD property. The two restoration programs under the DERP are the Installation Restoration Program (IRP) and the Military Munitions Response Program (MMRP). The IRP requires each installation to identify, investigate, and clean up contaminated sites. The MMRP addresses nonoperational military ranges and other sites that are suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituents. Non-DERP sites are remediated under the Compliance Restoration Cleanup Program.

FHL has 2 active IRP sites, 32 closed IRP sites, 1 active MMRP site, 11 closed MMRP sites, and 1 active Compliance Restoration site. The active IRP sites consist of soil and groundwater contamination at the former installation landfill and groundwater contamination at Building 194, the former POL facility. Appropriate clean-up actions are underway for both active IRP sites. The active MMRP site is the former Artillery Range, which is in the final stages of remedial action. The active Compliance Restoration site

addresses soil and groundwater contamination at Building 258 from an underground storage tank release. Appropriate clean-up actions are underway for this site (FHL 2011a).

Asbestos is the generic term used to describe a group of naturally occurring silicate minerals that have the ability to separate into small, fine fibers. Asbestos has been used in building materials and exists in a variety of forms, which can include siding, ceiling tiles, floor tiles, floor tile mastic, roofing materials, joint compound, wallboard, thermal system insulation, boiler gaskets, paint, and other materials. Building materials in older buildings (pre-1980) are assumed to contain asbestos. If ACMs are found during renovation or demolition activities, the installation's Asbestos Management Plan provides the proper handling and disposal practices (Houston 2009).

Lead is a heavy, ductile metal commonly used in house paint before 1978. It is assumed that all structures constructed prior to 1978 could contain LBP. If LBP is found during renovation or demolition activities, the installation's LBP Management Plan provides the proper handling and disposal practices (Houston 2009).

Transformers at FHL are reportedly manufacturer-certified as PCB-free or have been tested to determine the PCB content. All transformers known to have PCBs have been removed from the installation (Houston 2009). It is not known if the off-installation transformers leading to FHL and maintained by PG&E are PCB-free.

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5. Environmental Consequences

The Proposed Action addressed in **Section 5** includes implementation of a net zero program at FHL. This EA is programmatic in nature because specific net zero projects have not yet been selected and designs and site plans have been developed.

The specific criteria for evaluating the potential environmental effects of the Proposed Action or the No Action Alternative are described in the following sections. The significance of an action is also measured in terms of its context and intensity. The context and intensity of potential environmental effects are described in terms of duration, whether they are direct or indirect, the magnitude of the impact, and whether they are adverse or beneficial, as summarized in the following paragraphs:

Short-term or long-term. In general, short-term effects are those that would occur only with respect to a particular activity, for a finite period, or only during the time required for construction or installation activities. Long-term effects are those that are more likely to be persistent and chronic.

Direct or indirect. A direct effect is caused by an action and occurs around the same time at or near the location of the action. An indirect effect is caused by an action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action.

Negligible, minor, moderate, or significant. These relative terms are used to characterize the magnitude or intensity of an impact. Negligible impacts are generally those that might be perceptible but are at the lower level of detection. A minor effect is slight, but detectable. A moderate effect is readily apparent. Significant effects are those that, in their context and due to their magnitude (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the policies set forth in NEPA. Significance criteria by resource area are presented in the following text.

Adverse or beneficial. An adverse effect is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial effect is one having positive outcomes on the man-made or natural environment.

5.1 Noise

5.1.1 Evaluation Criteria

The Proposed Action would result in a significant impact if it added noise sources that would be incompatible with substantial areas of existing land use or that would violate applicable Federal, state, or local noise ordinances.

5.1.2 Environmental Consequences

5.1.2.1 Proposed Action

Short- and long-term, minor, adverse effects would be expected. Short-term effects would be expected from increases in noise from construction activities. Long-term effects would be expected from increases in noise if a WTE facility is constructed. Implementing the Proposed Action would not create substantial areas of incompatible land use or violate any Federal, state, or local noise ordinances. There would be no changes in military training activities, use of weaponry, demolitions, or aircraft operations under the Proposed Action and, therefore, no changes in the existing noise environment associated with these sources would be expected.

Energy. Implementation of net zero energy reduction projects would be relatively quiet; however, construction or installation of the energy efficiency, cogeneration, and renewable energy projects would include some short-term noise. The net zero energy projects that would require construction activities include the improved wastewater treatment, PV systems, GSHPs, and the WTE facility. Other net zero energy projects would be completely quiet or would generate little to no noise because they would not require the use of heavy equipment. **Table 5-1** presents typical noise levels (e.g., dBA at 50 feet) that the USEPA has estimated for the main phases of outdoor construction. Individual pieces of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods, and the zone of relatively high noise typically extends to distances of 400 to 800 feet from the site of major equipment operations.

Table 5-1. Noise Levels Associated With Outdoor Construction

Construction Phase	Typical Sound Level (dBA)
Ground clearing	84
Excavation, grading	89
Foundations	78
Structural	85
Finishing	89

Source: USEPA 1971

If potential net zero energy projects are sited farther than 800 feet from NSAs, noise generated during construction or installation would likely not disturb people at those NSAs. If net zero energy projects are sited closer than 800 feet, it would be loud at nearby NSAs due to construction and installation activities. However, given the temporary nature of construction and installation activities and the limited amount of noise that heavy equipment would generate, this impact would be minor. It would be unlikely that construction would take place within 2,500 feet of any off-installation residence; therefore, these activities would be specifically exempt from the Monterey County noise ordinance.

All net zero energy projects, except for a WTE facility, would be completely quiet or have little to no noise after installation. Although potential designs and technologies for a WTE facility have not yet been determined, it is likely that operation of the facility itself would not generate a significant noise level. However, associated operations such as fuel grinding, conveyer equipment, and use of a generator would have the potential to operate 24 hours per day, 7 days per week, and would be permanent new sources of noise. A possible design for a WTE facility could include a 400- to 500-kW genset. Although the genset would likely be enclosed in the facility, intakes and exhausts would be open to the exterior of the building. As a reasonable worst-case scenario, it was assumed the WTE facility would be 101 dBA at 1 foot (Dresser-Rand 2013). Depending on the wind conditions, the WTE facility could be audible 1,000 feet away from source, and annoying to noise-sensitive receptors within 500 feet of the facility. This would be true more so at night when background noises were more limited. Sound level data for the genset were derived using surrogate equipment data, and the analysis assumes the genset would be enclosed and an industrial silencer would be used. Therefore, a WTE facility could result in long-term, adverse effects if it is sited near NSAs.

Water. The net zero water efficiency, recycle, reuse, and recharge projects would include some short-term construction or installation activities. Noise from these activities would be similar in nature and overall level as the energy efficiency, cogeneration, and renewable energy projects. All net zero

water projects would be completely quiet or have little to no noise after completion of construction or installation.

Waste. The net zero waste re-purpose, recycling and compost, and energy recovery projects would include some short-term construction or installation activities. Noise from these activities would be similar in nature and overall level as the energy efficiency, cogeneration, and renewable energy projects. Other than the WTE facility, all net zero waste projects would be completely quiet or have little to no noise after completion of construction or installation.

5.1.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement a net zero program for energy, water, and waste, and would only implement those net zero projects required by other mandates or identified in other documents. There would be no new noise sources and no change to the existing noise environment. Any construction needed to implement the existing limited net zero projects could result in short-term, adverse effects from increased noise generation due to operation of construction equipment and increased vehicular traffic. The intensity of these impacts would depend on the proximity to NSAs. However, construction activities would be limited to daytime hours (7:00 a.m. to 5:00 p.m.) and the noise generated from construction activities would be temporary. No new impacts on noise would occur.

5.2 Land Use

5.2.1 Evaluation Criteria

The significance of potential land use effects is based on the level of land use sensitivity in areas affected by a proposed action and compatibility of proposed actions with existing conditions. The Proposed Action was evaluated to determine if any the following were to occur:

- Be inconsistent or in noncompliance with existing land use plans or policies
- Preclude the viability of existing land use, or the continued use or occupation of an area
- Be incompatible with adjacent land use to the extent that public health or safety is threatened
- Conflict with planning criteria established to ensure the safety and protection of human life and property.

5.2.2 Environmental Consequences

5.2.2.1 Proposed Action

The screening criteria identified in **Section 3.1** were considered prior to development of the net zero projects that would be implemented under the Proposed Action. As such, these projects would support FHL's mission, be of appropriate scale for the installation, and generally be compatible with installation land uses. The Proposed Action would not preclude the viability of any existing land uses or the continued use or occupation of any areas.

The Proposed Action would be consistent with the Army Net Zero Initiative and the design principles used to develop the FHL RPMP, which include sustainable, energy- and water-efficient building designs and master planning concepts and standards that foster net zero energy and water.

Many net zero projects associated with conservation and improved efficiency of energy and water, and the reduction and re-purposing of waste would have no impacts on land use. Energy and water conservation and waste-reduction measures would primarily be procedural, behavioral, process, or

operational changes that would not change existing land uses or conflict with land use plans and policies. Similarly, implementation of energy- and water-efficiency projects would generally have no impacts on land use compatibility. These projects would occur at existing buildings (e.g., renovations or equipment replacement), or would consist of incorporation of improved energy and water systems designs in new building construction.

Energy. Improvements to the secondary treatment system at the WWTP would allow use of the existing spray field to be discontinued, and its 105 acres repurposed for a more productive use. This would be a long-term, beneficial land use impact.

New industrial land uses, such as a WTE facility, would be sited to be consistent with the consolidation of industrial uses in Mission Valley as identified in the RPMP, and, therefore, would be compatible with existing adjacent industrial land uses.

PV systems sited on building rooftops and other existing infrastructure would be compatible with surrounding land uses. If sited at electric meters, the potential PV systems would be small in scale, and would not preclude the viability of existing land uses or prevent the continued occupation of any areas. It is assumed that all PV systems would be sited according to the FHL RPMP. Similarly, it is assumed that energy storage options and a microgrid would also be sited in Mission Valley due to their industrial functions, and would be compatible with surrounding land uses. Modernization of the installation electrical distribution system, including burying existing overhead electric distribution lines, would allow for more efficient use of this land, and result in a long-term, beneficial land use effect.

Use of GSHPs for building heat and cooling would be compatible with surrounding land uses as long as siting, design, construction, operation, and maintenance occur in accordance with Bulletin 74-90, *California Well Standards*, which include the 1999 Draft Geothermal Heat Exchange Well standards (currently being updated). These standards include minimum separation distances between GSHPs and certain uses, including potential pollution sources. See **Section 5.5.2.1** for more information on potential impacts from GSHPs on water resources.

Water. Water conservation measures, which would be behavioral or procedural in nature, and efficiency measures, which would include modification to existing buildings and infrastructure, would not generally impact land use. Incorporation of design standards that foster water recharge at the installation (i.e., reduction of impervious surfaces and implementation of landscape standards including use of infiltration basins) would be consistent with the FHL RPMP. These designs would be compatible with existing land uses and would not preclude the continued use of any area as they would be integrated into existing uses or new development.

Waste. The generation of less waste through implementation of a green/sustainable procurement program, and the increase in material repurposing, recycling, and composting would reduce the amount of waste that would be disposed of at the landfill, thereby freeing up landfill capacity. The development of new or more comprehensive green projects that would be industrial in nature and require additional space would likely be sited in Mission Valley (i.e., southernmost portion of the cantonment area) in accordance with the FHL RPMP. These projects would be consistent with the consolidation of industrial uses in Mission Valley, and would be compatible with existing adjacent industrial land uses. If the Transfer Station is consolidated with the Recycling Center and WTE facility, consolidation of recycling and waste management activities would allow other existing waste management areas to be developed for more productive uses. If a WTE facility is not feasible, then waste products that would have been diverted for use as fuel would be disposed of in the same manner as other non-recyclable waste.

5.2.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement a net zero program for energy, water, and waste, and would only implement those net zero projects identified in existing policies. Therefore, while FHL would continue to implement net zero projects if they are required by other mandates, it would not meet the need of the Proposed Action to enhance energy and water security at FHL and allow for predictable and potentially reduced operational costs, or be consistent with the Army Net Zero Initiative. The less efficient energy and water systems would be maintained at existing buildings and infrastructure, design of new facilities could include more sustainable technologies, and the current waste management and limited recycling programs would continue. The No Action Alternative would not result in new impacts on land use.

5.3 Air Quality

5.3.1 Evaluation Criteria

Effects would be less than significant unless the emissions would exceed the major source thresholds; contribute to a violation of any Federal, state, or local air regulation; or exceed the presumptive effects threshold in the draft CEQ guidance on GHGs in NEPA.

5.3.2 Environmental Consequences

5.3.2.1 Proposed Action

Short-term, minor, adverse and long-term, beneficial effects on air quality would be expected from implementation of the Proposed Action. Short-term effects would result from the generation of airborne dust and other pollutants during construction. Beneficial effects would result from an overall net decrease in both criteria pollutants and GHGs due to reduction in the use of fossil-fuel-based electricity, and JP8 fuel and propane on-installation. Effects would be less than significant because the emissions would not exceed the major source thresholds; would not exceed the GHG threshold in the draft CEQ guidance; and would not contribute to a violation of any Federal, state, or local air regulation.

Energy. The net zero energy efficiency, cogeneration, and renewable energy projects would include some short-term construction or installation activities that would generate fugitive dust, and emissions from on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gasses. These emissions would be limited and end with the construction phase. The California Code of Regulations (CCR) outlines requirements for construction activities, such as controlling fugitive dust and open burning. The installation and any contractors would take reasonable precautions to prevent fugitive dust from becoming airborne, including using water to control dust from building construction, road grading, or land clearing. Although CCR requirements do not contain specific not-to-exceed thresholds, construction would proceed in full compliance with current requirements, and with compliant practices and products.

Although not quantifiable at this time, the Proposed Action would result in long-term emissions savings from electricity displaced by the proposed energy-efficiency and renewable-energy projects. Indirect emissions from fossil-fuel based electricity production would be eliminated with the implementation of the net zero measures under the Proposed Action. Additionally, emissions generated from the use of JP8 and propane would be eliminated except for that generated from cooking and periodic maintenance of any remaining stationary sources. It is likely that several stationary sources of air emissions would be decommissioned and removed from FHL permitting requirements. Energy demand-reduction measures would also contribute to emissions savings.

The only potential new operational source of emissions would be from a WTE facility. No design or specific technology for a WTE facility has been selected, and emissions profiles are unknown at this time. One design could include a 400- to 500- kilowatt (kW) genset to generate electricity. If this design is used, it is anticipated that overall emissions would be comparable to and somewhat less than a standard 500-kW genset powered by natural gas and less than the U.S. average emissions rates for traditional fossil-fuel power generation. The estimated long-term emissions savings from displaced electricity from a WTE facility using a 400- to 500-kW genset is outlined in **Table 5-3**. Although the net emissions would decrease, the WTE facility would still constitute a new stationary source of air emissions at the installation. Design of the WTE facility would ensure that it fully complies with all Federal and state air permitting regulations, including New Source Review, Prevention of Significant Deterioration, National Emission Standards for Hazardous Air Pollutants, or New Source Performance Standards. Although the exact potential to emit is unknown at this time, the WTE facility would not exceed the major source threshold of 250 tons per year. Additionally, the WTE facility would require an air permit with the MBUAPCD. Overall, these effects would be minor.

Table 5-3. Net Emissions Savings from the WTE Facility

	NO_x	SO_x	CO	VOC	$PM_{2.5}$	CO_2e
Emission Rate (g/kWh)						
FastOx Syngas	0.668	0.011	0.113	0.004	0.073	457
U.S. Average	0.803	2.141	0.226	0.015	0.079	586
Difference	-0.135	-2.130	-0.113	-0.011	-0.006	-129
Annual Emissions (Continuous 500 kW Production) (tons per year)						
FastOx Syngas	3.2	0.1	0.5	0.0	0.4	2,207
U.S. Average	3.9	10.3	1.1	0.1	0.4	2,830
Difference	-0.7	-10.3	-0.5	-0.1	0.0	-623

Source: Sierra Energy 2012
Key: g =gram, kWh = kilowatt hour, kW = kilowatt

Greenhouse Gases and Climate Change. Construction activities would generate some amount of GHG. These emissions would be limited and end with the construction phase. Other than the WTE facility, there would be no direct ongoing GHG emissions from operation of net zero energy projects. There would be an annual decrease of indirect GHG emissions resulting from the reduction in generation of electricity off-installation but purchased by the installation. GHG emissions generated from the use of JP8 and propane would be eliminated except for that generated from cooking and periodic maintenance of any remaining stationary sources. It is likely that the GHG emissions associated with the Proposed Action would fall well below the CEQ threshold, and FHL would be taking steps to help the Army reach their GHG reduction goals in accordance with EO 13514. These effects would be beneficial.

Water. The net zero water efficiency, recycle, reuse, and recharge projects would include some short-term construction or installation activities. Air emissions from these activities would be similar in nature and overall level as the energy efficiency, cogeneration, and renewable energy projects. None of the net zero water projects are anticipated to have ongoing air emissions after completion of construction or installation.

Waste. The net zero waste re-purpose, recycling and compost, and energy recovery projects would include some short-term construction or installation activities. Air emissions from these activities would be similar in nature and overall level as the energy efficiency, cogeneration, and renewable energy

projects. Composting activities would have relatively small amounts of emissions when compared to other stationary sources. Other than the WTE facility and composting, none of the net zero waste projects would have ongoing air emissions after completion of construction or installation.

5.3.2.2 No Action Alternative

The No Action Alternative would not implement a net zero energy, water, and waste program at FHL, and would only implement those net zero projects required by other mandates and identified in other documents. Existing conditions would remain the same, and no new impacts on air quality would occur. However, continuation of existing energy usage patterns at FHL, including use of less energy-efficient building designs and infrastructure components, greater dependence on fossil fuels for electricity and heating, and overall greater energy consumption, would result in continued long-term, adverse effects on air quality. Construction related to implementation of existing net zero policies would result in the temporary generation emissions during the construction phase. These effects would be similar to the Proposed Action.

5.4 Geological Resources

5.4.1 Evaluation Criteria

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential effects of a proposed action on geological resources. Generally, adverse effects can be avoided or minimized if proper construction techniques, erosion-control measures, and structural engineering design are incorporated into project development. The Proposed Action could have a significant effect with respect to geological resources if any of the following were to occur:

- Alteration of the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability
- Changes to the soil composition, structure, or function within the environment.

5.4.2 Environmental Consequences

5.4.2.1 Proposed Action

Short- and long-term, minor, adverse effects on geological resources would occur from the work activities associated with the proposed net zero projects. Adverse effects would result from the compaction, disturbance, and erosion of soil during work activities; however, most ground disturbance would likely occur in areas that have previously been disturbed, which would minimize the severity of adverse effects. Compaction of soils from foot and vehicle traffic would disturb and modify soil structure. The loss of soil structure due to compaction could change drainage patterns but could be managed with soil decompaction methods. Soil productivity, which is the capacity of the soil to produce vegetative biomass, would decline in disturbed areas and be eliminated in areas within the footprint of impervious surface.

Site-specific soil testing would be conducted prior to work activities to determine if limitations based on shrink-swell potential, slope, depth to saturated zone, and flooding exist for any particular project location. Appropriate BMPs and environmental control measures would be developed to offset potential adverse effects. BMPs and environmental control measures could include installing silt fencing and sediment traps, applying water to disturbed soil, and revegetating disturbed areas as soon as possible after

the disturbance, as appropriate. Earthquake hazards would also be considered for each particular project, and appropriate seismic design measures would be included.

A storm water pollution prevention plan with erosion- and sediment-control measures would be prepared for projects that would disturb 1 or more acres of land. Any new construction would be designed consistent with requirements established in Unified Facilities Criteria 3-310-03, *Seismic Design for Buildings*, and EO 12699, *Seismic Safety*, which would reduce the potential for adverse effects on humans associated with structural failure during or following a seismic event.

Specific effects on geological resources from the Proposed Action are discussed in the following subsections.

Energy. Short-term, minor, adverse and long-term, minor, beneficial effects on geological resources would result from the implementation of FHL's net zero energy program. Work activities, such as the construction of the GSHPs and high performance buildings and moving the installation's existing overhead electrical lines to underground, would entail the disturbance of soils and possibly subsoil depending on the depth of disturbance. Adverse effects would be minimized by the implementation of environmental control measures and BMPs.

FHL's net zero energy program would aim to divest the installation from all fossil fuels. Therefore, under the Proposed Action, FHL would eliminate its dependency on fossil fuels as an energy source. Eliminating fossil fuel consumption at the installation would be beneficial on geological resources because FHL would no longer contribute to the depletion of these non-renewable energy resources.

GSHPs would be designed in accordance with Bulletin 74-90, including the 1999 Draft Geothermal Heat Exchange Well standards (currently being updated) to help minimize and prevent groundwater contamination associated with leaks. It is possible that an earthquake could cause a pressure/fluid loss from a GSHP system; however, most GSHPs have automatic shutdown devices to minimize leaks of fluid (e.g., refrigerant, antifreeze, or oil).

Water. Long-term, minor, beneficial effects on geological resources would result from the implementation of FHL's net zero water program. Beneficial effects would include increasing the amount of pervious surface on the installation and modifying landscaping to assist with recharging the aquifer. Such actions would decrease the amount of storm water runoff by allowing more rainwater to permeate into the ground. Reducing the amount of storm water runoff is beneficial in that it reduces the potential for soil erosion during storm events.

Waste. No effects on geological resources would result from the implementation of FHL net zero waste program.

5.4.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement the Proposed Action and thereby would not achieve the net zero for energy, water, and waste. FHL would continue to implement net zero projects if they are required by other mandates or identified in other documents. The existing geological resources conditions discussed in **Section 4.4.2** would continue, although any construction required by existing net zero mandates could result in additional soil disturbance leading to erosion and sedimentation that would be similar to short-term, adverse effects of the Proposed Action. Long-term, adverse effects would occur due to FHL's continued dependence on fossil-fuel-based energy sources and contribution to their depletion, and their existing management practices that contribute to storm water runoff resulting in erosion and sedimentation. Although these would not be new impacts, the No Action Alternative would have continuing long-term effects on geological resources.

5.5 Water Resources

5.5.1 Evaluation Criteria

Evaluation criteria for effects on water resources are based on water availability, quality, and use; existence of flood zones; and associated regulations. The Proposed Action could have a significant effect on water resources if any the following were to occur:

- Substantial reduction in water availability or supply to existing users
- Overdraft of groundwater basins
- Exceedance of safe annual yield of water supply sources
- Substantial adverse effect on water quality
- Endangerment to public health by the creation or worsening of health hazard conditions
- Threats or damage to unique hydrologic characteristics
- Violation of established laws or regulations adopted to protect water resources.

The potential effect of flood hazards as a result of the Proposed Action would be important if the net zero proposed project would occur in an area with a high probability of flooding.

5.5.2 Environmental Consequences

5.5.2.1 Proposed Action

The Proposed Action of implementing a net zero program for energy, water, and waste at FHL would result in short- and long-term, negligible to minor, adverse effects on water resources. None of the proposed projects would be constructed in floodplains, or constructed in a way that would modify the flow of surrounding washes, streams, or rivers.

Energy. The Proposed Action would have short- and long-term, negligible, adverse effects on water resources in and near the Proposed Action area. The construction of new buildings or other ground-disturbing infrastructure that would assist FHL in becoming net zero for energy, such as improved secondary treatment at the WWTP and PV systems, could temporarily increase runoff and lower water quality due to the compaction of soil from heavy equipment and materials. Net zero energy projects requiring an Erosion and Sediment Control Plan (ESCP) or NPDES permit would have more potential to result in adverse effects as a result of soil erosion and sedimentation into surface water bodies, but the ESCP would minimize adverse effects. Adverse effects from sedimentation would be addressed by proper implementation of erosion-control BMPs. The short-term, adverse effects on water quality from spills of hydrocarbons and other hazardous materials would be avoided or minimized through the implementation of a spill control plan and BMPs.

The construction of new buildings and infrastructure for proposed net zero energy projects could have short- and long-term, adverse effects on the surrounding aquifers. Development of new structures would increase the amount of impervious surfaces, decreasing the amount of recharge into aquifers. However, FHL would use low impact development (LID) designs for all new facilities constructed with the goal of maintaining or restoring natural hydrologic functions in accordance with EISA Section 438. Use of LID features would reduce the amount of runoff and would facilitate groundwater recharge through infiltration. Because the existing hydrology at work sites would be maintained, the Proposed Action would have a negligible effect on water resources.

Short-term, minor, adverse effects could occur during installation of the proposed GSHPs due to contamination of groundwater from spills or leaks of fuel or other hazardous materials from construction

vehicles and equipment, or from infiltration of surface water runoff. The proposed GSHPs would likely be closed-loop systems; however, in the event of a spill or leak of the water-antifreeze mixture from the GSHP system, there could be long-term, adverse effects on groundwater. Additionally, if the proposed GSHPs are a vertical-loop system and the sealing (i.e., grouting) between the associated boreholes and pipes is not adequate, groundwater could be contaminated by leaking water-antifreeze mixture or surface water infiltration. Implementation of the Bulletin 74-90, *California Well Standards*, and 1999 Draft Geothermal Heat Exchange Well standards (currently being updated), which include minimum standards for construction, maintenance, abandonment, and destruction of ground heat exchange wells (include GSHPs) and other wells would help minimize and prevent groundwater contamination.

Water. The Proposed Action would have short- and long-term, negligible, adverse and long-term, beneficial effects on the water resources. The Proposed Action includes the installation of improved secondary treatment at the existing WWTP, the modernization of the sewer lines from the cantonment area to the Blackjack training site, reduction of impervious surfaces by increasing vegetated areas, the use of green roofs in new development, and implementation of graywater recycling.

The construction and modernization of the sewer line from the cantonment area to Blackjack training site and the reduction of impervious surfaces would have short-term, adverse effects on the water quality. The construction activities would cause temporary increase in sedimentation of surface waters and temporary decrease of water quality due to the compaction of soil from heavy equipment and materials used during construction. Net zero water projects requiring an ESCP or NPDES permit would have more potential to result in adverse effects as a result of soil erosion and sedimentation into surface water bodies, but the ESCP would minimize those effects. Negligible effects on water resources would be expected with the implementation of BMPs.

The Proposed Action could have long-term, direct and indirect, beneficial effects on water resources. The decrease of impervious surfaces would increase the recharge of aquifers, and could increase the quality and quantity of water flow into streams and other bodies of water in the area. By reducing impervious surfaces, sediment in storm water runoff could decrease, thereby improving water quality. Additionally, implementation of the improved secondary wastewater treatment and discontinuation of use of the WWTP spray field would result in long-term, beneficial effects on surface water and groundwater quality. FHL would no longer release secondary treated wastewater on the spray field, thereby eliminating the potential that contaminants, such as nitrogen, could pollute surface water through runoff and groundwater through percolation.

The Proposed Action would have long-term, beneficial effects on water resources from the implementation of water reduction (i.e., conservation) and efficiency measures. These measures would allow FHL to reduce its water consumption and decrease its demand for potable water, thereby further minimizing the potential for the installation to reduce water availability or supply to existing users, or cause an overdraft of groundwater basins and exceedance of safe annual yield of water supply sources.

Waste. The Proposed Action would have short-term, negligible, indirect, adverse effects on the water resources at FHL. The establishment and operation of recycling and composting resources at FHL might require the clearing of an area for the programs, which would temporarily increase sedimentation of surface waters and could temporarily reduce water quality due to the compaction of soil from heavy equipment and materials used during construction. Implementation of erosion-control BMPs would minimize impacts, and negligible effects on water resources would be expected. If a proposed net zero waste project, such as one of the enhanced recycling, mulching, or composting programs, would be within an already developed area, no effects on water resources would be expected.

5.5.2.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. A net zero program for energy, water, and waste at FHL would not be implemented, and only those net zero projects required by other mandates or identified in other documents would be implemented. Continuation of existing water management, including current water consumption rates, under the No Action Alternative would result in demands for additional water capacity and possible reductions in quality of existing supply. No new impacts would be expected to occur; however, long-term, adverse effects from degradation of water resources could occur.

5.6 Biological Resources

5.6.1 Evaluation Criteria

The significance of effects on biological resources is based on the following:

- The importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource
- The proportion of the resource that would be affected relative to its occurrence in the region
- The sensitivity of the resource to proposed activities
- The duration of ecological ramifications.

Effects on biological resources would be significant if species or habitats of high concern are adversely affected over relatively large areas. Effects would also be considered significant if disturbances cause reductions in population size or distribution of a species of high concern.

5.6.2 Environmental Consequences

5.6.2.1 Proposed Action

The Proposed Action of implementing a net zero program for energy, water, and waste at FHL would result in minimal adverse or beneficial effects on wetlands, vegetation, and wildlife species.

Environmental review, to include assessing site-specific impacts on biological resources from proposed construction actions, would be conducted during conceptual design phase. Planning and construction would include compliance with EISA and NDPES permitting, which would protect resources from effects from storm water. Net zero projects would be reviewed to determine if the effects were sufficiently addressed in this EA, and additional NEPA analysis would be completed as needed.

Energy. Construction of new facilities, such as PV systems and a microgrid, could result in noise, erosion, sedimentation, and runoff. Noise impacts would be temporary and occur in developed areas. Construction activities must comply with CWA NPDES permitting and EISA. U.S. Army regulations require that new development use LID design techniques, such as maintaining vegetated buffers between drainages and development, and creating bio-swales to trap sediments and pollutants before they can enter a waterway. In accordance with these regulations, net zero energy projects would be designed to comply with LID and EISA requirements, which would minimize impacts on biological resources from storm water runoff.

Water. Decrease of impervious surfaces and implementation of water conservation measures could increase the recharge of aquifers, and increase the quality and quantity of water flow in aquatic habitats. By reducing impervious surfaces, sediment in storm water runoff could decrease, thereby improving wetlands and stream quality for vegetation and wildlife.

Waste. Implementation of the proposed recycling programs, and modification of waste disposal and management practices through the reuse and repurposing of waste materials and use of a WTE facility could reduce transportation of waste and waste added to local landfills, which would generally result in beneficial impacts on biological resources.

5.6.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement a net zero program for energy, water, and waste, and would only implement those net zero projects required by other mandates or identified in other documents. The existing conditions of wetlands, vegetation, and wildlife at FHL would continue as described in **Section 4.6.2**, although vegetation and wildlife and their habitats could be affected by construction activities. These impacts would be similar to those of the Proposed Action, and no new impacts would be expected.

5.7 Threatened and Endangered Species

5.7.1 Evaluation Criteria

As a requirement under the ESA, Federal agencies must provide documentation that ensures that agency actions will not adversely affect the existence of any threatened or endangered species. Section 7 of the ESA establishes a consultation process with the USFWS that ends with USFWS concurrence or a determination of the risk of jeopardy from a Federal agency project. The Proposed Action could have a significant effect with respect to disturbance if the following were to occur:

- "Taking" threatened or endangered species
- Adversely modifying threatened or endangered species habitat.

5.7.2 Environmental Consequences

5.7.2.1 Proposed Action

No significant effects on Federal- or state-listed threatened and endangered species would be expected from implementing the Proposed Action. Special status species that could occur at FHL are described in **Section 4.7.2**. Implementation of a net zero program for energy, water, and waste would result in minimal adverse or beneficial effects on arroyo toad, California condor, San Joaquin kit fox, vernal pool fairy shrimp, purple amole, and bald eagle.

The FHL net zero projects for energy, water, and waste would comply with the FHL INRMP (FHL 2007, FHL 2011b) and any state-listed species potentially impacted by facility siting and design would be addressed through the goals and strategies of the INRMP. Any project potentially affecting federally listed species must be coordinated with USFWS. The USFWS prepared a programmatic Biological Opinion (BO) addressing the effects on federally listed species, as required under Section 7 of the ESA. FHL would comply with the terms and conditions of the programmatic BO for FHL issued by the USFWS in 2010 (USFWS 2010).

Environmental review, to include assessing site-specific impacts on sensitive species from proposed construction actions, would be conducted during conceptual design phase. Planning and construction would include compliance with EISA and NDPES permitting, which would protect arroyo toad and vernal pool fairy shrimp habitat from effects from storm water. Net zero projects would be reviewed to determine if the effects were sufficiently addressed in the BO and this EA, and additional NEPA analysis or consultation with USFWS would be completed as needed.

Energy. Construction of new facilities, such as PV systems and a microgrid, could result in erosion, sedimentation, and runoff; however, construction activities must comply with CWA NPDES permitting and EISA. U.S. Army regulations require that new development use LID design techniques, such as maintaining vegetated buffers between drainages and development, and creating bio-swales to trap sediments and pollutants before they can enter a waterway. In accordance with these regulations, net zero energy projects would be designed to comply with LID and EISA requirements, which would minimize impacts on sensitive species habitat from storm water runoff.

Water. Decrease of impervious surfaces and implementation of water conservation measures could increase the recharge of aquifers, and increase the quality and quantity of water flow in aquatic habitats. By reducing impervious surfaces, sediment in storm water runoff could decrease, thereby improving stream quality for sensitive species.

Waste. Implementation of the proposed recycling programs, and modification of waste disposal and management practices through the reuse and repurposing of waste materials and use of a WTE facility could reduce transportation of waste and waste added to local landfills, which would generally result in beneficial impacts on sensitive species.

5.7.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement net zero energy, water, and waste projects unless they are required by other mandates or identified in other documents. Similar to the Proposed Action, construction and possibly operational activities could result in noise, increased vehicular traffic and human presence that could affect threatened and endangered species, and erosion and sedimentation that could affect their habitats. Federal- and state-listed species and their habitats would still be considered during implementation of these projects; therefore, no new impacts would be expected.

5.8 Cultural Resources

5.8.1 Evaluation Criteria

Adverse impacts on cultural resources can include the following:

- Physically altering, damaging, or destroying all or part of a resource
- Altering characteristics of the surrounding environment that contribute to the resource's significance
- Introducing visual or audible elements that are out of character with the property or that alter its setting
- Neglecting the resource to the extent that it deteriorates or is destroyed
- The sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

Ground-disturbing activities, aboveground construction, and visual impacts associated with the Proposed Action constitute the most relevant potential effects on cultural resources at FHL.

5.8.2 Environmental Consequences

5.8.2.1 Proposed Action

The Proposed Action consists of the implementation of a net zero program for energy, water, and waste at FHL through a series of policies, procedures, BMPs, and proposed projects. The Proposed Action could have short- and long-term, direct and indirect, adverse impacts on historic properties depending on the type of project and proposed location. Any possible significant effects on cultural resources could be minimized through avoidance or consultation with the SHPO. Projects would be implemented in accordance with the guidelines set forth in the FHL ICRMP and coordinated with the Cultural Resources Manager at FHL for compliance with the NHPA and other appropriate authorities. SHPO and Tribal consultation would occur as necessary and as required by NHPA, NAGPRA, and other authorities. Adverse effects on NRHP-eligible and -listed cultural resources should be avoided or, if avoidance is not possible, mitigation of adverse effects is required in consultation with the SHPO. No impacts are expected on resources of Traditional, Religious, or Cultural Significance to Native American Tribes.

Energy. Energy reduction efforts as part of the net zero energy portion of the Proposed Action would have little to no effect on cultural resources. However, some of the proposed energy-efficiency and renewable-energy projects might have more indirect and direct, adverse impacts on cultural resources. Proposed new construction, demolition of older less energy-efficient buildings, and the retrofitting of existing buildings could adversely affect historic properties. Construction of PV system sites near historic properties could result in adverse effects. These types of projects have the potential to alter the viewshed of cultural resources or introduce noise and vibration that would be considered an indirect, adverse effect. Some proposed energy-related modifications, such as the replacement of historic-age windows, demolition, daylighting, or the installation of PV systems or SHW systems on or near a historic property, might not be possible without significant adverse effects on the property. These types of adverse effects could be minimized through careful site selection, compatible design, and close and frequent consultation with the SHPO prior to construction. All net zero energy projects would be located outside of the Mission Viewshed Restricted Building Zone around the Mission San Antonio de Padua (an NRHP-listed property); however, proposed facilities or activities might be within the viewshed of the mission. Therefore, particular attention should be taken to preserve the viewshed of the mission to prevent adverse effects on this historic resource.

Short- and long-term, indirect and direct, adverse impacts on archaeological resources could result from the installation of GSHPs, moving overhead wires underground, or from staging equipment areas related to new construction and demolition. Adverse impacts on archaeological resources could be reduced or avoided by limiting these activities to previously disturbed land, through careful site selection and design, and consultation with the SHPO.

Water. The implementation of a FHL net zero water program could have short- and long-term, indirect and direct, adverse impacts on historic properties. The majority of the water-conservation and water-efficiency measures should have little to no effect on cultural resources. However, some of the measures, including the use of rainwater collection systems on buildings and the modernization of the sewer line from the cantonment to the Blackjack training site, could adversely affect historic properties as a result of new components to historic buildings or ground disturbance for subsurface cultural resources. These impacts could be reduced or eliminated by limiting these activities to previously disturbed land, through careful site selection and design, and consultation with the SHPO.

Waste. No effects on cultural resources would result from the implementation of a FHL net zero waste program.

Should any net zero projects be proposed that have the potential to impact historic properties, FHL would need to coordinate with the SHPO pursuant to 36 CFR Part 800 regarding methods to avoid, minimize, or mitigate adverse effects. In the event of any inadvertent find of archaeological materials during implementation of the Proposed Action, FHL would follow the procedures for inadvertent discovery outlined in the installation's ICRMP (FHL 2003).

5.8.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement the Proposed Action, but net zero projects would continue to be implemented if they are required by other mandates or identified in other documents. Implementation of these projects would need to follow procedures outlined in the FHL ICRMP and in consultation with SHPO pursuant to the NHPA. Effects would be anticipated to be similar to the Proposed Action.

5.9 Socioeconomics and Environmental Justice

5.9.1 Evaluation Criteria

Construction expenditures are assessed in terms of direct and indirect effects on the local economy and related effects on other socioeconomic resources (e.g., housing). The magnitude of potential effects can vary greatly, depending on the location of a proposed action. If potential socioeconomic changes were to result in substantial shifts in population trends or a decrease in regional spending or earning patterns, those effects would be considered adverse. The Proposed Action could have a significant effect with respect to the socioeconomic and environmental justice conditions in the ROI if the following were to occur:

- Change the local business volume, employment, personal income, or population that exceeds the ROI's historical annual change
- Adversely affect social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates
- Disproportionately impact minority, low-income, or youth populations.

5.9.2 Environmental Consequences

5.9.2.1 Proposed Action

No significant effects on socioeconomics or environmental justice would be expected from implementing the a net zero program for energy, water, and waste.

Energy

Socioeconomics. No significant effects on socioeconomics would be expected from implementing the proposed net zero energy projects. Short-term, minor, beneficial effects on employment would be expected during construction, renovation, and, if necessary, demolition activities associated with the Proposed Action. The number of workers who would be hired for construction activities would likely come from the existing supply within the ROI. Relocation of construction workers to meet demands for the Proposed Action would not be expected as the scope of construction activities should not necessitate out-of-town workers to relocate permanently. The number of construction workers necessary for the Proposed Action is not large enough to outstrip the supply of the industry. Indirect, beneficial effects would result from the increase in payroll tax revenues, purchase of materials and other goods and services

in the area, and cost savings on energy utility bills resulting in less than significant beneficial effects on the socioeconomic climate of the ROI. No effects on income and housing would be expected.

Environmental Justice and Protection of Children. Implementation of the proposed net zero energy projects would have no effects on environmental justice and protection of children. It is unlikely that off-installation populations, including the community of Lockwood, would experience increased traffic and noise, or decreased air quality during any construction activities.

Water

Socioeconomics. No significant effects on socioeconomics would be expected from implementing the proposed net zero water projects. The net zero water strategy does not consist of any large-scale construction or demolition activities, but would include making behavioral changes maximizing water conservation and improving water efficiency in existing facilities and processes to limit the consumption of freshwater resources. Short-term, minor, beneficial effects on socioeconomics would result from the purchase of materials necessary to become net zero for water, such as ultra-low-flush toilets, water-efficient faucets and showerheads, and other Water Wise products and cost savings on water utility bills. No effects on income and housing would be expected.

Environmental Justice and Protection of Children. Implementation of the proposed net zero water projects would have no effects on environmental justice and protection of children.

Waste

Socioeconomics. No significant effects on socioeconomics would be expected from implementing the proposed net zero waste projects. The net zero waste strategy does not consist of any large-scale construction or demolition activities, but would be accomplished by implementing FHL's pollution prevention program and various opportunities identified in the Net Zero Waste Installation Plan such as a green procurement program; and increasing reuse, recycling, and composting of waste materials. Short-term, negligible, indirect, beneficial effects on socioeconomics would result from cost savings on solid waste disposal and hauling tipping fees. No effects on income and housing would be expected.

Environmental Justice and Protection of Children. Implementation of the proposed net zero waste projects would have no effects on environmental justice and protection of children.

5.9.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement a net zero program for energy, water, and waste to reduce the overall consumption of energy and water resources and disposal of solid waste in landfills beyond those policies and procedures that are currently in place. However, FHL would continue to implement projects related to net zero energy, water, and waste if they are required by other mandates or identified in other documents. This would result in a long-term, moderate, adverse effect on socioeconomics by not reducing operational costs at the installation. No effects on minority, low-income, or youth populations would be expected.

5.10 Infrastructure

5.10.1 Evaluation Criteria

Evaluation of impacts is based on the compatibility of the Proposed Action, including its demand and capacity, with the existing infrastructure network. An impact might be determined significant if it

resulted in the disruption of utility supplies, or an increase in demand that would adversely impact capacity to support operations or normal community functions.

5.10.2 Environmental Consequences

5.10.2.1 Proposed Action

Long-term, moderate, beneficial effects on infrastructure would result from the implementation of FHL's net zero program. All of the policies, procedures, BMPs, and proposed projects necessary to implement FHL's net zero program for energy, water, and waste are designed to improve the energy, water, and waste management infrastructure of FHL. Full implementation of the proposed energy efficiency and renewable energy projects would cover all of FHL's existing energy requirements. Effects on infrastructure from the Proposed Action are discussed in the following subsections.

Energy. Long-term, moderate, beneficial effects on energy infrastructure would result from the implementation of FHL's net zero energy projects. These effects would include the following:

- A reduction in installationwide electric, propane, and JP8 consumption from constructing new buildings as net zero energy buildings and retrofitting existing buildings with modern and energy-efficient lighting, daylighting, HVAC, SVP, and water heating equipment.
- A minor reduction in the electrical consumption at the WWTP from the implementation of more efficient treatment processes, and the elimination of the need to pump wastewater from the secondary lagoon to the spray field.
- An increase in electrical capacity from reduced electrical demand.
- A decreased dependency on outdated, commercially provided electric, propane, and JP8 infrastructure. Energy would be generated on installation using modern, government-owned infrastructure, including a WTE facility, solar PV systems, and GSHPs.
- Improved reliability of electric distribution resulting from upgrading and modernizing electrical substations and moving existing overhead electrical lines to underground. A microgrid might be established for select, mission-critical buildings, and backup battery power sources would provide uninterruptable electrical service.

Water. Long-term, moderate, beneficial effects on water infrastructure would result from the implementation of FHL's net zero water projects. A reduction in installationwide water consumption from FHL decreasing demand for water, improving water efficiency, and implementing water recycling and reuse strategies would be the most prominent effect resulting from implementation of the net zero water projects. Decreased water consumption would allow the installation's groundwater wells and potable water treatment system to be used less intensely and possibly for FHL to reduce its water storage requirements.

The decrease in the volume of water consumed at FHL would translate into a decrease in the volume of wastewater generated. In conjunction with the development of non-potable water reuse systems, the volume of wastewater treated at the WWTP would be substantially reduced. This would reduce the amount of liquid needed to evaporate from the settling basins and reduce the amount of solids to be dredged away.

FHL's net zero water projects also include reducing the amount of impervious surface on the installation and including pervious surfaces in new development to assist with recharging the aquifer. An increase in the amount of pervious surface on the installation would allow rainwater to permeate into the ground and decrease the amount of storm water runoff. This would reduce the amount of storm water handled by the

installation's storm water handling infrastructure, and possibly reduce the potential for flooding events and erosion in drainage swales.

Waste. Long-term, moderate, beneficial effects on waste infrastructure would result from the implementation of FHL's net zero waste projects. Implementation of these projects would result in a reduction in the amount of solid waste landfilled. Reducing the amount of material landfilled is beneficial in that it helps to extend the permitted lifespan of landfills.

Under the Proposed Action, solid waste generation at FHL would be curtailed by implementing green procurement practices, repurposing initiatives, and robust recycling programs. Recycling programs would aim to increase the recycling diversion rate of the installation to approximately 50 percent for nonhazardous solid wastes and 60 percent for construction and demolition debris. FHL could also establish a mulching or composting program to reduce the amount of vegetative waste sent to landfills.

Solid wastes that cannot be reused or recycled could be processed as feedstock for a WTE facility rather than sent to landfills. A WTE facility could generate energy that could be used in other applications at FHL. Any remaining solid wastes not able to be reused, recycled, or used as feedstock would be disposed of at a landfill in an identical manner to how solid wastes are currently disposed.

5.10.2.2 No Action Alternative

Long-term, adverse effects on infrastructure would be expected under the No Action Alternative because only a subset of the proposed net zero projects (i.e., those required by other mandates or identified in other documents) would continue to be implemented. However, the No Action Alternative would not achieve FHL's net zero goals for energy, water, and waste, including reduction in demand and consumption, increase of efficiencies, and expansion of self-sufficient management of energy, water, and waste. Continuation of FHL's existing management practices, including current energy and water consumption rates and amount of waste generation, could lead to increased demands on infrastructure supply and capacity.

5.11 Traffic and Transportation Systems

5.11.1 Evaluation Criteria

Impacts on traffic and transportation systems are evaluated by how well existing roadways can accommodate increases in traffic. Effects could be significant if the Proposed Action would increase traffic volume and create widespread traffic congestion, decrease LOS, disrupt traffic and create permanent road closures, or result in other road traffic conflicts.

5.11.2 Environmental Consequences

5.11.2.1 Proposed Action

Short-term, minor and long-term, negligible, adverse effects would be expected. Short-term effects would occur due to additional construction vehicles and installation of the net zero projects. Long-term effects would occur from minute changes in traffic levels due to operation and maintenance activities. Effects on traffic and transportation systems would be less than significant because the Proposed Action would not create permanent road closures or widespread traffic congestion. The Proposed Action would have no appreciable effect on air, rail, or public transportation.

Energy. Energy reduction and recovery components would have no short-term effects on traffic or transportation resources; whereas, the energy efficiency, cogeneration, and renewable energy projects

would involve short-term construction or installation activities and associated traffic, including worker commutes and delivery of equipment and materials to and from FHL. Although traffic from these activities would be distributed throughout the installation, and would not be focused in any one location, traffic levels might increase due to additional vehicles near some sites. In addition, there could be temporary road closures or detours to accommodate utility system work. These effects would be primarily on-post, temporary in nature, and would end with the construction or installation phase. The existing transportation infrastructure would be sufficient to support the temporary increase in vehicle traffic. Although minor, such effects would be limited further by minimizing construction vehicle movement during peak traffic hours, and placing staging areas where they would least interfere with traffic. All heavy construction vehicles would be equipped with backing alarms, two-way radios, and "Slow Moving Vehicle" signs, when appropriate.

There would be no appreciable long-term increases in traffic or changes in transportation infrastructure due to the energy components. There would be no changes in LOS at any intersections or roadway segments, no permanent changes in traffic, no addition or removal of parking, and no new access points to the roadway network. Long-term effects from the operations and maintenance of the energy efficiency, cogeneration, and renewable energy projects include minute increases in traffic levels from operation and maintenance activities. Energy reduction and recovery components would have no long-term effects on traffic or transportation resources.

Water. The water efficiency, recycle, reuse, and recharge projects would involve short-term construction or installation activities, and long-term operations or maintenance activities. Effects on traffic and transportation systems from these activities would be similar in nature and overall level as the energy efficiency, cogeneration, and renewable energy projects. Water reduction components would have no effects on traffic or transportation resources.

Waste. The waste re-purpose, recycling and compost, and energy recovery projects would involve short-term construction or installation activities, and long-term operations or maintenance activities. Effects on traffic and transportation systems from these activities would be similar in nature and overall level as the energy efficiency, cogeneration, and renewable energy projects. Waste reduction and disposal components would have no effects on traffic or transportation resources.

5.11.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement a net zero program for energy, water, and waste except for those required by existing policies. Traffic and transportation systems would continue as described in **Section 4.11.2**. There would be no effects on traffic volume or changes to transportation resources.

5.12 Hazardous Materials and Wastes

5.12.1 Evaluation Criteria

Impacts on hazardous materials and wastes would be considered significant if the Proposed Action resulted in noncompliance with applicable Federal or state regulations, or increased the amounts generated or procured beyond current FHL waste management procedures, permits, and capacities. Impacts on the ERP would be considered significant if the Proposed Action disturbed or created contaminated sites resulting in negative effects on human health or the environment, or if a proposed action made it substantially more difficult or costly to remediate existing contaminated sites.

5.12.2 Environmental Consequences

5.12.2.1 Proposed Action

Short-term, minor, adverse effects on hazardous materials, hazardous wastes, and petroleum products would occur from the work activities associated with the projects needed to become net zero for energy, water, and waste. Proposed net zero projects could result in the need to relocate existing storage locations of hazardous materials, hazardous wastes, and petroleum products. Contractors performing work activities would require the delivery and use of minimal amounts of hazardous materials and petroleum products, and would generate minimal amounts of hazardous wastes. Contractors would be responsible for the management of hazardous materials, hazardous wastes, and petroleum products during all work activities and implementation of appropriate handling procedures to limit the potential for a release. Because the proposed net zero projects would be implemented over several years, hazardous materials used for and hazardous wastes generated from work activities would not exceed current FHL capacities.

The work activities associated with the projects needed to become net zero for energy, water, and waste are not proposed at the locations of FHL's active DERP sites. However, prior to commencing any ground disturbance, FHL staff would ensure that contaminated soil or groundwater would not be encountered. If contaminated soil or groundwater were to be encountered during work activities, appropriate clean-up measures would be implemented to ensure that no adverse effects would occur.

Effects on hazardous materials and wastes from implementation of the proposed net zero energy, water, and waste projects of the Proposed Action are discussed in the following subsections.

Energy. Long-term, minor, beneficial effects on hazardous materials and wastes would result from the implementation of FHL's net zero energy projects. These effects would include the following:

- The net zero energy projects aim to divest FHL from fossil fuels including liquid fuels such as JP8 and diesel fuel. Therefore, under the Proposed Action, FHL would greatly reduce its need to use and store these liquid fuels. FHL could then eliminate some of its liquid fuel transfer infrastructure and storage capacity, which would be beneficial in that it would lessen the potential for a release to the environment.
- The net zero energy projects could include the retrofit of several existing buildings on FHL. Contractors performing the retrofits would properly test, handle, and dispose of any suspected ACMs and LBP that might be disturbed during these retrofits. The removal of ACMs and LBP from the installation would be a long-term, minor, beneficial effect.

PCB-containing fluorescent lamp ballasts might be removed with the proposed lighting upgrade projects. Contractors would take appropriate precautions to manage any waste materials potentially containing PCBs. The removal of PCB-containing equipment would be a long-term, minor, beneficial effect.

Water. Long-term, minor, beneficial effects on hazardous materials and wastes would result from the implementation of FHL's net zero water projects. The Proposed Action entails reducing the amount of water used at the installation, which would reduce the amount of water and wastewater treated at the installation. Such reductions would in turn reduce the amount of hazardous materials needed for the water and wastewater treatment processes and reduce the amount of hazardous waste by-products generated from such activities.

Waste. Long-term, minor, beneficial effects on hazardous materials and wastes would result from the implementation of FHL's net zero waste projects. FHL's net zero waste projects would reduce the amount of hazardous wastes generated on installation by implementing green procurement practices and

expanding recycling programs. With respect to hazardous wastes, green procurement would include purchasing reusable oil filters and expanding recycling programs, which would allow for more hazardous wastes to be recycled. FHL could expand its battery recycling program to include alkaline, nickel-cadmium, and lithium batteries. Such actions would be beneficial in that they would reduce the amount of hazardous wastes sent for disposal. The Proposed Action would not entail changes to the disposal streams for hazardous wastes.

5.12.2.2 No Action Alternative

Under the No Action Alternative, FHL would not implement the Proposed Action, but would continue to implement net zero projects if they are required by other mandates or identified in other documents. Although, short-term, minor, adverse effects on hazardous materials and wastes would occur due to any work activities associated with the implementing existing net zero policies, the primary effect of the No Action Alternative would be long-term, adverse effects from the continued use of hazardous materials and generation of hazardous wastes under existing energy, water, and waste management practices. No new impacts on hazardous materials and wastes would result from the No Action Alternative.

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6. Cumulative Effects, Best Management Practices, and Adverse Effects

6.1 Cumulative Effects

CEQ regulations stipulate that the cumulative effects analysis in an EA should consider the potential environmental effects resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR Part 1508.7). CEQ guidance in considering cumulative effects affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects that coincide with the location and timetable of a proposed action and other actions. Cumulative effects analyses must also evaluate the nature of interactions among these actions (CEQ 1997).

6.1.1 Projects Identified with the Potential for Cumulative Effects

The geographic ROI is an important consideration when discussing cumulative effects. For the purposes of this analysis, the ROI was determined to be FHL and the adjacent communities, including the community of Lockwood.

An effort was undertaken to identify other projects for evaluation in the context of the cumulative effects analysis. This was further developed through review of public documents and information gained from the coordination with various applicable agencies.

Activity within the adjacent communities was negligible. Municipal planning in the ROI is provided by the Monterey County Planning Department. The South County Planning Area, of which FHL is part, is the largest and least populated of the Planning Areas identified in the Monterey County General Plan. Overall, the future vision for the South County Planning Area will be to maintain its rural character and expand the agricultural-based economy, while enhancing infrastructure and community services for the small, unincorporated communities. The vision also seeks to achieve a balance between the two perspectives of restricting additional subdivisions while maintaining property rights. The vision includes the development of the proposed Jolon Road winery corridor, which would provide revenue and jobs in the area; however, the development of this corridor is dependent upon concurrent improvement of the Planning Area's infrastructure. The Monterey County General Plan also specifically calls for low-density development in areas adjacent to FHL to avoid encroachment issues (Monterey County 2010). Industry within the ROI appears limited to agriculture and some gas and oil exploration.

Two specific off-installation projects were included in the analysis. These projects are the completed 1.4-MW landfill gas-to-energy project and the approved full-scale commercial steam autoclave demonstration project at the Johnson Canyon landfill in Gonzales (Ameresco 2013, SVSWA 2014). No additional projects at FHL were identified.

6.1.2 Cumulative Effects Analysis

Table 6-1 summarizes potential cumulative effects on resources from the Proposed Action when combined with other past, present, and future activities. Only those actions that are additive to the Proposed Action are considered.

Table 6-1. Cumulative Effects of the Proposed Action on Resources

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Noise	Helicopter and aircraft activities and heavy artillery use during division-level training were the dominant noise sources, and other support activities produced noise in the cantonment area as it developed.	Helicopters and aircraft activities in addition to small arms fire are the dominant noise sources.	Short-term, adverse effects from construction activities and long-term, adverse effects from operation of a WTE facility.	Continued increases in training operations at FHL could result in increased noise. Development at FHL and in surrounding communities could result in short-term, localized increases in noise.	Aircraft and helicopter activities along with small arms fire would remain the dominant noise sources at FHL. The Proposed Action would introduce short- and long-term, negligible incremental increases in the FHL noise environment from construction and changes in operations.
Land Use	Past development has extensively modified land use.	Military installation land uses, including urban uses and training, in the FHL cantonment area, and agricultural land uses in surrounding communities.	Short-term, adverse effects from noise and traffic during construction, and long-term, beneficial effects from repurposing land to more productive uses.	No changes in FHL training lands or adjacent communities. Development in the FHL cantonment area would be sited according to the FHL RPMP.	Proposed Action would be consistent with the FHL RPMP and would not induce additional development beyond the proposed activities. No cumulative effects would be anticipated.
Air Quality	Emissions from aircraft, vehicles, and stationary sources could have resulted in some degradation of habitat; however, AQCRs have been classified as being in attainment.	Emissions from aircraft, vehicles, and stationary sources.	Short-term, adverse effects from generation of airborne dust and other pollutants during construction, and long-term, beneficial effects from an overall net decrease in criteria pollutants and GHGs due to reduction in use of fossil-fuel-based electricity, JP8, and propane.	Combustion air emissions and dust generation during construction and demolition activities on- and off-installation; operation of facilities; and during increased field training, small arms range use, and aircraft and helicopter operations at FHL.	Proposed Action could consist of an overall net decrease in criteria pollutants and GHG, resulting in beneficial effects in the context of regional air quality or global warming. Estimated emissions from the WTE facility would not be expected to contribute significantly to adverse cumulative effects on air quality.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Geological Resources	Past development and training activities have modified soils resulting in increased erosion and sedimentation.	Development and training activities contribute to ongoing modification of soils; existing impervious surfaces can lead to locally increased storm runoff, both of which contribute to erosion and sedimentation.	Short- and long-term, adverse effects from compaction, disturbance, and erosion of soil during construction. Long-term, beneficial effects from FHL's reduced dependency on fossil fuels and decreased contribution to depletion of non-renewable energy resources, and from reduction of impervious surfaces leading to aquifer recharge and decrease of storm water runoff and associated erosion.	Continued impacts on soils, and increased erosion and sedimentation from construction and operation of new projects.	Long-term, minor cumulative effects on soils due to modification by development and training activities and increased erosion and sedimentation, although these would be offset by BMPs in numerous management plans.
Water Resources	Groundwater and surface water quality and quantity moderately impacted by past development and training activity.	Pollution from industrial and municipal sources is generally low. Contaminated groundwater plumes are present in the FHL cantonment area.	Effects on groundwater and surface water quality could result from construction and operations that lead to erosion and sedimentation, and possible contamination of storm water runoff. Use of LID features and other BMPs would help minimize effects. Long-term, beneficial effects from decreased water consumption, reduced impervious surfaces, and recharge of aquifers.	Development would result in sedimentation from construction activities potentially affecting water quality, and increases in impervious surfaces resulting in increased storm water runoff.	Proposed Action would overall not induce further degradation of water quality, and would reduce water consumption and recharge aquifers. Cumulative effects would not be significant due to implementation of LID features and BMPs from numerous other management plans.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Biological Resources	Wetlands, vegetation and wildlife moderately impacted in localized areas by past development and training.	Presence and operation of facilities and FHL training lands impact wildlife and their habitats, vegetation, and wetlands.	Short- and long-term, direct and indirect, negligible, adverse effects on vegetation from vegetation removal and increased erosion, on wildlife from increased noise, vehicular traffic, and human presence, and on wetlands from increased runoff and sedimentation from construction and operation in undeveloped areas. Beneficial effects on wetlands, vegetation, and wildlife by increasing the quality and quantity of water flow into wetland areas and improvement of habitat.	Development of the area and construction and operation of new facilities would impact vegetation communities and wildlife habitat.	Permanent loss of vegetation and other habitat are minor in scale, and impacts would be minimized by selective siting and project design and careful management and monitoring. Cumulative effects would not be significant.
Threatened and Endangered Species	Threatened and endangered species moderately impacted in localized areas by past development and training.	Presence and operation of facilities and FHL training lands impact federally listed species and their habitat.	No effects to negligible, adverse effects on arroyo toad, California condor, San Joaquin kit fox, vernal pool fairy shrimp, purple amole, and bald eagle. There would be no direct alteration of vernal pools. Long-term, indirect, beneficial effects could occur from potential improvements to habitat quality.	Development of the area and construction and operation of new facilities could have continuing minor effects on Federal- and state-listed threatened and endangered species and their habitats.	Proposed Action could have minor cumulative effects on Federal- and state-listed species. Permanent loss of threatened and endangered species habitat would be minimized through continued natural resources management.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Cultural Resources	Possible destruction of eligible historic properties and archaeological sites. Unknown impacts on traditional cultural properties.	Presence and operation of facilities and FHL training lands have no significant effects.	Short- and long-term, direct and indirect, adverse effects on historic properties and archaeological resources depending on the type of project and proposed location. Construction on or near older buildings would have the potential to alter viewsheds, or introduce noise and vibration. Adverse effects could be reduced or avoided by limiting activities to previously disturbed land, through careful site selection and compatible design, and consultation with the SHPO.	General development and FHL training activities could have effects on viewsheds, archaeological sites, and traditional cultural properties. Consultation with the SHPO would be required to avoid significant effects.	Implementation of procedures in the FHL ICRMP including survey, monitoring, and site protection would help minimize cumulative effects. The Proposed Action would not significantly contribute to cumulative effects on cultural resources.
Socioeconomics and Environmental Justice	FHL and communities contribute to local economy.	Continued support of local economy.	Minor, beneficial effects on local economy from increased payroll tax revenues, purchase of materials and other goods and services in the area, and cost savings on FHL energy utility bills and solid waste disposal and hauling tipping fees.	Continued development of the South County Planning Area and operation of proposed facilities would impact local economy.	Proposed Action and other projects would result in minor stimulation of local economy.
Infrastructure	Infrastructure developed to support current FHL cantonment area, and surrounding communities.	FHL and communities continue to improve infrastructure systems.	Long-term, moderate, beneficial effects from implementation of a net zero program as the Proposed Action is designed to improve the energy, water, and waste management infrastructure of FHL.	Utility and waste management infrastructure improvements and additions would occur.	The Proposed Action and other projects would result in a beneficial cumulative impact.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Traffic and Transportation Systems	Past division-level training exercises resulted in heavy convoy activity that impacted local traffic flows.	Current traffic flow is related to daily operations and various training activities. Units primarily arrive by bus or aircraft with minimal convoy activity.	Short-term, adverse effects from increased vehicular traffic during construction, and long-term, adverse effects from minute increases in traffic from operation and maintenance activities.	Increases in vehicular traffic as a result of operations of proposed facilities.	Size and scope of the changes to traffic from the Proposed Action would be extremely small when compared to other planned projects in the area. The Proposed Action would negligibly contribute to cumulative effects on traffic or transportation resources.
Hazardous Materials and Wastes	34 IRP sites, 1 active Compliance Restoration site, and 12 MMRP sites have been identified.	Presence and operation of facilities and training operations.	Short-term, adverse effects from construction activities. Long-term, beneficial effects from reduced use of fossil fuels with decreased potential for a release; possible removal of ACMs, LBP, and PCB-containing equipment; less water/wastewater treatment from reduced water consumption resulting in reduced hazardous materials and wastes; and reduced generation of hazardous wastes.	Development of on- and off-installation facilities will increase use of hazardous material and generation of hazardous wastes, but not to levels that cannot be managed by current practices.	Construction and demolition activities would have a minor cumulative effect on hazardous materials and wastes, although effects would not be significant.

6.2 Reasonable and Prudent Measures and Best Management Practices

The Proposed Action would not result in significant adverse effects on the land or the surrounding area. However, BMPs and other impact minimization measures would be implemented to eliminate or reduce adverse effects.

General BMPs that would be implemented as part of the Proposed Action are summarized as follows:

- Clearing and grubbing would be timed with construction to minimize the exposure of cleared surfaces. Such activities would not be conducted during periods of wet weather. Construction activities would be staged to allow for the stabilization of disturbed soils. These BMPs would minimize adverse effects associated with soil and water resources.
- Fugitive dust-control techniques such as watering and stockpiling would be used to minimize adverse effects. All such techniques would comply with applicable regulations. These BMPs would minimize adverse effects associated with air quality, soil, and water resources.
- Soil erosion-control measures, such as soil erosion-control mats, silt fences, straw bales, diversion ditches, riprap channels, water bars, water spreaders, vegetative buffer strips, and hardened stream crossings, would be used as appropriate. These BMPs would minimize adverse effects associated with soil and water resources.
- Storm water management would be incorporated as appropriate during project design to minimize offsite runoff. Storm water management systems included in the project design would ensure that predevelopment site hydrology is maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow in accordance with Section 438 of EISA. These BMPs would minimize adverse effects associated with water resources.
- Minimize the disturbance of environmental resources by integrating existing vegetation, trees, and topography into site design. These BMPs would minimize adverse effects associated with soil and biological resources.
- Provisions would be taken to prevent pollutants from reaching the soil, groundwater, or surface water. During project activities, contractors would be required to perform daily inspections of equipment, maintain appropriate spill-containment materials on site, and store all fuels and other materials in appropriate containers. Equipment maintenance activities would not be conducted on construction sites. These BMPs would minimize adverse effects associated with soil, water resources, and hazardous materials and wastes.
- FHL would comply with the terms and conditions of the programmatic biological opinion for FHL issued by the USFWS in 2010.
- Construction equipment would be used only as necessary during the daylight hours and would be maintained to the manufacturer's specifications to minimize noise impacts. These BMPs would minimize adverse effects associated with noise.

6.3 Unavoidable Adverse Effects

Unavoidable adverse effects would result from implementation of the Proposed Action. As discussed in detail in **Section 5** and summarized in **Section 7**, the Proposed Action would result in short-term, adverse effects associated with the Proposed Action, including air emissions and increased traffic from construction activities. Additional non-significant impacts would also result from implementation of FHL's net zero program for energy, water, and waste including increased noise levels, use and generation

of small amounts of hazardous materials and wastes, removal of some vegetation, and a potential new stationary source of air emissions. None of these effects would be significant.

6.4 Compatibility of the Proposed Action and Alternatives with the Objectives of Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

Effects on the ground surface as a result of the Proposed Action would occur entirely within the boundaries of FHL. Implementation of FHL's net zero program for energy, water, and waste would not result in any significant or incompatible land use changes on or off the installation. The net zero projects that would require construction of a new building or infrastructure would be designed to fully consider the existing conditions and constraints at FHL. Consequently, implementation of FHL's net zero program would not be in conflict with installation land use policies or objectives, but rather would be consistent with the sustainability standards identified in the FHL RPMP. The Proposed Action would not conflict with designated clear zones or any applicable off installation land use ordinances.

6.5 Relationship Between the Short-Term Use of the Environment and Long-Term Productivity

Short-term uses of the biophysical components of human environment include direct construction-related disturbances and direct effects associated with an increase in activity that occurs over a period of less than 5 years. Long-term uses of human environment are those effects occurring over a period of more than 5 years, including permanent resource loss.

The Proposed Action would not result in an intensification of land use in the surrounding area. Implementation of the Proposed Action would not represent a significant loss of open space as most net zero projects would occur in previously developed areas or inside existing buildings. The long-term, beneficial effects of implementing a net zero program for energy, water, and waste at FHL would support FHL's ongoing and future mission requirements and national security objectives, and the Army Net Zero Initiative and other Federal and DOD sustainability goals and mandates.

6.6 Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources will have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals).

Land Use. The Proposed Action would result in the commitment of land for net zero projects.

Biological Resources. The Proposed Action would result in the loss of minimal vegetation and habitat.

Material Resources. Material resources used for the Proposed Action include building materials, concrete and asphalt, and various material supplies for infrastructure, and would be irreversibly lost. Most of the materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

Energy Resources. Energy resources, including petroleum-based products (e.g., gasoline and diesel) and electricity, consumed while implementing the Proposed Action would be irretrievably lost. During construction, gasoline and diesel would be used for the operation of construction vehicles. During operation and maintenance, gasoline or diesel would be used for the operation of privately owned and

government-owned vehicles, and electricity would be used by operational activities such as the improved secondary wastewater treatment. Consumption of these energy resources would not place a significant demand on their availability in the region.

Human Resources. The use of human resources for construction and operation of some of the net zero projects under the Proposed Action is considered an irretrievable loss, only in that it would preclude such personnel from engaging in other work activities. However, this use of human resources represents employment opportunities, and is considered beneficial.

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7. Conclusions and Recommendations

This EA contains a comprehensive evaluation of the existing conditions and potential environmental consequences of the Proposed Action. The conclusions in this section are limited to the Proposed Action and the No Action Alternative, as required under NEPA.

7.1 Impacts Identified

Resources that could be adversely affected by the Proposed Action include noise, land use, air quality, geological resources, water resources, biological resources, threatened and endangered species, cultural resources (historic buildings and archaeological resources), traffic and transportation systems, and hazardous materials and wastes. In all instances, effects on these resources are expected to be negligible to minor in significance. Use of common BMPs and other minimization measures identified in FHL management plans would help minimize effects on water resources, biological resources, and threatened and endangered species. No effects on resources of Traditional, Religious, or Cultural Significance to Native American Tribes would be anticipated. Beneficial effects on land use, air quality, geological resources, water resources, biological resources, threatened and endangered species, socioeconomics and environmental justice, infrastructure, and hazardous materials and waste would be expected. Implementation of the No Action Alternative would not result in a change in how energy, water, and waste are managed at FHL; therefore, no reductions of energy and water usage or waste generation would occur. While the No Action Alternative would result in associated adverse effects, no significant direct or indirect effects would occur.

Table 7-1 summarizes the effects of the Proposed Action and the activities that could be conducted during implementation to avoid or minimize these effects. Activities to minimize effects would be required by Federal or state regulations. Evaluation of each of the effect categories during preparation of this EA resulted in negligible to minor, adverse effects, which can be considered an “insignificant” effect or “no effect” classification. No significant effects would be anticipated from implementing the Proposed Action.

7.2 Cumulative Effects Identified

The potential for cumulative effects on the environment was evaluated by reviewing other projects in the vicinity of the FHL that could affect the same environmental resources as the Proposed Action. Although some cumulative effects could occur, they are expected to be negligible to minor in significance. Implementation of the No Action Alternative would not result in a change in current conditions or how energy, water, and waste are managed at FHL; therefore, continued management under existing mandates could result in long-term, adverse cumulative effects on the quality of the human or natural environment when compared to the Proposed Action.

7.3 NEPA Determination

Based upon the findings of this EA, implementation of the Proposed Action would not have a significant adverse direct, indirect, or cumulative effect on the quality of the human or natural environment on FHL or on adjacent properties. Implementation of the Proposed Action would ensure that FHL fulfills Federal, DOD, and U.S. Army energy and sustainability goals, mandates, and objectives, while also enhancing its energy and water security, allowing for predictable and potentially reduced operational costs, and appropriately managing natural resources.

Based upon the analysis of potential effects, it has been determined that the Proposed Action does not constitute a major Federal action affecting the quality of human health or the environment. Because there would be no significant effect resulting from the implementation of the Proposed Action, a Draft FNSI has been prepared to accompany this EA and concludes that an EIS, the next higher level of environmental effect investigation under NEPA, is not required for this action.

Table 7-1. Summary of Environmental Consequences for the Proposed Action

Resource Area	Proposed Action	No Action
Noise	Short- and long-term, minor, adverse effects would be anticipated. Short-term effects would be expected from increases in noise during construction activities associated with net zero energy, water, and waste projects. Long-term effects could be expected from increases in noise from operation of a WTE facility.	No new adverse effects would be anticipated.
Land Use	Long-term, beneficial effects would be anticipated from the repurposing of the WWTP spray field and the existing Transfer Station to more productive uses, and the freeing up of landfill capacity. The Proposed Action would not affect the viability of existing land uses or the continued use and occupation of any areas, and it would be consistent with the FHL RPMP.	No new adverse effects would be anticipated.
Air Quality	Short-term, minor, adverse effects would be anticipated from generation of airborne dust and other pollutants during construction of net zero projects. Long-term, beneficial effects would result from an overall net decrease in criteria pollutants and GHGs due to reduction in use of fossil-fuel-based electricity, JP8, and propane. Emissions from the Proposed Action would not exceed the major source thresholds or the GHG threshold; and it would not contribute to a violation of any air regulations.	No new adverse effects would be anticipated.
Geological Resources	Short- and long-term, minor, adverse effects on geological resources would occur from compaction, disturbance, and erosion of soil during construction of net zero projects. Long-term, minor, beneficial effects would be anticipated due to FHL reducing its dependency on fossil fuels that would decrease its contribution to the depletion of non-renewable energy resources, and reducing impervious surfaces and modifying landscaping to assist with aquifer recharge and decrease of storm water runoff and associated erosion. Soil testing, special project design, and BMPs can minimize soil limitations and effects from erosion and sedimentation.	No new adverse effects would be anticipated.

Resource Area	Proposed Action	No Action
Water Resources	Short- and long-term, negligible to minor, adverse and beneficial effects could occur from implementation of net zero projects. Construction and other ground-disturbing activities could temporarily increase runoff, erosion, and sedimentation, thereby decreasing water quality. Use of LID features, ESCP, and other BMPs would minimize effects. Installation and operation of GSHPs could result in short- and long-term, adverse effects on groundwater quality. Long-term, beneficial effects on water quantity and quality would be anticipated from FHL's reduced water consumption, decrease of impervious surfaces and recharge of aquifers, and improved secondary wastewater treatment and discontinuation of use of the spray field. Proposed recycling, mulching, and composting programs could result in short- and long-term, negligible, indirect, adverse effects due to soil compaction and associated sedimentation of surface waters from heavy equipment used during construction and operation.	No new adverse effects would be anticipated.
Biological Resources	Short- and long-term, negligible to minor, indirect and direct, adverse effects on wetlands, vegetation, and wildlife species would be anticipated. Runoff, erosion, and sedimentation associated with construction activities and possible replacement of existing landscaping with xeric species, and runoff and surface flow of graywater could result in adverse effects on wetlands. Adverse effects on vegetation and migratory birds could occur from net zero projects sited in undeveloped areas. Increased noise, vehicular traffic, and human presence associated with construction and, possibly, operation of some net zero projects could result in negligible, indirect, adverse effects on wildlife. Beneficial effects on wetlands, vegetation, and wildlife could occur from the decrease of impervious surfaces and recharge of aquifers, and modified management of waste materials by increasing the quality and quantity of water flow into wetland areas and improvement of habitat.	No new effects would be anticipated.
Threatened and Endangered Species	Short-term, adverse effects on arroyo toad could result from noise and human presence associated with construction and operation of net zero water and waste projects. No effects would be anticipated if project sites are in previously developed areas. No effects to negligible, adverse effects on arroyo toad, California condor, San Joaquin kit fox, vernal pool fairy shrimp, purple amole, and bald eagle would be anticipated. There would be no direct alteration of vernal pools. Long-term, indirect, beneficial effects on arroyo toad, California condor, San Joaquin kit fox, vernal pool fairy shrimp, and bald eagle could occur from net zero water and waste projects due to potential improvements to habitat quality.	No new effects would be anticipated.

Resource Area	Proposed Action	No Action
Cultural Resources	Short- and long-term, adverse effects on historic properties would be anticipated due to implementation of some net zero energy and water projects depending on the type of project and proposed location. Work on or near older buildings has the potential to alter the viewshed, or introduce noise and vibration that would be considered an indirect, adverse effect. Short- and long-term, indirect and direct, adverse effects on archaeological resources could result from construction or demolition associated with some net zero energy projects. Adverse impacts could be reduced or avoided by limiting activities to previously disturbed land, through careful site selection and compatible design, and consultation with the SHPO.	No new effects would be anticipated.
Socioeconomics and Environmental Justice	Short-term, minor, beneficial effects on employment would be anticipated during construction and other work activities associated with the net zero projects. Indirect, beneficial effects would result from the increase in payroll tax revenues, purchase of materials and other goods and services in the area, and cost savings on energy utility bills and solid waste disposal and hauling tipping fees. No effects on income and housing would be expected. The Proposed Action would not result in effects on minority, low-income, or youth populations because it is unlikely off-installation areas would experience adverse effects.	Long-term, adverse effects would be anticipated.
Infrastructure	Long-term, moderate, beneficial effects on infrastructure would be anticipated from implementation of a net zero program. All policies, procedures, BMPs, and projects proposed under the Proposed Action are designed to improve the energy, water, and waste management infrastructure of FHL.	Long-term, adverse effects would be anticipated.
Traffic and Transportation Systems	Short-term, minor, adverse effects would occur due to increased vehicular traffic from construction activities. Long-term, negligible, adverse effects would occur from minute increases in traffic from operation and maintenance activities. The Proposed Action would not result in permanent road closures or widespread traffic congestion, and would have no appreciable effect on air, rail, or public transportation.	No new effects would be anticipated.
Hazardous Materials and Wastes	Short-term, minor, adverse effects would be anticipated from work activities associated with the Proposed Action, and long-term, minor, beneficial effects from implementation of net zero projects. Net zero energy projects would reduce dependence on fossil fuels, thereby lessening the potential for a release to the environment; and could remove ACMs and LBP during energy efficiency upgrades and remove PCB-containing equipment during electrical infrastructure modernization. Net zero water projects would reduce water consumption and the amount of water and wastewater needing treatment resulting in reduced hazardous materials and wastes needed for and generated during these processes. Net zero waste projects such as green procurement and recycling programs would reduce the generation of hazardous wastes. No effects on FHL's active DERP sites would be anticipated.	No new effects would be anticipated.

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10. Abbreviations and Acronyms

°C	Degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	microgram per cubic meter
AADT	average annual daily traffic
ACM	asbestos-containing material
AHP	Army Heliport
AQCR	Air Quality Control Region
AR	Army Regulation
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
AST	aboveground storage tank
BMP	best management practice
BO	Biological Opinion
CAA	Clean Air Act
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Data Base
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CSP	concentrating solar power
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DERP	Defense Environmental Restoration Program
DFAC	dining facility
DNL	Day-Night Average Sound Level
DOD	Department of Defense
EA	Environmental Assessment
ECIP	Energy Conservation Investment Program
ECS	Equipment Concentration Site
EISA	Energy Independence and Security Act
EMCS	environmental management control system
EO	Executive Order
EPAct05	Energy Policy Act of 2005
ESA	Endangered Species Act
ESCP	Erosion and Sediment Control Plan
FEDS	Federal Energy Decision System
FEMA	Federal Emergency Management Agency
FHL	Fort Hunter Liggett
FIRM	Flood Insurance Rate Map
FNSI	Finding of No Significant Impact
FR	Federal Register
ft^2	square feet
FY	fiscal year
g	gram
GHG	greenhouse gas
GSHP	ground source heat pump
HVAC	heating, ventilation, and air conditioning
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan

IRP	Installation Restoration Program
ISWMP	Integrated Solid Waste Management Plan
JP8	jet propellant 8
kW	kilowatt
kWh	kilowatt hour
LBP	lead-based paint
LEED	Leadership in Energy and Environmental Design
L_{eq}	Equivalent Sound Level
LID	low impact development
LOS	Level of Service
MBTA	Migratory Bird Treaty Act
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MGD	million gallons per day
MMRP	Military Munitions Response Program
msl	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NZEI	net zero energy installation
NOA	Notice of Availability
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NSA	noise-sensitive area
O_3	ozone
ORTC	Operational Readiness Training Complex
PCB	polychlorinated biphenyl
percent g	percentage of the force of gravity
PG&E	Pacific Gas and Electric
P.L.	Public Law
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POL	petroleum, oil, and lubricant
ppm	parts per million
PV	photovoltaic
QRP	Qualified Recycling Program
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
RONA	Record of Non-Applicability
RPMP	Real Property Master Plan
SHPO	State Historic Preservation Officer
SHW	solar hot water
SO_2	sulfur dioxide
SVP	solar ventilation preheat
SWRCB	State Water Resources Control Board
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USAR	U.S. Army Reserve
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WTE	waste-to-energy
WWTP	wastewater treatment plant

APPENDIX A

APPLICABLE LAWS, REGULATIONS, POLICIES, AND PLANNING CRITERIA

Appendix A

Applicable Laws, Regulations, Policies, and Planning Criteria

When considering the affected environment, the various physical, biological, economic, and social environmental factors must be considered. In addition to the National Environmental Policy Act (NEPA), there are other environmental laws and Executive Orders (EOs) to be considered when preparing environmental analyses. These laws are summarized below.

NOTE: This is not a complete list of all applicable laws, regulations, policies, and planning criteria potentially applicable to documents, however, it does provide a general summary for use as a reference.

Energy

The Energy Policy Act (EPAct05) of 2005, P.L. 109-58, amended portions of the National Energy Conservation Policy Act and established energy management goals for Federal facilities and fleets. Section 109 of EPAct05 directs that new Federal buildings (commercial or residential) be designed 30 percent below American Society of Heating, Refrigerating, and Air-Conditioning Engineers standards or the International Energy Code. Section 109 also includes the application of sustainable design principles for new buildings and requires Federal agencies to identify new buildings in their budget requests that meet or exceed the standards. Section 203 of EPAct05 requires that all Federal agencies' renewable electricity consumption meet or exceed 3 percent from FY 2007 through FY 2009, with increases to at least 5 percent in FY 2010 through FY 2012 and 7.5 percent in FY 2013 and thereafter. Section 203 also establishes a double credit bonus for Federal agencies if renewable electricity is produced onsite at a Federal facility, on Federal lands, or on Native American lands. Section 204 of EPAct05 establishes a photovoltaic energy commercialization program for Federal buildings.

EO 13514, *Federal Leadership In Environmental, Energy, And Economic Performance* (dated October 5, 2009), directs Federal agencies to improve water use efficiency and management; implement high performance sustainable Federal building design, construction, operation and management; and advance regional and local integrated planning by identifying and analyzing impacts from energy usage and alternative energy sources. EO 13514 also directs Federal agencies to prepare and implement a Strategic Sustainability Performance Plan to manage its greenhouse gas emissions, water use, pollution prevention, regional development and transportation planning, sustainable building design and promote sustainability in its acquisition of goods and services. Section 2(g) requires new construction, major renovation, or repair and alteration of buildings to comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings. The CEQ regulations at 40 CFR 1502.16(e) directs agencies to consider the energy requirements and conservation potential of various alternatives and mitigation measures.

Section 503(b) of EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, instructs Federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. EO 13423 sets goals in energy efficiency, acquisition, renewable energy, toxic chemical reduction, recycling, sustainable buildings, electronics stewardship, fleets, and water conservation. Sustainable design measures such as the use of "green" technology (e.g., photovoltaic

panels, solar collection, heat recovery systems, wind turbines, green roofs, and habitat-oriented storm water management) would be incorporated where practicable.

Table A-1 presents information on the relationship between these energy-related laws and EOs and net zero goals for energy, water, and waste. Additional information on the Energy Independence and Security Act (EISA) of 2007 is within the Water Resources section below.

Table A-1. Federal Regulations and Policies Related to Net Zero Initiative and Goals

Regulation/Policy	Net Zero Area	Goal(s)
EPAct05	Renewable Energy	• At least 3% of total electricity consumption (FY 2007-2009), 5 percent (FY 2010-2012), and 7.5 percent (post FY 2013) should be from renewable sources.
EISA	Renewable Energy	• 25% of total energy consumption should be from renewable sources by FY 2025.
	Solar Energy	• 30% of hot water in new/renovated buildings should be from solar energy by FY 2015, if cost-effective.
	Fossil Fuel Reduction	• Reduce fossil fuel use by 55% by FY 2010 and 100% by FY 2030.
EO 13423	Renewable Energy	• At least 50% of renewable energy consumed in a FY should be from new renewable sources. • Implement renewable energy generation projects, where feasible.
	Energy Use	• Reduce energy use by 3% annually or total of 30% by FY 2015 (using FY 2003 baseline)
	Energy Efficiency	• Ensure all new construction/renovated buildings and 15% of existing buildings meet Guiding Principles for High Performance and Sustainable Buildings by the end of FY 2015. • Acquire more energy efficient and environmentally sustainable electronic equipment.
	Energy/Water/Waste	• Use of sustainable environmental practices, including acquisition of bio-based, environmentally preferable, energy-efficient, water efficient, and recycled-content products. • Use paper of at least 30% post-consumer fiber content.
	Water Consumption	• Beginning in FY 2008, reduce water consumption by 2% annually through end of FY 2015; or 16% by end of FY 2015.
	Solid Waste	• Increase the diversion of solid waste, and establish diversion goals to be achieved by 31 December 2010. • Maintain cost-effective waste prevention and recycling programs. Establish a minimum 35% recycling goal established by USEPA or continual improvement. • Implement BMPs for life-cycle management of electronic equipment. • Promote market growth and infrastructure for the reuse, donation, transfer, sale, de-manufacturing, and recycling of obsolete electronic equipment.

Regulation/Policy	Net Zero Area	Goal(s)
EO 13514	Net Zero Energy	• All new buildings designed in FY 2020 and after should be net zero energy by FY 2030.
	Energy Efficiency	• Ensure all new construction/renovated buildings and 15% of existing buildings meet Guiding Principles for High Performance and Sustainable Buildings by the end of FY 2015. • Procure products that are ENERGY STAR® labeled.
	Water Consumption	• Reduce potable water consumption by 26% by FY2020 (using FY 2007 baseline). • Reduce industrial, landscaping, and agricultural water use by 20% by FY 2020 (using FY 2010 baseline).
	Energy/Water/Waste	• Ensure 95% of new contract actions are energy- and water-efficient, bio-based, environmentally preferable, generally non-toxic, and contain recycled content.
	Solid Waste	• Divert at least 50% non-hazardous solid waste and 50% construction and demolition debris by end of FY 2015. • Reduce paper use and increase composting.
DOD*	Energy Efficiency	• Reduce fossil fuel-generated energy consumption by 100% in new/renovated buildings by 2030. • Reduce facility energy intensity by 30% by FY 2015 and 37.5% by FY 2020 (using FY 2003 baseline). • 15% of existing buildings should conform to the Guiding Principles for High Performance and Sustainable Buildings by FY2015 and through FY2020.
	Renewable Energy	• Reduce all energy consumed by 25% by 2025. • Reduce fossil fuel use. • Produce/procure energy (at least 20% of electricity consumed) from renewable sources by FY 2020.
	Energy/Water/Waste	• 95% compliance with mandatory Federal green procurement programs in procurement transactions.
	Water Consumption	• Improve water resources management. • Reduce facility potable water consumption intensity by 26% from FY 2007 to FY 2020. • Reduce industrial and irrigation water consumption by 20% from FY 2010 to FY 2020. • Maintain predevelopment hydrology (to the maximum extent technically feasible) for all development projects of 5,000 ft^2 or greater.
	Solid waste	• Divert 50% of non-hazardous solid waste by FY 2015 and through FY 2020. • Divert 60% of construction and demolition debris by FY 2015 and through FY 2020. • Implementing policies to reduce the use of printing paper by FY 2014.

Note: * DOD goals are from various documents including energy reduction goals from *DOD Energy Manager's Handbook* (25 August 2005), renewable energy voluntary goal from the National Defense Authorization Act of 2007, and numeric goals from *DOD Strategic Sustainability Performance Plan* (1 October 2011) (FHL 2013a).

Land Use

The term "land use" refers to real property classifications that indicate either natural conditions or the types of human activities occurring on a defined parcel of land. In many cases, land use descriptions are codified in local zoning laws. However, there is no nationally recognized convention or uniform terminology for describing land use categories.

The Army uses the 12 land use types for installation land use planning, and these land use types roughly parallel those employed by municipalities in the civilian sector.

Air Quality

The Clean Air Act (CAA) of 1970, and Amendments of 1977 and 1990, recognizes that increases in air pollution result in danger to public health and welfare. To protect and enhance the quality of the Nation's air resources, the CAA authorizes the U.S. Environmental Protection Agency (USEPA) to set six National Ambient Air Quality Standards (NAAQS) which regulate carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter pollution emissions. The CAA seeks to reduce or eliminate the creation of pollutants at their source, and designates this responsibility to state and local governments. States are directed to utilize financial and technical assistance and leadership from the Federal government to develop implementation plans to achieve NAAQS. Geographic areas are officially designated by the USEPA as being in attainment or nonattainment for pollutants in relation to their compliance with NAAQS. Geographic regions established for air quality planning purposes are designated as Air Quality Control Regions (AQCRs). Pollutant concentration levels are measured at designated monitoring stations within the AQCR. An area with insufficient monitoring data is designated as unclassified. Section 309 of the CAA authorizes USEPA to review and comment on impact statements prepared by other agencies.

An agency should consider what effect an action might have on NAAQS due to short-term increases in air pollution during construction and long-term increases resulting from changes in traffic patterns. For actions in attainment areas, a Federal agency could also be subject to USEPA's Prevention of Significant Deterioration (PSD) regulations. These regulations apply to new major stationary sources and modifications to such sources. Although few agency facilities will actually emit pollutants, increases in pollution can result from a change in traffic patterns or volume. Section 118 of the CAA waives Federal immunity from complying with the CAA and states all Federal agencies will comply with all Federal- and state-approved requirements.

The General Conformity Rule requires that any Federal action meet the requirements of a State Implementation Plan (SIP) or Federal Implementation Plan. More specifically, CAA conformity is ensured when a Federal action does not cause a new violation of the NAAQS; contribute to an increase in the frequency or severity of violations of NAAQS; or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

The General Conformity Rule applies only to actions in nonattainment or maintenance areas and considers both direct and indirect emissions. The rule applies only to Federal actions that are considered "regionally significant" or where the total emissions from the action meet or exceed the *de minimis* thresholds presented in 40 Code of Federal Regulations (CFR) 93.153. If a Federal action does not meet or exceed the *de minimis* thresholds and is not considered regionally significant, then a full Conformity Determination is not required.

On May 13, 2010, the USEPA issued the Greenhouse Gas (GHG) Tailoring Rule that sets thresholds for GHG emissions from large stationary sources. The new GHG emissions thresholds for large stationary

sources define when permits under the New Source Review Prevention of PSD and Title V Operating Permit programs are required for new and existing industrial facilities. Large industrial facilities that have CAA permits for non-GHG emissions must also include GHGs in these permits. All new construction or renovations that increase GHG emissions by 75,000 tons of carbon dioxide or equivalent per year or more are required to obtain construction permits for GHG emissions. Operating permits are needed by all sources that emit GHGs above 75,000 tons of carbon dioxide or equivalent per year.

Geological Resources

Recognizing that millions of acres per year of prime farmland are lost to development, Congress passed the Farmland Protection Policy Act (FPPA) to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland (7 CFR Part 658). Prime farmland is described as soils that have a combination of soil and landscape properties that make them highly suitable for cropland, such as high inherent fertility, good water-holding capacity, and deep or thick effective rooting zones, and that are not subject to periodic flooding. Under the FPPA, agencies are encouraged to conserve prime or unique farmlands when alternatives are practicable. Some activities that are not subject to the FPPA include Federal permitting and licensing, projects on land already in urban development or used for water storage, construction for national defense purposes, or construction of new minor secondary structures such as a garage or storage shed.

Water Resources

The Clean Water Act (CWA) of 1977 is an amendment to the Federal Water Pollution Control Act of 1972, is administered by USEPA, and sets the basic structure for regulating discharges of pollutants into U.S. waters. The CWA requires USEPA to establish water quality standards for specified contaminants in surface waters and forbids the discharge of pollutants from a point source into navigable waters without a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits are issued by USEPA or the appropriate state if it has assumed responsibility. Section 404 of the CWA establishes a Federal program to regulate the discharge of dredge and fill material into waters of the United States. Section 404 permits are issued by the U.S. Army Corps of Engineers (USACE). Waters of the United States include interstate and intrastate lakes, rivers, streams, and wetlands that are used for commerce, recreation, industry, sources of fish, and other purposes. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Each agency should consider the impact on water quality from actions such as the discharge of dredge or fill material into U.S. waters from construction, or the discharge of pollutants as a result of facility occupation.

Section 303(d) of the CWA requires states and USEPA to identify waters not meeting state water quality standards and to develop Total Maximum Daily Loads (TMDLs). A TMDL is the maximum amount of a pollutant that a waterbody can receive and still be in compliance with state water quality standards. After determining TMDLs for impaired waters, states are required to identify all point and nonpoint sources of pollution in a watershed that are contributing to the impairment and to develop an implementation plan that will allocate reductions to each source to meet the state standards. The TMDL program is currently the Nation's most comprehensive attempt to restore and improve water quality. The TMDL program does not explicitly require the protection of riparian areas. However, implementation of the TMDL plans typically calls for restoration of riparian areas as one of the required management measures for achieving reductions in nonpoint source pollutant loadings.

The Coastal Zone Management Act (CZMA) of 1972 declares a national policy to preserve, protect, and develop, and, where possible, restore or enhance the resources of the Nation's coastal zone. The coastal zone refers to the coastal waters and the adjacent shorelines, including islands, transitional and intertidal areas, salt marshes, wetlands, and beaches, including the Great Lakes. The CZMA encourages states to exercise their full authority over the coastal zone through the development of land and water use

programs in cooperation with Federal and local governments. States may apply for grants to help develop and implement management programs to achieve wise use of the land and water resources of the coastal zone. Under Section 307, Federal agency activities that affect any land or water use or natural resource of a coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the state's coastal management program.

The Safe Drinking Water Act (SDWA) of 1974 establishes a Federal program to monitor and increase the safety of all commercially and publicly supplied drinking water. Congress amended the SDWA in 1986, mandating dramatic changes in nationwide safeguards for drinking water and establishing new Federal enforcement responsibility on the part of USEPA. The 1986 amendments to the SDWA require USEPA to establish Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs), and Best Available Technology (BAT) treatment techniques for organic, inorganic, radioactive, and microbial contaminants; and turbidity. MCLGs are maximum concentrations below which no negative human health effects are known to exist. The 1996 amendments set current Federal MCLs, MCLGs, and BATs for organic, inorganic, microbiological, and radiological contaminants in public drinking water supplies.

The Wild and Scenic Rivers Act of 1968 provides for a wild and scenic river system by recognizing the remarkable values of specific rivers of the Nation. These selected rivers and their immediate environment are preserved in a free-flowing condition, without dams or other construction. The policy not only protects the water quality of the selected rivers but also provides for the enjoyment of present and future generations. Any river in a free-flowing condition is eligible for inclusion, and can be authorized as such by an Act of Congress, an act of state legislature, or by the Secretary of the Interior upon the recommendation of the governor of the state(s) through which the river flows.

EO 11988, *Floodplain Management* (May 24, 1977), directs agencies to consider alternatives to avoid adverse effects and incompatible development in floodplains. An agency may locate a facility in a floodplain if the head of the agency finds there is no practicable alternative. If it is found there is no practicable alternative, the agency must minimize potential harm to the floodplain, and circulate a notice explaining why the action is to be located in the floodplain prior to taking action. Finally, new construction in a floodplain must apply accepted floodproofing and flood protection to include elevating structures above the base flood level rather than filling in land.

EO 11990, *Protection of Wetlands* (May 24, 1977), directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (October 5, 2009), directed the USEPA to issue guidance on Section 438 of the EISA. The EISA establishes into law new storm water design requirements for Federal construction projects that disturb a footprint of greater than 5,000 square feet of land. Under these requirements, predevelopment site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Predevelopment hydrology would be calculated and site design would incorporate storm water retention and reuse technologies to the maximum extent technically feasible. Post-construction analyses will be conducted to evaluate the effectiveness of the as-built storm water reduction features. These regulations are applicable to DOD Unified Facilities Criteria. Additional guidance is provided in the USEPA's *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*.

EO 13514 also requires Federal agencies to improve water efficiency and management by reducing potable water consumption intensity by 2 percent annually, or by 26 percent, by Fiscal Year (FY) 2020, relative to a FY 2007 baseline. Furthermore, Federal agencies must also reduce agency industrial, landscaping, and agricultural water consumption by 2 percent annually, or 20 percent, by FY 2020, relative to a FY 2010 baseline.

Biological Resources

The Endangered Species Act (ESA) of 1973 establishes a Federal program to conserve, protect, and restore threatened and endangered plants and animals and their habitats. The ESA specifically charges 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 an endangered or threatened species or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption. The Secretary of the Interior, using the best available scientific data, determines which species are officially endangered or threatened, and the U.S. Fish and Wildlife Service (USFWS) maintains the list. A list of Federal endangered species can be obtained from the Endangered Species Division, USFWS (703-358-2171). States might also have their own lists of threatened and endangered species which can be obtained by calling the appropriate State Fish and Wildlife office. Some species also have laws specifically for their protection (e.g., Bald Eagle Protection Act).

MBTA of 1918, as amended, implements treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Unless otherwise permitted by regulations, the MBTA makes it unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess; offer to or sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. The MBTA also makes it unlawful to ship, transport, or carry from one state, territory, or district to another; or through a foreign country, any bird, part, nest, or egg that was captured, killed, taken, shipped, transported, or carried contrary to the laws from where it was obtained; and import from Canada any bird, part, nest, or egg obtained contrary to the laws of the province from which it was obtained. The U.S. Department of the Interior has authority to arrest, with or without a warrant, a person violating the MBTA.

The Sikes Act (16 U.S.C. 670a-670o, 74 Stat. 1052), as amended, Public Law (P.L.) 86-797, approved September 15, 1960, provides for cooperation by the Departments of the Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States. In November 1997, the Sikes Act was amended via the Sikes Act Improvement Amendment (P.L. 105-85, Division B, Title XXIX) to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate this program, the amendments require the Secretaries of the military departments to prepare and implement Integrated Natural Resources Management Plans (INRMPs) for each military installation in the United States unless the absence of significant natural resources on a particular installation makes preparation of a plan for the installation inappropriate. INRMPs must be reviewed by the USFWS and applicable states every 5 years. The National Defense Authorization Act of 2004 modified Section 4(a) (3) of the ESA to preclude the designation of critical habitat on DOD lands that are subject to an INRMP, if the Secretary of the Interior determines in writing that such a plan provides a benefit to the species for which critical habitat is proposed for designation.

EO 11514, *Protection and Enhancement of Environmental Quality* (March 5, 1970), states that the President, with assistance from the Council on Environmental Quality (CEQ), will lead a national effort to provide leadership in protecting and enhancing the environment for the purpose of sustaining and

enriching human life. Federal agencies are directed to meet national environmental goals through their policies, programs, and plans. Agencies should also continually monitor and evaluate their activities to protect and enhance the quality of the environment. Consistent with NEPA, agencies are directed to share information about existing or potential environmental problems with all interested parties, including the public, in order to obtain their views.

EO 13112, *Invasive Species* (February 3, 1999), provides direction to use relevant programs and authorities to prevent introduction of invasive species, detect and respond rapidly to control populations of invasive species, monitor invasive species populations, provide restoration of native species and habitat conditions in ecosystems that have been invaded, conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species, and promote public education on invasive species with means to address them. EO 13112 was created to minimize the economic, ecological, and human health impacts that invasive species cause.

EO 13186, *Conservation of Migratory Birds* (January 10, 2001), creates a more comprehensive strategy for the conservation of migratory birds by the Federal government. EO 13186 provides a specific framework for the Federal government's compliance with its treaty obligations to Canada, Mexico, Russia, and Japan. EO 13186 provides broad guidelines on conservation responsibilities and requires the development of more detailed guidance in a Memorandum of Understanding (MOU). EO 13186 will be coordinated and implemented by the USFWS. The MOU will outline how Federal agencies will promote conservation of migratory birds. EO 13186 requires the support of various conservation planning efforts already in progress; incorporation of bird conservation considerations into agency planning, including NEPA analyses; and reporting annually on the level of take of migratory birds.

Cultural Resources

The American Indian Religious Freedom Act of 1978 and Amendments of 1994 recognize that freedom of religion for all people is an inherent right, and traditional American Indian religions are an indispensable and irreplaceable part of Indian life. It also recognized the lack of Federal policy on this issue and made it the policy of the United States to protect and preserve the inherent right of religious freedom for Native Americans. The 1994 Amendments provide clear legal protection for the religious use of peyote cactus as a religious sacrament. Federal agencies are responsible for evaluating their actions and policies to determine if changes should be made to protect and preserve the religious cultural rights and practices of Native Americans. These evaluations must be made in consultation with native traditional religious leaders.

The Archaeological Resource Protection Act (ARPA) of 1979 protects archaeological resources on public and American Indian lands. It provides felony-level penalties for the unauthorized excavation, removal, damage, alteration, or defacement of any archaeological resource, defined as material remains of past human life or activities which are at least 100 years old. Before archaeological resources are excavated or removed from public lands, the Federal land manager must issue a permit detailing the time, scope, location, and specific purpose of the proposed work. ARPA also fosters the exchange of information about archaeological resources between governmental agencies, the professional archaeological community, and private individuals. ARPA is implemented by regulations found in 43 CFR Part 7.

The National Historic Preservation Act (NHPA) of 1966 sets forth national policy to identify and preserve properties of state, local, and national significance. The NHPA establishes the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), and the National Register of Historic Places (NRHP). The ACHP advises the President, Congress, and Federal agencies on historic preservation issues. Section 106 of the NHPA directs Federal agencies to take into account effects of their undertakings (actions and authorizations) on properties included in or eligible for the NRHP.

Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally owned cultural properties. Section 106 of the act is implemented by regulations of the ACHP, 36 CFR Part 800. Agencies should coordinate studies and documents prepared under Section 106 with NEPA where appropriate. However, NEPA and NHPA are separate statutes and compliance with one does not constitute compliance with the other. For example, actions which qualify for a categorical exclusion under NEPA might still require Section 106 review under NHPA. It is the responsibility of the agency official to identify properties in the area of potential effects, and whether they are included or eligible for inclusion in the NRHP. Section 110 of the NHPA requires Federal agencies to identify, evaluate, and nominate historic property under agency control to the NRHP.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 establishes rights of American Indian tribes to claim ownership of certain "cultural items," defined as Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony, held or controlled by Federal agencies. Cultural items discovered on Federal or tribal lands are, in order of primacy, the property of lineal descendants, if these can be determined, and then the tribe owning the land where the items were discovered or the tribe with the closest cultural affiliation with the items. Discoveries of cultural items on Federal or tribal land must be reported to the appropriate American Indian tribe and the Federal agency with jurisdiction over the land. If the discovery is made as a result of a land use, activity in the area must stop and the items must be protected pending the outcome of consultation with the affiliated tribe.

EO 11593, *Protection and Enhancement of the Cultural Environment* (May 13, 1971), directs the Federal government to provide leadership in the preservation, restoration, and maintenance of the historic and cultural environment. Federal agencies are required to locate and evaluate all Federal sites under their jurisdiction or control which might qualify for listing on the NRHP. Agencies must allow the ACHP to comment on the alteration, demolition, sale, or transfer of property which is likely to meet the criteria for listing as determined by the Secretary of the Interior in consultation with the SHPO. Agencies must also initiate procedures to maintain federally owned sites listed on the NRHP.

EO 13007, *Indian Sacred Sites* (May 24, 1996), provides that agencies managing Federal lands, to the extent practicable, permitted by law, and not inconsistent with agency functions, shall accommodate American Indian religious practitioners' access to and ceremonial use of American Indian sacred sites, shall avoid adversely affecting the physical integrity of such sites, and shall maintain the confidentiality of such sites. Federal agencies are responsible for informing tribes of proposed actions that could restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites.

EO 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000), was issued to provide for regular and meaningful consultation and collaboration with Native American tribal officials in the development of Federal policies that have tribal implications, and to strengthen the United States government-to-government relationships with Native American tribes. EO 13175 recognizes the following fundamental principles: Native American tribes exercise inherent sovereignty over their lands and members, the United States government has a unique trust relationship with Native American tribes and deals with them on a government-to-government basis, and Native American tribes have the right to self-government and self-determination.

EO 13287, *Preserve America* (March 3, 2003), orders Federal agencies to take a leadership role in protection, enhancement, and contemporary use of historic properties owned by the Federal government, and promote intergovernmental cooperation and partnerships for preservation and use of historic properties. EO 13287 established new accountability for agencies with respect to inventories and stewardship.

Socioeconomics and Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), directs Federal agencies to make achieving environmental justice part of their mission. Agencies must identify and address the adverse human health or environmental effects that its activities have on minority and low-income populations, and develop agencywide environmental justice strategies. The strategy must list "programs, policies, planning and public participation processes, enforcement, and/or rulemakings related to human health or the environment that should be revised to promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations, ensure greater public participation, improve research and data collection relating to the health of and environment of minority populations and low-income populations, and identify differential patterns of consumption of natural resources among minority populations and low-income populations." A copy of the strategy and progress reports must be provided to the Federal Working Group on Environmental Justice. Responsibility for compliance with EO 12898 is with each Federal agency.

Hazardous Materials and Waste

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 authorizes USEPA to respond to spills and other releases of hazardous substances to the environment, and authorizes the National Oil and Hazardous Substances Pollution Contingency Plan. CERCLA also provides a Federal "Superfund" to respond to emergencies immediately. Although the "Superfund" provides funds for cleanup of sites where potentially responsible parties cannot be identified, USEPA is authorized to recover funds through damages collected from responsible parties. This funding process places the economic burden for cleanup on polluters. Section 120(h) of CERCLA requires Federal agencies to notify prospective buyers of contaminated Federal properties about the type, quantity, and location of hazardous substances that would be present.

The Pollution Prevention Act (PPA) of 1990 encourages manufacturers to avoid the generation of pollution by modifying equipment and processes; redesigning products; substituting raw materials; and making improvements in management techniques, training, and inventory control. Consistent with pollution prevention principles, EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (January 24, 2007 [revoking EO 13148]), sets a goal for all Federal agencies to promote environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products; and use of paper of at least 30 percent post-consumer fiber content. In addition, EO 13423 sets a goal that requires Federal agencies to ensure that they reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of; increase diversion of solid waste, as appropriate; and maintain cost-effective waste prevention and recycling programs at their facilities. Additionally, in *Federal Register* Volume 58 Number 18 (January 29, 1993), CEQ provides guidance to Federal agencies on how to "incorporate pollution prevention principles, techniques, and mechanisms into their planning and decisionmaking processes and to evaluate and report those efforts, as appropriate, in documents pursuant to NEPA."

The Resource Conservation and Recovery Act (RCRA) of 1976 is an amendment to the Solid Waste Disposal Act. RCRA authorizes USEPA to provide for "cradle-to-grave" management of hazardous waste and sets a framework for the management of nonhazardous municipal solid waste. Under RCRA, hazardous waste is controlled from generation to disposal through tracking and permitting systems, and restrictions and controls on the placement of waste on or into the land. Under RCRA, a waste is defined as hazardous if it is ignitable, corrosive, reactive, toxic, or listed by USEPA as being hazardous. With the Hazardous and Solid Waste Amendments (HSWA) of 1984, Congress targeted stricter standards for waste disposal and encouraged pollution prevention by prohibiting the land disposal of particular wastes. The

HSWA strengthens control of both hazardous and nonhazardous waste and emphasizes the prevention of pollution of groundwater.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 mandates strong clean-up standards and authorizes USEPA to use a variety of incentives to encourage settlements. Title III of SARA authorizes the Emergency Planning and Community Right to Know Act (EPCRA), which requires facility operators with "hazardous substances" or "extremely hazardous substances" to prepare comprehensive emergency plans and to report accidental releases. If a Federal agency acquires a contaminated site, it can be held liable for cleanup as the property owner/operator. A Federal agency can also incur liability if it leases a property, as the courts have found lessees liable as "owners." However, if the agency exercises due diligence by conducting a Phase I Environmental Site Assessment, it can claim the "innocent purchaser" defense under CERCLA. According to Title 42 United States Code (U.S.C.) 9601(35), the current owner/operator must show it undertook "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" before buying the property to use this defense.

The Toxic Substance Control Act (TSCA) of 1976 consists of four titles. Title I established requirements and authorities to identify and control toxic chemical hazards to human health and the environment. TSCA authorized USEPA to gather information on chemical risks, require companies to test chemicals for toxic effects, and regulate chemicals with unreasonable risk. TSCA also singled out polychlorinated biphenyls (PCBs) for regulation, and, as a result, PCBs are being phased out. PCBs are persistent when released into the environment and accumulate in the tissues of living organisms. They have been shown to cause adverse health effects on laboratory animals and could cause adverse health effects in humans. TSCA and its regulations govern the manufacture, processing, distribution, use, marking, storage, disposal, clean-up, and release reporting requirements for numerous chemicals like PCBs. TSCA Title II provides statutory framework for "Asbestos Hazard Emergency Response," which applies only to schools. TSCA Title III, "Indoor Radon Abatement," states indoor air in buildings of the United States should be as free of radon as the outside ambient air. Federal agencies are required to conduct studies on the extent of radon contamination in buildings they own. TSCA Title IV, "Lead Exposure Reduction," directs Federal agencies to "conduct a comprehensive program to promote safe, effective, and affordable monitoring, detection, and abatement of lead-based paint and other lead exposure hazards." Further, any Federal agency having jurisdiction over a property or facility must comply with all Federal, state, interstate, and local requirements concerning lead-based paint.

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APPENDIX B

INTERAGENCY COORDINATION AND PUBLIC INVOLVEMENT

August 11, 2014

FROM: U.S. Army Garrison Fort Hunter Liggett
California Avenue, Building 238
Fort Hunter Liggett, CA 93928-7000

Subject: Environmental Assessment (EA) Addressing Implementation of a Net Zero Program at Fort Hunter Liggett, California and Draft Finding of No Significant Impact (FNSI)

Dear Interested Party,

Fort Hunter Liggett proposes to implement a net zero program at Fort Hunter Liggett. The Proposed Action consists of the implementation of a series of policies, procedures, best management practices, and proposed projects, some of which are possibly related or interconnected, that would be necessary for Fort Hunter Liggett to become net zero for energy, water, and waste.

We request your participation and solicit comments on the attached EA and Draft FNSI for this Proposed Action. Please provide your comments no later than 30 days from receipt of this correspondence. Comments may include any issues or concerns related to the Proposed Action.

The EA and Draft FNSI are also available for review at the following Web site: http://www.liggett.army.mil/sites/dpw/environmental.asp, and at the following locations: Fort Hunter Liggett Library, Building 291, Room 3, 7th Division Road, Fort Hunter Liggett, Jolon, CA 93928; Monterey County Free Library, Buena Vista Branch, 18250 Tara Drive, Salinas, CA 93908; and Monterey County Free Library, King City Branch, 402 Broadway Avenue, King City, CA 93930.

Please provide any comments or information within 30 days from receipt of this correspondence to Liz Clark, Fort Hunter Liggett Environmental Office, 233 California Avenue, Fort Hunter Liggett, CA 93928-7090 or e-mail to elizabeth.r.clark14civ@mail.mil.

Sincerely,

HDR
David Boyes
Project Manager

Attachments:
EA and Draft FNSI
Distribution List

Environmental Assessment Distribution List

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San Francisco Region
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California State Clearinghouse
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Sacramento, CA 95812-3044

Regional Water Quality Control Board
Central Coast Region 3
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

Pinnacles National Park (NPS)
Park Headquarters
5000 Hwy 146
Paicines, CA 95043

APPENDIX C

RENEWABLE ENERGY TECHNOLOGIES

Appendix C

Renewable Energy Technologies

The following renewable energy technologies could be implemented by FHL in order to achieve net zero for energy. These descriptions are from Appendix B of the Army Net Zero Programmatic EA (U.S. Army 2012).

Photovoltaic Systems

Photovoltaic (PV) systems are based on the use of semiconductors, materials that can generate small amounts of electric current when exposed to sunlight. Semiconductors are materials that hold their bonding electrons tightly in covalent bonds (and therefore act as insulators in their pure state), but that have conducting properties when combined with small amounts of impurities called dopants. Currently, silicon-based solar cells that have efficiencies of about 15 percent are likely to be used in utility-scale PV facilities built in the United States; however, multi-junction solar cells that contain two or more semiconductors and can increase efficiency to 30 percent or greater will likely be used in utility-scale PV facilities in the future. Another means of increasing efficiency is to use concentrating lenses (also known as concentrating PV technology [CPV]) and tracking systems to capture additional energy from the sun over longer periods of daylight. To produce electricity at utility scale, many individual solar cells are connected as a module; modules are combined to make individual solar panels; and solar panels are grouped into arrays that produce direct current (DC) electricity.

The power-producing components of utility-scale PV facilities are the solar field, which contains the PV panels, and the power conditioning system (PCS), which contains an inverter to convert the produced DC to AC and a transformer to boost voltage for feeding into the power grid. The PCS also contains devices that can sense grid destabilization and automatically disconnect the PV facility from the grid, if needed.

PV technologies can be grouped into two types of systems: flat-plate and concentrating systems. The solar cell materials in either system are typically a thin film in a weather-resistant enclosure. The two systems differ in the manner in which they capture sunlight and direct it to the solar cell materials. In flat-plate systems, the modules are placed in the solar field, either in a fixed position optimal for capturing sunlight, or on a tracking system that follows the Sun's path to optimize power production. CPV systems use silicon solar cells or high-performance multi-junction solar cells (typically made of aluminum, gallium, indium, nitrogen, phosphorus, antimony) and use concentrating or reflecting optical devices to concentrate sunlight that strikes the solar cells. They also usually incorporate tracking devices. Because of their higher efficiency, CPV systems also generate excess heat, which may require cooling systems to dissipate the heat (e.g., passive cooling fins; active forced air cooling or water cooling).

Concentrating Solar Power

Concentrating solar power (CSP) is sometimes referred to as solar thermal electric or thermoelectric power since all variations are designed to convert the Sun's energy to heat and then apply that heat in various ways to produce electricity. CSP can be very water intensive, so regional water availability will be a key consideration of whether the technology is appropriate in a specific setting. CSP technologies are distinguished by three basic design architectures for reflecting and concentrating solar energy:

Line-focus systems that concentrate solar energy along a line-shaped receiver, typically an oil-filled pipe positioned at the focus of parabolic-shaped reflectors (parabolic trough systems) or flat mirrors using Fresnel lenses as concentrators

Point-focus systems that concentrate solar energy to a point-receiver by means of flat plate mirrors focusing reflected light on a receiver located at the top of a centrally located tower (solar power tower systems)

Point-focus systems that use a parabolic-shaped reflector dish to focus the sun's energy on a point-receiver at which is located the gas-filled chamber of an external heat engine (solar dish engines).

To produce heat, all CSP technologies use direct normal insolation; that is, sunlight that directly strikes the reflecting/concentrating surface, rather than global sunlight that also includes sunlight that has been refracted or diffused by clouds, airborne dusts, or the ground. Thus, for optimal performance, the reflective surfaces of CSP technologies must track the Sun (keeping the Sun's incident rays perpendicular to the reflecting surface), and reflectors and/or concentrators must exhibit good optical characteristics.

Parabolic trough and solar power tower CSP systems will typically use a heat-transfer fluid (usually synthetic oil in the case of parabolic trough facilities and molten salt in the case of power tower facilities) to transfer the heat generated at the solar collectors to a heat exchanger where steam is produced to drive a conventional Steam Turbine-Generator (STG). The Compact Linear Fresnel system dispenses with the heat-transfer fluid, making steam directly at the solar field for delivery to the STG. The power block of a solar thermal facility containing the STG and other related power-generating and power management equipment is virtually identical in both form and function to the power block of fossil fuel and nuclear power plants that also use steam to produce electricity. The solar dish engine is unique among CSP technologies in that it uses the Sun's heat not to produce steam but to expand a gas, generating mechanical energy in the form of angular momentum (torque) as that gas acts on the piston of a Stirling-type external heat engine, which then directly drives an electric generator or alternator. Although all CSP systems rely on their ability to collect and concentrate the Sun's energy and convert it to heat, point-focus systems such as solar power towers and solar dish engines can attain greater degrees of concentration of the Sun's energy and thus can be designed to operate at higher temperatures than parabolic troughs. These higher temperatures generally equate to greater overall system power and efficiency.

A thermoelectric technology alternative to steam uses Organic Rankine Cycle (ORC) turbines coupled to conventional generators. ORC turbines use heat (vs. an external steam source) to boil an organic working fluid contained in the reservoir of a closed system, allowing the resulting hot expanding vapors of the working fluid to drive the turbine-generator set. The working fluid loses sufficient thermal energy to return to its liquid state, and, after further cooling, it is returned to its reservoir, allowing the process to repeat. ORC turbines have many industrial applications, recovering otherwise wasted heat and converting it to electrical power or mechanical energy. Their advantages include: the ability to produce power from relatively minor sources of heat, minimal internal corrosion issues due to the absence of water, thermal efficiencies as high as 85 percent, and extended mechanical life due to relatively slower rotational speeds than conventional STGs. More importantly for CSP applications in water-deprived locations, ORC turbines require substantially less water than conventional STGs.

An option to increase reliability of power production for parabolic trough and power tower technologies is to use some form of energy storage (e.g., storage as chemical energy in a chemical or galvanic battery; compressed air/pneumatic battery). However, these energy storage options are impractical and inefficient for adaptation to CSP facilities. Because the form of energy initially captured and controlled in these facilities is heat, thermal energy storage opportunities are both technically feasible and efficient additions

to parabolic trough and power tower CSP facilities. Because solar dish engine systems do not produce steam, they cannot be easily hybridized with thermal energy storage. Adding thermal energy storage capabilities allows a portion of the heat generated during periods of greatest solar insolation to be diverted to storage for later use rather than being used immediately to produce steam. Simple salts with high heat capacities have been found to act as excellent heat storage media.

Fuel Cells

Fuel cells are electro-chemical devices that act as fully-charged batteries while they are supplied with fuel. Fuel cells convert fuels (e.g., natural gas, propane, hydrogen, landfill gas, biogas) directly to electricity. This process is highly efficient and produces extremely low criteria pollutants. Fuel cell systems have been on the market since the early 1990s, and U.S. manufacturers produce systems ranging from 100 to 1,400 kilowatt (kW) for large stationary applications. These large fuel cell systems typically operate on natural gas and produce electricity and heat or cooling. By using a low-intensity carbon fuel (e.g., natural gas) and by using both the electricity and waste heat, fuel cell systems can often reduce emissions by 20-50 percent as compared to energy supplied from the grid. In remote locations, fuel cells can operate with delivered fuel (e.g., LPG). High efficiency leads to less fuel deliveries required for electric heating and cooling.

Another fuel cell market segment produces small 2-10 kW systems for backup power (e.g., for telecommunications). These systems use hydrogen as fuel, which is typically delivered but can also be made with on-site electrolyzers. This type of system also provides options for energy storage to balance renewables such as solar and wind power.

Besides stationary applications, fuel cells are also mobile. Fuel-cell powered vehicles are ultra-quiet as they have all electric drives, have similar driving range as conventional gasoline vehicles, and have very low thermal signatures due to ultra-high efficiency drives. Fuel efficiency for sports utility vehicle-sized vehicles ranges from 45 to 68 miles per gallon of gasoline equivalent (on energy basis).

Fuel cells are also penetrating the materials-handling market by replacing lead acid batteries on fork lift trucks. They allow quick refueling instead of battery replacements and charging, which allows higher productivity, lower GHG emissions, and the ability to work in both indoor and cold environments.

Ground Source Heat Pumps

Ground source heat pumps (GSHPs) use the constant temperature of the ground to heat or cool buildings instead of the outside air temperature. GSHP systems are generally composed of geothermal heat pumps, fluid circulating pumps, and a buried ground loop heat exchanger usually composed of plastic pipe. In the summer, GSHPs extract heat from buildings and transfer it to the circulating fluid in the cooler ground loop system. In the winter, fluid circulating in the ground loop system absorbs heat from the ground and transfers it to the GSHPs. The GSHPs then extract the heat from the fluid, which is then used to increase the temperature of the air transported to the buildings. Implementation would require the installation of multiple GSHP units within each building. The location of the units within each building would be dependent upon the thermal and occupancy zoning requirements of each building. The number of wells would be based on the dominant load condition (i.e., heating or cooling) of each building. Each building would require the design and installation of new supply air ductwork.

Waste-to-Energy

Waste-to-energy (WTE) is the process by which solid waste material (typically municipal solid waste) is converted into energy through various processes. The primary WTE technologies include:

Mass Burn. This is the most proven technology, using standard combustion techniques. Waste materials are delivered to the facility using collection trucks, each carrying 13 to 14 tons of municipal solid waste, or transfer trucks carrying approximately 24 tons of municipal solid waste each. The waste is transported to a receiving area, kept at a slight negative pressure to minimize the release of odors to the surrounding areas. Large appliances or other non-combustible materials are removed and the remaining waste is fed into a chute that directs the waste into a furnace. In the furnace, the waste is either combusted on a grate or in a fluidized bed to release energy in the form of heat. The gaseous and particulate products of the combustion reaction pass through several stages of emissions controls to meet USEPA air emissions standards. The heat released from the combustion of the fuel is transferred to water in the boiler to make steam that drives a steam turbine to produce electricity or is used for various heating applications.

High-Temperature Gasification. This is an emerging WTE technology in which fuel is heated in a limited-oxygen environment. Waste materials are delivered and stockpiled in a similar manner as mass burn systems. These facilities are typically smaller in scale and the rate of feedstock delivery much smaller. They are also more likely to include sorting of feedstock to remove recyclable materials and help provide a more homogeneous fuel. The non-recyclable material is fed into the gasification chamber using an auger feed mechanism. Once in the chamber, the fuel is heated and a portion of the fuel is combusted, using the small amount of oxygen present. This exothermic reaction releases heat necessary to produce endothermic reactions that produce a synthetic gas, or syngas, made up primarily of hydrogen and carbon monoxide. The syngas can be used in several ways, such as the following:

- *Steam Creation.* Syngas can be combusted to create heat for converting water to steam, which drives a steam turbine to generate electricity.
- *Direct Motive Force.* Syngas can be cooled and cleaned for use as fuel for an internal combustion engine or gas turbine, either of which can coupled to a generator for electricity production.
- *Liquid Fuel Conversion.* Cooled and cleaned syngas can be converted to various liquid fuels using the Fischer-Tropsch process, a series of chemical reactions occurring from introduction of a catalyst to the syngas.
- *Energy Storage.* Syngas can be stored for later use or transferred to another location.

Anaerobic Digestion. This is an emerging WTE technology using biologic methods to process waste materials. The feedstock collection and processes for anaerobic digestion are the same as discussed for mass burn and gasification. The importance of sorting materials is higher for anaerobic digestion than other WTE technologies. As such, manual or automatic sorting of materials is typically the first step, removing inorganic materials and recycling those materials with value. The organic materials are placed into a digester, where microorganisms break down the material and release a biogas high in methane. The resulting biogas is captured and serves several purposes, including the following:

- *Steam Creation.* The biogas can be combusted to provide heat for steam to drive a turbine, coupled to a generator for power production.
- *Motive Force.* The biogas can be conditioned and serve as fuel for an internal combustion engine or gas turbine, linked to an electrical generator for power production.
- *Energy Storage.* The biogas can be stored for later use or transferred to another location.

Solar Thermal Heating and Cooling

These systems differ by the type of collector used to gather and store solar energy. There are three basic types of liquid collector systems: flat plate, evacuated, and concentrating. Air collectors use air as the working fluid for absorbing and transferring solar energy. Technologies include the following:

Glazed and Unglazed Flat Plate Collectors. Flat plate collectors are the simplest and most common type of collector, designed to heat water or another fluid to medium temperatures (i.e., approximately 140 degrees Fahrenheit [°F]). This collector generally consists of a thin flat-plate absorber sheet that intercepts and absorbs solar energy. The absorber may have a selective coating or it may be chemically coated to increase its solar absorption capacity. Copper pipes or tubes wind back and forth across the absorber and carry fluid through the flat plate collector. Often the pipes are painted black and bonded to the material of the flat plate collector to maximize heat absorption. The collector is covered with glass, or "glazing," that allows solar energy to pass through but reduces heat loss from the absorber. As heat builds up in the collector, it heats the fluid passing through the pipes. "Unglazed" flat plate collectors without the glass covering are best suited for low temperature applications, such as heating swimming pools. While these unglazed collectors capture a larger portion of the Sun's energy, they lose a large portion of the absorbed heat because they are not insulated with a covering. Unglazed collectors are substantially less expensive than glazed systems.

Evacuated Tube Collectors. Evacuated tube collectors produce higher temperatures (i.e., approximately 300 °F). This collector is made of parallel rows of tempered glass vacuum tubes and an absorber surface inside the tube. The absorber is surrounded by a vacuum that reduces heat losses. The glass tubes heat up the solar absorbers and, ultimately, the solar working fluid in order to heat domestic hot water, or provide space heating.

Air Collectors. Collectors for air heating systems perform the same important function as those for liquid heating systems, although they operate on a much different principle. They consist of a dark-colored, perforated façade installed on a building's south-facing wall. These systems operate by using a fan or the building's own ventilation system to draw ventilation air into the building through a perforated absorber plate on the façade and up through the airspace between the absorber and the wall.

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APPENDIX D

RECORD OF NON-APPLICABILITY

Appendix D

Record of Non-Applicability to the General Conformity Rule for a Net Zero Program at Fort Hunter Liggett, California

The Army's Proposed Action is to implement a net zero energy program for energy, water, and waste at Fort Hunter Liggett while meeting energy mandates for renewable energy production and GHG emissions reduction. In doing so, the Army will increase Fort Hunter Liggett's energy security and sustain ongoing and future military missions. General Conformity under the Clean Air Act, Section 176 has been evaluated according to the requirements of 40 CFR Part 93, Subpart B. The requirements of this rule are not applicable to the Proposed Action because:

All activities associated with the Proposed Action and alternatives are located in an area designated by the USEPA to be in attainment for all criteria pollutants.

Supported documentation and emission estimates:

( ) Are Attached
( ) Appear in the NEPA Documentation
(X) Other (Not Necessary)

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