Final Legislative Environmental Impact Statement for Military Training and Public Land Withdrawal Extension

The National Training Center

at Fort Irwin, California

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Department of the Army

Installation Management Command

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Record of Decision Legislative Environmental Impact Statement for Training and Public Land Withdrawal Extension

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Contents

Acronyms and Abbreviations

AR	Army Regulation
Army	Department of the Army
BCC	Bird of Conservation Concern
BCT	Brigade Combat Team
BLM	Bureau of Land Management
BMP	Best Management Practice
CBRN	Chemical, Biological, Radiological, and Nuclear
CFR	*Code of Federal Regulations*
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FARP	Forward Arming and Refueling Point
GAO	U.S. Government Accountability Office
I-15	Interstate 15
ICRMP	Integrated Cultural Resources Management Plan
ITAM	Integrated Training Area Management
LEIS	Legislative Environmental Impact Statement
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NTC	National Training Center
PA	Programmatic Agreement
RASA	Ready Ammunition Storage Area
ROD	Record of Decision
SHPO	State Historic Preservation Office
SPCP	Spill Prevention and Contingency Plan
SRP	Sustainable Range Program

UO	Urban Operation
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
WQO	Water Quality Order

SECTION 1

Introduction

Established in 1980, the 753,537-acre National Training Center (NTC) on Fort Irwin, California, provides training for the Army and other military branches. Because of its size, design, and terrain, the NTC is one of the few places in the world where brigade-size units (5,000+ soldiers) can test their combat readiness. Changes at the NTC are needed because training requirements of the Army evolve as new weapons and defense systems are developed, as new threats in different parts of the globe emerge, and as the tactics and technology used by enemies' change. The proposed new actions will enable the NTC to meet these evolving requirements.

In 2023, the Department of the Army (Army) prepared a *Final Legislative Environmental Impact Statement for Training and Public Land Withdrawal Extension at Fort Irwin, California* (Final LEIS), incorporated herein by reference. Fort Irwin developed this Final LEIS to serve as both a programmatic environmental impact statement (EIS) to assess the Army's future use of Fort Irwin and a LEIS to assess the effects associated with the congressional decision on whether to extend the existing land withdrawal. This Record of Decision (ROD) declares the Army's selected alternative for implementing changes in training and training infrastructure on Fort Irwin.

Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001, authorized approximately 110,000 acres of Fort Irwin training land areas to be withdrawn from all forms of appropriation under the general land laws, including mining, mineral, and geothermal leasing laws. The withdrawn land is in the Western Training Area, Eastern Training Area, and a narrow strip paralleling a utility corridor on U.S. Department of Interior Bureau of Land Management (BLM) land adjacent to the southeastern boundary of Fort Irwin (refer to Figure ES-2 of the Final LEIS). The land is entirely within the boundaries of Fort Irwin and consists of both the land and mineral rights. The Army has a continuing need for the land and will ask the U.S. Congress to extend the withdrawal for at least 25 years or place the land under the permanent control of the Army. While the Final LEIS addresses the effects of extending the land withdrawal, the decision on extending the land withdrawal is a congressional decision that is not addressed in this ROD. This ROD does, however, decide on changes in training and improvements in training infrastructure that would occur on the withdrawn land.

SECTION 2

Purpose and Need

According to Army Regulation (AR) 350-1, *Army Training and Leader Development*, the Army's mission is to build a campaign-quality, expeditionary Army capable of operating effectively with joint military branches and interagency, intergovernmental, and multinational players across the spectrum of conflict. The Army must also provide capable and ready forces to Combatant Commands in support of the National Security and National Defense Strategies. The training of Army units must address this joint context. To this end, the focus of the NTC is to assist deployable (U.S. Army Forces Command) units in preparing their soldiers and to serve as a leadership crucible before these soldiers are deployed into combat. To train soldiers to the highest degree of proficiency possible, individual and crew training must be realistic, well-managed, and aggressively executed.

As described in AR 200-1, *Environmental Protection and Enhancement*, the Army is also committed to environmental stewardship in all actions as an integral part of the Army mission and has focused efforts to conserve and preserve natural and cultural resources for future generations. The Army developed the Sustainable Range Program (SRP) (AR 350-19) to maximize the capability, availability, and accessibility of ranges and training land to support training requirements, mobilizations, and deployments. The SRP includes the G3 Integrated Training Area Management (ITAM) program, which provides the capability to manage and maintain training land by integrating mission requirements with environmental requirements and sound land management practices. Following AR 350-19, the NTC SRP created a Range Complex Master Plan to detail ITAM projects and the current status of, and planned upgrades to, range and training area infrastructure, which are necessary to meet the requirements of the National Defense Strategy; AR 350-1, *Army Training and Leader Development;* AR 350-52, *Training Support System;* AR 350-50, *Combat Training Center Program;* and AR 200-1, *Environmental Protection and Enhancement*.

In 2018, the U.S. Department of Defense released an updated National Defense Strategy emphasizing the need to rebuild readiness. The Army is shifting its focus from fighting irregular warfare or insurgencies to preparing to fight adversaries who are our military peers or near-peers. In testimony to the U.S. Congress in March 2018, then-Secretary of the Army Mark Esper described this shift:

> The Army's mission to defend the nation has not changed, but the strategic environment has. We have returned to an era of great power competition that makes the world ever more complex and dangerous. While the Army must be ready to deploy, fight, and win any time against any adversary, the National Defense Strategy has identified China and Russia as the principal competitors against which we must build sufficient capacity and capabilities.

The Army's 2019 Posture Statement, provided to Congress, stated:

> We must have an Army prepared for high-intensity conflict, modernized to extend overmatch against near-peer adversaries, and trained to fight as part of the Joint Force alongside our allies and partners, all while sustaining our ability to conduct irregular warfare.

The 2022 posture statement reiterated this requirement:

> The Army's role is to provide combatant commanders with combat-credible ground forces capable of fighting and winning in large scale combat operations. We are the backbone of the Joint Force in the Indo-Pacific, our priority theater for responding to China as our pacing challenge. In Europe, the Army remains the tip of the Joint-Force spear in responding to Russia as an acute threat and reassuring our NATO Allies.

To achieve this, the Army's number one priority is to "rebuild warfighting readiness… Ready forces must be organized, trained, and equipped for prompt and sustained ground combat." In turn, the Army has increased readiness across all Army units. The Posture Statement continues, "Army collective training focuses on high-intensity conflict, with an emphasis on operating in complex terrain, electronically degraded environments, and under constant surveillance." The Posture Statement concludes that the Army will "remain the most capable and lethal ground combat force in the world." The Army reiterated this goal in its 2020 Posture Statement, "The Army must be ready today and, in a future, where we know will be contested in every domain – land, sea, air, space, and cyber space."

The Army's vision of 2023:

> The Army of 2028 will be ready to deploy, fight, and win decisively against any adversary, anytime and anywhere, in a joint, multi-domain, high-intensity conflict, while simultaneously deterring others and maintaining its ability to conduct irregular warfare. The Army will do this through the employment of modern manned and unmanned ground combat vehicles, aircraft, sustainment systems, and weapons, coupled with robust combined arms formations and tactics based on a modern warfighting doctrine and centered on exceptional Leaders and Soldiers of unmatched lethality.

The U.S. Government Accountability Office (GAO) examined Army readiness and provided recommendations to aid in the progression of, and overcome the challenges with, rebuilding personnel and equipping and training them. The GAO stated that the Army needs to focus on growing Army forces, providing forces with modernized equipment, and training units to conduct large-scale, decisive-action operations across multiple domains.

The training needs and requirements of the Army change as new weapons and defense systems are developed for soldiers to use; new threats in different parts of the globe emerge; and the tactics and technology used by our adversaries change. Force-on-force training at the NTC must change to accommodate the shift to a greater emphasis on Unified Land Operations and near-peer conflict scenarios while maintaining the ability to provide training in other types of combat. To enable the shift in training focus, the following changes in training activities are needed.

2.1 Changes in Training Activity

As training at the NTC evolves to meet current and future requirements and doctrine, training must also evolve. The necessary changes in military training projected on Fort Irwin are described in the following sections.

The proposed solution outlined in Alternative 4 is to fully utilize the Eastern and Western Training Areas in full scale operations. Increase training infrastructure and range complex improvements to keep up with current doctrine and modernization of future equipment. Manix Trail needs to be maintained regularly within the existing right-of-way to provide for safe and efficient logistics before and after rotational training.

2.1.1 Maneuver Training

Brigade Combat Team (BCT)s can operate over distances greater than those currently accessible at the NTC. The BCT must protect its rear areas as well as the routes that supply its elements. To make NTC training more realistic, the distances between the BCT's rear operations and the BCT's main area of operations must be increased. Furthermore, since 2013, BCTs have become larger, composed of three maneuver battalions instead of two. To train properly for combat, a BCT must have the ability—the space and terrain type—to maneuver its three battalions. The current utilization of maneuver space at the NTC does not provide the distance or area for which the BCT would expect to be responsible when deployed. A more complete utilization of the existing training areas would create the necessary distance and terrain over which the BCT would be operating when deployed. This increased area would better

facilitate realistic combined arms training. Full utilization of the Eastern and Western Training Areas is necessary to meet doctrinal requirements to overcome terrain restrictions in the decisive action scenario, the exercise that culminates a BCT's NTC training. The Proposed Action in the EIS identifies new maneuver training at NTC to meet this need.

2.1.2 Sustainment Training

All BCTs at the NTC must train and exercise their support battalions in sustainment operations. The challenging terrain at the NTC can be more fully utilized than currently practiced, to replicate the various challenges a BCT faces when deployed, including maintaining line of communications over long distances and rear area security. Currently, the NTC does not have the length of maneuver area necessary to replicate the distance expected between forward combat elements and support and logistics. Given the changes in technology and expected combat situations, the units need a greater distance between forward units and maintenance and refueling operations than is currently afforded to train for planning and execution of sustainment capability. The BCTs must face the challenges of recovering damaged vehicles, maintenance priority, parts flow, and fueling operations across extended distances. The EIS proposes to do this by fully utilizing the Eastern and Western Training Areas.

2.2 Training Infrastructure Improvement Alternative

To meet current and projected training requirements, training infrastructure must be improved. The following activities need to occur on Fort Irwin to meet training requirements.

2.2.1 Increased Live Weapons Training Capabilities

BCTs conduct weapons training with live ammunition as the final training event at the NTC. The NTC needs to increase the capability to use live ammunition in rear areas to replicate the security mission that these units would experience when deployed. Units primarily use the Northern Corridor for BCT-level live ammunition training. Although limited, small-scale live ammunition activities are conducted in the Central and Southern Corridors to simulate specific ground combat requirements, the current infrastructure does not allow the BCT to use live ammunition simultaneously over the entire battlefront, and only part of the BCT is able to participate in live ammunition training at any given time. The Proposed Action would increase live ammunition capabilities throughout the NTC training areas, the BCT could conduct live weapons training simultaneously across its entire front.

2.2.2 Improve Urban Operations Sites

With more of the world's population residing in cities, urban operations (UOs) are a focus of Army leaders. On deployments, a BCT can expect to encounter urban areas in the battle space. Consequently, UO sites are essential in training BCTs in the complexities of UOs during combat. Urban areas also play a role in live-fire training. The NTC uses urban areas in the Northern, Southern, and Central Corridors, but it is necessary to have more UO sites throughout a larger area and make them more realistic. To remedy this, the EIS proposed to build UO locations throughout the corridors and in the Eastern and Western Training Areas.

2.2.3 Improve Communication Capabilities

The NTC relies on a handheld radio communication system linked into fiber to maintain command and control during training exercises across varying terrain in the Northern, Southern, and Central Corridors and the Eastern and Western Training Areas. Because of the increased size and pace of BCT operations and the need to integrate all war-fighting functions, the current infrastructure poses challenges related to training realism and safety during rotational training. The improvement of communications is accomplished by leveraging current and future technologies. The EIS analyzed improvement of existing communication systems throughout Fort Irwin, to improve training realism and safety.

2.2.4 Create New CBRN Training Facilities

Simulated chemical, biological, radiological, and nuclear (CBRN) training facilities provide realism to the training exercises. The current CBRN training facilities provide the BCT with only isolated (simulated) CBRN threats and preclude the BCT from being challenged with simultaneous CBRN concerns across its areas of operation. The BCT must train in tasks that involve responding to the threat of CBRN. The Northern, Central, and Southern Corridors and the Eastern and Western Training Areas require new CBRN training facilities to train BCTs to respond properly to the threats posed by CBRN and to exercise BCT capabilities. The EIS proposes new CBRN facilities. The facilities can be built underground, above ground, or in bunkers, with the type of facility used depending on the specific training scenario requirements. The equipment used would be inert and not operational; in other words, no real chemical, biological, radiological, or nuclear agents will be used. New CBRN training facilities would be secluded and masked to prevent them from being easily detected by the training unit, thereby developing the BCT's ability to find, secure, and mitigate the notional capabilities of CBRN threats.

2.2.5 FARPs and RASAs

The training rotations at the NTC require BCTs to employ extensive aviation support. Forward arming and refueling points (FARPs) and ready ammunition storage areas (RASAs) are located throughout the NTC, providing locations to refuel and maintain aircraft (helicopters) and obtain necessary supplies, food, and ammunition to continue with the training mission. The FARPs and RASAs at the NTC currently do not provide the variety or distance needed for realistic training. FARPs and RASAs must be located in places that provide for doctrinally required security, safety, and lines of communication to provide realistic training to aviation units. The Proposed Action would locate FARPs and RASAs throughout the length of the training battlefield. Increasing the number of FARPs and RASAs in the Central and Southern Corridors and Eastern and Western Training Areas would increase the flexibility of aviation operations.

2.2.6 Radar System Upgrades

The Army is shifting to operations that require ground-based radar; however, the NTC currently has no ground-based radar capability. Furthermore, radar systems have a short shelf life and periodic upgrades, including complete system replacement, are common. The EIS proposes improved radar employment that would extend the radar reach and provide the training unit with the opportunity to integrate it into the training scenario.

2.3 Training Area Improvements

The EIS proposes improvements to training land, tactical sites, and secondary trails are needed to provide for the safe and efficient movement of soldiers, equipment, and materiel while reducing the potential for erosion and damage to the physical environment. These modifications maintain training proficiency required by AR 350-1 and enable the NTC to comply with environmental requirements detailed in AR 200-1. Land Rehabilitation and Maintenance activities, including erosion control and site stabilization, are implemented to improve soldier safety, prevent regulatory violations, maintain realism in the training environment, and sustain the training land to support current and future training.

2.4 Range Improvements Alternative

In addition to training area improvements, individual weapon ranges need to be improved to meet current training requirements. The EIS identifies the improvements needed to meet the requirements of new weapon systems and reduce conflicts in range usage. The modifications would maintain training for individual and squad proficiency with weapons systems and increase training efficiency by reducing range overlap that prevents concurrent training on adjacent ranges.

2.5 Manix Trail Alternative

The Manix Trail is critical for transporting rotational units and equipment to and from Fort Irwin. Wheeled ground vehicles and equipment travel from the Marine Corps Logistics Base Barstow to Fort Irwin via surface roads from the Yermo Annex East to the community of Manix, where the equipment continues to Fort Irwin via the Manix Trail. The Manix Trail includes approximately 6.5 miles within the boundary of Fort Irwin (between the Langford Lake Main Supply Route and the boundary) and approximately 15 miles between Interstate 15 (I-15) and the Fort Irwin boundary. The portion of trail that requires maintenance is the unpaved portion of trail between Fort Irwin and I-15. The trail needs to be maintained regularly within the existing right-of-way to provide for safe and efficient logistics before and after rotational training. The EIS sets out the required maintenance and improvements necessary to meet these requirements.

SECTION 3
Alternatives

The Army analyzed the following mission-related alternatives in the Final LEIS. Alternatives involving renewal of the land withdrawal are not addressed by the Army as the decision will be made by the U.S. Congress.

3.1 No Mission Change Alternative (No Action)

The No Action Alternative continues training at current levels and no additional training activities, or infrastructure would be constructed on Fort Irwin. A detailed explanation of current training activities on Fort Irwin is provided in Section 2.1.1 of the Final LEIS.

3.2 Mission Change Alternatives (Proposed Action)

The Mission Change Alternatives would continue current training activities on Fort Irwin, with an increase in training activities and training infrastructure improvements identified to meet the purpose and need.

While the amount of maneuver activity associated with rotational training varies depending on the specific training scenario, there would be no expected change in average miles traveled under the proposed Mission Change Alternatives. Activities are proposed for areas not currently heavily used for training; however, the amount of training and number of military vehicles used on Fort Irwin would not increase.

The proposed Mission Change Alternatives include the following:

- Changes in Training Activity Alternative, including the following four Western Training Area Alternatives (described in Section 2.1.2.1 of the Final LEIS)
  - Alternative 1: Medium-Intensity Aviation Task Force
  - Alternative 2: Medium-to-High-Intensity Aviation Task Force and Brigade Support Area
    Alternative 2 does include elements of Alternative 1.
  - Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers – Limited Ammunition
    Alternative 3 does include elements of Alternatives 1 and 2.
  - Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition
    Alternative 4 does include elements of Alternative 1, 2, and 3.
- Training Infrastructure Improvement Alternative (described in Section 2.1.2.2 of the Final LEIS)
- Range Improvements Alternative (described in Section 2.1.2.3 of the Final LEIS)
- Manix Trail Alternative (described in Section 2.1.2.4 of the Final LEIS)

SECTION 4

Environmental Consequences

The Final LEIS evaluated a full range of environmental issues, including biological resources, water resources, geological resources, cultural resources, air quality, noise, utilities, transportation, hazardous materials and hazardous waste, health and safety, land use, and recreation. Overall impacts related to the proposed mission activities are anticipated to be mostly negligible to minor, with potential moderate effects to biological resources, geological resources, cultural resources, and air quality. A moderate benefit would be expected to biological and geological resources through implementation of the ITAM program. A detailed explanation of these impacts can be found in Section 4 of the Final LEIS. The resources with potential moderate effects are described in more detail in this section.

Cultural Resources: Cultural resources on Fort Irwin primarily consist of archaeological resources and buildings and structures that are reflective of past uses and patterns. Numerous sites on Fort Irwin are eligible for listing, or are already listed, on the National Register of Historic Places (NRHP). A detailed accounting of the cultural resources on Fort Irwin can be found in Section 3.4 of the Final LEIS.

The mission activities described in the Proposed Action could affect archaeological resources on Fort Irwin and result in moderate, adverse, and long-term effects; for a full explanation of these effects, refer to Section 4.4 of the Final LEIS. An increase in ground-disturbing activities within previously undisturbed areas would be expected from this alternative, and damage, destruction, erosion, or exposure of archaeological resources could occur; however Cultural Mitigation-1 through -4 would be implemented to help reduce and resolve these effects. To meet its requirements under the National Historic Preservation Act, Fort Irwin modified its Integrated Cultural Resources Management Plan (ICRMP) in conjunction with the preparation of the LEIS. The ICRMP serves as the Historic Properties Component for implementation of a Programmatic Agreement (PA) with the State Historic Preservation Officer (SHPO). The PA was developed in conjunction with the LEIS and provides for Section 106 compliance for activities discussed in the LEIS. A copy of the signed PA is included as Appendix 4.4A of the Final LEIS.

Biological Resources: Biological resources on Fort Irwin include plants and wildlife and the habitats in which they occur. The analysis included in Section 4.1 of the Final LEIS assesses the potential effects to common, pest, and sensitive plant and wildlife populations on Fort Irwin. Sensitive species on Fort Irwin include species listed as threatened or endangered under the Endangered Species Act (ESA), the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, or the California Endangered Species Act, or that are classified as sensitive by BLM.

The Mission Change Alternatives could affect biological resources on Fort Irwin and result in moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species. Fort Irwin has completed ESA Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) regarding potential effects to listed species. Fort Irwin training operates under a biological opinion from USFWS, which sets forth the agreed upon mitigation measures for ESA-listed species. The biological opinion determined that the Proposed Action is not likely to jeopardize the continued existence of Lane Mountain milk-vetch or the desert tortoise. A copy of the biological opinion is included as Appendix 4.1A of the Final LEIS.

Air Quality: In accordance with the Clean Air Act, air quality at Fort Irwin was evaluated at the local and regional level in Section 4.5 of the Final LEIS. While the intensity of training would vary in some locations, there would be no appreciable change in the duration of vehicle and equipment operation as the number of vehicles and equipment usage would remain the same as the current condition. Because the training levels would remain relatively unchanged within the air basins, there would be no change in emissions with regard to the ozone and 10-micron particulate matter (PM_{10}) non-attainment areas from training activities and the overall effect is considered negligible across all the alternatives, compared to

the current activities. Loss of vegetation in the Western Training Area under the selected alternative could result in an increase in wind generated PM_{10}, but the effect in the basins would remain moderate as defined in Section 4.5.

Geological Resources: Geologic resources on Fort Irwin include topography, geological features, soils, seismicity, and paleontology. The mission activities described in the Proposed Action would result in negligible to moderate, adverse, and long-term effects on soils and paleontology. There would be no effects from training on topography, geological features, or seismicity. For a full explanation of these effects, refer to Section 4.4 of the Final LEIS.

Summary on negligible to minor categories: Summary on negligible to minor categories:

Effects on biological resources from construction of the landfill expansion and conversion of Range 1 into a MPRC would have adverse, long-term, and minor to moderate effects on biological resources, including the Desert tortoise, within the Central Corridor and Cantonment Area on Fort Irwin. Construction of the facilities included in the Energy Security Measures projects could temporarily displace wildlife and disrupt habitat, including sensitive species and desert tortoise. However, these effects would not be significant and would be managed in accordance with existing agreements.

There would be no increase in demand on water resources as a result of the Mission Change Alternatives and no effect on groundwater levels. Cumulative effects on groundwater quantity and levels are not discussed because the Mission Change Alternatives would have no effect on groundwater quantity.

Increased training activities can reshape banks and washes; broaden channels and washes within alluvial fans; cause soil or desert pavement disturbance, compaction, erosion, and wind erosion; therefore, the Mission Change Alternatives is expected to cause minor to moderate, adverse, long-term effects on soils and paleontology.

On Fort Irwin, the Mission Change Alternatives would result in adverse, moderate, and long-term effects on archaeological resources as a result of training activities and improvements to training infrastructure. The potential for effects would be managed in accordance with the Fort Irwin ICRMP and PA, and mitigation measures would be implemented.

The new activities associated with the Mission Change Alternatives are well below *de minimis* thresholds and would only result in a negligible impact compared to current conditions. The landfill expansion, the conversion of Range 1, the XpressWest high-speed rail, the Energy Security Measures projects, and the Daggett Solar Power Facility could have air emissions that would occur concurrent with emissions from the Mission Change Alternatives, but estimates indicate the combined emissions would remain well below both the *de minimis* thresholds and the MDAQMD thresholds for all pollutants (Fort Irwin, 2017a, 2018b, San Bernardino County, 2019). Given the low quantity of new emissions the cumulative effects on other air quality parameters would be **less than significant.**

Summary on cumulative Impacts: Cumulative impacts would occur if incremental effects of the Mission Change Alternatives result in an increased effect when added to the environmental effects of past, ongoing, and reasonably foreseeable future activities. The Mission Change Alternatives includes both increased training activities and infrastructure improvements within the training areas, ranges, and along the Manix Trail. There are three activities on Fort Irwin that could interact with the Mission Change Alternatives to contribute to cumulative effects. The landfill expansion is under construction, the conversion of Range 1 into an MPRC (Fort Irwin, 2018c) is slated to occur in 2028, and Energy Security Measures projects were approved in February 2021 (Fort Irwin, 2021).

Cumulative effects on groundwater quantity and levels are not discussed because the Mission Change Alternatives would have no effect on groundwater quantity.

Maintenance activities along the Manix Trail between Fort Irwin and I-15 would be beneficial to soil resources by reducing erosion potential and would not interact with the Daggett Solar Power Facility to cause adverse cumulative effects on soils. The ITAM program, coupled with project-specific water quality erosion control BMPs, would minimize effects on soils. Cumulative effects on soils would be **less than significant**.

SECTION 5
Mitigation

The Army has proposed a variety of mitigation measures to reduce, eliminate, or offset direct, indirect, and cumulative effects of the proposed mission activities. The following mitigation measures, including best management practices (BMPs), would be implemented to reduce the potential for effects.

5.1 Biological Resources

- **Biology Mitigation-1**: Require soldiers and work crews operating on Fort Irwin to place trash in the appropriate containers and remove trash at the completion of work or the training event.
- **Biology Mitigation-2**: Apply water for dust suppression in a manner that does not create pools that could attract pest species.
- **Biology Mitigation-3:** Continue the ITAM program's actions to encourage revegetation to the degree practicable after training events.
- **Biology Mitigation-4:** Train soldiers to avoid effects to the desert tortoise. If a tortoise is on a trail, instruct soldiers to stop their movement until the tortoise has cleared the trail. These measures are in effect now and are effective. Within the Manix Trail between I-15 and the Fort Irwin boundary, use trained home-station soldiers escort convoys and conduct relocation if a tortoise must be moved.
- **Biology Mitigation-5:** Implement mitigation measures related to special status plant species, as specified in the 2021 Biological Opinion (refer to Appendix 4.1A of the Final LEIS).
- **Biology Mitigation-6:** Monitor species identified by the State of California as Species of Special Concern and threatened or endangered species and manage populations in accordance with the Fort Irwin Integrated Natural Resources Management Plan. In the future, if any of these species are designated threatened or endangered by the USFWS, Fort Irwin will initiate consultation with the USFWS per Section 7 of the ESA.
- **Biology Mitigation-7:** To avoid any effects on special status species, ensure all construction involves the implementation of the mitigation measures as specified in the 2021 Biological Opinion (refer to Appendix 4.1A of the Final LEIS), including the following practices.
  - Before construction or maintenance begins, brief personnel working onsite about the desert tortoise, detailing the protocol to follow if a tortoise is encountered in the project area. Have an authorized biologist conduct the briefing.
  - Have an authorized biologist conduct a preconstruction survey. If an active burrow or desert tortoise is identified during the survey, implement the appropriate measures as agreed to with the USFWS.
  - During land clearing and construction, have a biological monitor onsite observe construction activities and verify that no tortoise has wandered into the construction area. If an active burrow or desert tortoise is identified during work, implement the appropriate measures as agreed to with the USFWS.
  - Require workers to inspect the underside of all onsite parked vehicles before moving them, unless parked in a staging or parking area protected by exclusion fencing. If a desert tortoise is detected, have a trained person remove the animal to a safe place or wait to operate the vehicle(s) until the animal moves to safety on its own.

- To the extent possible, schedule construction activities involving vegetation clearing and/or ground disturbances when tortoises are inactive (November to mid-March).
- If channels or basins are constructed, design them to allow desert tortoise to pass through them unimpeded so the desert tortoise would not be constrained in these features.
- Fill or cover trenches and other excavations at the end of each workday.
- If vegetation clearing is required during the breeding and nesting season, conduct preconstruction surveys for breeding birds. Protect project-identified active nests or burrows (burrowing owl) from disturbance with a 500-foot buffer that would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season.
- If a kit fox or American badger burrow is identified on or adjacent to the project area during the preconstruction survey, contact Fort Irwin natural resources staff to determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin would decide if fencing or flagging would suffice to delineate the exclusion zone.
- The Army has not conducted full scale training exercises in the Western Training Area. The Army will not conduct full scale training in the WTA, until the translocation of the desert tortoises is completed under the guidance of USFWS.

5.2 Water Resources

- **Water Mitigation-1**: Continue ITAM's work to reduce erosion caused by military training by implementing erosion control BMPs and revegetating areas when necessary.
- **Water Mitigation-2**: Continue to implement the Fort Irwin Spill Prevention and Contingency Plan (SPCP) in the event of an accidental spill of vehicle or equipment fluids to prevent any potential contaminants from reaching surface or groundwater.
- **Water Mitigation-3**: Prepare a stormwater pollution prevention plan with appropriate BMPs for the construction activities in accordance with the National Pollutant Discharge Elimination System Construction General Storm Water Permit, Water Quality Order (WQO) 2009-0009-DWQ.
- **Water Mitigation-4**: Monitor water diversion and/or dewatering activities in accordance with either the National Pollutant Discharge Elimination System General Permit, Limited Threat Discharges to Surface Waters, Board Order R6T-2014-0049, or the General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQO-2003-0003, issued by the Lahontan Water Board.
- **Water Mitigation-5:** For excavation, discharge of fill, or other physical alteration of a surface water, either permanently or temporarily, obtain either a Lahontan Water Board-issued General Waste Discharge Requirements (Permit) for dredge or fill discharges to non-federal waters, or a Lahontan Water Board-issued Clean Water Act Section 401 water quality certification for effects to federal waters.
- **Water Mitigation-6:** New targetry will not be placed in desert washes. Avoiding placement of targets in washes helps to prevent munitions constituents from migrating off-range, consistent with policy in DoD Instruction 4715.14.

5.3 Geology

- **Geology Mitigation-1**: Continue the ITAM program's efforts to control erosion in the training area where it negatively affects training or could lead to regulatory violations. Land Rehabilitation and Maintenance projects include revegetation of native vegetation and the installation of erosion control BMPs, such as check dams and berms.
- **Geology Mitigation-2**: Place new targetry and other training infrastructure outside high potential paleontological areas.

5.4 Cultural

- **Cultural Mitigation-1:** Continue to perform cultural resource surveys throughout the training and support operation areas, following procedures detailed in Stipulation III of the PA. Surveys will be prioritized based on the potential for significant cultural resources or historic properties to exist, the area's geology, and the intensity and location of the training activity. Surveys and other technical or specialized assistance will be completed by qualified personnel or organizations, including individuals who meet the Secretary of the Interior's Professional Qualification Standards, pursuant to *Code of Federal Regulations* (CFR) Title 36, Part 61, unless other specialized assistance is needed, as described in Stipulation II of the PA.
- **Cultural Mitigation-2:** Implement unanticipated/post-review discovery plans for unexpected finds of archaeological resources and unforeseen effects in accordance with the ICRMP and Stipulation VIII of the PA. The NTC will avoid further direct effects and develop a suitable buffer area, determined on a case-by-case basis, with 30 meters being a commonly used minimum distance, around the discovery, demarcated with flagging, tape, or other suitable materials. The NTC will complete a NRHP evaluation and assessment of effect for the discovery and consult with the State Historic Preservation Office and Native American tribes as necessary.
- **Cultural Mitigation-3:** Treat all Native American human remains and associated funerary objects, sacred objects, and objects of cultural patrimony that are inadvertently discovered, in accordance with the Native American Graves Protection and Repatriation Act and its implementing regulations (43 CFR Part 10) and AR 200-1, *Environmental Protection and Enhancement*, as described in Stipulation VII of the PA. When such items are encountered, suspend all use of the immediate area, protect in place the remains and items, and secure the immediate area until appropriate qualified personnel, such as an osteologist, the San Bernardino County Coroner, or law enforcement personnel, will determine whether the remains are human, and if they are, whether they should be considered part of a crime scene or police investigation. If determined to be Native American remains or associated funerary objects, contact tribal members, and undertake consultation for the appropriate disposition of the human remains and associated cultural items in accordance with the processes outlined in 43 CFR Sections 10.3 through 10.6.
- **Cultural Mitigation-4:** Continue to conduct cultural resources surveys and significance evaluations prior to specific construction activities and potentially opening the Western Training Area to full training in accordance with Stipulations III and IV of the PA. In addition, implement avoidance and protection in place for NRHP-eligible archaeological resources sites to the greatest extent feasible through notation in the electronic operations control system, anti-tank obstacles, Seibert stakes, designation of no-fire or restricted-fire areas, fencing, signage, capping/hardening, condition monitoring, and other measures. If protection in place or avoidance is not feasible, the NTC will consult with Native American tribes and State Historic Preservation Office to resolve adverse effects in accordance with Stipulation V of the PA.

5.5 Air Quality

- GHGs are compounds that may contribute to accelerated climate change by altering the thermodynamic properties of the Earth's atmosphere. GHGs consist of carbon dioxide, methane, nitrous oxide, and fluorinated gases (EPA, 2021). Activities on Fort Irwin such as training activities generate GHG emissions. GHG emissions are associated with RTUs traveling to and from Fort Irwin and their home stations. RTUs consume energy for shelter and sustenance that generates GHG emissions while at NTC. During training, the operation of military equipment, including aircraft, produce GHG emissions. Training infrastructure requires minimal energy and water, as the structures are designed to replicate the austere desert environment. The annual emissions from RTU training events are part of the baseline emissions for the NTC. Current projections for the Mojave Desert estimate an increase of 3.4 to 5.4 degrees Celsius by 2100 (Cal-Adapt, 2020). Increased temperatures and aridity resulting from climate change may cause changes in wildlife and vegetation species composition on Fort Irwin.
- **Air Quality Mitigation-1**: Stabilize training routes and other disturbed areas by watering and using chemical stabilizers and asphalt chip sealer when feasible.
- **Air Quality Mitigation-2:** Revegetate previously disturbed areas under the ITAM program.
- **Air Quality Mitigation-3**: Continue to designate dry lake beds off-limits to vehicle travel.
- **Air Quality Mitigation-4**: Implement the reduction measures as defined in Mojave Desert Air Quality Management District Rule 403.2 for construction activities.
-

5.6 Noise

- **Noise Mitigation-1**: If Alternative 2 through Alternative 4 for the Western Training Area is chosen, locate the brigade support areas away from noise-sensitive land use areas at the National Aeronautics and Space Administration (NASA) Goldstone Complex.
- **Noise Mitigation-2**: If Alternative 2 through Alternative 4 for the Western Training Area is chosen, the Army would work with NASA to ensure that any changes to the noise contours would not disrupt the NASA Deep Space Communication Network at the NASA Goldstone Complex.
- **Noise Mitigation-3**: Locate all new infrastructure improvement sites away from the telescopes at the NASA Goldstone Complex and other NASA facilities determined to be eligible for listing in the NRHP.

5.7 Utilities

- **Utility Mitigation-1**: Use dig restrictions and off-limits areas to prevent training activities from damaging utility infrastructure.
- **Utility Mitigation-2**: Use recycled water for dust suppression and other non-potable purposes during construction.
- **Utility Mitigation-3**: Plan in advance for any potential short-term utility disruptions and coordinate between the contractor and Fort Irwin staff.

5.8 Transportation

- **Transportation Mitigation-1**: Require coordination by the NTC with NASA in advance of planned training movements through the NASA Goldstone Complex to either the Central Corridor or the Western Training Area.

- **Transportation Mitigation-2**: Coordinate traffic control during operations at the Silver Lake Mine.
- **Transportation Mitigation-3:** Coordinate all downrange work to install or maintain training infrastructure with Range Operations to avoid conflicts with the training mission.

5.9 Hazardous Materials and Hazardous Waste

- **Hazardous Mitigation-1**: Require all training activities to comply with applicable laws and regulations related to hazardous materials and hazardous wastes, in accordance with the Fort Irwin SPCP and Hazardous Materials and Hazardous Waste Management Plan. Train units on these requirements prior to beginning training activities.
- **Hazardous Mitigation-2**: Require all military and civilian personnel on the installation and all subcontractors working with potentially hazardous materials to receive a briefing on hazardous waste management protocol.
- **Hazardous Mitigation-3**: Present the Rotational Unit Environmental Briefing Handbook that addresses hazardous waste training to all personnel attending Rotational Training Unit training.
- **Hazardous Mitigation-4**: Require each rotation to provide a 20-person environmental cleanup team with designated equipment to clean up any spills that occur down range. Following each rotation, require military personnel to survey the training areas by ground reconnaissance and aerial overflights to identify any spills that were not cleaned up. Note areas where a release occurred and dispatch a cleanup team to the spill area. Remove the contaminated soil and take to the Fort Irwin bioremediation land farm.

5.10 Health and Safety

- **Health and Safety Mitigation-1**: Maintain protective buffers around abandoned mine sites as off-limits to military training.
- **Health and Safety Mitigation-2**: Implement the following measures to reduce the potential exposure to, and effects of, Valley fever:
  - Make available a brochure detailing Valley fever, its cause, and symptoms and include information on how to control the spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials.
  - Educate personnel through briefings to recognize the symptoms of Valley fever and quickly report suspected symptoms of work-related Valley fever.
- **Health and Safety Mitigation-3**: Train all individuals at the site to identify unexploded ordnance (UXO) and in how to contact Fort Irwin Range Operations. Once a UXO is identified, Explosive Ordnance Disposal (EOD) personnel will be contacted and the UXO will be rendered safe (removed or blown in place) or marked with a red UXO sign.
- **Health and Safety Mitigation-4**: After rotations, scout areas where targets are located for UXO and deploy EOD personnel to respond to identified UXO.
- **Health and Safety Mitigation-5:** Limit bomb drops to existing impact areas and prohibit personnel from entering these areas during training activities.
- **Health and Safety Mitigation-6**: During construction activities, require personnel or contractors to develop and implement site-specific health and safety plans to manage and minimize potential human health hazards and risk.
- **Health and Safety Mitigation-7:** Coordinate activities with Range Operations to prevent the installation or upgrade of range infrastructure during training events.

- **Health and Safety Mitigation-8:** Receive confirmation that EOD personnel have cleared the areas where potential UXO could be encountered prior to infrastructure improvement activities.

With implementation of the proposed mitigation measures, no effects would be considered significant as a result of implementation of the Proposed Action.

SECTION 6

6 Public Involvement

Public involvement began for this LEIS in 2020 and is discussed in detail in Appendix 1A *NTC Public Engagement* of the Final LEIS. Fort Irwin published a Notice of Intent in the *Federal Register* on 11 August 2020. Virtual public scoping meetings were held on 25 and 27 August 2020. In-person meetings were not an option because of the COVID-19 pandemic. On 21 May 2021, the U.S. Environmental Protection Agency (EPA) published a Notice of Availability of the Draft LEIS, at which time a 45-day public comment period began. Two virtual public hearings on the Draft LEIS were held on 09 June 2021.

The scoping meetings, public hearings, and the availability of the Draft LEIS were publicized in regional newspapers. Copies of the Draft LEIS were also placed in libraries for public review. In addition, the Army regularly updated its web page at https://aec.army.mil/index.php/irwin-nepa-meeting to facilitate public involvement in the NEPA process. The Draft LEIS and information on the Proposed Action and NEPA process were published on the website for public review throughout the comment period. The comments received during scoping and public review of the Draft LEIS are included as Appendix 1A *NTC Public Engagement* of the Final LEIS and were addressed in the Final LEIS.

On 07 April 2023, EPA published a Notice of Availability in the *Federal Register* of the Final LEIS, at which time a 30-day waiting period began. Copies of the Final LEIS were placed in the libraries for public review and on the U.S. Army Environmental Command web page at https://aec.army.mil/index.php/irwin-nepa-meeting.

During the waiting period, Fort Irwin received five comments, one letter by mail, one letter through email, and three emails.

The letter mail was a thank you letter for all the analysis that went into the Fort Irwin LEIS.

The letter through email addressed/expressed concerns about air quality (PM_{10}), health and safety relative to climate change, new targetry emplacement, and the presence of low levels of lead detected in water samples. Fort Irwin has established mitigation measures to improve air quality and reduce emissions (PM_{10}) by implementing land repair protocols such as revegetation, dust control, and erosion control measures. Opening the WTA will allow training impacts to be spread over a larger area, thus allowing for natural revegetation in areas receiving less training activity. Health and safety mitigations are in place for education, from the basic soldier level to senior leaders utilizing safety briefings and training aids such as the Soldier's Field Card (Appendix 2B in FLEIS). Personnel are provided with appropriate Personal Protective Equipment (PPE) and sufficient water, food, and shelter for ambient weather conditions. New targetry emplacement guidance has been added to ROD. Metal migration from operational range areas to the groundwater is unlikely due to the neutral (7.0) to strongly alkaline (9.0) pH of the soil, depth to groundwater, limited amount of precipitation, and high evapotranspiration rates. Low levels of lead detected in several wells will continue to be monitored under the Army's Operational Range Assessment Program.

The email comments/concerns included a question of how to submit comments for the Final LEIS, the opportunity for tribal input regarding effects to cultural resources as defined from a Native American view, and Fort Irwin's future leadership engagements with tribal leadership. An email address was provided to the commenter for submitting comments on the Final LEIS. The commenter noted the importance of providing opportunities for culturally affiliated Native American Tribes to provide input, specifically tribal ethnographic insights and commentary. In responding, we noted that opportunities for providing tribal perspectives are not limited to the LEIS. Opportunities include contributions to Fort Irwin's draft Integrated Cultural Resources Management Plan (ICRMP), recently circulated for tribal review and input. This document is intended to provide scope for discussions of cultural resources in the

broadest sense, to include definitions provided by Tribes. Additional opportunities to discuss tribal perspectives with Fort Irwin leadership including ongoing Native American Graves Protection and Repatriation Act consultation and the annual meetings for Fort Irwin's Programmatic Agreement for military training activities (signed in December of 2022).

The Army has determined that supplementation of the EIS is not required because there are no substantial changes to the Proposed Action that are relevant to environmental concerns; and there are no significant new circumstances or information relevant to environmental concerns and bearing on the Proposed Action or its impacts.

SECTION 7

7 Decision

Based on the analysis contained in the Final LEIS addressing the Army's mission needs and the effects of the Army's action on the human environment on Fort Irwin, the Army has chosen to implement the following Mission Change Alternative, with Alternative 4 (High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition) for the Western Training Area. The Mission Change Alternative includes:

- Changes in Training Activity Alternative, with Alternative 4 for the Western Training Area (described in Section 2.1.2.1 of the Final LEIS)
- Training Infrastructure Improvement Alternative (described in Section 2.1.2.2 of the Final LEIS)
- Range Improvements Alternative (described in Section 2.1.2.3 of the Final LEIS)
- Manix Trail Alternative (described in Section 2.1.2.4 of the Final LEIS)

In making its decision, the Army analyzed the effects of the proposed alternatives, issues of concern, and the comments provided during the public review periods. The Army determined that the selected alternative most closely achieves the purpose and need of the Proposed Action while maintaining a high level of environmental stewardship. The Army also considered evolving mission requirements and National Defense Policy.

The No Action Alternative is the least disruptive to natural and cultural resources and, therefore, is the environmentally preferred alternative. Of the action alternatives considered, the Mission Change Alternatives with Western Training Area Alternative 1 was the environmentally preferred because it is the least disruptive to natural and cultural resources. Both, however, rated poorly with regard to meeting critical training mission requirements as described in the purpose and need for the Proposed Action.

The Army has determined that, with implementation of the mitigations proposed in Section 5.0 of this ROD, there would be no significant adverse effects to the environment from any of the considered alternatives. All identified mitigation measures have been adopted and all practicable means to avoid or minimize environmental harm from the selected alternatives have been adopted. Accordingly, the Army will implement its Preferred Alternative, which includes all of the Mission Change Alternatives and Alternative 4 for the Western Training Area, as it is the most practical approach for meeting the current and anticipated future military mission on Fort Irwin.

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OMAR J. JONES IV
Lieutenant General, U.S. Army
Commanding General

Department of the Army

Installation Management Command

March 2023

Final Legislative Environmental Impact Statement for Military Training and Public Land Withdrawal Extension

The National Training Center at Fort Irwin, California

Notice: Reviewers should provide the Department of the Army (DA) with their comments during the review period of the environmental impact statement (EIS). This will enable the DA to analyze and respond to the comments at one time and to use information acquired in the preparation of the EIS, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions (*Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 United States [U.S.] 519, 553, 1978).

Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the Final Environmental Impact Statement (*City of Angoon v. Hodel*, 9th Cir, 1986; and *Wisconsin Heritages Inc., v. Harris*, 490 F. Supp. 1334, 1338, E.D. Wis. 1980). Comments on the EIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 *Code of Federal Regulations* [CFR] § 1503.3).

Comments received in response to this document, including names and addresses of those who comment, will be considered part of the public record on this proposed action and will be available for public inspection. Comments submitted anonymously will be accepted and considered; however, those who submit anonymous comments will not have standing to appeal the subsequent decision under 36 CFR Parts 215 or 217. Additionally, pursuant to 7 CFR § 1.27(d), any person may request the agency to withhold a submission from the public record by showing how the Freedom of Information Act (FOIA) permits such confidentiality. Persons requesting such confidentiality should be aware that, under FOIA, confidentiality may be granted in only very limited circumstances, such as to protect trade secrets. The DA will inform the requester of the agency's decision regarding the request for confidentiality, and where the request is denied, the agency will return the submission and notify the requester that the comments may be resubmitted, with or without name and address.

Additional documentation, reports, and analysis referenced in this document can be found in the administrative record files. These items have not been included in this document due to the technical nature, excessive length, or are reference materials used to develop the analysis in this document. All supporting documents in the planning record are located at the Environmental Management Division, Directorate of Public Works, Fort Irwin, California.

Cover Sheet

Final Legislative Environmental Impact Statement

Military Training and Public Land Withdrawal Extension

Responsible Agencies: Department of the Army

Proposed Action: Changes in Training, Infrastructure Improvements, and Extension of Land Withdrawal

For more information, contact:

Fort Irwin Directorate of Public Works, Environmental Division
Attention: The NEPA Planner
Building 602, Fifth Street, Fort Irwin, CA 92310-5085
email: usarmy.jbsa.aec.nepa@army.mil

Report Designation: Final Legislative Environmental Impact Statement

Abstract: The Department of the Army has produced a Legislative Environmental Impact Statement (LEIS) for the National Training Center (NTC) on Fort Irwin, California. The LEIS analyzes the potential environmental impacts associated with modernizing training, improving the training infrastructure, and extending the existing land withdrawal. Environmental resources and concerns considered in the Final LEIS include biological resources, water resources, geological resources, cultural resources, air quality, noise, utilities, transportation, hazardous materials and hazardous waste, health and safety, land use, and recreation.

SIGNATURE PAGE

LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

Military Training and Public Land Withdrawal Extension

Proponent: Department of the Army, Fort Irwin, California

NEPA Lead Agency: Department of the Army, Fort Irwin, California

APPROVAL

This Environmental Impact Statement meets the requirements of the National Environmental Policy Act, *Code of Federal Regulations* (CFR) Title 40, Parts 1500–1508; Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*, dated 13 December 2007; and 32 CFR Part 651 *Environmental Analysis of Army Actions*, dated 29 March 2002.

25 Jan 23
Date

Curtis D. Taylor
Brigadier General, U.S. Army
Commanding General

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Acronyms and Abbreviations

11th ACR	11th Armored Cavalry Regiment
916th SPT BDE	916th Support Brigade
µg/m^3	Microgram(s) per Cubic Meter
ABCT	Armored Brigade Combat Team
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ADP	Army Doctrine Publication
ADRP	Army Doctrine Reference Publication
AFB	Air Force Base
AFCCC	Air Force Combat Climatology Center
AGL	Above Ground Level
APE	Area of Potential Effects
AR	Army Regulation
Army	U.S. Army
ATP	Army Techniques Publication
BCC	Bird of Conservation Concern
BCT	Brigade Combat Team
BGEPA	Bald and Golden Eagle Protection Act
BLAAF	Bicycle Lake Army Airfield
BLM	Bureau of Land Management
BMP	Best Management Practice
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CBRN	chemical, biological, radiological, and nuclear
CDFW	California Department of Fish and Wildlife
CDNL	C-weighted Day-Night Sound Level
CEQ	U.S. Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	*Code of Federal Regulations*
CIP	Community Involvement Plan
CNPS	California Native Plant Society

CO	Carbon Monoxide
COIN	Counter-insurgency
COP	Combat Outpost
CRPR	California Rare Plant Rank
CWA	Clean Water Act
dB	Decibel(s)
dBA	Decibel (A-weighted scale)
DERP	Defense Environmental Restoration Program
DNL	Day-Night Level
DoD	U.S. Department of Defense
DPW	Directorate of Public Works
DZ	Drop Zone
EAB	Echelon-Above-Brigade
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESC	Expeditionary Sustainment Command
FARP	Forward Arming and Refueling Point
FCC	Facility Category Code
FLS	Flight Landing Strip
FM	Field Manual
FON	Fiber Optic Network
FORSCOM	U.S. Army Forces Command
FRA	Federal Railroad Administration
FY	Fiscal Year
GAO	U.S. Government Accountability Office
GHG	Greenhouse Gas
HAP	Hazardous Air Pollutant
HMCC	Hazardous Material Control Center
HMHWMP	Hazardous Materials and Hazardous Waste Management Plan
I	Interstate
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ITAM	Integrated Training Area Management
JPADS	Joint Precision Air Drop System

LEIS	Legislative Environmental Impact Statement
LPG	Liquified Petroleum Gas
LBP	Lead-based Paint
LRAM	Land Rehabilitation and Maintenance
LSA	Logistics Support Area
LUPZ	Land Use Planning Zone
MBTA	Migratory Bird Treaty Act
MDAQMD	Mojave Desert Air Quality Management District
MEDDAC	U.S. Army Medical Department Activity
MEDEVAC	Medical Evacuation
mgd	Million Gallon(s) per Day
mm	Millimeter(s)
MMRP	Military Munitions Response Program
MPRC	Multipurpose Range Complex
msl	Mean Sea Level
MSR	Main Supply Route
MWR	Morale, Welfare, and Recreation
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NAWS	Naval Air Weapons Station
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTC	National Training Center
O_3	Ozone
ORA	Operational Range Assessment
ORV	Off-road Vehicle
OPFOR	Opposing Force
OPS GRP	Operations Group
PA	Programmatic Agreement
PCB	Polychlorinated Biphenyl
PM_{10}	Particulate Matter Equal to or Less Than 10 Micrometers in Aerodynamic Diameter

$PM_{2.5}$	Particulate Matter Equal to or Less Than 2.5 micrometers in Aerodynamic Diameter
POL	Petroleum, Oil, and Lubricants
ppm	Part(s) per Million
RASA	Ready Ammunition Storage Area
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
RSOI	Reception/Staging/Onward Movement/Integration
RTU	Rotational Training Unit
RV	Recreational Vehicle
RWQCB	Regional Water Quality Control Board
SBCT	Stryker Brigade Combat Team
SDZ	Surface Danger Zone
SF	Special Forces
SFEIS	Supplemental Final Environmental Impact Statement
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SPCP	Spill Prevention and Contingency Plan
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
SSC	Species of Special Concern
STARS	Standard Terminal Automation Replacement System
SWFP	Solid Waste Facility Permit
SWPPP	Stormwater Pollution Prevention Plan
TC	Training Circular
tpy	Ton(s) per Year
TSC	Theater Sustainment Command
U.S.	United States
U.S.C.	*United States Code*
UAS	Unmanned Aerial System
ULO	Unified Land Operations
UO	Urban Operation
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator

UXO	Unexploded Ordnance
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

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Executive Summary

ES.1 Introduction

Established in 1980, the 753,537-acre National Training Center (NTC) on Fort Irwin, California, provides training for the Army and joint military branches. Because of its size, design, and terrain, the NTC is one of the few places in the world where brigade-size units (5,000+ soldiers) can test their combat readiness. The training needs and requirements of the Army change as new weapons and defense systems are developed, as new threats in different parts of the globe emerge, and as the tactics and technology used by enemies change.

Mission changes and infrastructure improvements are needed on Fort Irwin to meet current and future requirements and doctrine. Additionally, the Army has a continuing need for the approximately 110,000 acres of Fort Irwin training land that were withdrawn from all forms of appropriation under the general land laws, including the mining laws and mineral and geothermal leasing laws under Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001). In light of these dual requirements, Fort Irwin has developed this legislative environmental impact statement (LEIS) to serve as both a programmatic EIS to assess the Army's future use of the NTC and a legislative EIS to assess the effects associated with the congressional decision of either extending or not extending the existing land withdrawal. This LEIS was written in accordance with the National Environmental Policy Act (NEPA); Council on Environmental Quality NEPA implementing regulations in *Code of Federal Regulations* (CFR) Title 40, Parts 1500 through 1508; and 32 CFR Part 651.

The No Action Alternative is the least disruptive to natural and cultural resources and, therefore, is the environmentally preferred alternative. Of the action alternatives considered, the Mission Change Alternatives with Western Training Area Alternative 1 is the environmentally preferred alternative because it is the least disruptive to natural and cultural resources. However, both environmentally preferred alternatives rated poorly with regard to meeting critical training mission requirements as described in the Purpose and Need for the Proposed Action. Based on the analysis in this LEIS addressing the Army's mission needs and the effects of the Army's action on the human environment on Fort Irwin, the Army's preferred alternative is the full Mission Change Alternatives, with Alternative 4 for the Western Training Area, as described in Section ES.9.1.2.

ES.2 Purpose and Need

According to Army Regulation (AR) 350-1, *Army Training and Leader Development*, the Army's mission is to build a campaign-quality, expeditionary Army capable of operating effectively with joint military branches and interagency, intergovernmental, and multinational players across the spectrum of conflict. The Army also must provide capable and ready forces to Combatant Commands in support of the National Security and National Defense Strategies. The training of Army units must address this joint context (Army, 2017b). To this point, the focus of the NTC is to assist deployable (U.S. Army Forces Command [FORSCOM]) units in preparing their soldiers and to serve as a leadership crucible before soldiers are deployed into combat. To train soldiers to the highest degree of proficiency possible, individual and crew training must be realistic, well-managed, and aggressively executed (Army, 2015).

Under AR 200-1, *Environmental Protection and Enhancement*, the Army is also committed to environmental stewardship in all actions as an integral part of the Army mission and has focused efforts to conserve and preserve natural and cultural resources for future generations (Army, 2007). The Army developed *The Army Sustainable Range Program* (SRP) (AR 350-19; Army, 2005) to maximize the capability, availability, and accessibility of ranges and training land to support training requirements, mobilizations, and deployments. The SRP includes the G3 Integrated Training Area Management (ITAM) program, which provides the

capability to manage and maintain training land by integrating mission requirements with environmental requirements and sound land management practices (Army, 2005). Following AR 350-19, the NTC SRP created a Range Complex Master Plan to detail current status and planned upgrades to range and training area infrastructure, as well as ITAM projects necessary to meet the requirements of the National Defense Strategy; AR 350-1, *Army Training and Leader Development*; AR 350-52, *Army Training Support System*; AR 350-50, *Combat Training Center Program* (Army, 2018a); and AR 200-1, *Environmental Protection and Enhancement*.

In 2018, the U.S. Department of Defense (DoD) released an updated National Defense Strategy emphasizing the need to rebuild readiness (DoD, 2018). The Army is shifting its focus from fighting irregular warfare or insurgencies to preparing to fight adversaries who are our military peers or near-peers. Force-on-force training at NTC must change to accommodate the shift to a greater emphasis on unified land operations and near-peer scenarios, while maintaining the ability to provide training in other types of combat. To enable the shift in training focus, the following activities are needed.

ES.3 Changes in Training Activity

As training at the NTC evolves to meet current and future requirements and doctrine, the activities during training events must also evolve. The necessary changes in military training projected on Fort Irwin are described in the following sections.

ES.3.1 Maneuver Training

Brigade Combat Teams (BCTs) are capable of operating over distances greater than those currently accessible at the NTC. The BCT must protect its rear areas as well as the routes that supply its elements. To make NTC training more realistic, the distances between the BCT's rear operations and the BCT's main area of operations must be increased. Furthermore, since 2013, BCTs have become larger, composed of three maneuver battalions instead of two. To train properly for combat, a BCT must have the ability—the space and terrain type—to maneuver its three battalions. The current utilization of maneuver space at the NTC does not provide the distance for linear and lateral replication of the area for which the BCT would expect to be responsible when deployed. A more complete utilization of the existing training areas would create the necessary distance and terrain over which the BCT would be operating when deployed. This increased area would better facilitate realistic combined arms training. Full utilization of the Eastern and Western Training Areas (Figure ES-1) is necessary for a BCT to meet doctrinal requirements to overcome terrain restrictions in the decisive-action scenario.

ES.3.2 Sustainment Training

All BCTs at the NTC must train and exercise their support battalions in sustainment operations. The challenging terrain at the NTC can be more fully utilized to replicate the various challenges a BCT faces when deployed, including maintaining line of communications over long distances and rear area security. Currently, the NTC does not have the length of maneuver area necessary to replicate the distance expected between forward combat elements and support and logistics. Given the changes in technology and expected combat situations, the units need a greater distance between forward units and maintenance and refueling operations than is currently afforded to train for planning and execution of sustainment capability. The BCTs must face the challenges of recovering damaged vehicles, maintenance priority, parts flow, and fueling operations across extended distances, which could be accomplished by fully utilizing the Eastern and Western Training Areas.

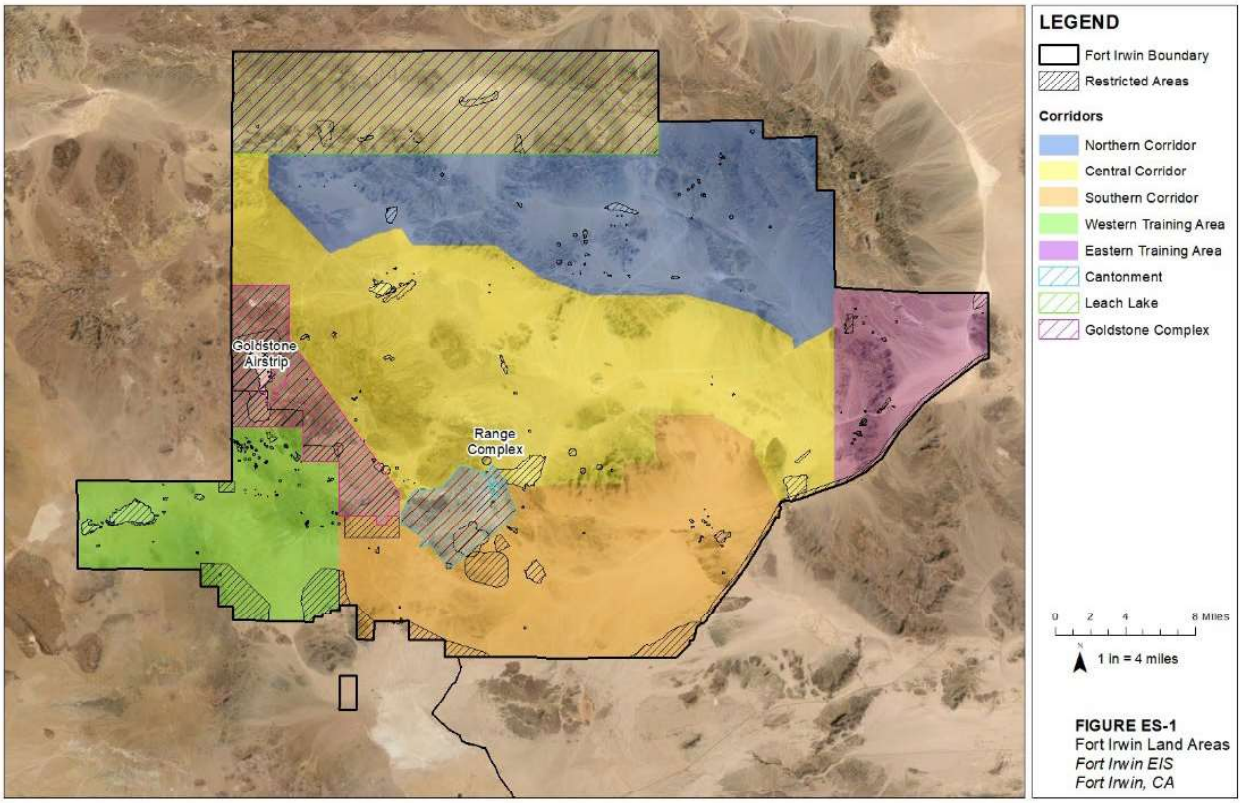


FIGURE ES-1
Fort Irwin Land Areas
Fort Irwin EIS
Fort Irwin, CA

ES.4 Training Infrastructure Modifications

To meet current and projected training requirements, training infrastructure must be improved. The following activities need to occur on Fort Irwin to meet training requirements.

ES.4.1 Increased Live Weapons Training Capabilities

BCTs conduct weapons training with live ammunition as the final training event at the NTC. The NTC needs to increase the capability to use live ammunition in rear areas to replicate the security mission that these units would experience when deployed. Units primarily use the Northern Corridor for BCT-level live ammunition training, though limited, small-scale live ammunition activities are conducted in the Central and Southern Corridors to simulate specific ground combat requirements. The current infrastructure does not allow the BCT to use live ammunition simultaneously over the entire battlefront, and only part of the BCT is able to participate in live ammunition training at any given time. By increasing live ammunition capabilities throughout the NTC training areas, the BCT could conduct live weapons training simultaneously across its entire front.

ES.4.2 Improve Urban Operations Sites

With more of the world's population residing in cities, urban operations (UOs) are a focus of Army leaders. On deployments, a BCT can expect to encounter urban areas in the battle space. Consequently, UO sites are essential in training BCTs in the complexities of UOs during combat. Urban areas also play a role in live-fire training. The NTC uses urban areas in the Northern, Southern, and Central Corridors, but it is necessary to have more UO sites throughout a larger area and make them more realistic. As a result, it is necessary to build UO locations throughout the corridors and in the Eastern and Western Training Areas.

ES.4.3 Improve Communication Capabilities

The NTC relies on a handheld radio communication system linked into fiber to maintain command and control during training exercises across varying terrain in the Northern, Southern, and Central Corridors and the Eastern and Western Training Areas. Because of the increased size and pace of BCT operations and the need to integrate all warfighting functions, the current infrastructure poses challenges related to training realism and safety during rotational training. The improvement of communications is accomplished by leveraging current and future technologies. Existing communication systems throughout Fort Irwin need to be upgraded to improve training realism and safety.

ES.4.4 Create New CBRN Training Facilities

Simulated chemical, biological, radiological, and nuclear (CBRN) training facilities provide realism to the NTC training exercises. The current CBRN training facilities provide the BCT with only isolated CBRN threats and preclude the BCT from being challenged with simultaneous CBRN concerns across its areas of operation. The BCTs must train in tasks that involve responding to the threat of CBRN. The Northern, Central, and Southern Corridors and the Eastern and Western Training Areas require new CBRN training facilities to train BCTs to respond properly to the threats posed by CBRN and to exercise BCT capabilities. The facilities can be built underground, above ground, or in bunkers, with the type of facility used depending on the specific training scenario requirements. The equipment used is inert and not operational; in other words, no real chemical, biological, radiological, or nuclear agents will be used. CBRN training facilities are secluded and masked to prevent them from being easily detected by the training unit, thereby developing the BCT's ability to find, secure, and mitigate the notional capabilities of CBRN threats.

ES.4.5 FARPs and RASAs

The training rotations at the NTC require BCTs to employ extensive aviation support. Forward arming and refueling points (FARPs) and ready ammunition storage areas (RASAs) are located throughout the NTC, providing locations to refuel and maintain aircraft (helicopters) and obtain necessary supplies, food, and ammunition to continue with the training mission. The FARPs and RASAs at the NTC currently do not provide the variety or distance needed for realistic training. FARPs and RASAs must be located in places that provide for doctrinally required security, safety, and lines of communication to provide realistic training to aviation units. They must be located throughout the length of the battlefield. Increasing the number of FARPs and RASAs in the Central and Southern Corridors and Eastern and Western Training Areas would increase the flexibility of aviation operations.

ES.4.6 Radar System Upgrades

The Army is shifting to operations that require ground-based radar; however, the NTC currently has no ground radar capability. Furthermore, radar systems have a short shelf life and periodic upgrades, including complete system replacement, are common. Improved radar employment would extend the radar reach and provide the training unit with the opportunity to integrate it into the training scenario.

ES.4.7 Training Area Improvements

Improvements to training land, tactical sites, and secondary trails are needed to provide for the safe and efficient movement of soldiers, equipment, and materiel while reducing the potential for erosion and damage to the physical environment. These modifications maintain training proficiency required by AR 350-1, *Army Training and Leader Development*, and enable the NTC to comply with environmental requirements detailed in AR 200-1, *Environmental Protection and Enhancement*. Land Rehabilitation and Maintenance (LRAM) activities, including erosion control and site stabilization, are implemented to improve soldier safety, prevent regulatory violations, maintain realism in the training environment, and sustain the training land to support current and future training.

ES.5 Range Improvements

In addition to training area improvements, individual weapon ranges need to be improved to meet current training requirements. The NTC has identified the improvements needed to meet the requirements of new weapon systems and reduce conflicts in range usage. The modifications would maintain training for individual and squad proficiency with weapons systems and increase training efficiency by reducing range overlap that prevents concurrent training on adjacent ranges.

ES.6 Manix Trail Maintenance

The Manix Trail is critical for transporting rotational units and equipment to and from Fort Irwin. The trail is an unpaved trail between Fort Irwin and Interstate 15 (I-15), with approximately 15.5 miles within the boundary of Fort Irwin and approximately 15 miles between I-15 and the Fort Irwin boundary. The trail needs to be regularly maintained within the existing right-of-way to provide for safe and efficient logistics before and after rotational training.

ES.7 Public Law 107-107 Training Land Withdrawal Extension

Approximately 110,000 acres of Fort Irwin training land areas are public land withdrawn from all forms of appropriation under the general land laws, including the mining laws and mineral and geothermal leasing laws under Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001). The land is located entirely within the boundaries of Fort Irwin and consists of both the land and mineral rights. The Army has a continuing need for the land and will ask the U.S. Congress to extend the withdrawal for at least 25 years or place the land under the permanent control of the Army. The withdrawn land is in the Western Training Area, Eastern Training Area, and a narrow strip paralleling a utility corridor on U.S. Department of Interior Bureau of Land Management (BLM) land adjacent to the southeastern boundary of Fort Irwin.

ES.8 Decision Process

ES.8.1 Decision to be Made

The Army is the lead federal agency responsible for completing the NEPA analysis for the proposed mission changes and withdrawal extension. While the Army will decide between the proposed Mission Change Alternatives, the withdrawal extension will require congressional approval. For this reason, two distinct decision pathways are analyzed in this LEIS:

1. **Army Decision** – **Alternatives related to proposed mission changes**. The Army will decide between the No Mission Change and Proposed Mission Change Alternatives provided in Section 2.1, *Mission Change Analysis*; a detailed analysis of the potential effects associated with the Proposed Mission Change Alternatives is presented in Section 4, *Environmental Consequences - Mission Analysis*.
2. **Congressional Approval** – **Alternatives related to the withdrawal extension for the Western Training Area, Eastern Training Area and portions of the Southern Corridor**. The Army has determined that training is needed in the withdrawn areas, and, therefore, there is a continuing military need for the withdrawal. To obtain congressional approval for the withdrawal extension, the Army must conduct an environmental review of the potential impacts of approving the withdrawal. The effects associated with approving the withdrawal extension are included in the mission analysis. Those effects are presented in the Mission Change Analysis in Section 4, *Environmental Consequences - Mission Analysis*. The unique effects associated with not approving the withdrawal extension are presented in Section 5, *Environmental Consequences - Withdrawal Extension*.

There are four primary decision outcomes that may occur based on the two decision pathways:

1. **No Withdrawal Extension Alternative (Congressional Approval) and No Mission Change Alternative (Army Decision)**: includes the analysis provided in the No Mission Change Alternative from Section 4, *Environmental Consequences - Mission Analysis,* except there would be no continuing action in the Eastern Training Area, the Western Training Area, and portions of the Southern Corridor, as described in Section 5, *Environmental Consequences - Withdrawal Extension*.
2. **No Withdrawal Extension Alternative (Congressional Approval) and Proposed Mission Change Alternatives (Army Decision)**: includes the analysis provided in the Mission Change Alternative from Section 4, *Environmental Consequences - Mission Analysis,* except there would be no continuing action in the Eastern Training Area, the Western Training Area, and portions of the Southern Corridor, as described in Section 5, *Environmental Consequences - Withdrawal Extension*.
3. **Withdrawal Extension Alternative (Congressional Approval) and No Mission Change Alternative (Army Decision)**: includes the analysis provided in the No Mission Change Alternative from Section 4, *Environmental Consequences - Mission Analysis*. The current level of training in the Eastern Training Area, the Western Training Area, and portions of the Southern Corridor would continue.
4. **Withdrawal Extension Alternative (Congressional Approval) and Mission Change Alternative (Army Decision)**: includes the analysis provided in the Mission Change Alternative from Section 4, *Environmental Consequences - Mission Analysis* (including additional alternatives for the Western Training Area).

ES.9 Description of Proposed Actions and Alternatives

ES.9.1 Mission Analysis

Several alternatives were developed in response to foreseeable military mission needs as described in ES.2, *Purpose and Need*. The No Mission Change Alternative is described in Section ES.7.1.1 and the Proposed Mission Change Alternatives are described in Section ES.7.1.2.

ES.9.1.1 No Mission Change Alternative

Under the No Mission Change Alternative, training on Fort Irwin would continue at current levels and infrastructure projects identified to support training activities against replicated current military threats would not be implemented. The Army would not be able to train soldiers sufficiently based on current threats, making the Army less capable than our peer or near-peer adversaries during combat. This alternative fails to meet the objectives defined in Section 1.2, *Purpose and Need for the Proposed Actions*.

ES.9.1.2 Proposed Mission Change Alternatives

The Proposed Action is to continue current training activities on Fort Irwin, with an increase in training activities and training infrastructure improvements identified to meet the purpose and need. The analysis in this LEIS considers the combined environmental consequences of the No Mission Change Alternative baseline and the Proposed Mission Change Alternatives. The decision maker may adopt all or less than all of the alternatives. No changes to airspace are proposed and there would be no change to existing Federal Aviation Administration-designated special-use airspace on Fort Irwin.

While the amount of maneuver activity associated with rotational training varies depending on the specific training scenario, there would be no expected change in average miles traveled under the proposed mission changes. While activities are proposed for areas not currently heavily used for training, the amount of training and number of military vehicles used on Fort Irwin would not increase. Furthermore, the distance to the Western Training Area from the Cantonment Area is no greater than the distance to the eastern and western ends of the Central Corridor, so there would be no noticeable increase in distance traveled. While

the areas used by Rotational Training Units (RTUs) would expand into the Western Training Area, there would be no substantial change to the number of vehicles, types of vehicles, or vehicle miles traveled associated with rotational training.

The Proposed Mission Change Alternatives considered for the Proposed Action include:

- Changes in Training Activity Alternative (Section 2.1.2.1)
  - Northern Corridor – increased aviation and cyber operations
  - Central Corridor – increased live-fire training and aviation operations
  - Southern Corridor – increased live-fire training and aviation operations
  - Eastern Training Area – increased live-fire training, mounted maneuver, maintenance and refueling, and aviation operations
  - Western Training Area (four potential alternatives)
- Alternative 1: Medium-Intensity Aviation Task Force
- Alternative 2: Medium-to-High-Intensity Aviation Task Force and Brigade Support Area
- Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition
- Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition
- Training Infrastructure Improvement Alternative (Section 2.1.2.2)
  - Northern Corridor – improve existing UO sites, communication capabilities, and radar upgrades; create new CBRN sites and an unmanned aerial system (UAS) runway; and perform ITAM activities
  - Central Corridor – improve live ammunition capabilities, number of training obstacles, existing UO sites, radar systems, and communication capabilities; create new CBRN facilities, FARPs, and RASAs; and perform ITAM activities
  - Southern Corridor – improve live ammunition capabilities, existing UO sites, radar systems, and communication capabilities; create new CBRN facilities, FARPs, and RASAs; and perform ITAM activities
  - Eastern Training Area – improve communication capabilities; create new CBRN facilities, UO sites, FARPs, and RASAs; and perform ITAM activities
  - Western Training Area – improve communication capabilities; create new CBRN facilities, UO sites, and FARPs; and perform ITAM activities
- Range Improvements Alternative (Section 2.1.2.3)
- Manix Trail Alternative (Section 2.1.2.4)

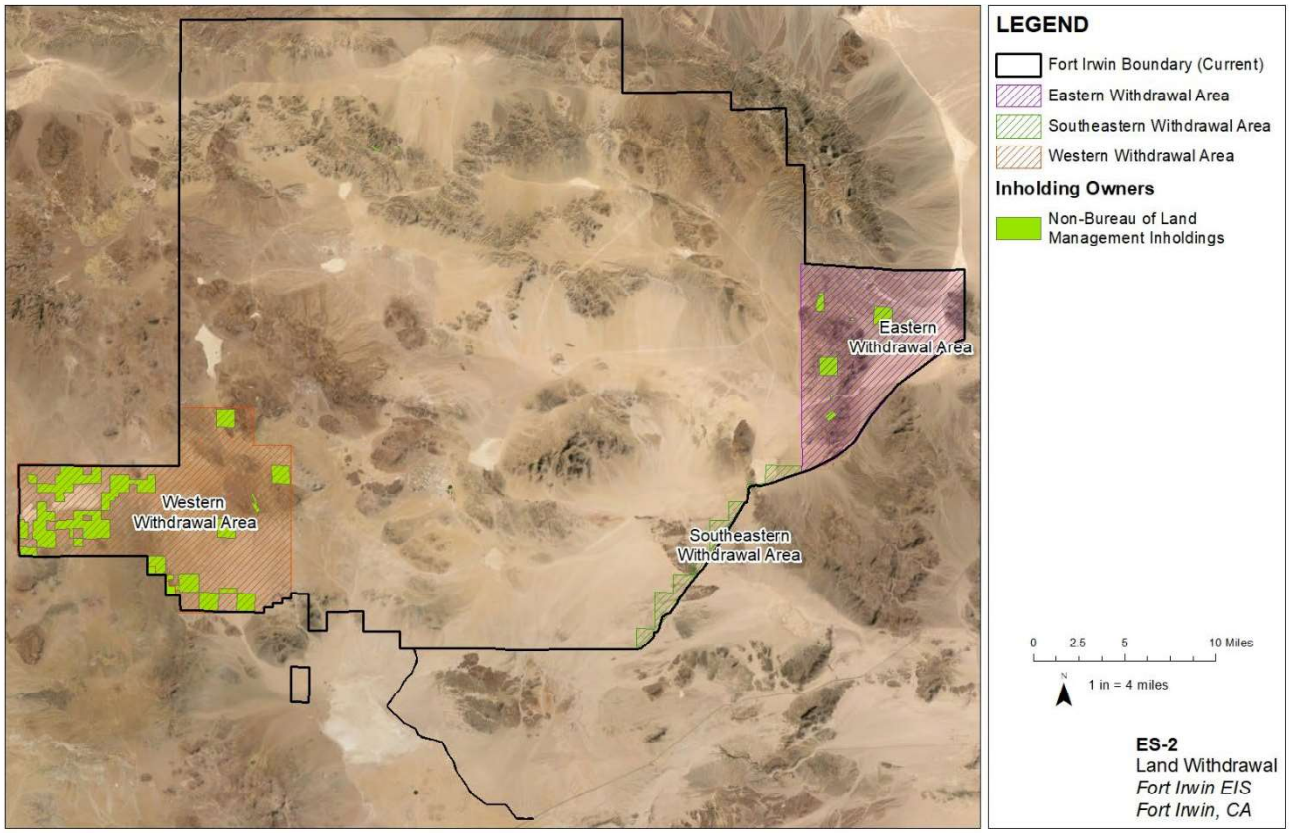
ES.9.2 Withdrawal Extension Analysis

The withdrawal extension analysis consists of the No Withdrawal Extension Alternative, described in Section ES.7.2.1, and the Withdrawal Extension Alternative, described in Section ES.7.2.2.

ES.9.2.1 No Withdrawal Extension Alternative

Under this alternative, the withdrawal extension of federal land in the Eastern Training Area, Western Training Area, and a portion of the Southern Corridor would not occur (Figure ES-2). The land would become available for public appropriation under federal laws and would be managed for various public uses. Maneuver training could not occur in the Army-owned federal parcels that are mixed in with the withdrawn land. The Western Training Area and Eastern Training Area include scattered parcels purchased by the Army

when they were private inholdings within the larger area of withdrawn BLM land. These scattered isolated parcels are not of sufficient size to safely support maneuver training in the absence of Army use of the surrounding land. Because these parcels are spread throughout the training areas, the entire training areas, both BLM- and Army-owned land, would be unsuitable for military training.



ES.9.2.2 Withdrawal Extension Alternative

Under the Withdrawal Extension Alternative, the Army would have either its withdrawal extended for another 25 years or the land assigned to the control of the Secretary of the Army until such time as the Army determines it no longer needs the land for military purposes. For purposes of this LEIS, these two possibilities are treated as one NEPA alternative. Under either extension approach, the land in question would be used exclusively for military training, with the exception of specified off-limits areas, for the foreseeable future. The environmental effects of the extension of the withdrawal are described in Section 2.1, *Mission Analysis*, and analyzed in Section 4, *Environmental Consequences – Mission Analysis*.

ES.10 Alternatives Considered but Not Carried Forward

Fort Irwin considered the following other alternatives that were not carried forward for detailed analysis in this LEIS:

- **Relocate the NTC**: The relocation of the NTC to another Army or DoD installation has been evaluated previously and rejected as not feasible (Fort Irwin, 2005). The conditions precluding relocation of the NTC to another installation have not changed since that evaluation. There are no suitable installations that could provide the land, infrastructure, and training features necessary to execute the NTC mission without a corresponding severe reduction in that installation's current mission and the displacement of active military units. Relocation of Fort Irwin also would not meet the purpose and need for the Proposed Actions.

- **Discontinue Use of or Close Fort Irwin for Military Training**: Fort Irwin provides a unique setting for the training conducted by the NTC. The topography, size, and remote nature of Fort Irwin makes it invaluable for training brigade-size units. Discontinuing the use of Fort Irwin is not considered feasible as a means of meeting Army training requirements. Fort Irwin has not been identified for closure under the Base Closure and Realignment Act, and closure would require congressional authorization. Closure of Fort Irwin also would not meet the purpose and need for the Proposed Actions.
- **Expand the Size of Fort Irwin**: Surrounding land use, including national parks and Naval Air Weapons Station (NAWS) China Lake, and surrounding topography (mountains) limit the potential for expansion of Fort Irwin. At present, there are no plans to expand the size of Fort Irwin and any effort to expand Fort Irwin would require congressional authorization. No such authorization has been proposed or requested. Expansion of Fort Irwin is not considered feasible and this action is not considered in this LEIS.
- **Spread Training Activities to Multiple Installations**: Divisional training entailing larger forces than BCTs can be effectively separated and conducted across multiple installations; however, the BCT training provided on Fort Irwin cannot be separated into components with separate training conducted at multiple locations. The training is holistic, meaning that the missions of the elements of the BCT are inextricably interconnected and must train together in the same place and at the same time. The entire BCT or joint force must participate simultaneously. This alternative was eliminated from further consideration because it is not feasible to conduct this type of training at multiple locations or at different times and because this alternative would not meet the purpose and need of the Proposed Actions.

ES.11 Resources Eliminated from Further Analysis

Initial analysis indicated that certain resource areas would not have the potential for noticeable or measurable effects under any of the considered alternatives. These resource areas are identified here and not discussed further:

- **Environmental Justice**: No one lives in the areas where any of the alternatives would be implemented. There are no minority or low-income populations immediately adjacent to the installation. There would be no effects that would disproportionately affect minority and low-income populations. Therefore, environmental justice is not considered further in this LEIS.
- **Socioeconomics**: While a slight benefit from short-term construction jobs would occur, no new permanent employment would be created from the Proposed Actions. Likewise, no loss of permanent employment would occur from the Proposed Actions. There would be no change in the population of Fort Irwin and no increase in demand on public services and housing. Because there would be no potential for significant effects on the local or regional economy, socioeconomics is not considered further in this LEIS.
- **Airspace**: No changes to airspace are proposed and there would be no change to existing Federal Aviation Administration-designated special-use airspace on Fort Irwin. Fort Irwin conducts manned aircraft sorties during training rotations. Manned aircraft sorties would continue, with a change in the distribution of flights across the landscape that would increase flights in the Western Training Area. Use of existing special-use airspace on Fort Irwin is expected to increase with regard to UAS operations. Any increases beyond current UAS use would be directly tied to training scenarios developed for RTU training and would not exceed any current airspace restrictions/limitations. All operations would be coordinated with the authority that controls each restricted airspace, as appropriate. Therefore, airspace is not considered further in this LEIS.
- **Visual Resources**: Construction activities would be removed from the view of the public and would not affect valued view sheds. Training activities would not change the visual character of the training ranges.

Some changes in locations of nighttime activities may occur, but nighttime operations would not result in a discernable change in the appearance of the night sky from off-installation areas. While portions of the Western Training Area would be visible from the installation boundary, the visual character of the landscape would not change to casual observers near the boundary. Therefore, visual resources are not considered further in this LEIS.

- **Protection of Children**: No child-centric resources are located in the vicinity of the primary action areas (training areas, Range Complex, and Manix Trail). Implementation of the Proposed Actions would have no potential to disproportionately affect the environmental health and safety of children because military training and the supporting infrastructure for military training are intentionally placed away from areas where children typically occur and congregate. Therefore, the protection of children is not considered further in this LEIS.
- **Timber Production**: Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001) specifically excludes consideration of effects on timber production from the analysis for extending the withdrawal unless the Army specifically intends to develop the resource. The Army has no intention of developing timber production on the withdrawn land. Therefore, timber production is not considered in this LEIS.
- **Mineral Resources**: Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001) specifically excludes the consideration of effects on mineral resources from the analysis for extending the withdrawal unless the Army specifically intends to develop the resource. The Army has no intention of developing mineral resources, other than the limited use of surficial material for construction or road maintenance, on the withdrawn land. Therefore, mineral resources are not considered in this LEIS.
- **Grazing Resources**: Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001) specifically excludes the consideration of effects on grazing resources from the analysis for extending the withdrawal unless the Army specifically intends to develop the resource. The Army has no intention of developing grazing resources on the withdrawn land. Therefore, grazing resources are not considered in this LEIS.

ES.12 Summary of Effects

No significant cumulative effects were identified for any resource area analyzed. Tables ES-1 through ES-12 identify the environmental effects per the definitions provided in the Significance Criteria Tables (4.1-1 through 4.12-1) associated with implementing the Proposed Actions by resource area. The effects presented include implementation of measures, design features, and mitigation, as appropriate, for each resource. Mitigation measures are identified in Section ES.13.

TABLE ES-1
Summary of Effects – Biological Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	No perceptible change.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Not Applicable.
Central Corridor	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Not Applicable.
Southern Corridor	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Long-term, minor benefit on vegetation and wildlife.
Eastern Training Area	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A moderate, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Negligible compared to current Army activities on the land.
Western Training Area *Alternative 1*	Negligible effects on vegetation and wildlife, including sensitive species.	Minor, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A minor, adverse, and long-term increase still resulting in a minor, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 2*	Negligible effects on vegetation and wildlife, including sensitive species.	Minor, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A minor, adverse, and long-term increase still resulting in a minor, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Negligible compared to proposed Army activities on the land.

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Western Training Area *Alternative 3*	Negligible effects on vegetation and wildlife, including sensitive species.	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 4*	Negligible effects on vegetation and wildlife, including sensitive species.	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect. A moderate, long-term benefit would result from the implementation of ITAM activities.	Negligible compared to proposed Army activities on the land.
Range Complex	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	Not Applicable.	A negligible increase still resulting in a moderate, adverse, and long-term effect.	Not Applicable.
Manix Trail	Moderate, adverse, and long-term effects on vegetation and wildlife, including sensitive species.	Not Applicable.	A negligible increase still resulting in a moderate, adverse, and long-term effect.	Not Applicable.

TABLE ES-2
Summary of Effects – Water Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Minor, adverse, and long-term effects on surface water and groundwater.	No perceptible change.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Not Applicable.
Central Corridor	Minor, adverse, and long-term effects on surface water and groundwater.	A negligible increase still resulting in a minor, adverse, and long-term effect.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Not Applicable.
Southern Corridor	Minor, adverse, and long-term effects on surface water and groundwater.	A negligible increase still resulting in a minor, adverse, and long-term effect.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Long-term, minor benefit on surface water and groundwater.
Eastern Training Area	Minor, adverse, and long-term effects on surface water and groundwater.	A negligible increase still resulting in a minor, adverse, and long-term effect.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Negligible compared to current Army activities.
Western Training Area *Alternative 1*	Negligible effects on surface water and groundwater.	Negligible effects on surface water and groundwater.	A negligible increase still resulting in a negligible effect.	Negligible compared to proposed Army activities.
Western Training Area *Alternative 2*	Negligible effects on surface water and groundwater.	Negligible effects on surface water and groundwater.	A negligible increase still resulting in a negligible effect.	Negligible compared to proposed Army activities.
Western Training Area *Alternative 3*	Negligible effects on surface water and groundwater.	Minor, adverse, and long-term effects on surface water and groundwater.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Negligible compared to proposed Army activities.
Western Training Area *Alternative 4*	Negligible effects on surface water and groundwater.	Minor, adverse, and long-term effects on surface water and groundwater.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Negligible compared to proposed Army activities.
Range Complex	Minor, adverse, and long-term effects on surface water and groundwater.	Not Applicable.	A negligible increase still resulting in a minor, adverse, and long-term effect.	Not Applicable.
Manix Trail	Negligible effects on surface water and groundwater.	Not Applicable.	A negligible increase still resulting in a negligible effect.	Not Applicable.

TABLE ES-3
Summary of Effects – Geological Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Moderate, adverse, and long-term effects on soils and paleontology. No effects on topography, geologic features and seismicity.	No perceptible change.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Not Applicable.
Central Corridor	Moderate, adverse, and long-term effects on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term effect still resulting in a moderate, adverse, and long-term effect. There would continue to be no effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Not Applicable.
Southern Corridor	Moderate, adverse, and long-term effects on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term effect still resulting in a moderate, adverse, and long-term effect. There would continue to be no effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Long-term, minor benefit on geologic resources.
Eastern Training Area	Moderate, adverse, and long-term effects on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term effect still resulting in a moderate, adverse, and long-term effect. There would continue to be no effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Negligible compared to current Army activities.
Western Training Area *Alternative 1*	No effects on soils, paleontology, topography, geologic features and seismicity.	Negligible effects on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in negligible effect. No effects on topography, geologic features and seismicity.	Negligible compared to proposed Army activities.

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Western Training Area *Alternative 2*	No effects on soils, paleontology, topography, geologic features and seismicity.	Negligible effects on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in negligible effect. No effects on topography, geologic features and seismicity.	Negligible compared to proposed Army activities.
Western Training Area *Alternative 3*	No effects on soils, paleontology, topography, geologic features and seismicity.	A moderate, adverse, and long-term effect on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Negligible compared to proposed Army activities.
Western Training Area *Alternative 4*	No effects on soils, paleontology, topography, geologic features and seismicity.	A moderate, adverse, and long-term effect on soils and paleontology. No effects on topography, geologic features and seismicity.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Negligible compared to proposed Army activities.
Range Complex	Moderate, adverse, and long-term effects on soils and paleontology. No effects on topography, geologic features and seismicity.	Not Applicable.	A minor, adverse, and long-term increase in effects on soils and paleontology, still resulting in a moderate, adverse, and long-term effect. No effects on topography, geologic features and seismicity.	Not Applicable.
Manix Trail	No effects on soils, paleontology, topography, geologic features and seismicity.	Not Applicable.	A negligible increase in effects on soils and paleontology, still resulting in a negligible effect. No effects on topography, geologic features and seismicity.	Not Applicable.

TABLE ES-4
Summary of Effects – Cultural Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Moderate, adverse, and long-term effects on archaeological resources. No effects on architectural resources.	No perceptible change.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Not Applicable.
Central Corridor	Moderate, adverse, and long-term effects on archaeological resources. No effects on architectural resources.	A negligible increase still resulting in a moderate, adverse, and long-term effect.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Not Applicable.
Southern Corridor	Moderate, adverse, and long-term effects on archaeological resources. No effects on architectural resources.	A negligible increase still resulting in a moderate, adverse, and long-term effect.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Negligible compared to current Army activities on the land.
Eastern Training Area	Moderate, adverse, and long-term effects on archaeological resources. No effects on architectural resources.	A negligible increase still resulting in a moderate, adverse, and long-term effect.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Negligible compared to current Army activities on the land.
Western Training Area *Alternative 1*	Negligible effects on archaeological or architectural resources.	Negligible effects on archaeological or architectural resources.	A minor, adverse, and long-term increase.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 2*	Negligible effects on archaeological or architectural resources.	Negligible effects on archaeological or architectural resources.	A minor, adverse, and long-term increase.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 3*	Negligible effects on archaeological or architectural resources.	Moderate, adverse, and long-term effects archaeological resources. No effects on architectural resources.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 4*	Negligible effects on archaeological or architectural resources.	Moderate, adverse, and long-term effects archaeological resources. No effects on architectural resources.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Negligible compared to proposed Army activities on the land.
Range Complex	Moderate, adverse, and long-term effects on archaeological resources. No effects on architectural resources.	Not Applicable.	A minor, adverse, and long-term increase still resulting in a moderate, adverse, and long-term effect.	Not Applicable.
Manix Trail	Moderate, adverse, and long-term effects on archaeological resources. No effects on architectural resources.	Not Applicable.	A negligible increase still resulting in a moderate, adverse, and long-term effect.	Not Applicable.

TABLE ES-5
Summary of Effects – Air Quality
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Moderate, adverse, and long-term effects on air quality from PM_{10} emissions. Negligible effects on GHG emissions.	No perceptible change. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Not Applicable.
Central Corridor	Moderate, adverse, and long-term effects on air quality from PM_{10} emissions. Negligible effects on GHG emissions.	No perceptible change. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Not Applicable.
Southern Corridor	Moderate, adverse, and long-term effects on air quality from NOx and PM_{10} emissions. Negligible effects on GHG emissions.	No perceptible change. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Negligible compared to current Army activities on the land. Negligible effects on GHG emissions.
Eastern Training Area	Moderate, adverse, and long-term effects on air quality from PM_{10} emissions. Negligible effects on GHG emissions.	No perceptible change. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Negligible compared to current Army activities on the land. Negligible effects on GHG emissions.
Western Training Area *Alternative 1*	Negligible effects on air quality. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Negligible compared to proposed Army activities on the land. Negligible effects on GHG emissions.
Western Training Area *Alternative 2*	Negligible effects on air quality. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Negligible compared to proposed Army activities on the land. Negligible effects on GHG emissions.
Western Training Area *Alternative 3*	Negligible effects on air quality. Negligible effects on GHG emissions.	A minor increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Negligible compared to proposed Army activities on the land. Negligible effects on GHG emissions.

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Western Training Area *Alternative 4*	Negligible effects on air quality. Negligible effects on GHG emissions.	A minor increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Negligible compared to proposed Army activities on the land. Negligible effects on GHG emissions.
Range Complex	Moderate, adverse, and long-term effects on air quality from PM_{10} emissions. Negligible effects on GHG emissions.	Not Applicable.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Not Applicable.
Manix Trail	Moderate, adverse, and long-term effects on air quality from NO_X and PM_{10} emissions. Negligible effects on GHG emissions.	Not Applicable.	A negligible increase still resulting in a moderate, adverse, and long-term effect. Negligible effects on GHG emissions.	Not Applicable.

GHG = greenhouse gas
NO_x = nitrogen oxide
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter

TABLE ES-6
Summary of Effects – Noise
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Minor, adverse, and short-term effects on the human environment from noise. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	No perceptible change.	No perceptible change.	Not Applicable.
Central Corridor	Minor, adverse, and short-term effects on the human environment from noise. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Minor, adverse, and short-term on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Not Applicable.
Southern Corridor	Minor, adverse, and short-term effects on the human environment from noise. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	No perceptible change.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Negligible compared to current Army activities on the land.
Eastern Training Area	Minor, adverse, and short-term effects on the human environment from noise. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Minor, adverse, and short-term on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	No perceptible change.	Minor, long-term benefit on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.
Western Training Area *Alternative 1*	Negligible effects from noise.	No perceptible change.	A minor, adverse, and short-term increase on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Negligible compared to proposed Army activities on the land.

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Western Training Area *Alternative 2*	Negligible effects from noise.	No perceptible change.	A minor, adverse, and short-term increase on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 3*	Negligible effects from noise.	Moderate, adverse, and short-term change on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	A minor, adverse, and short-term increase still resulting in a moderate, adverse, and short-term effect on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 4*	Negligible effects from noise.	Moderate, adverse, and short-term change on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	A minor, adverse, and short-term increase still resulting in a moderate, adverse, and short-term effect on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Negligible compared to proposed Army activities on the land.
Range Complex	Minor, adverse, and short-term effects from noise on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Not Applicable.	No perceptible change.	Not Applicable.
Manix Trail	Minor, adverse, and short-term effects from noise on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Not Applicable.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect on the human environment. Noise effects on wildlife are considered in the analysis of disturbance under biological resources.	Not Applicable.

TABLE ES-7
Summary of Effects – Utilities
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Negligible effect on utilities.	Minor, adverse, and short-term change.	No perceptible change.	Not Applicable.
Central Corridor	Negligible effect on utilities.	No perceptible change.	No perceptible change.	Not Applicable.
Southern Corridor	Negligible effect on utilities.	No perceptible change.	No perceptible change.	Negligible compared to proposed Army activities.
Eastern Training Area	Negligible effect on utilities.	No perceptible change.	No perceptible change.	Minor, adverse, and long-term compared to current Army activities.
Western Training Area *Alternative 1*	Negligible effect on utilities.	No perceptible change.	No perceptible change.	Minor, adverse, and long-term compared to current Army activities.
Western Training Area *Alternative 2*	Negligible effect on utilities.	Minor, adverse, and short-term change.	No perceptible change.	Minor, adverse, and long-term compared to current Army activities.
Western Training Area *Alternative 3*	Negligible effect on utilities.	Minor, adverse, and short-term change.	No perceptible change.	Minor, adverse, and long-term compared to current Army activities.
Western Training Area *Alternative 4*	Negligible effect on utilities.	Minor, adverse, and short-term change.	No perceptible change.	Minor, adverse, and long-term compared to current Army activities.
Range Complex	Negligible effect on utilities.	Not Applicable.	No perceptible change.	Not Applicable.
Manix Trail	Negligible effect on utilities.	Not Applicable.	No perceptible change.	Not Applicable.

TABLE ES-8
Summary of Effects – Transportation
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Minor, adverse, and short-term effects on transportation.	No perceptible change.	Minor, long-term benefit.	Not Applicable.
Central Corridor	Minor, adverse, and short-term effects on transportation.	No perceptible change.	Minor, long-term benefit.	Not Applicable.
Southern Corridor	Minor, adverse, and short-term effects on transportation.	No perceptible change.	Minor, long-term benefit.	Negligible compared to current Army activities.
Eastern Training Area	Minor, adverse, and short-term effects on transportation.	No perceptible change.	Moderate, long-term benefit.	Minor, long-term benefit compared to current Army activities.
Western Training Area *Alternative 1*	Minor, adverse, and short-term effects on transportation.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and long-term effect.	Moderate, long-term benefit.	Minor, long-term benefit compared to current Army activities.
Western Training Area *Alternative 2*	Minor, adverse, and short-term effects on transportation.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and long-term effect.	Moderate, long-term benefit.	Minor, long-term benefit compared to current Army activities.
Western Training Area *Alternative 3*	Minor, adverse, and short-term effects on transportation.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and long-term effect.	Moderate, long-term benefit.	Minor, long-term benefit compared to current Army activities.
Western Training Area *Alternative 4*	Minor, adverse, and short-term effects on transportation.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and long-term effect.	Moderate, long-term benefit.	Minor, long-term benefit compared to current Army activities.
Range Complex	Minor, adverse, and short-term effects on transportation.	Not Applicable.	No perceptible change.	Not Applicable.
Manix Trail	Minor, adverse, and short-term effects on transportation.	Not Applicable.	Minor, long-term benefit.	Not Applicable.

TABLE ES-9
Summary of Effects – Hazardous Materials and Hazardous Waste
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Minor, adverse, and short-term effects from hazardous materials and hazardous waste.	No perceptible change.	No perceptible change.	Not Applicable.
Central Corridor	Minor, adverse, and short-term effects from hazardous materials and hazardous waste.	A minor increase still resulting in a minor, adverse, and short-term effect.	No perceptible change.	Not Applicable.
Southern Corridor	Minor, adverse, and short-term effects from hazardous materials and hazardous waste.	A minor increase still resulting in a minor, adverse, and short-term effect.	No perceptible change.	A minor, long-term benefit compared to current Army activities on the land.
Eastern Training Area	Minor, adverse, and short-term effects from hazardous materials and hazardous waste.	A minor increase still resulting in a minor, adverse, and short-term effect.	No perceptible change.	Negligible compared to current Army activities on the land.
Western Training Area *Alternative 1*	Negligible effects from hazardous materials and hazardous waste.	A minor, adverse, and short-term effect.	A minor, adverse, and short-term increase still resulting in an overall minor, adverse, and short-term effect.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 2*	Negligible effects from hazardous materials and hazardous waste.	A minor, adverse, and short-term effect.	A minor, adverse, and short-term increase still resulting in an overall minor, adverse, and short-term effect.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 3*	Negligible effects from hazardous materials and hazardous waste.	A minor, adverse, and short-term effect.	A minor, adverse, and short-term increase still resulting in an overall minor, adverse, and short-term effect.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 4*	Negligible effects from hazardous materials and hazardous waste.	A minor, adverse, and short-term effect.	A minor, adverse, and short-term increase still resulting in an overall minor, adverse, and short-term effect.	Negligible compared to proposed Army activities on the land.
Range Complex	Minor, adverse, and short-term effects from hazardous materials and hazardous waste.	Not Applicable.	No perceptible change.	Not Applicable.
Manix Trail	Minor, adverse, and short-term effects from hazardous materials and hazardous waste.	Not Applicable.	No perceptible change.	Not Applicable.

TABLE ES-10
Summary of Effects – Health and Safety
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	Minor, adverse, and short-term effects from military training. No effects on the public.	No perceptible change.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Not Applicable.
Central Corridor	Minor, adverse, and short-term effects from military training. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Not Applicable.
Southern Corridor	Minor, adverse, and short-term effects from military training. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	A minor, long-term benefit compared to current Army activities on the land.
Eastern Training Area	Minor, adverse, and short-term effects from military training. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Negligible compared to current Army activities on the land.
Western Training Area *Alternative 1*	No effects from military training. No effects on the public.	A minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 2*	No effects from military training. No effects on the public.	A minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Negligible compared to proposed Army activities on the land.
Western Training Area *Alternative 3*	No effects from military training. No effects on the public.	A minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Negligible compared to proposed Army activities on the land.

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Western Training Area *Alternative 4*	No effects from military training. No effects on the public.	A minor, adverse, and short-term effect. No effects on the public.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Negligible compared to proposed Army activities on the land.
Range Complex	Minor, adverse, and short-term effects from military training. No effects on the public.	Not Applicable.	A minor, adverse, and short-term increase still resulting in a minor, adverse, and short-term effect. No effects on the public.	Not Applicable.
Manix Trail	No effects from military training or on the public.	Not Applicable.	No perceptible change.	Not Applicable.

TABLE ES-11
Summary of Effects – Land Use
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	No effects on land use.	No effects on land use.	No effects on land use.	Not Applicable.
Central Corridor	No effects on land use.	No effects on land use.	No effects on land use.	Not Applicable.
Southern Corridor	No effects on land use.	No effects on land use.	No effects on land use.	A minor, long-term benefit for the public.
Eastern Training Area	No effects on land use.	No effects on land use.	No effects on land use.	A minor, long-term benefit for the public.
Western Training Area *Alternative 1*	No effects on land use.	No effects on land use.	No effects on land use.	A minor, long-term benefit for the public.
Western Training Area *Alternative 2*	No effects on land use.	No effects on land use.	No effects on land use.	A minor, long-term benefit for the public.
Western Training Area *Alternative 3*	No effects on land use.	No effects on land use.	No effects on land use.	A minor, long-term benefit for the public.
Western Training Area *Alternative 4*	No effects on land use.	No effects on land use.	No effects on land use.	A minor, long-term benefit for the public.
Range Complex	No effects on land use.	No effects on land use.	No effects on land use.	Not Applicable.
Manix Trail	No effects on land use.	No effects on land use.	No effects on land use.	Not Applicable.

TABLE ES-12
Summary of Effects – Recreation
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Training Area	No Mission Change Alternative	Changes in Training	Infrastructure Improvements	No Withdrawal Extension
Northern Corridor	No effects on recreation.	No effects on recreation.	No effects on recreation.	Not Applicable.
Central Corridor	No effects on recreation.	No effects on recreation.	No effects on recreation.	Not Applicable.
Southern Corridor	No effects on recreation.	No effects on recreation.	No effects on recreation.	A minor, long-term benefit for the public.
Eastern Training Area	No effects on recreation.	No effects on recreation.	No effects on recreation.	A minor, long-term benefit for the public.
Western Training Area *Alternative 1*	No effects on recreation.	No effects on recreation.	No effects on recreation.	A minor, long-term benefit for the public.
Western Training Area *Alternative 2*	No effects on recreation.	No effects on recreation.	No effects on recreation.	A minor, long-term benefit for the public.
Western Training Area *Alternative 3*	No effects on recreation.	No effects on recreation.	No effects on recreation.	A minor, long-term benefit for the public.
Western Training Area *Alternative 4*	No effects on recreation.	No effects on recreation.	No effects on recreation.	A minor, long-term benefit for the public.
Range Complex	No effects on recreation.	No effects on recreation.	No effects on recreation.	Not Applicable.
Manix Trail	No effects on recreation.	No effects on recreation.	No effects on recreation.	Not Applicable.

ES.13 Summary of Mitigation Measures

Under all alternatives, appropriate mitigation measures, including best management practices (BMPs), have been identified that would be implemented to reduce the potential for effects. The following mitigation measures would be implemented:

Biological Resources

- **Biology Mitigation-1**: Require soldiers and work crews operating on Fort Irwin to place trash in the appropriate containers and remove trash at the completion of work or the training event.
- **Biology Mitigation-2**: Apply water for dust suppression in a manner that does not create pools that could attract pest species.
- **Biology Mitigation-3:** Continue the ITAM program's actions to encourage revegetation to the degree practicable after training events.
- **Biology Mitigation-4:** Train soldiers to avoid effects to the desert tortoise. If a tortoise is on a trail, instruct soldiers to stop their movement until the tortoise has cleared the trail. Within the Manix Trail between I-15 and the Fort Irwin boundary, use trained home-station soldiers to escort convoys and conduct relocation if a tortoise must be moved.
- **Biology Mitigation-5:** Implement mitigation measures related to special status plant species, as agreed to with the U.S. Fish and Wildlife Service (USFWS).
- **Biology Mitigation-6:** Monitor species identified by the State of California as SSC and threatened or endangered species and manage populations in accordance with the Fort Irwin Integrated Natural Resources Management Plan (Fort Irwin, 2006b). In the future, if any of these species are designated by the USFWS to be threatened or endangered, Fort Irwin will initiate consultation with the USFWS per Section 7 of the ESA.
- **Biology Mitigation-7:** To avoid any effects on special status species, ensure all construction involves the implementation of the mitigation measures specified in the BO, including the following practices.
  - Before construction or maintenance begins, brief personnel working onsite about the desert tortoise, detailing the protocol to follow if a tortoise is encountered in the project area. Have a trained person conduct the briefing.
  - Have a trained person conduct a preconstruction survey. If an active burrow or desert tortoise is identified during the survey, implement the appropriate measures as specified in the BO.
  - During land clearing and construction, have a biological monitor onsite to observe construction activities and verify that no tortoise has wandered into the construction area. If an active burrow or desert tortoise is identified during work, implement the appropriate measures as specified in the BO.
  - Require workers to inspect the underside of all onsite parked vehicles before moving them, unless parked in a staging or parking area protected by exclusion fencing. If a desert tortoise is detected, have a trained person remove the animal to a safe place or wait to operate the vehicle(s) until the animal moves to safety on its own.
  - To the extent possible, schedule construction activities involving vegetation clearing and/or ground disturbances when tortoises are inactive (November to mid-March).
  - If channels or basins are constructed, design them to allow desert tortoise to pass through them unimpeded so the desert tortoise would not be constrained in these features.

- Fill or cover trenches and other excavations at the end of each work day.
- If vegetation clearing is required during the breeding and nesting season, conduct preconstruction surveys for breeding birds. Protect project-identified active nests or burrows (burrowing owl) from disturbance with a 500-foot buffer that would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season.
- If a kit fox or American badger burrow is identified on or adjacent to the project area during the preconstruction survey, contact Fort Irwin natural resources staff to determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin would decide if fencing or flagging would suffice to delineate the exclusion zone.

Water Resources

- **Water Mitigation-1**: Continue ITAM's work to reduce erosion caused by military training by implementing erosion control BMPs and revegetating areas when necessary.
- **Water Mitigation-2**: Continue to implement the Fort Irwin spill prevention and contingency plan (SPCP) in the event of an accidental spill of vehicle or equipment fluids to prevent any potential contaminants from reaching surface or groundwater.
- **Water Mitigation-3**: Prepare a stormwater pollution prevention plan with appropriate BMPs for the construction activities in accordance with the National Pollutant Discharge Elimination System (NPDES) Construction General Storm Water Permit, Water Quality Order (WQO) 2009-0009-DWQ.
- **Water Mitigation-4**: Monitor water diversion and/or dewatering activities in accordance with either the NPDES General Permit, Limited Threat Discharges to Surface Waters, Board Order R6T-2014-0049, or the General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQO-2003-0003, issued by the Lahontan Water Board.
- **Water Mitigation-5:** For excavation, discharge of fill, or other physical alteration of a surface water, either permanently or temporarily, obtain either a Lahontan Water Board-issued General Waste Discharge Requirements (Permit) for dredge or fill discharges to non-federal waters, or a Lahontan Water Board-issued Clean Water Act Section 401 water quality certification for effects to federal waters.

Geology

- **Geology Mitigation-1**: Continue the ITAM program's efforts to control erosion in the training area where it negatively affects training or could lead to regulatory violations. LRAM projects include revegetation of native vegetation and the installation of erosion control BMPs, such as check dams and berms.
- **Geology Mitigation-2**: Place new targetry and other training infrastructure outside high potential paleontological areas.

Cultural

- **Cultural Mitigation-1:** Continue to perform cultural resource surveys throughout the training and support operation areas, following procedures detailed in Stipulation III of the PA. Surveys will be prioritized based on the potential for significant cultural resources or historic properties to exist, the area's geology, and the intensity and location of the training activity. Surveys and other technical or specialized assistance will be completed by qualified personnel or organizations, including individuals who meet the Secretary of the Interior's Professional Qualification Standards, pursuant to 36 CFR Part 61, unless other specialized assistance is needed, as described in Stipulation II of the PA.

- **Cultural Mitigation-2:** Implement unanticipated/post-review discovery plans for unexpected finds of archaeological resources and unforeseen effects in accordance with the *Integrated Cultural Resources Management Plan* (ICRMP) and Stipulation VIII of the PA. The NTC will avoid further direct effects and develop a suitable buffer area, determined on a case-by-case basis, with 30 meters being a commonly used minimum distance, around the discovery, demarcated with flagging, tape, or other suitable materials. The NTC will complete a National Register of Historic Places (NRHP) evaluation and assessment of effect for the discovery and consult with the State Historic Preservation Office (SHPO) and Native American tribes as necessary.
- **Cultural Mitigation-3:** Treat all Native American human remains and associated funerary objects, sacred objects, and objects of cultural patrimony that are inadvertently discovered in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations (43 CFR Part 10) and AR 200-1, *Environmental Protection and Enhancement*, as described in Stipulation VII of the PA. When such items are encountered, suspend all use of the immediate area, protect in place the remains and items, and secure the immediate area until appropriate qualified personnel, such as an osteologist, the San Bernardino County Coroner, or law enforcement personnel, will determine whether the remains are human, and if they are, whether they should be considered part of a crime scene or police investigation. If determined to be Native American remains or associated funerary objects, contact tribal members and undertake consultation for the appropriate disposition of the human remains and associated cultural items in accordance with the processes outlined in 43 CFR Sections 10.3 through 10.6.
- **Cultural Mitigation-4:** Conduct cultural resources surveys and significance evaluations prior to specific construction activities and opening the Western Training Area to full training in accordance with Stipulations III and IV of the PA. In addition, implement avoidance and protection in place for NRHP-eligible archaeological resources sites to the greatest extent feasible through notation in the electronic operations control system, anti-tank obstacles, Seibert stakes, designation of no-fire or restricted-fire areas, fencing, signage, capping/hardening, condition monitoring, and other measures. If protection in place or avoidance is not feasible, the NTC will consult with Native American tribes and SHPO to resolve adverse effects in accordance with Stipulation V of the PA.

Air Quality

- **Air Quality Mitigation-1**: Stabilize training routes and other disturbed areas by watering and using chemical stabilizers and asphalt chip sealer when feasible.
- **Air Quality Mitigation-2:** Revegetate previously disturbed areas under the ITAM program.
- **Air Quality Mitigation-3**: Continue to designate dry lake beds off-limits to vehicle travel.
- **Air Quality Mitigation-4**: Implement the reduction measures as defined in Mojave Desert Air Quality Management District Rule 403.2 for construction activities.

Noise

- **Noise Mitigation-1**: If Alternative 2 for the Western Training Area is chosen, locate the brigade support areas away from noise-sensitive land use areas at the NASA Goldstone Complex.
- **Noise Mitigation-2**: If Alternative 2 for the Western Training Area is chosen, the Army would work with NASA to ensure that any changes to the noise contours would not disrupt the NASA Deep Space Communication Network at the NASA Goldstone Complex.
- **Noise Mitigation-3**: Locate all new infrastructure improvement sites away from the telescopes at the NASA Goldstone Complex and other NASA facilities determined to be eligible for listing in the NRHP.

Utilities

- **Utility Mitigation-1**: Use dig restrictions and off-limits areas to prevent training activities from damaging utility infrastructure.
- **Utility Mitigation-2**: Use recycled water for dust suppression and other non-potable purposes during construction.
- **Utility Mitigation-3**: Plan in advance for any potential short-term utility disruptions and coordinate between the contractor and Fort Irwin staff.

Transportation

- **Transportation Mitigation-1**: Require coordination by the NTC with NASA in advance of planned training movements through the NASA Goldstone Complex to either the Central Corridor or the Western Training Area.
- **Transportation Mitigation-2**: Coordinate traffic control during operations at the Silver Lake Mine.
- **Transportation Mitigation-3:** Coordinate all downrange work to install or maintain training infrastructure with Range Operations to avoid conflicts with the training mission.

Hazardous Materials and Hazardous Waste

- **Hazardous Mitigation-1**: Require all training activities to comply with applicable laws and regulations related to hazardous materials and hazardous wastes, in accordance with the Fort Irwin SPCP and Hazardous Materials and Hazardous Waste Management Plan (HMHWMP). Train units on these requirements prior to beginning training activities.
- **Hazardous Mitigation-2**: Require all military and civilian personnel on the installation and all subcontractors working with potentially hazardous materials to receive a briefing on hazardous waste management protocol.
- **Hazardous Mitigation-3**: Present the Rotational Unit Environmental Briefing Handbook that addresses hazardous waste training to all personnel attending RTU training.
- **Hazardous Mitigation-4**: Require each rotation to provide a 20-person environmental cleanup team with designated equipment to clean up any spills that occur down range. Following each rotation, require military personnel to survey the training areas by ground reconnaissance and aerial overflights to identify any spills that were not cleaned up. Note areas where a release occurred and dispatch a cleanup team to the spill area. Remove the contaminated soil and take to the Fort Irwin bioremediation land farm.

Health and Safety

- **Health and Safety Mitigation-1**: Maintain protective buffers around abandoned mine sites as off-limits to military training.
- **Health and Safety Mitigation-2**: Implement the following measures to reduce the potential exposure to, and effects of, Valley fever:
  - Make available a brochure detailing Valley fever, its cause, and symptoms and include information on how to control the spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials.
  - Educate personnel through briefings to recognize the symptoms of Valley fever and quickly report suspected symptoms of work-related Valley fever.
- **Health and Safety Mitigation-3**: Train all individuals at the site to identify unexploded ordnance (UXO) and in how to contact Fort Irwin Range Operations. Once a UXO is identified, Explosive

Ordnance Disposal (EOD) personnel will be contacted and the UXO will be rendered safe (removed or blown in place) or marked with a red UXO sign.

- **Health and Safety Mitigation-4**: After rotations, scout areas where targets are located for UXO and deploy EOD personnel to respond to identified UXO.
- **Health and Safety Mitigation-5:** Limit bomb drops to existing impact areas and prohibit personnel from entering these areas during training activities.
- **Health and Safety Mitigation-6**: During construction activities, require personnel or contractors to develop and implement site-specific health and safety plans to manage and minimize potential human health hazards and risk.
- **Health and Safety Mitigation-7:** Coordinate activities with Range Operations to prevent the installation or upgrade of range infrastructure during training events.
- **Health and Safety Mitigation-8:** Receive confirmation that EOD personnel have cleared the areas where potential UXO could be encountered prior to infrastructure improvement activities.

Land Use and Recreation

- None

ES.14 Public Engagement

The Army invites public participation in the NEPA process. Considering the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process. Details of the public engagement process, including a list of the federal and state agencies, tribal groups, and community groups with whom Fort Irwin has consulted, is provided in Appendix 1A. Public participation opportunities with respect to this LEIS and decision making on the Proposed Actions are guided by 32 CFR Part 651.

SECTION 1

Purpose and Need

1.1 Introduction

Army Doctrine Publication (ADP) 3-0, *Unified Land Operations* (ULO), is the U.S. Army's (Army's) warfighting doctrine (Army, 2011). It is based on the central idea that Army units seize, retain, and exploit the initiative to gain a position of relative advantage over the enemy. This is accomplished through a simultaneous combination of offensive, defensive, and stability operations that set conditions for favorable conflict resolution. The Army's two core competencies—combined arms maneuver and wide-area security—provide the means for balancing the application of Army warfighting functions within the tactical actions and tasks inherent in offensive, defensive, and stability operations. It is the integrated application of these two core competencies that enables Army forces to defeat an enemy, seize or occupy key terrain, protect or secure critical assets and populations, and prevent the enemy from gaining a position of advantage (Army, 2011).

Established in 1980, the National Training Center (NTC) on Fort Irwin, California, provides ULO training for maneuver Brigade Combat Teams (BCTs), including the Army's Stryker Brigade Combat Teams (SBCTs) and Armored Brigade Combat Teams (ABCTs). Training is also provided for joint military branches (Marine Corps, Navy, and Air Force), Army Reserve, National Guard units, and regular and transitional law enforcement units[1], as well as units permanently assigned on Fort Irwin (i.e., home-station units). Because of its size, design, and terrain, the NTC is one of the few places in the world where brigade-size units (5,000+ soldiers) can test their combat readiness.

The following statement is the mission of the NTC:

> Train Army combat formation to win the first fight of the next war while continuing to improve social connection and quality of life at Fort Irwin so that we can recruit and retain top talent.

The following is Fort Irwin's Vision Statement:

> Train the Force to Win in Large Scale Combat Operations
>
> - Develop ready units and adaptive leaders
> - Replicate complex, hybrid threats using a dedicated opposing force and a high fidelity training support system (peer/near-peer threats)
> - Replicate Theater Sustainment Command (TSC) and Expeditionary Sustainment Command (ESC) capabilities to command and control reception, staging, onward movement, and integration (RSOI), regeneration and Echelon-Above-Brigade (EAB) sustainment
> - Integrate conventional, joint, special operations forces, and Unified Action Partners[2]
> - Provide a "leadership crucible" event
> - Develop unit and leadership skills required to win

[1] Transitional law enforcement units are interim law enforcement units used in stability operations abroad until an indigenous police force is functionally operational.

[2] "Unified action partners are those military forces, governmental and nongovernmental organizations, and elements of the private sector with whom Army forces plan, coordinate, synchronize, and integrate during the conduct of operations" (Army, 2017a).

Units at the NTC design and execute training exercises that prepare brigade-level units for operational deployments. Fort Irwin is also designated a post-mobilization warfighting center for the National Guard. Brigade-level training events, or rotations, are highly realistic and stressful training events that incorporate force-on-force and live-fire scenarios designed to prepare units for combat and security missions. Army BCTs come to the NTC from across the United States to train as Rotational Training Units (RTUs). A RTU generally consists of a brigade-level headquarters and a collection of battalion- and company-sized units. Rotational training also may include joint forces constituents. Table 1-1 provides a list of the BCTs that are scheduled to train at the NTC during fiscal year (FY) 2022 and serves as a representation of a typical rotation schedule.

TABLE 1-1
Fiscal Year 2022 National Training Center Rotational Training Units
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Unit	Home-station	Unit Crest
3rd ABCT, 1st Cavalry Division	Fort Hood, Texas	
2nd SBCT, 4th Infantry Division	Fort Carson, Colorado	
1st SBCT, 2nd Infantry Division	Joint Base Lewis-McCord, Washington	
3rd Security Force Assistance Brigade	Fort Hood, Texas	
3rd ABCT, 4th Infantry Division	Fort Carson, Colorado	
2nd ABCT, 1st Cavalry Division	Fort Hood, Texas	
3rd Stryker Cavalry Regiment	Fort Hood, Texas	
278th Armored Calvary Regiment	Knoxville, Tennessee	
2nd ABCT, 1st Armored Division	Fort Bliss, Texas	

In addition to rotations, permanently assigned units train on Fort Irwin to meet the requirements prescribed in their unit's mission-essential task list. The following units are the largest home-station units on Fort Irwin.

- **Operations Group (OPS GRP):** The OPS GRP serves as the rotation scenario planners and primary trainers (observers, coaches, and trainers) at the NTC. The OPS GRP provides training in a realistic and competitive environment and then provides feedback to the RTUs on their training activities during after-action reviews.
- **11th Armored Cavalry Regiment (11th ACR):** The 11th ACR serves as the opposing force (OPFOR) during rotations and provides the threat or enemy against which the RTUs must operate. The 11th ACR adapts to the training needs of the Army to provide a realistic opponent for the RTUs during training scenarios. The 11th ACR is also a deployable unit and uses the training land and ranges to ensure combat readiness.
- **916th Support Brigade (916th SPT BDE):** The 916th SPT BDE is responsible for providing logistics support to RTUs on Fort Irwin, including resupply and vehicle recovery operations. The 916th SPT BDE conducts unmanned aerial system (UAS) operations and provides rotary-wing (helicopter) aviation sustainment to RTUs, NTC customers, and other government and civilian agencies.
- **U.S. Army Medical Department Activity (MEDDAC):** MEDDAC provides emergency medical services, behavioral health initiatives, population and deployment health services, and timely access to care. MEDDAC supports RTUs through ancillary services, logistics, and the NTC surgeons' cell.
- **U.S. Army Garrison:** The Garrison supports tenant units and training operations with facilities and base services, and it provides quality of life programs for soldiers and their families.

Fort Irwin encompasses 753,537 acres (Figure 1-1) and consists of a Cantonment Area (or community area), the Range Complex, training areas, the National Aeronautics and Space Administration (NASA) Deep Space Communications Complex (NASA Goldstone Complex), and the Leach Lake Tactical Range (Leach Lake). The NASA Goldstone Complex, which is leased by NASA from the Army, is located in the western part of the installation. The NASA Goldstone Complex consists of a series of deep space radio telescopes and serves as NASA's deep space communication network. The NASA Goldstone Complex telescopes are used by NASA's Jet Propulsion Laboratory to monitor deep space missions, including the Mars rovers and numerous spacecraft located throughout the solar system.

Rotations and maneuver training occur primarily in the training areas, which are constricted by terrain and off-limits areas. Approximately 75 percent of Fort Irwin is considered suitable for maneuver training. Maneuver training is prohibited in the following areas:

- NASA Goldstone Complex, except for the use of fixed main supply routes (MSRs) and the UAS facility and runway (32,411 acres)
- Leach Lake, which is used as an aerial bombing range by the Air Force and as an impact area for artillery training (91,330 acres)
- Cantonment Area (13,976 acres)
- Range Complex, which is the primary location for fixed firing ranges (19,608 acres)
- Natural and cultural resource conservation areas, including dry lake beds, sensitive equipment areas, safety restriction areas, and utility corridor areas (41,640 acres)

The Fort Irwin Directorate of Public Works (DPW), Environmental Division, along with the G3 Integrated Training Area Management (ITAM) program, actively manage natural and cultural resources on Fort Irwin. The DPW Environmental Division is tasked with managing sensitive resources such as threatened and endangered species and cultural sites and is responsible for ensuring compliance with relevant

federal environmental regulations, such as the Endangered Species Act (ESA), the Clean Air Act (CAA) and the Clean Water Act (CWA). The G3 ITAM program is tasked with monitoring training land conditions on Fort Irwin and implementing Land Rehabilitation and Maintenance (LRAM) projects to improve the sustainability of the training areas.

Fort Irwin's daily population is approximately 27,000 people, including 4,448 active duty military members, a 4,328-civilian-resident workforce, approximately 5,530 non-resident contractors, and 6,600 family members. In addition, over 6,000 service members typically visit Fort Irwin during training rotations (Fort Irwin, 2018a).

The Army has grown in recent years; the number of active duty soldiers was approximately 460,000 in 2016, and by FY2020, the number had increased to approximately 485,000 (Association of the Army, 2020). The Army is also transforming. Geopolitical realities have caused senior Army leaders to shift the emphasis of training from counter-insurgency (COIN) operations, which were common during the wars in Iraq and Afghanistan, to ULO in preparation for conflict with established "near-peer" or "high-end adversary" nation-states at the full brigade level. According to Army Doctrine Reference Publication (ADRP) 3-0, *Operations* (Army, 2017a), a peer threat is an adversary with the capability and capacity to oppose U.S. Forces across multiple domains worldwide or within a specific region in which they enjoy a position of relative advantage. The training activities at the NTC have evolved accordingly.

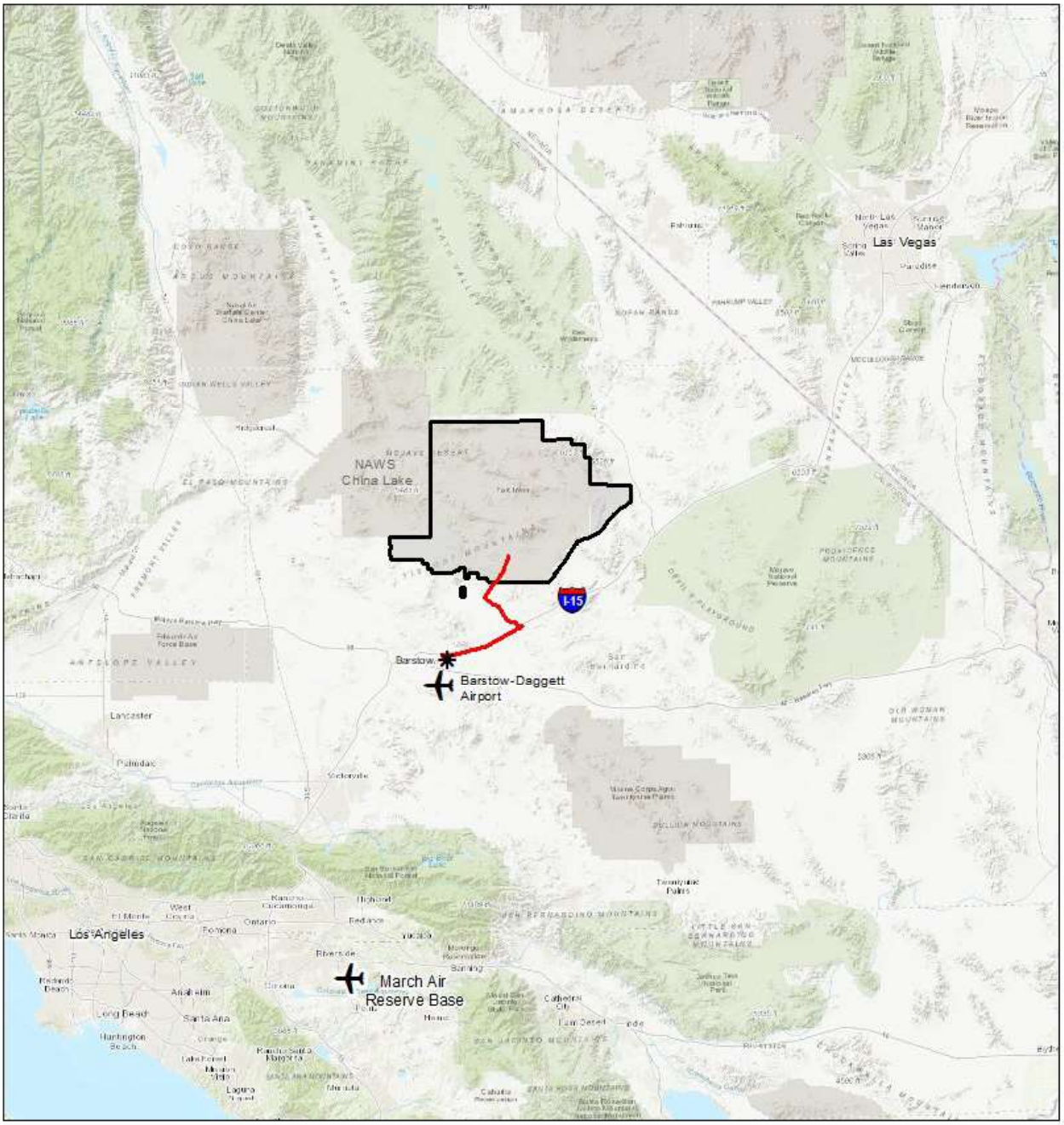


FIGURE 1-1
Fort Irwin Location
Fort Irwin EIS
Fort Irwin, CA

1.2 Purpose and Need for the Proposed Actions

According to Army Regulation (AR) 350-1, *Army Training and Leader Development*, the Army's mission is to build a campaign-quality, expeditionary Army capable of operating effectively with joint military branches and interagency, intergovernmental, and multinational players across the spectrum of conflict. The Army must also provide capable and ready forces to Combatant Commands in support of the National Security and National Defense Strategies. The training of Army units must address this joint context (Army, 2017b). To this end, the focus of the NTC is to assist deployable (U.S. Army Forces Command [FORSCOM]) units in preparing their soldiers and to serve as a leadership crucible before soldiers are deployed into combat. To train soldiers to the highest degree of proficiency possible, individual and crew training must be realistic, well-managed, and aggressively executed (Army, 2015).

As described in AR 200-1, *Environmental Protection and Enhancement*, the Army is also committed to environmental stewardship in all actions as an integral part of the Army mission and has focused efforts to conserve and preserve natural and cultural resources for future generations (Army, 2007). The Army developed *The Army Sustainable Range Program* (SRP) (AR 350-19; Army, 2005) to maximize the capability, availability, and accessibility of ranges and training land to support training requirements, mobilizations, and deployments. The SRP includes the G3 ITAM program, which provides the capability to manage and maintain training land by integrating mission requirements with environmental requirements and sound land management practices (Army, 2005). Following AR 350-19, the NTC SRP created a Range Complex Master Plan to detail ITAM projects and the current status of, and planned upgrades to, range and training area infrastructure, which are necessary to meet the requirements of the National Defense Strategy; AR 350-1, *Army Training and Leader Development;* AR 350-52, *Training Support System;* AR 350-50, *Combat Training Center Program* (Army, 2018a)*;* and AR 200-1, *Environmental Protection and Enhancement*.

In 2018, the U.S. Department of Defense (DoD) released an updated National Defense Strategy emphasizing the need to rebuild readiness (DoD, 2018). The Army is shifting its focus from fighting irregular warfare or insurgencies to preparing to fight adversaries who are our military peers or near-peers. In testimony to the U.S. Congress in March 2018, then-Secretary of the Army Mark Esper described this shift:

> The Army's mission to defend the nation has not changed, but the strategic environment has. We have returned to an era of great power competition that makes the world ever more complex and dangerous. While the Army must be ready to deploy, fight, and win any time against any adversary, the National Defense Strategy has identified China and Russia as the principal competitors against which we must build sufficient capacity and capabilities.

The Army's 2019 Posture Statement, provided to Congress, stated:

> We must have an Army prepared for high-intensity conflict, modernized to extend overmatch against near-peer adversaries, and trained to fight as part of the Joint Force alongside our allies and partners, all while sustaining our ability to conduct irregular warfare.

To achieve this, the Army's number one priority is to "rebuild warfighting readiness… Ready forces must be organized, trained, and equipped for prompt and sustained ground combat" (Army, 2019). In turn, the Army has increased readiness across all Army units. The Posture Statement continues, stating, "Army collective training focuses on high-intensity conflict, with an emphasis on operating in complex terrain, electronically degraded environments, and under constant surveillance." The Posture Statement concludes by stating that the Army will "remain the most capable and lethal ground combat force in the world" (Army, 2019). The Army reiterated this goal in its 2020 Posture Statement by stating: "The Army

must be ready today and in a future where we know will be contested in every domain – land, sea, air, space, and cyber space" (Army, 2020a).

The U.S. Government Accountability Office (GAO) examined Army readiness and provided recommendations to aid in the progression of, and overcome the challenges with, rebuilding personnel and equipping and training them. The GAO stated that the Army needs to focus on growing Army forces, providing forces with modernized equipment, and training units to conduct large-scale, decisive-action operations across multiple domains (GAO, 2019).

The training needs and requirements of the Army change as new weapons and defense systems are developed for soldiers to use; new threats in different parts of the globe emerge; and the tactics and technology used by our adversaries change. Force-on-force training at the NTC must change to accommodate the shift to a greater emphasis on ULO and near-peer conflict scenarios, while maintaining the ability to provide training in other types of combat. To enable the shift in training focus, the following changes in training activities are needed.

1.2.1 Changes in Training Activity

As training at the NTC evolves to meet current and future requirements and doctrine, the activities during training events must also evolve. The necessary changes in military training projected on Fort Irwin are described in the following sections.

1.2.1.1 Maneuver Training

BCTs are capable of operating over distances greater than those currently accessible at the NTC. The BCT must protect its rear areas as well as the routes that supply its elements. To make NTC training more realistic, the distances between the BCT's rear operations and the BCT's main area of operations must be increased. Furthermore, since 2013, BCTs have become larger, composed of three maneuver battalions instead of two. To train properly for combat, a BCT must have the ability—the space and terrain type—to maneuver its three battalions. The current utilization of maneuver space at the NTC does not provide the distance for linear and lateral replication of the area for which the BCT would expect to be responsible when deployed. A more complete utilization of the existing training areas would create the necessary distance and terrain over which the BCT would be operating when deployed. This increased area would better facilitate realistic combined arms training. Full utilization of the Eastern and Western Training Areas (Figure 1-2) is necessary for a BCT to meet doctrinal requirements to overcome terrain restrictions in the decisive action scenario.

1.2.1.2 Sustainment Training

All BCTs at the NTC must train and exercise their support battalions in sustainment operations. The challenging terrain at the NTC can be more fully utilized to replicate the various challenges a BCT faces when deployed, including maintaining line of communications over long distances and rear area security. Currently, the NTC does not have the length of maneuver area necessary to replicate the distance expected between forward combat elements and support and logistics. Given the changes in technology and expected combat situations, the units need a greater distance between forward units and maintenance and refueling operations than is currently afforded to train for planning and execution of sustainment capability. The BCTs must face the challenges of recovering damaged vehicles, maintenance priority, parts flow, and fueling operations across extended distances, which could be accomplished by fully utilizing the Eastern and Western Training Areas.

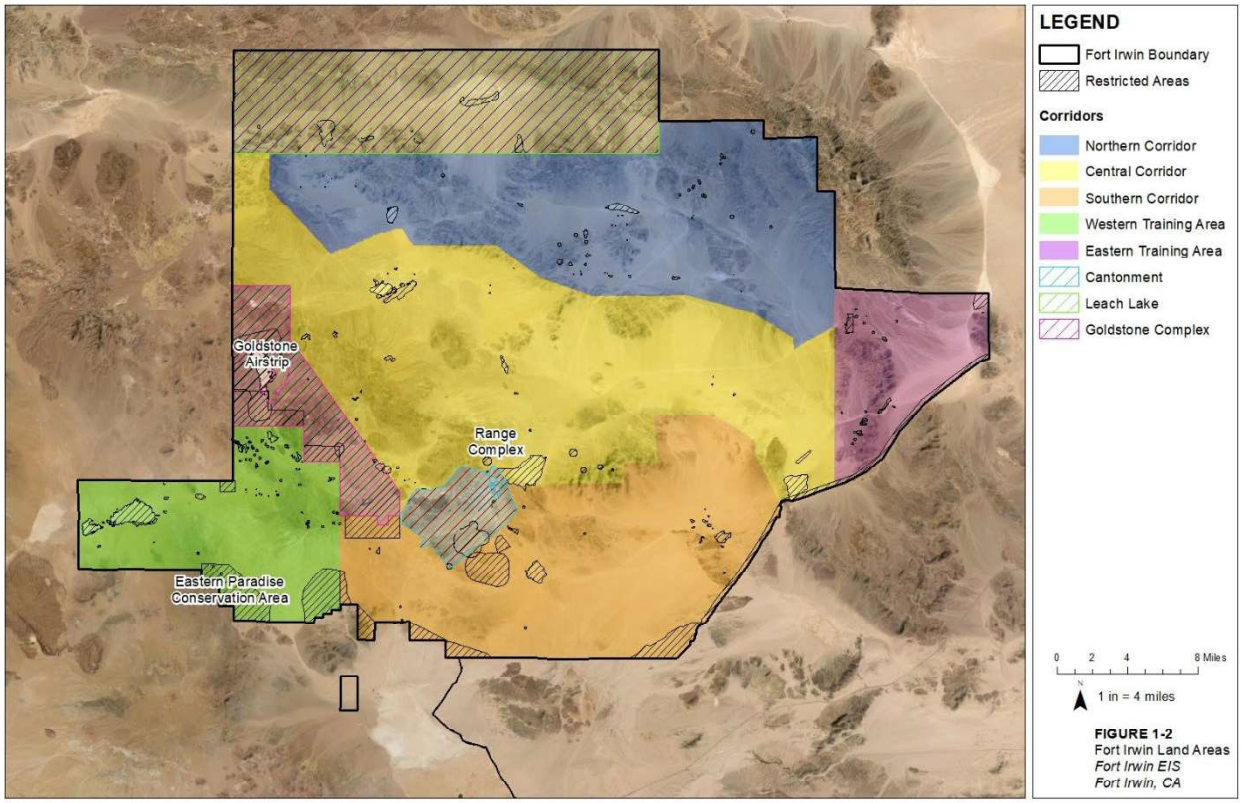


FIGURE 1-2
Fort Irwin Land Areas
Fort Irwin EIS
Fort Irwin, CA

1.2.2 Training Infrastructure Modifications

To meet current and projected training requirements, training infrastructure must be improved. The following activities need to occur on Fort Irwin to meet training requirements.

1.2.2.1 Increased Live Weapons Training Capabilities

BCTs conduct weapons training with live ammunition as the final training event at the NTC. The NTC needs to increase the capability to use live ammunition in rear areas to replicate the security mission that these units would experience when deployed. Units primarily use the Northern Corridor for BCT-level live ammunition training. Although limited, small-scale live ammunition activities are conducted in the Central and Southern Corridors to simulate specific ground combat requirements, the current infrastructure does not allow the BCT to use live ammunition simultaneously over the entire battlefront, and only part of the BCT is able to participate in live ammunition training at any given time. By increasing live ammunition capabilities throughout the NTC training areas, the BCT could conduct live weapons training simultaneously across its entire front.

1.2.2.2 Improve Urban Operations Sites

With more of the world's population residing in cities, urban operations (UOs) are a focus of Army leaders. On deployments, a BCT can expect to encounter urban areas in the battle space. Consequently, UO sites are essential in training BCTs in the complexities of UOs during combat. Urban areas also play a role in live-fire training. The NTC uses urban areas in the Northern, Southern, and Central Corridors, but it is necessary to have more UO sites throughout a larger area and make them more realistic. As a result, it is necessary to build UO locations throughout the corridors and in the Eastern and Western Training Areas.

1.2.2.3 Improve Communication Capabilities

The NTC relies on a handheld radio communication system linked into fiber to maintain command and control during training exercises across varying terrain in the Northern, Southern, and Central Corridors

and the Eastern and Western Training Areas. Because of the increased size and pace of BCT operations and the need to integrate all warfighting functions, the current infrastructure poses challenges related to training realism and safety during rotational training. The improvement of communications is accomplished by leveraging current and future technologies. Existing communication systems throughout Fort Irwin need to be upgraded to improve training realism and safety.

1.2.2.4 Create New CBRN Training Facilities

Simulated chemical, biological, radiological, and nuclear (CBRN) training facilities provide realism to the training exercises. The current CBRN training facilities provide the BCT with only isolated CBRN threats and preclude the BCT from being challenged with simultaneous CBRN concerns across its areas of operation. The BCT must train in tasks that involve responding to the threat of CBRN. The Northern, Central, and Southern Corridors and the Eastern and Western Training Areas require new CBRN training facilities to train BCTs to respond properly to the threats posed by CBRN and to exercise BCT capabilities. The facilities can be built underground, above ground, or in bunkers, with the type of facility used depending on the specific training scenario requirements. The equipment used is inert and not operational; in other words, no real chemical, biological, radiological, or nuclear agents will be used. CBRN training facilities are secluded and masked to prevent them from being easily detected by the training unit, thereby developing the BCT's ability to find, secure, and mitigate the notional capabilities of CBRN threats.

1.2.2.5 FARPs and RASAs

The training rotations at the NTC require BCTs to employ extensive aviation support. Forward arming and refueling points (FARPs) and ready ammunition storage areas (RASAs) are located throughout the NTC, providing locations to refuel and maintain aircraft (helicopters) and obtain necessary supplies, food, and ammunition to continue with the training mission. The FARPs and RASAs at the NTC currently do not provide the variety or distance needed for realistic training. FARPs and RASAs must be located in places that provide for doctrinally required security, safety, and lines of communication to provide realistic training to aviation units. They must be located throughout the length of the battlefield. Increasing the number of FARPs and RASAs in the Central and Southern Corridors and Eastern and Western Training Areas would increase the flexibility of aviation operations.

1.2.2.6 Radar System Upgrades

The Army is shifting to operations that require ground-based radar; however, the NTC currently has no ground-based radar capability. Furthermore, radar systems have a short shelf life and periodic upgrades, including complete system replacement, are common. Improved radar employment would extend the radar reach and provide the training unit with the opportunity to integrate it into the training scenario.

1.2.2.7 Training Area Improvements

Improvements to training land, tactical sites, and secondary trails are needed to provide for the safe and efficient movement of soldiers, equipment, and materiel while reducing the potential for erosion and damage to the physical environment. These modifications maintain training proficiency required by AR 350-1 and enable the NTC to comply with environmental requirements detailed in AR 200-1. LRAM activities, including erosion control and site stabilization, are implemented to improve soldier safety, prevent regulatory violations, maintain realism in the training environment, and sustain the training land to support current and future training.

1.2.3 Range Improvements

In addition to training area improvements, individual weapon ranges need to be improved to meet current training requirements. The NTC has identified the improvements needed to meet the requirements of new weapon systems and reduce conflicts in range usage. The modifications would

maintain training for individual and squad proficiency with weapons systems and increase training efficiency by reducing range overlap that prevents concurrent training on adjacent ranges.

1.2.4 Manix Trail Maintenance

The Manix Trail is critical for transporting rotational units and equipment to and from Fort Irwin. Wheeled ground vehicles and equipment travel from the Marine Corps Logistics Base Barstow to Fort Irwin via surface roads from the Yermo Annex east to the community of Manix, where the equipment continues to Fort Irwin via the Manix Trail. The Manix Trail includes approximately 6.5 miles within the boundary of Fort Irwin (between the Langford Lake MSR and the boundary) and approximately 15 miles between Interstate 15 (I-15) and the Fort Irwin boundary. The portion of trail that requires maintenance is the unpaved portion of trail between Fort Irwin and I-15. The trail needs to be maintained regularly within the existing right-of-way to provide for safe and efficient logistics before and after rotational training.

1.2.5 Public Law 107-107 Training Land Withdrawal Extension

Approximately 110,000 acres of Fort Irwin training land areas are public land withdrawn from all forms of appropriation under the general land laws, including the mining laws and mineral and geothermal leasing laws under Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001). The land is located entirely within the boundaries of Fort Irwin and consists of both the land and mineral rights. The Army has a continuing need for the land and will ask the U.S. Congress to extend the withdrawal for at least 25 years or place the land under the permanent control of the Army. The withdrawn land is in the Western Training Area, Eastern Training Area, and a narrow strip paralleling a utility corridor on U.S. Department of Interior Bureau of Land Management (BLM) land managed for the public adjacent to the southeastern boundary of Fort Irwin.

As stated in Public Law 107-107, the purpose of the withdrawal included “the conduct of combined arms military training at the National Training Center, development and testing of military equipment, and other ‘defense-related purposes.’ ” The legislation required an Installation Natural Resource Management Plan and stated that there should be no ground disturbance on the withdrawn land until compliance with the National Environmental Policy Act (NEPA) and the ESA was completed. The law also required completion of the West Mojave Coordinated Management Plan and coordination with NASA about the Goldstone Deep Space Communications Complex.

Public Law 85-337, commonly known as the Engle Act (43 U.S.C. Section 157) allows the DoD to apply for withdrawal of public land for defense purposes. Procedures to implement an application for withdrawal are set forth in *Code of Federal Regulations* (CFR) Title 43, Part 2300 – Land Withdrawals. BLM processes applications for public land withdrawal. Withdrawal or extension of withdrawals of public land greater than 5,000 acres require congressional approval.

Public Law 107-107 requires the Secretary of the Army to determine at least 3 years before the withdrawal termination date (December 2026) whether the withdrawal will need to be extended because of continuing military need. Because the amount of land involved exceeds 5,000 acres, extension of the withdrawal must be approved by Congress. The legislative proposal for the extension must be accompanied by appropriate NEPA documentation, in this case a legislative environmental impact statement (EIS).

If the Secretary of the Army determines that there will be a continuing military need after the termination date for any of the land withdrawn and reserved, the Secretary of the Army will consult with the Secretary of the Interior concerning any adjustments to be made, the extent of, or to the allocation of management responsibility for, such needed land and file an application for extension of the withdrawal and reservation of such needed land. After submission of the application, the Secretary of the Interior and the Secretary of the Army may submit to the U.S. Congress a legislative proposal for

the extension of the withdrawal and reservation. The legislative proposal will be accompanied by an appropriate analysis of environmental impacts associated with the proposal, as required by Section 102(2)(c) of NEPA (42 U.S.C. Section 4332(2)(C)).

1.3 Scope of Analysis

This LEIS was prepared in accordance with NEPA implementing regulations in 40 CFR Parts 1500 through 1508 and 32 CFR Part 651 and the National Historic Preservation Act (NHPA) and implementing regulations in 36 CFR Part 800. The notice of intent for this LEIS was published prior to the promulgation of the revised NEPA implementing regulations in 40 CFR Part 1500; consequently, this document has been written in accordance with the 40 CFR Part 1500 implementing regulations established before September 2020. The purpose of this LEIS is to describe the environmental resources on Fort Irwin and inform decision makers and the public of the potential environmental consequences of implementing either the proposed mission changes or withdrawal extension activities, which are discussed in Section 2, *Description of the Proposed Actions and Alternatives*. Reasonable mitigation measures are also identified and described.

An interdisciplinary team of environmental scientists, biologists, planners, economists, engineers, archaeologists, historians, and military technicians has analyzed the Proposed Actions (training changes, infrastructure improvements, and withdrawal extension) in light of existing conditions and has identified relevant beneficial and adverse effects associated with the Proposed Actions and the proposed alternatives.

This LEIS identifies, documents, and evaluates the potential environmental and socioeconomic effects of the Proposed Actions to make sure appropriate consideration is given to environmental resources. The evaluation considers direct, indirect, and cumulative effects, both short-term and long-term, that could occur as a result of implementing the proposed mission changes or the withdrawal extension. Reasonably foreseeable future actions that may contribute to cumulative effects are also identified. Any additional requirements stemming from unrelated military actions would undergo separate NEPA analysis and evaluation.

This LEIS also considers the potential effects of two No Action Alternatives, referred to as the No Mission Change Alternative and the No Withdrawal Extension Alternative. The No Action Alternatives provide a benchmark against which the potential effects of the alternatives can be compared.

The Fort Irwin mission will continue to evolve as this LEIS is prepared. Mission requirements may necessitate implementing certain actions to support training during LEIS development. Should this situation arise, a separate, specific NEPA analysis would be conducted for those activities. The potential for cumulative effects from developing and implementing such activities to the extent they are currently known is considered in the assessment of potential cumulative effects in this NEPA analysis.

As this LEIS was developed, Fort Irwin concurrently modified its ICRMP to serve as the Historic Properties Component for implementation of a Programmatic Agreement (PA). The ICRMP modification occurred in conjunction with the LEIS but is not part of this NEPA analysis. The PA was developed in conjunction with the LEIS and will provide for Section 106 compliance for activities discussed in the LEIS. The ICRMP will incorporate the PA once the PA is signed. The PA is included in Appendix 4.4A.

The geographic scope of the Proposed Actions for the Mission Change Alternatives includes the Northern Corridor, Central Corridor, Southern Corridor, Eastern Training Area, Western Training Area, Range Complex, and Manix Trail (Figure 1-2). The geographic scope for the withdrawal extension is the withdrawn areas: Eastern Training Area, Western Training Area, and a portion of the Southern Corridor.

The No Action Alternative is the least disruptive to natural and cultural resources and, therefore, is the environmentally preferred alternative. Of the action alternatives considered, the Mission Change Alternatives with Western Training Area Alternative 1 is the environmentally preferred alternative

because it is the least disruptive to natural and cultural resources. However, both environmentally preferred alternatives rated poorly with regard to meeting critical training mission requirements as described in the Purpose and Need for the Proposed Action. Based on the analysis in this LEIS addressing the Army's mission needs and the effects of the Army's action on the human environment on Fort Irwin, the Army's preferred alternative is the full Mission Change Alternatives, with Alternative 4 for the Western Training Area.

1.4 Framework of Decision Making

The Army is the lead federal agency responsible for completing the NEPA analysis for the proposed mission changes and withdrawal extension. While the Army will decide between the proposed Mission Change Alternatives, the withdrawal extension requires congressional approval. For this reason, two distinct decision pathways are analyzed in this LEIS:

1. **Army Decision – Alternatives related to proposed mission changes.** The Army will decide between the No Mission Change and Proposed Mission Change Alternatives provided in Section 2.1, *Mission Analysis*; a detailed analysis of the potential effects associated with the Proposed Mission Change Alternatives is presented in Section 4, *Environmental Consequences - Mission Analysis*.
2. **Congressional Approval – Alternatives related to the withdrawal extension for the Western Training Area, Eastern Training and portions of the Southern Corridor.** The Army has determined that training is needed in the withdrawn areas, and, therefore, there is a continuing military need for the withdrawal. To obtain congressional approval for the withdrawal extension, the Army must conduct an environmental evaluation of the potential impacts of approving the withdrawal. The effects associated with approving the withdrawal extension are included in the mission analysis. Those effects are presented in the Mission Change Analysis in Section 4, *Environmental Consequences - Mission Analysis*. The unique effects associated with not approving the withdrawal extension are presented in Section 5, *Environmental Consequences - Withdrawal Extension*.

Table 1-2 provides a detailed breakdown of how the potential effects of the two decision pathways were analyzed in this LEIS.

TABLE 1-2
EIS Decision Pathways and Effects Analysis Crosswalk
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Army Decision: Mission Change Analysis (Section 2.1)	**Congressional Approval: Withdrawal Extension Analysis (Section 2.2)**
No Mission Change Alternative: Considers the effect of current training activities and assumes no changes to current infrastructure throughout the installation (refer to Section 2.1.1, *No Mission Change Alternative*) **Effects Analysis**: Potential effects associated with the No Mission Change Alternative are provided throughout the resource areas in Section 4, *Environmental Consequences-Mission Analysis*	**No Withdrawal Extension Alternative**: Considers the effect of not extending the current land withdrawal for the Eastern Training Area, Western Training Area, and a portion of the Southern Corridor (refer to Section 2.2.1, *No Withdrawal Extension Alternative*) **Effects Analysis**: Potential effects associated with the No Withdrawal Extension Alternative are provided throughout the resource areas in Section 5, *Environmental Consequences - Withdraw Extension*
Proposed Mission Change Alternatives: Considers the effect of potential changes to current training activities and infrastructure (Section 2.1.2, *Proposed Mission Change Alternatives*), including four potential alternatives in the Western Training Area (Section 2.1.2.1, *Western Training Area*)	**Withdrawal Extension Alternative**: Considers the effect of extending the current land withdrawal for the Eastern Training Area, Western Training Area, and a portion of the Southern Corridor (Section 2.1.2, *Proposed Mission Change Alternatives*) **Effects Analysis**: Potential effects associated with this alternative are analyzed as part of the Proposed Mission

Army Decision: Mission Change Analysis (Section 2.1)	Congressional Approval: Withdrawal Extension Analysis (Section 2.2)
Effects Analysis: Potential effects associated with this alternative are provided throughout the resource areas in Section 4, *Environmental Consequences - Mission Analysis*	Change Alternatives in Section 4, *Environmental Consequences - Mission Analysis*

There are four primary decision outcomes that may occur based on the two decision pathways:

1. **No Withdrawal Extension Alternative (Congressional Approval) and No Mission Change Alternative (Army Decision):** includes the analysis provided in the No Mission Change Alternative from Section 4, *Environmental Consequences – Mission Analysis*, except there would be no continuing action in the Eastern Training Area, the Western Training Area, and portions of the Southern Corridor, as described in Section 5, *Environmental Consequences – Withdrawal Extension Analysis*.
2. **No Withdrawal Extension Alternative (Congressional Approval) and Proposed Mission Change Alternatives (Army Decision):** includes the analysis provided in the Mission Change Alternative from Section 4, *Environmental Consequences – Mission Analysis*, except there would be no continuing action in the Eastern Training Area, the Western Training Area, and portions of the Southern Corridor, as described in Section 5, *Environmental Consequences – Withdrawal Extension Analysis*.
3. **Withdrawal Extension Alternative (Congressional Approval) and No Mission Change Alternative (Army Decision):** includes the analysis provided in the No Mission Change Alternative from Section 4, *Environmental Consequences – Mission Analysis*. The current level of training in the Eastern Training Area, the Western Training Area, and portions of the Southern Corridor would continue.
4. **Withdrawal Extension Alternative (Congressional Approval) and Proposed Mission Change Alternatives (Army Decision):** includes the analysis provided in the Mission Change Alternative from Section 4, *Environmental Consequences – Mission Analysis* (including additional alternatives for the Western Training Area).

1.5 Permits, Approvals, and Agreements Potentially Required by Other Agencies

This section lists and summarizes some of the permits and approvals that might be needed to implement the Proposed Actions. This section provides the reader with a general understanding of the regulatory requirements that may need to be met before the Proposed Actions are implemented. Discussions with the identified agencies would be required to determine the specific nature of any future permits or approvals that might be required from those agencies. Their inclusion in this document is intended to acknowledge the potential role of these agencies and to ensure their notification and the subsequent inclusion of any comments from them. This list is not intended to be all-inclusive; for example, a variety of permits and approvals might be needed from local and regional agencies that are not reflected here, and some of the permits identified here may be deemed unnecessary as specific projects are implemented. Table 1-3 lists the permits and approvals that could be required for the Proposed Actions.

TABLE 1-3
Possible Permits and Approvals
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Permitting or Approval Agency	Permit or Approval	Requirement	Comments
California SHPO and the Advisory Council on Historic Preservation (ACHP)	NHPA Section 106 Consultation	Section 106 requires federal agencies to consult with the SHPO regarding the effects of federal undertakings on historical, archaeological, and cultural resources, with concurrence sought. Additionally, in consultation with the SHPO, federal agencies will consult with Native American tribes and other interested parties, as appropriate, regarding the identification of historical, archaeological, and cultural resources and an undertaking's effects, in accordance with 36 CFR Section 800.4.	Applies to all actions on federal land, sponsored or permitted by a federal agency, or funded with federal monies.
Mojave Desert Air Quality Management District	CAA General Conformity Determination	CAA Section 176(c) requires federal actions to conform to applicable federal implementation plans or State Implementation Plans to ensure that the actions do not interfere with strategies employed to attain the NAAQS.	Applicable to federal actions. May require modification of the SIP emission budgets for NO_x and PM_{10}.
	Permits to Construct and Operate Stationary Sources	Various air quality permits would be needed for construction and operation and maintenance of stationary sources such as generators, pumping plants, and treatment facilities.	Applies to any implementing agency.
	Approval of Large Operation Notification (Dust Control Plan)	The purpose is to reduce the amount of particulate matter entrained in the ambient air as a result of manmade fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Compliance with this regulation would be required for a variety of alternative activities.	Applies to any implementing agency.
USFWS	ESA Section 7 Consultation	The ESA protects federally listed threatened and endangered species from unauthorized take. Section 7 of the ESA requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat.	The ESA applies to any action that "may affect" a federally listed species.

CAA = Clean Air Act
ESA = Endangered Species Act (federal)
NAAQS = National Ambient Air Quality Standards
NO_x = nitrogen oxide
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
SHPO = State Historic Preservation Office
SIP = State Implementation Plan
USFWS = U.S. Fish and Wildlife Service

1.6 Agency and Public Participation

The Army invites public participation in the NEPA process. Considering the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the Proposed Actions, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process. Native American groups include federally recognized tribes; non-federally recognized tribes and State-recognized tribes; and tribal groups, societies, and individuals. Details of the public engagement process, including a list of the federal agencies, State agencies, Native American groups, and community groups with which Fort Irwin has consulted, are provided in Appendix 1A. Public participation opportunities with respect to this LEIS and decision making on the Proposed Actions are guided by 32 CFR Part 651.

SECTION 2

Description of the Proposed Actions and Alternatives

This section describes the Proposed Actions and alternatives to meet the project's purpose and need as described in Section 1.2, *Purpose and Need for the Proposed Actions*. For a detailed explanation of the rationale for the multiple alternative pathways developed for this LEIS, refer to Section 1.4, *Framework for Decision Making.*

2.1 Mission Analysis

Several alternatives were developed in response to foreseeable military mission needs as described in Section 1.2, *Purpose and Need for the Proposed Actions.* The following sections detail these alternatives and include an explanation of the No Mission Change Alternative, which documents the impacts associated with current training activities on Fort Irwin.

2.1.1 No Mission Change Alternative

Under the No Mission Change Alternative, training on Fort Irwin would continue at current levels and the infrastructure projects identified to support training activities against replicated current military threats would not be implemented. The Army would not be able to train soldiers sufficiently based on current threats, making the Army less capable than our peer or near-peer adversaries during combat. This alternative fails to meet the objectives defined in Section 1.2, *Purpose and Need for the Proposed Actions.*

Previous Analyses of Activities Under the No Mission Change Alternative

Fort Irwin has completed multiple NEPA analyses prior to this LEIS. These documents address activities included in the No Mission Change Alternative and the descriptions and analyses in the following NEPA documents are incorporated into this LEIS by reference.

- *Environmental Assessment for the Construction, Operation and Maintenance of a Dense Urban Terrain Complex, Fort Irwin, California* (Fort Irwin, 2018b)
- *Environmental Assessment for the Construction and Maintenance of Stormwater Controls at Tiefort City, Fort Irwin, California* (Fort Irwin, 2017a)
- *Environmental Assessment for the Implementation of the Fort Irwin Real Property Vision Plan, Fort Irwin, California* (Fort Irwin, 2017b)
- *Environmental Assessment for the Implementation of Integrated Pest Management Plan, Fort Irwin, California* (Fort Irwin, 2017c)
- *Environmental Assessment for the Fort Irwin Stormwater Management Plan for the Cantonment Area, Fort Irwin, California* (Fort Irwin, 2017d)
- *Programmatic Environmental Assessment for Capital Improvement Project WW62, Implementation of the Recycled Water Master Plan, Fort Irwin, California* (Fort Irwin, 2017e)
- *Environmental Assessment for the Verizon–Fort Irwin Fiber Optic Cable Project at Fort Irwin, California* (Fort Irwin, 2016a)
- *Environmental Assessment for Capital Improvement Project W46 for Fire Flow Improvements to the Ammunition Supply Point, Fort Irwin, California* (Fort Irwin, 2015)

- *Environmental Assessment for the Construction and Operation of a C-17-Capable Flight Landing Strip, Fort Irwin, California* (Fort Irwin, 2014a)
- *Environmental Assessment for the Construction, Operation, and Maintenance of Combat Training Center-Instrumentation Systems Range Communication System, Fort Irwin, California* (Fort Irwin, 2014b)
- *Environmental Assessment for the Stationing of Company B, 229th Aviation Regiment (Extended Range/Multi-purpose), Fort Irwin, California* (Fort Irwin, 2014c)
- *Supplemental Final Environmental Impact Statement (SFEIS) for the Proposed Addition of Maneuver Training Land at Fort Irwin, California and Biological Assessment Supplement* (Fort Irwin, 2005)
- *Final Environmental Impact Statement for the National Training Center, Fort Irwin Site, Fort Irwin, California* (Army, 1979)

2.1.1.1 Training Areas

Generally, areas on Fort Irwin that are not part of the Cantonment Area, NASA Goldstone Complex, Leach Lake, or the Range Complex are classified as training areas. The training areas serve as the primary maneuver areas during all training exercises. While fixed ranges within the Range Complex allow units and individuals to train and qualify on specific weapon systems, the training areas are where military units work as a team and prepare for combat. The training areas on Fort Irwin represent nearly 75 percent of the NTC land area.

The use of the training areas has changed dramatically as the training mission at the NTC has evolved since 11 September 2001. From approximately 2001 to 2013, RTU training was based mostly on the COIN model, which focuses on unit training in defense support of foreign civil authorities primarily in an urban environment. The COIN model requires the establishment and use of large staging areas protected by berms, known as Logistics Support Areas (LSAs), and simulated towns, referred to as UO sites. UO sites consist of buildings and other infrastructure to simulate an urban environment and they vary in size to provide greater realism. During this period, training scenarios generally involved units traveling from the Cantonment Area along MSRs to the appropriate LSA or UO sites. Consequently, maneuver disturbance was concentrated in specific locations along the MSRs. Figure 2-1 shows the typical distribution of disturbance through the installation during this COIN model period.

Since 2013, however, the Army has been moving away from COIN training and increasing the emphasis on ULO training, which prepares brigade-level armored or mechanized forces to seize, retain, and exploit the initiative against a near-peer adversary. ULO training is similar to pre-2001 Army training activities. ULO training requires a more traditional offensive, defensive, and stability operations scenario, utilizing joint, interagency, and multinational partners as part of a larger effort in which large, armored units engage opponents in an open environment. For example, in a ULO scenario, a tank platoon would confront an enemy tank unit of the same size (or echelon) in an open battlefield, while COIN operations would focus more on conflicts in an urban setting against insurgents. ULO scenarios are more encompassing and typically require greater use of secondary trails and open areas to perform tactical operations. As a result, maneuver disturbance occurs over a larger area in ULO scenarios than during COIN training. Figure 2-2 shows the current typical distribution of disturbance through the installation during ULO scenario training.

Within an operational environment, an Army leader may conduct major combat, military engagement, and humanitarian assistance simultaneously. Army forces must be prepared to transition rapidly from one type of operation to another. Because the Army must be able to operate in towns and cities when deployed, UO sites will continue to be used in training. Today's training environment can be viewed as a hybrid between traditional mechanized force-on-force and UO training.

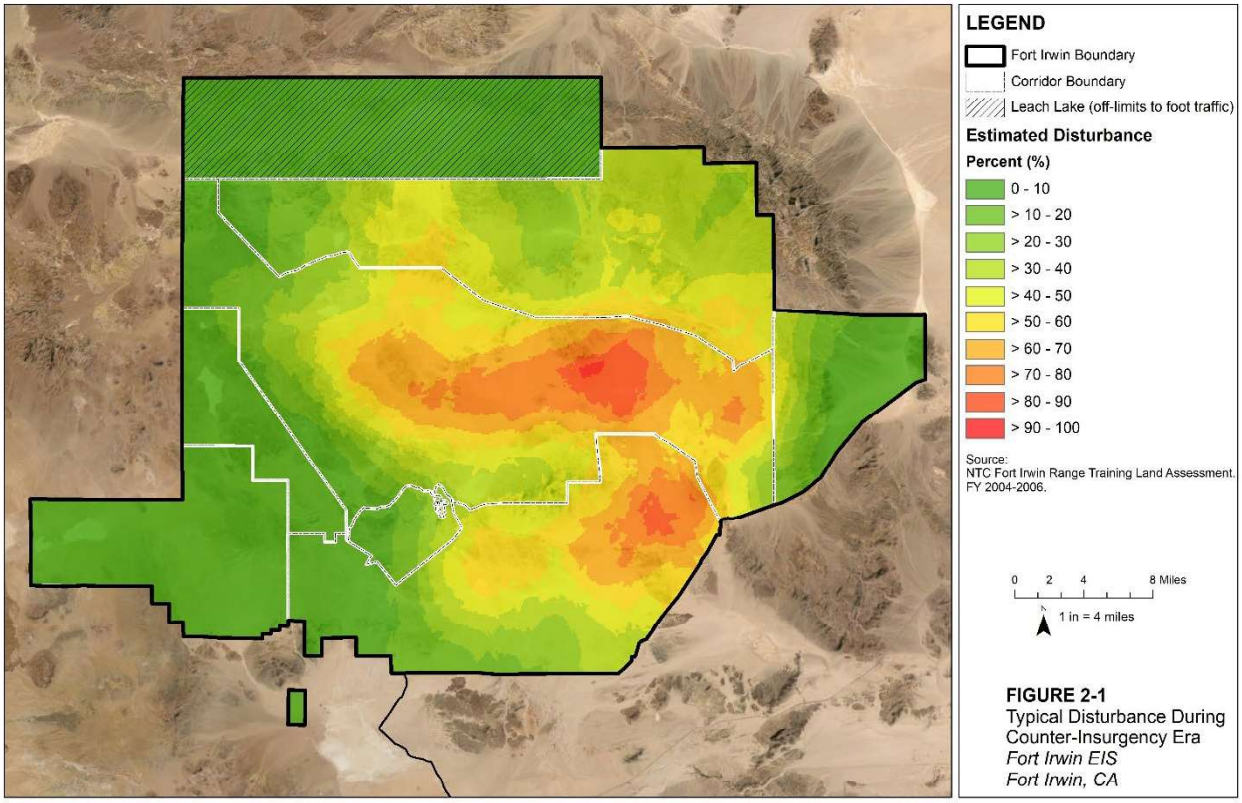


FIGURE 2-1
Typical Disturbance During Counter-Insurgency Era
Fort Irwin EIS
Fort Irwin, CA

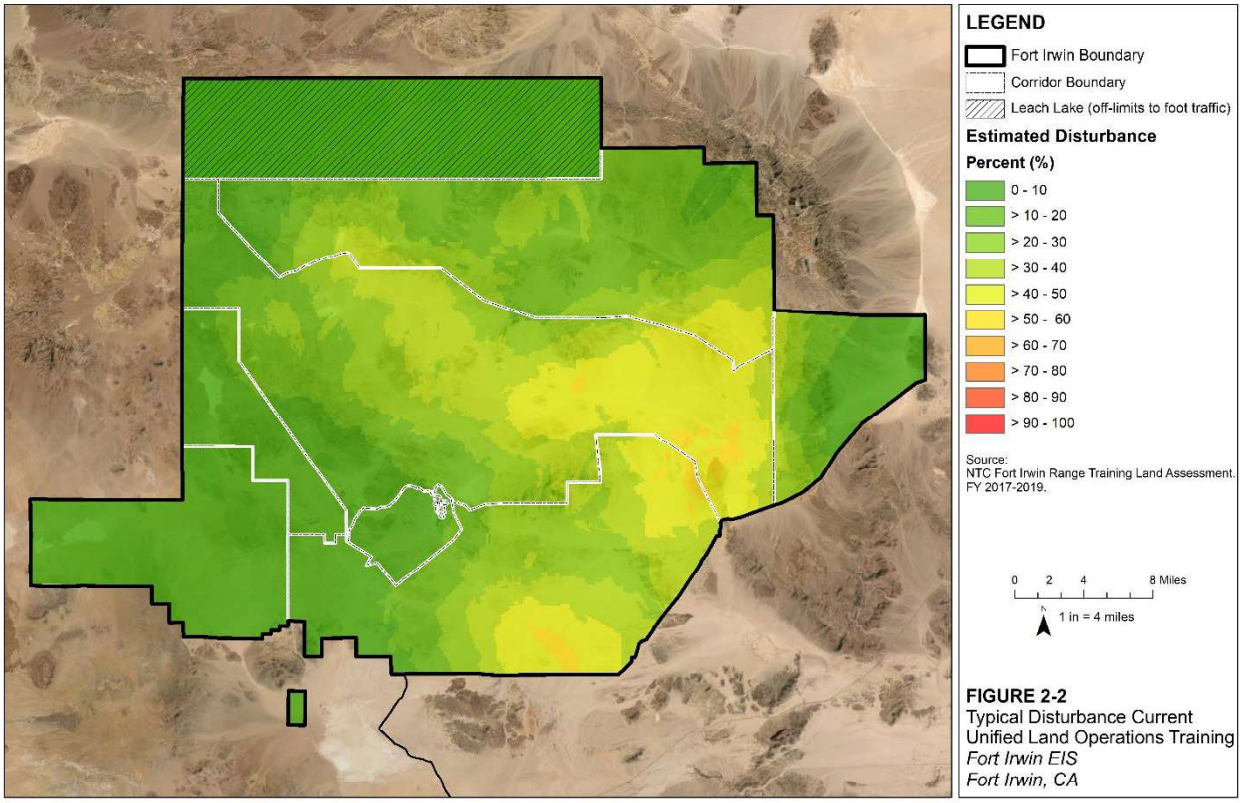


FIGURE 2-2
Typical Disturbance Current Unified Land Operations Training
Fort Irwin EIS
Fort Irwin, CA

Rotational Training

The NTC conducts up to 12 training rotations per year, with a typical training year having 10 rotations. Each rotation involves four organizations: the RTU, the 11th ACR (OPFOR), the OPS GRP (observers/ coaches/trainers), and the 916th SPT BDE. RTUs consist primarily of ABCTs and SBCTs from Army installations across the United States. In addition to ABCTs and SBCTs, portions of Infantry BCTs, Marine Corps units, U.S. Air Force (USAF) units, Naval units, Special Forces (SF) units, aviation units, and other unified action partners take part in training events. Because rotations are a collection of multiple military units, the numbers of soldiers and equipment used during a rotation can vary widely. Nonetheless, typical ABCT or SBCT training at the NTC comprises approximately 9,000 personnel using various vehicles and aircraft. A typical training rotation produces approximately 1.01 million total vehicle miles traveled (VMT), including 130,000 VMT by OPFOR, 609,000 VMT by the RTU, and 271,000 VMT by OPS GRP (Fort Irwin, 2005). These miles accrue on a combination of paved, unpaved, and undesignated routes. The travel occurs during daytime, nighttime, and all-weather conditions. The following list shows examples of the typical military vehicles and aircraft used during a rotation. Pictures and explanations of vehicle capabilities are provided in Appendix 2A.

- Wheeled vehicles
- Tracked fighting vehicles
- Rotary-wing aircraft (helicopter)
- UASs
- Fixed-wing aircraft
- Engineer vehicles

Typical training rotations at the NTC last 28 days and consist of three phases (Table 2-1):

1. RSOI into the tactical scenario areas (5 days)
2. Scenario-based training (14 days)
3. Regeneration of combat power (9 days)

During RSOI, the units and their equipment move from their home-stations to Fort Irwin by ground rail, sea, and/or air and conduct initial entry and preparation for combat operations and activities. The 14--day scenario-based training is broken into two primary phases: force-on-force training (10 days) and live-fire maneuver exercise (4 days). Training activities during this 14-day period occur 24 hours a day and are monitored by OPS GRP and a sophisticated automated instrumentation system to provide feedback and enhance unit learning. Force-on-force and live-fire maneuver exercises are discussed further in this section. During the third phase of a training rotation, combat power regeneration, the RTU returns from the training areas to the Fort Irwin Cantonment Area, conducts recovery and maintenance activities, and then redeploys back to its home-station.

TABLE 2-1
NTC Typical 28-Day Rotation Phases
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Phase	Title	Explanation	Typical Duration
Phase 1	**RSOI**	Mobilization and preparation for combat	5 Days
Phase 2	**Scenario Exercises: Force-on-Force**	Tactical operations against the OPFOR	10 Days
Phase 2	**Scenario Exercises: Live-Fire**	Use of live munitions directed at targets	4 Days
Phase 3	**Regeneration of Combat Power**	Recovery, maintenance, and redeployment to home-station	9 Days

Force-on-Force Training Exercises

During force-on-force training, the RTUs conduct brigade-level tactical operations against the OPFOR using eye-safe lasers in place of munitions; the current laser system is called Tactical Engagement Simulation System. RTUs and the OPFOR use the breadth of combat vehicles assigned to each unit, as detailed in Appendix 2A, during these exercises. In addition to using the Tactical Engagement Simulation System, pyrotechnics, such as smoke grenades, artillery simulators, and small arms blanks, are used to simulate battlefield effects, but no live munitions are used during this period. In addition to combat and tactical vehicle training, force-on-force exercises involve soldiers training under various conditions, including austere (harsh conditions), urban, and subterranean environments using established UO sites. Hundreds of civilian personnel role-players will inhabit the UO sites during the 10-day period.

Live-fire Training Exercises

During live-fire training, the RTU uses weapons systems, firing live munitions at a remotely operated target array tailored to the RTU's training objectives. The OPFOR does not participate during live-fire exercises. Examples of munitions used during live-fire exercises include smoke, artillery, small arms munitions, surface-to-surface munitions, air-to-surface munitions, demolitions, and tank and mortar rounds. Fort Irwin has several thousand established target pits where targets can be placed. The target pit provides protection for the machinery that lifts the targets into position during live-fire training. Proposed target pit locations are authorized through the established dig permit process, which helps ensure target pits are not placed in areas of environmental, safety, or cultural resource concerns. Because of the potential for damage from floods, permanent infrastructure for targetry is not placed in washes. Configuration of the live-fire target array takes into consideration off-limits areas and other no-fire or restricted-fire areas. Surface danger zone (SDZ) configurations take many safety considerations into account, including installation boundaries and the Cantonment Area.

The target array is configured within pits based on specific rotation scenarios. The number and types of targets utilized varies by rotation scenarios. Currently target pits are in the Northern Corridor (approximately 500), Central Corridor (approximately 350), and Southern Corridor (approximately 75). Additional pits are added, as needed, based on training scenario requirements. Munition SDZs are developed for each live-fire exercise based on the locations of the targets and engagement points. This flexibility in target location and SDZ configuration allows units to shoot weapons from within the training corridors toward various locations. The live-fire command and control center is located in the northeastern portion of the installation and includes numerous buildings. OPS GRP scenario planners occupy the command and control center from which they control targetry during the live-fire portion of a rotation.

Munitions used in live-fire exercises can be separated into two broad categories: dud producing and non-dud producing. Dud-producing munitions include explosive or flammable components. If a munition fails to fire or detonate, a dud is produced that has the potential to detonate at a later time. Dud-producing munitions can be fired into designated impact areas or into target locations within the established dud-effects line (Figure 2-10). Dud-producing munitions fired outside designated dud impact areas are surface cleared following the training scenario to reduce the risk of surface danger outside designated impact areas.

Training Categorization

Rotational training exercises are guided by the principles of combined arms maneuver. Combined arms maneuver is the application of the elements of combat power in unified action to defeat enemy ground forces; seize, occupy, and defend land areas; and achieve physical, temporal, and psychological advantages over the enemy to seize and exploit the initiative (ADRP 1-02) (Army, 2018b). Combined arms include combinations of joint capabilities, such as maneuver, maneuver support operations, and sustainment.

Combined arms maneuver can be broken into four primary categories. Each of these categories can be performed individually, but it is more common for a rotational exercise to include a hybrid of the activities occurring simultaneously. A definition of each category follows.

- **Maneuver:** tactical exercise at the NTC that is carried out in the air or on the ground to imitate combat. Distinct tactical combinations of fire and movement are dependent on the training scenario (ADRP 1-02) and generally consist of the following activities:
  - **Mounted maneuver**: movement of troops and equipment by combat and tactical vehicles (ADRP 1-02). Approximately 120 tanks, 520 other tracked vehicles, 1,400 wheeled vehicles, and 50 fuel tankers typically are used in daily operations during a rotation (Fort Irwin, 2005). Appendix 2A contains a list of vehicles.
  - **Dismounted maneuver**: movement of troops and equipment mainly by foot, with limited support by vehicles (ADRP 1-02).
  - **Aviation**: operations that include the use of drop zones (DZs) and landing zones, aerial supply, and evacuation (ADRP 1-02). A DZ is a specific area upon which airborne troops, equipment, or supplies are airdropped (ADRP 1-02). Approximately 34 helicopters and 25 fixed-wing aircraft are flown each day during a typical rotation (Fort Irwin, 2005).
  - **Fire and movement**: concept of applying fires[3] from all sources to suppress, neutralize, or destroy the enemy and the tactical movement of combat forces in relation to the enemy (ADRP 1-02).
- **Maneuver Support Operations:** operations that integrate the reinforcing capabilities of mobility, protection, and sustainment tasks (ADRP 1-02). These operations generally consist of the following activities:
  - **Engineer Support**: engineer units construct roadways, berm obstacles, anti-tank ditches, force protection berms, vehicle fighting positions, and runways in support of the larger unit mission.
  - **Explosive Ordnance Disposal (EOD)**: specially trained EOD units detect, identify, evaluate, and render safe unexploded ordnance (UXO) (ADRP 1-02).
  - **CBRN**: operations that employ tactical capabilities to counter the entire range of CBRN threats and hazards through weapons of mass destruction proliferation prevention, weapons of mass destruction counterforce, CBRN defense, and CBRN consequence management activities (ADRP 1-02).
  - **Cyber**: activities leveraged to seize, retain, and exploit an advantage over adversaries in both cyberspace and the electromagnetic spectrum, while simultaneously denying and degrading adversary and enemy use of the same, and protecting the mission command system. These activities occur in cyberspace, which includes the Internet, telecommunications networks, computer systems, and embedded processors and controllers (ADRP 1-02).
  - **UASs**: an aircraft that does not carry a human operator and is capable of flight with or without human remote control (ADRP 1-02).
- **Sustainment**: the provisions of logistics, personnel services, and health services necessary to maintain operations until successful mission completion (ADRP 1-02). Sustainment units provide support to local units located in, or passing through, their assigned areas (ADRP 1-02).
  - **Re-arming:** replenishing ammunition supplies to support combat operations; generally, takes place at the RASA and basic load storage area.

[3] *Fires* include mortars, field artillery, close combat attack, and close air support integration (ADRP 1-02).

  - **Refueling**: replenishing fuel supplies at a temporary site, organized, equipped, and deployed as a far forward or widely dispersed, as tactically feasible to provide fuel necessary for the sustainment of ground and aviation maneuver units in combat (Army Techniques Publication [ATP] 3-04.17; Army, 2018c).
  - **Field Maintenance**: system maintenance and repair and return to the user (ADRP 1-02).
  - **Assembly Area** (bivouac) **Development**: creating an area for a unit to occupy in preparation for an operation (Field Manual [FM] 3-90-1; Army, 2013).
  - **Medical**: Army Health System support provided across the range of military operations and various types of missions; the support may be provided simultaneously in various locations throughout the areas of operation (FM 4-02; Army, 2020b).
  - **Military Working Dogs**: working dogs that contribute to combat operations. Working dog teams are used in garrison and combat support missions, including area security; movement and mobility support operations; law and order; and force protection, including narcotic, human, landmine, firearm, ammunition, and explosive detection (AR 190-12).

- **SF Operations:** operations requiring unique modes of employment, tactical techniques, equipment and training. Often these operations are time sensitive, clandestine, low visibility, and conducted with and/or through indigenous forces, which require forces that are organized, trained, and equipped to conduct and/or support special operations (ADRP 1-02).
  - **Airborne Operations**: involves the movement of SF units by air (ADRP 1-02).
  - **Joint Precision Air Drop System (JPADS)**: provides rapid, precise, high-altitude delivery capabilities that do not rely on ground transportation. JPADS is designed for aircraft to drop cargo from altitudes of up to 24,500 feet above mean sea level.
  - **High-angle movement**: a form of dismounted movement used to operate across steep and complex mountainous terrain. Technical climbing and rappelling may be required to position weapons to support the assault (ATP 3-90.97; Army, 2016a).

Non-rotational Training

Home-station units, other DoD branches (Marine Corps, Navy, Air Force), National Guard, Reserve, and law enforcement may use the training areas to accomplish mission-essential training when the training areas are not occupied for rotational training. Non-rotational training is conducted either outside the live-fire and force-on-force phases or in areas not being used for RTU training. Units not involved in the rotation may use the training areas by coordinating their requests through Fort Irwin Range Operations.

Non-rotational training activities include the combined arms maneuver training described previously, as well as the following:

- **Leach Lake Tactical Range Use**: U.S. and allied aircrews training in the tactics, techniques, and procedures of Joint Close Air Support at a tactical bombing range (USAF, 2006).
- **USAF Task Force Operations:** USAF activities on Fort Irwin include joint terminal attack control, which involves combat aircraft engaged in close air support and other offensive air operations (ADP 1-02).
- **Personnel Recovery Operations**: Combat search and rescue, which includes the sum of military, diplomatic, and civil efforts to prepare for and execute the recovery of isolated personnel (ADRP 1-02).
- **Home-station Off-rotation Training**: Fort Irwin units not involved with rotational training may use training areas for combined arms training when rotations are not ongoing or in areas geographically separated from the rotational training scenarios.

- **Other Organization Austere Training Requirements**: Training areas are available for joint military branches (Marine Corps, Navy, and Air Force), Army Reserve, National Guard units, and regular and transitional law enforcement units to conduct harsh desert training outside the rotation scenarios.

Training Infrastructure

A great deal of training infrastructure has been built in the training areas to support the training activities described in the preceding section. A description of the primary training infrastructure on Fort Irwin is provided in this section (Figure 2-3).

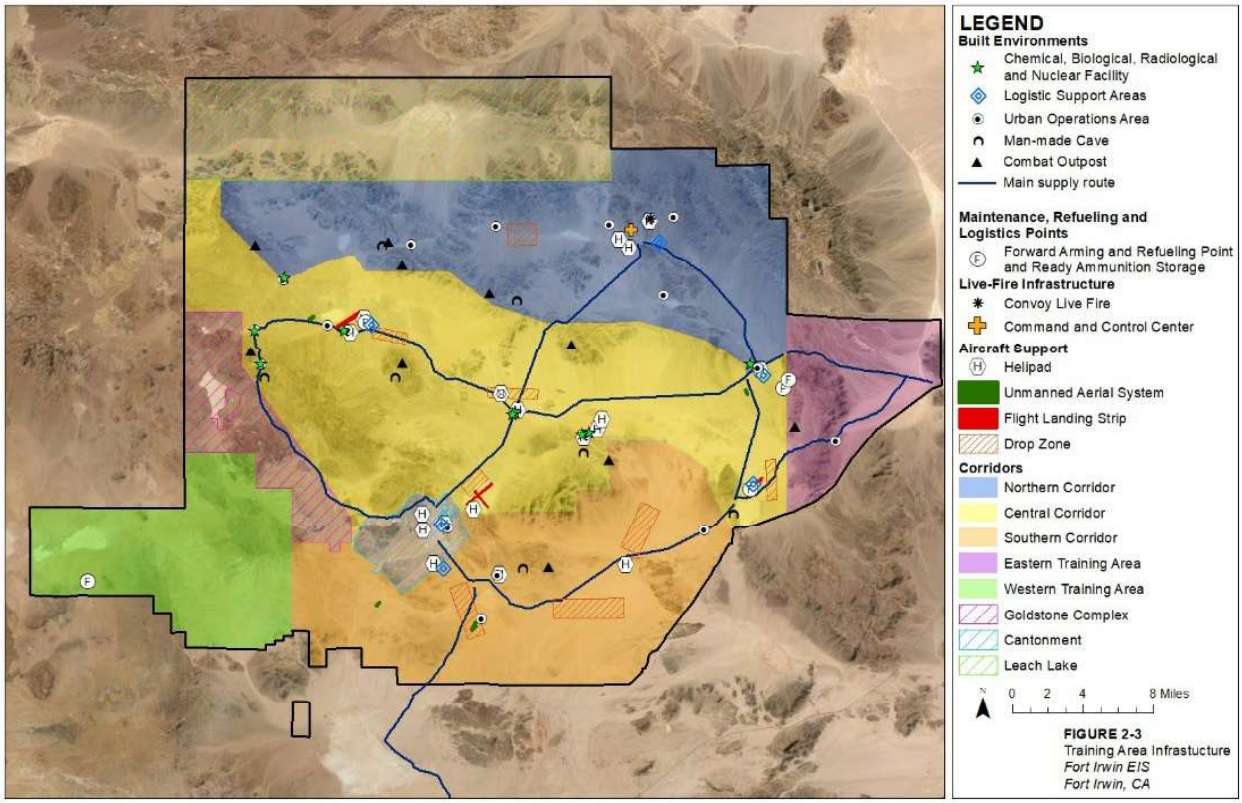
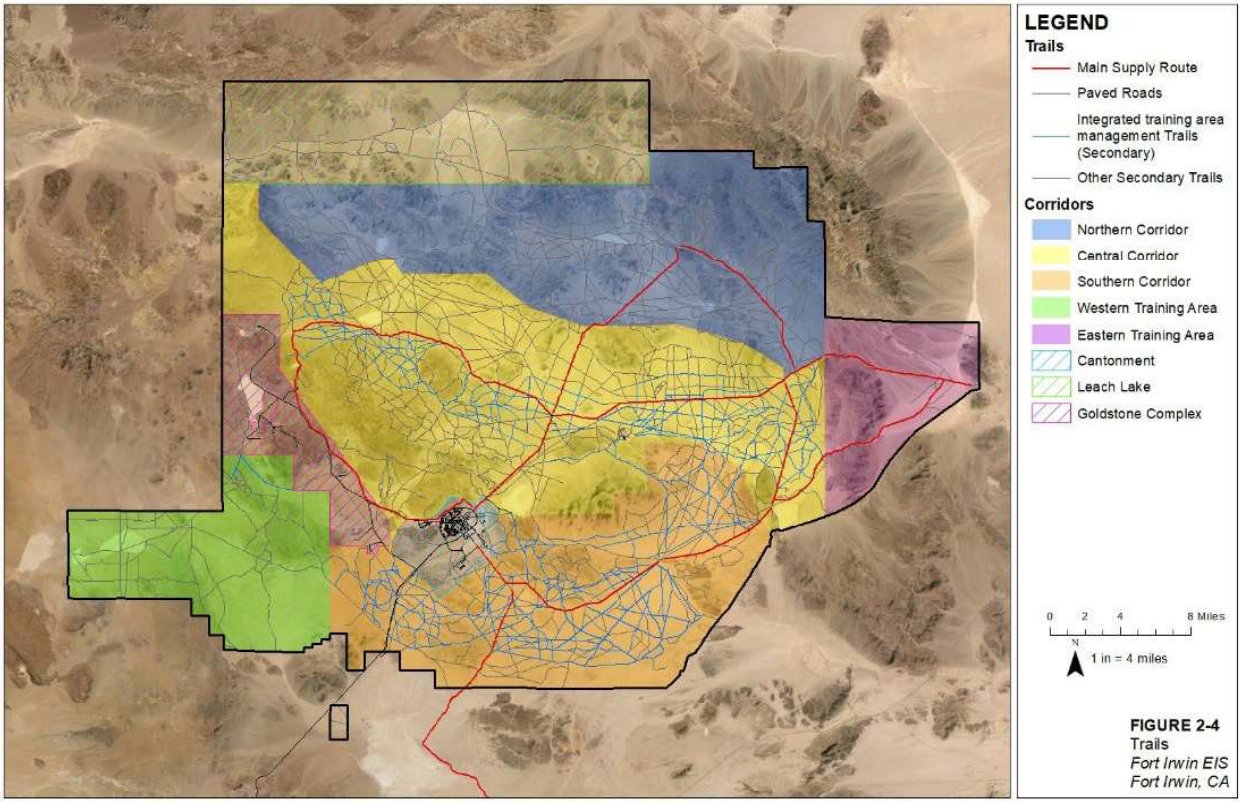


FIGURE 2-3
Training Area Infrastucture
Fort Irwin EIS
Fort Irwin, CA

Primary and Secondary Access Trails

The trail network is one of the most critical training assets at the NTC, because it allows units to access training areas and maneuver relatively safely during simulated combat scenarios. The MSRs serve as the primary access routes and transportation arteries throughout the training areas and allow for the efficient movement of vehicles and supplies to all points on the NTC. There are approximately 170 miles of MSRs, which are improved dirt roads that are typically 50-feet wide and routinely graded by Range Operations.

In addition to the MSRs, a large network of secondary trails throughout the training areas are traversed routinely during training events. These trails have developed over time as units habitually use certain routes during cross-country maneuver. Once a significant secondary trail has been identified, it is added to the ITAM trail network. These trails are monitored periodically for the following conditions: erosion, dust, roughness, rutting, and deep sand. Trail maintenance includes addressing erosion and other safety concerns as well as eliminating unsafe trails. Figure 2-4 depicts the trail network at the NTC.



Communication Infrastructure

The Army uses its communication infrastructure to support after-action reviews, enable exercise command and control, and transmit video and digital data. Communication infrastructure consists primarily of a fiber optic network (FON) and telecommunication towers (Figure 2-5).

Three generations of communication infrastructure are found at the NTC:

- Phase I: The legacy fiber network, consisting of a main trunk with a loop at its northern end and extended fiber optic cables to the Northern Corridor for use during live-fire exercises.
- Phase II: Fiber optic cable along the MSRs, essentially bringing the FON to most of the Fort Irwin training areas.
- Phase III: Cellular technology designed to augment the FON. Twenty-one telecommunication towers are distributed throughout the training areas, with 4 in the Northern Corridor, 11 in the Central Corridor, and 6 in the Southern Corridor. One of these towers is collocated with a commercial telephone tower.

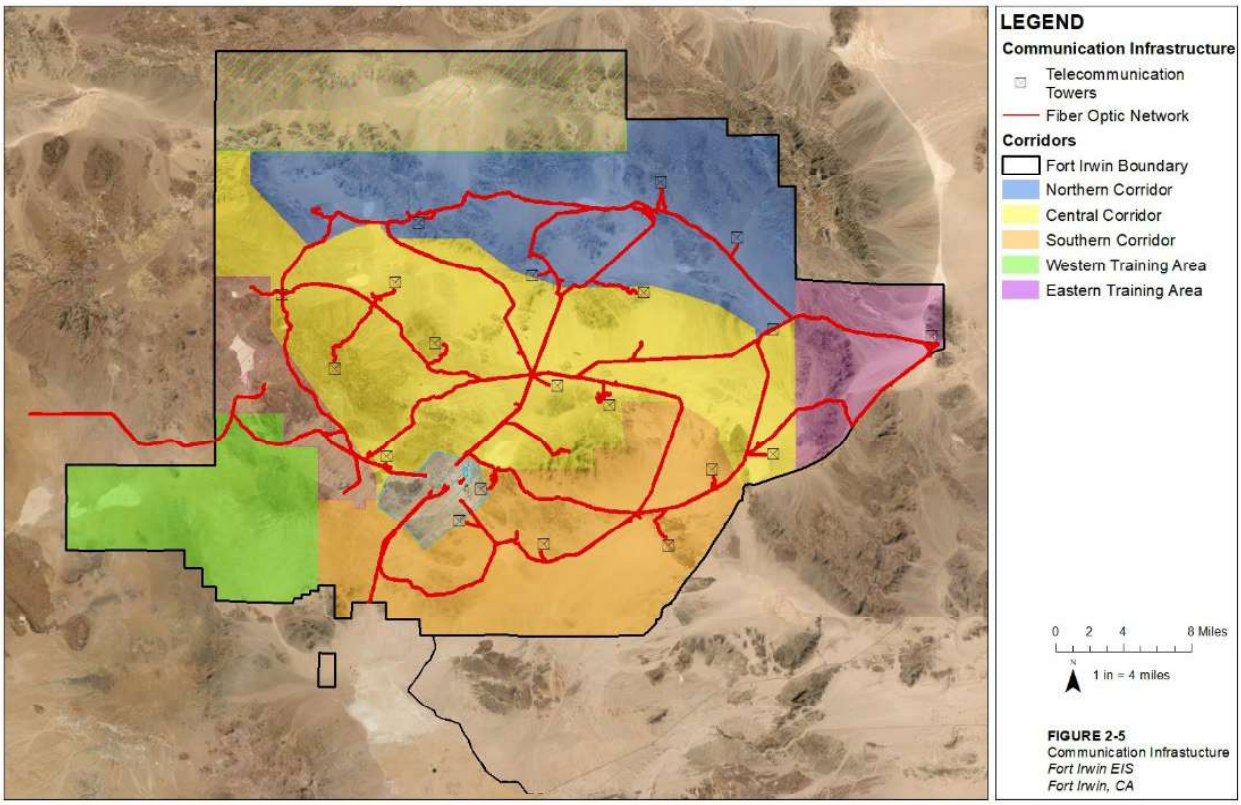


FIGURE 2-5
Communication Infrastucture
Fort Irwin EIS
Fort Irwin, CA

Built Environments

The built environments on Fort Irwin consist of numerous facilities designed to replicate potential combat zones. Examples of built environment infrastructure are described in this section.

FIGURE 2-6
NTC UO Site

UO Sites: The NTC has 18 UO sites, ranging in size from 2 buildings to a medium-sized city. Small UO sites typically encompass approximately 5 acres, medium UO sites cover approximately 12 acres, and large UO sites are approximately 20 acres. The largest UO site is north of Tiefort Mountain and covers approximately 130 acres, much larger than any other UO site. Four of these sites are capable of supporting live-fire UO operations using pop-up targets and shock-absorbing concrete. Urban structures are prefabricated metal buildings, wooden structures, concrete masonry unit construction, or tilt-up precast concrete construction. Figure 2-6 shows a typical UO configuration found in the training areas.

CBRN Facilities: Ten CBRN facilities are located throughout the training areas. These facilities help train soldiers in current battlefield threats, such as how to approach and secure a concealed CBRN production site and how to react to potential contamination scenarios. No live biological, nuclear, or radiological weapons are used during this training. Chemical agents such as tear gas are used under controlled situations.

Manmade Caves: Seven caves are located throughout the training areas (Figure 2-3). These caves are manmade concrete structures built into the existing terrain. They create a realistic training environment for antiterrorism activities.

FIGURE 2-7
NTC LSA

LSA/Combat Outpost (COP): The use of LSAs has declined significantly since the conversion from COIN to ULO operations, and there has been an effort to recover the maneuver land where previously constructed LSAs have been removed. The use of historical LSAs continues to be appropriate for some training scenarios and three LSAs remain in the training areas. Figure 2-7 shows a typical LSA layout. In addition to LSAs, a number of COPs serve a similar function on a much smaller scale. An LSA typically supports a battalion (300 to 900 soldiers), while a COP supports a platoon (15 to 30 soldiers).

Obstacles: Obstacles add to the realism of the training environment and are typically built as necessary during rotations and non-rotational training. These obstacles include concertina wire, ditches large enough to prevent a tank from crossing (anti-vehicle ditches), large berms, and simulated minefields. While some permanent obstacles are located in the corridors, most obstacles are constructed for specific rotation scenarios and are removed or filled in after the rotation ends.

Maintenance, Refueling, and Logistics Points: Temporary and permanent FARPs are located throughout the training areas. The locations of the temporary FARPs vary depending on the training scenario. FARPs serve as temporary positions for the re-arming and refueling of aircraft. In addition to the FARPs, other temporary maintenance, refueling, and logistics locations are established within the training areas to meet training scenario requirements, including refueling stations, RASAs, tactical assembly areas, and Combined Sustained Support Battalion sites. The purposes of these sites are to provide locations for vehicle refueling and maintenance and to obtain necessary supplies, food, and ammunition. Although not an established tactical assembly area, the Goldstone Airstrip, which has a 999-acre footprint within the NASA Goldstone Complex, is a designated FARP location, supporting aircraft used by observers/ coaches/trainers and RTU aviation aircraft FARP operations; however, this FARP is administrative and not used for rotational (RTU versus OPFOR) tactical operations.

Aircraft Support Infrastructure

The following training infrastructure is designed specifically to support aircraft operations.

Bicycle Lake Army Airfield (BLAAF): BLAAF is a tactical area used as a forward staging base for aircraft operations. It has a 9,500-foot dirt runway, a 5,800-foot dirt runway, and a helipad. The airfield is capable of accommodating C-17, C-130, and MV22 Osprey aircraft landings. It has an aircraft parking ramp and sufficient additional space to park up to 44 rotary-wing aircraft. In addition, BLAAF has two refueling pads; Desert Radio Airspace Information Center; Airfield Operations; Flight Planning, which is conducted from a modular building that also houses the installation G3 Aviation offices; Aviation refueling; Ridgerunner contract helicopter office; and the Air Force 12th Combat Training Squadron weather station. Air Traffic Control Maintenance, Airfield Safety, and Aviation Fuel Supervisor are located in a metal building. A maintenance hangar and second building house aircraft maintenance operations and personnel. There is also a nonoperational control tower. BLAAF operates 24 hours a day, 7 days a week.

UAS Strips: UAS strips are used for the takeoff and landing of UASs. Six permanent UAS strips are located throughout the training areas, and hasty UAS strips are often constructed for a single rotation. UAS strips are typically 1,100-feet long and 70-feet wide and are constructed of compacted soil and soil stabilizers.

Freedom Landing Strip (FLS): One fixed-wing aircraft landing strip, with two parallel runways, is located in the training areas. Training activities at the FLS include aircraft takeoff and landing; airfield seizure exercises, including forcible entry training, rapid runway damage repair training, airmobile operations, and equipment offload and upload; and use as a staging base for other tactical operations. The FLS includes a 9,600-foot dirt runway, airfield apron, taxiway, aircraft staging areas, rapid runway repair area, and a simulated airfield control tower.

Helipads: The installation has 26 fixed helipads. Five are at locations within the Cantonment Area: Building 990, RUBA, Main Post Helipad, the Ammunition Supply Depot, and the new Weed Army Community Hospital. The other 20 concrete helipads are located throughout the training areas at LSAs, UO sites, and other contact points (Figure 2-3). The fixed helipads are used primarily for medical purposes or to transport personnel unrelated to training exercises.

DZs: Fort Irwin has eight established DZs, as shown on Figure 2-3, that are used for personnel and equipment drops during training exercises. Personnel and equipment are dropped into DZs and then the units move to other areas to conduct training, including live-fire exercises.

Integrated Training Area Management

The G3 ITAM program is tasked with managing and maintaining the physical condition of the training areas by integrating mission requirements with sound land management practices. The function of ITAM is to serve the overall needs of the Army through balancing the requirements of force readiness with land stewardship. It does so through three different program components:

- Range Training Land Assessment: Assesses training land conditions and the capability of the land to support current and future training requirements. Also identifies areas in need of repair and recommends possible repair actions.
- LRAM: Implements projects to maintain the training areas and repair the effects of maneuver on the natural environment. Projects are also designed to improve frequently used areas to better support current and future training activity.
- Sustainable Range Awareness (SRA): Educates soldiers and other land users on the training environment and their responsibilities with regard to environmental laws and regulations. SRA also

trains land users in how to avoid environmental effects when operating downrange. A primary component of the SRA is the soldier's Field Card, an example of which is provided in Appendix 2B.

Under the LRAM component of ITAM and based on information obtained through Range Training Land Assessment, Fort Irwin regularly performs the following activities to improve training conditions and safety in training areas:

FIGURE 2-8
Seibert Stake

- Maintains and installs barriers, including Seibert stakes (Figure 2-8), around conservation areas and other off-limits areas.
- Uses revegetation and other soil stabilization techniques to repair maneuver damage and minimize wind and water erosion.
- Identifies frequently used tactical sites and improves them to better support continued use.
- Applies chemical soil binders to regularly used trails to avoid dust and soil erosion.
- Removes old obstacles and other debris from the training areas to facilitate movement and maneuver.
- Identifies and revegetates unnecessary trails and previous operation sites.
- Conducts maintenance, improvement, and development of secondary trails.

A summary of ITAM projects and estimates of the effectiveness are provided in Appendix 2C.

Dig Restrictions and Off-limits Areas

A number of locations within the training areas have been identified as off-limits or are restricted from digging activities because of natural and manmade constraints (Figure 2-9). Natural constraints include sensitive biological resources and sensitive physical aspects of the environment, such as high dust potential. Manmade constraints include buried or aboveground utility infrastructure, potential for UXO, known or suspected contamination, and cultural resources.

Off-limits Areas: Certain areas are designated as off-limits to training activities by NTC Regulations. Off-limits areas are indicated on maps and are marked in the field with Seibert stakes to prevent entry into these areas during training.

Dig Restrictions: Dig restrictions are placed on areas because a constraint is present that may preclude digging, such as a UXO (designated as a no-dig area) or that may require supervision during digging activities, such as buried utility lines (designated as a limited dig area). RTUs are informed of dig-restricted areas prior to the start of a training scenario and are provided with a red/amber/green Tactical Dig Map showing no dig and restricted dig areas. Ground-disturbing activities in the training areas must be authorized through the established dig permit process through the G3 Training Support Division. The dig permit process helps ensure digging activities do not occur in areas of environmental, safety, or cultural resource concerns.

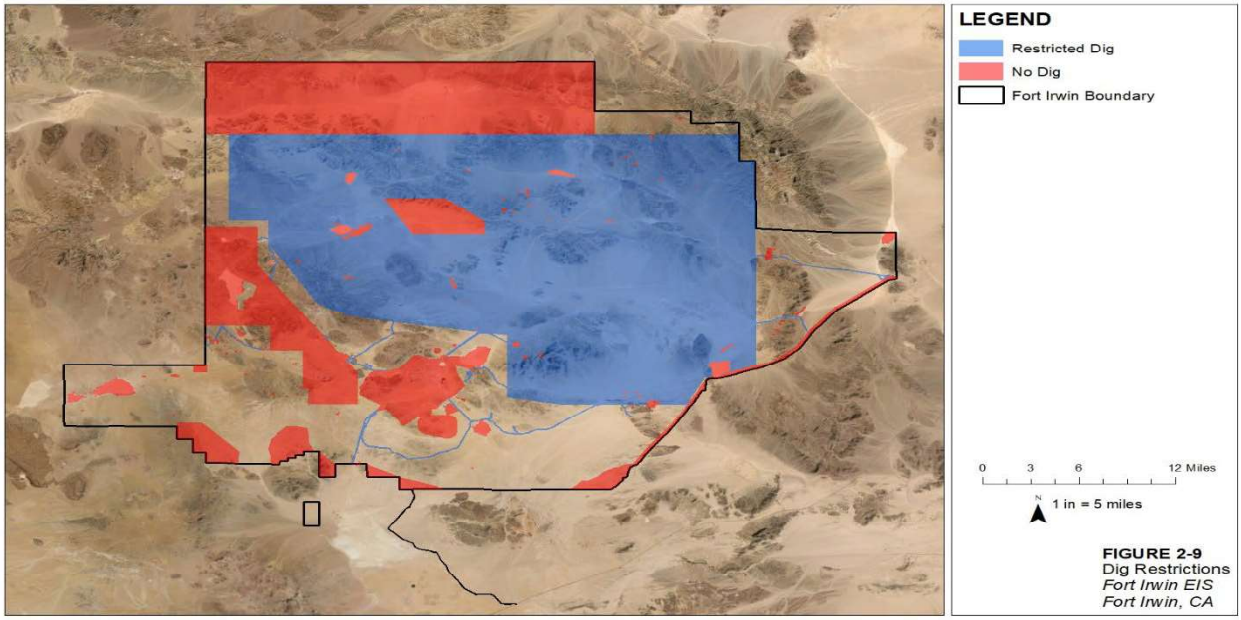


FIGURE 2-9
Dig Restrictions
Fort Irwin EIS
Fort Irwin, CA

Training Corridors

Within the training land are three maneuver corridors, consisting of multiple smaller training areas. As shown on Figure 2-10, the Northern, Central, and Southern Corridors are the primary locations for training activities. Combined Arms training can occur anywhere within the maneuver corridors, except for designated off-limits areas (Figure 2-9), though the intensity of training may vary based on the natural terrain and proximity to the Cantonment Area and Housing Area. In addition to the three primary maneuver corridors, the NTC includes the Eastern Training Area, which consists of two smaller training areas, and the Western Training Area, which consists of four smaller training areas. The Eastern and Western Training Areas could be used in conjunction with training activities in the three larger maneuver corridors; however, there are currently restrictions on training activities in these areas. Limited training activities can also occur within the NASA Goldstone Complex and the Cantonment Area. Training also takes place at Leach Lake, which contains targetry for aircraft operations and indirect fire activities; ground maneuver activities, however, are not conducted at Leach Lake, except for limited engineer support training. Descriptions of the training infrastructure, off-limits areas, and training activities that take place within each maneuver corridor and other areas used for training are provided in the following sections.

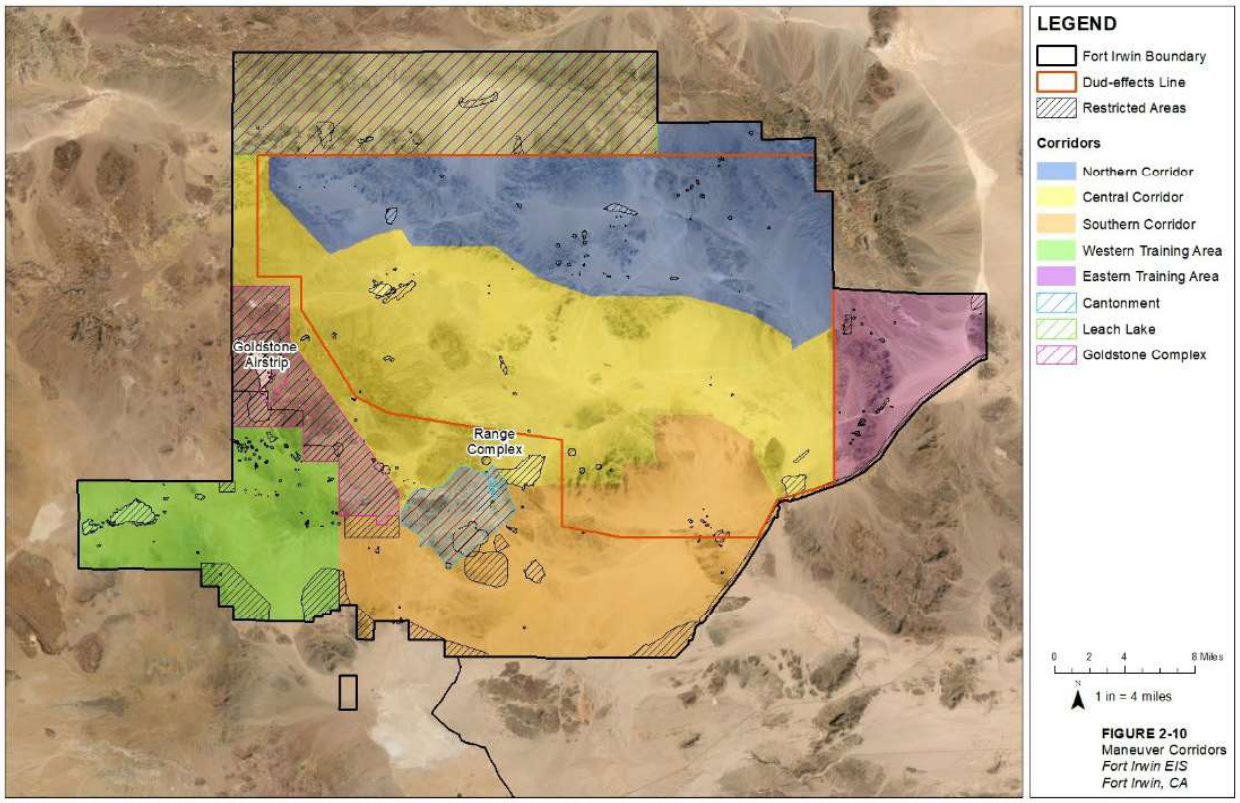


FIGURE 2-10
Maneuver Corridors
Fort Irwin EIS
Fort Irwin, CA

Northern Corridor

The Northern Corridor contains the Granite Mountain Range and historically has been the site of live-fire training scenarios. The Granite Mountains make the terrain in the Northern Corridor extremely rugged, and existing trails through the passes are often steep, narrow, and rocky. Elevations within the Granite Mountains range from approximately 3,200 feet to approximately 4,460 feet. Dry lake beds in the Northern Corridor include McLean Lake and Drinkwater Lake. The following training infrastructure is found in the Northern Corridor:

- Trails
  - MSRs: 18 miles
  - Secondary Trails: approximately 365 miles
- Communication Infrastructure
  - FON: 32 miles
  - Telecommunication Towers: 4
- Built Environments
  - UO Sites: 4 (including shoot houses)
  - CBRN Facilities: 2
  - Manmade Caves: 2
  - COPs: 4
  - Obstacles: approximately 26
- Aircraft Support
  - DZs: 1
  - Helipads: 3

- Live-fire Infrastructure
  - Targets: approximately 500
  - Command and Control Center

The Northern Corridor contains the following off-limits areas:

- Cultural resource conservation areas (144 acres)
- Natural resource conservation areas (156 acres)
- Dry lake beds (618 acres)
- Sensitive equipment – antenna (48 acres)
- Safety restrictions – inactive mines (98 acres)

The following training activities regularly occur in the Northern Corridor during rotational and non-rotational training. These activities follow the definitions provided in Section 2.1.2.1, *Changes in Training Activity Alternative*.

- Maneuver
- Maneuver Support
- Sustainment
- Special Operations
- Non-scenario Activities

Central Corridor

The Central Corridor is used primarily for force-on-force exercises; however, pop-up targets have been placed throughout this corridor and the dud-effects line includes most of the Central Corridor (Figure 2-10). Although the Central Corridor contains Tiefort Mountain, which is one of the most notable landmarks on Fort Irwin, the corridor is primarily flat, allowing for open maneuver through the area. Dry lake beds in the Central Corridor include Red Pass Lake, Nelson Lake, and Pioneer Lake. The following training infrastructure is found in the Central Corridor:

- Trails
  - MSRs: 80 miles
  - Secondary Trails: approximately 800 miles
- Communication Infrastructure
  - FON: 74 miles
  - Communication Towers: 11
- Built Environments
  - UO Sites: 9 (including shoot houses)
  - CBRN Facilities: 7
  - Manmade Caves: 4
  - LSAs: 2
  - COPs: 5
  - Obstacles: 1
- Maintenance, Refueling, and Logistics Points
  - FARPs: established based on training scenarios
  - RASA: 1
- Aircraft Support
  - FLS: 2
  - DZs: 4

  - Helipads: 9
  - UAS Strips: 2
  - BLAAF
- Live-fire Infrastructure
  - Targets: approximately 250

The Central Corridor contains the following off-limits areas:

- Cultural resource conservation areas (560 acres)
- Dry lake beds (1,299 acres)
- Sensitive equipment – antenna (97 acres)
- Safety and legal restrictions – inactive mines/borrow pits and explosive safety quantity distance arcs (432 acres)

The following training activities regularly occur in the Central Corridor during rotational and non-rotational training. These activities follow the definitions provided in Section 2.1.2.1, *Changes in Training Activity Alternative*.

- Maneuver
- Maneuver Support
- Sustainment
- Special Operations
- Non-scenario activities

Southern Corridor

The Southern Corridor is used primarily for force-on-force exercises and land navigation training; however, targetry has been set up in portions of the Southern Corridor. The Southern Corridor is south of Tiefort Mountain and extends to the western boundary of Fort Irwin. The terrain is primarily level, allowing for open maneuver. Langford Well Lake, a dry lake bed, is in the Southern Corridor. The following infrastructure is found in the Southern Corridor:

- Trails
  - MSRs: 24 miles
  - Secondary Trails: approximately 420 miles
  - Paved Roads: 4.5 miles
  - Land Navigation Course
- Communication Infrastructure
  - FON: 28 miles
  - Communication Towers: 6
- Built Environments
  - UO Sites: 3
  - Manmade Caves: 1
  - LSAs: 1
  - COPs: 1
- Aircraft Support
  - DZs: 3
  - Helipads: 2

  - UAS Strips: 3
- Live-fire Infrastructure
  - Targets: 45

The Southern Corridor contains the following off-limits areas:

- Cultural resource conservation areas (189 acres)
- Natural resource conservation areas (11,293 acres)
- Dry lake bed (586 acres)
- Sensitive equipment – antenna (48 acres)
- Safety restriction – inactive mines/borrow pits, explosive safety quantity distance arcs, and UXO areas (4,726 acres)

The following training activities regularly occur in the Southern Corridor during rotational and non-rotational training. These activities follow the definitions provided in Section 2.1.2.1, *Changes in Training Activity Alternative*.

- Maneuver
- Maneuver Support
- Sustainment
- Special Operations
- Non-scenario Activities

Eastern Training Area

The Eastern Training Area, which was opened to training in 2006, includes two training areas at the eastern end of the Central Corridor. The Eastern Training Area is generally undeveloped and consists of steep topography that is not conducive to maneuver training activities. Only a few trails exist, which further limits movement and flexibility of training activities. Dud-producing munitions may be fired from firing points in the Eastern Training Area, within the limits of established safety constraints, but no dud-producing munitions are deliberately fired to impact in the Eastern Training Area. Small arms ammunition may be fired in the Eastern Training Area and pyrotechnics and small-scale explosives are used during training events. In addition, training is constrained by an active mineral mine (Silver Lake Mine) in the northwestern portion of the Eastern Training Area. The East Gate MSR passes thorough the mining area, necessitating coordination with mine-related traffic when military activities are occurring. The Army can limit mine operations a maximum of 6 days per rotation and during night hours to accomplish training needs. The Red Pass MSR enters the Eastern Training Area from the southwest and does not pass near the Silver Lake Mine. The following infrastructure is found in the Eastern Training Area:

- Trails
  - MSRs: 18 miles
  - Secondary Trails: 34 miles
- Communication Infrastructure
  - FON: 11 miles
  - Communication Tower: 1
- Built Environments
  - UO Sites: 1
  - COPs: 1

- Maintenance, Refueling and Logistics Points
  - FARPs: established based on training scenarios

The Eastern Training Area contains the following off-limits areas:

- Cultural resource conservation (137 acres)
- Dry lake bed (400 acres)
- Utility corridor (1,814 acres)
- Legal restriction – active Silver Lake Mine (250 acres)
- Safety restriction – inactive mines (192 acres)

The following training activities regularly occur in the Eastern Training Area during rotational and non-rotational training. These activities follow the definitions provided in Section 2.1.2.1, *Changes in Training Activity Alternative*.

- Maneuver
- Maneuver Support
- Sustainment
- Special Operations
- Non-scenario Activities

Western Training Area

The terrain in the Western Training Area is generally level, with elevated terrain on the eastern side. A network of roads and trails exists from previous recreational (off-highway vehicle use and camping) and mining activities. The area around Superior Lake has fine soils that are susceptible to dust generation. The Army completed an SFEIS for the use of Western Training Area for armored and mechanized unit maneuver training (Fort Irwin, 2005); however, training has not yet occurred in this area. Fort Irwin is working to finalize the necessary agreements with the U.S. Fish and Wildlife Service (USFWS) and is implementing the mitigation measures outlined in the 2005 SFEIS and Biological Assessment (Fort Irwin, 2005). Dry lake beds in the Western Training Area include Superior Lake and Inferior Lake. The following infrastructure is found in the Western Training Area:

- Trails – Secondary Trails: 146 miles
- Communication Infrastructure – FON: 3 miles
- Maintenance, Refueling and Logistics Points – 1 FARP

The Western Training Area contains the following off-limits areas:

- Cultural resource conservation (647 acres)
- Dry lake beds (1,797 acres)
- Natural resource conservation (13,697 acres)
- Safety restriction – inactive mines (380 acres)

The following training activities can occur in the Western Training Area, though training has not yet occurred there. The variations or limitations also are described in the list. These activities follow the definitions provided in Section 2.1.2.1, *Changes in Training Activity Alternative*.

- Maneuver – These activities were analyzed in the Western Training Area under the 2005 SFEIS (Fort Irwin, 2005). While analyzed, mounted maneuver has not occurred here since the land was withdrawn.
- Maneuver Support – These activities were analyzed in the Western Training Area under the 2006 SFEIS (Fort Irwin, 2006a). While analyzed, maneuver support activities have not occurred here since the land was withdrawn.

- Sustainment – These activities in the Western Training Area were analyzed as "maintenance and logistical support" in the 2005 SFEIS (Fort Irwin, 2005). While analyzed, sustainment activities have not occurred here since the land was withdrawn.
- Special Operations – These activities were analyzed in the Western Training Area under the 2005 SFEIS (Fort Irwin, 2005). While analyzed, special operations activities have not occurred here since the land was withdrawn.

NASA Goldstone Complex

Minimal training activities occur in the NASA Goldstone Complex, which is permitted to NASA and is the site of numerous deep space radio telescopes, used to communicate with spacecraft in the deepest reaches of the solar system. MSRs through the NASA Goldstone Complex are used to access the Western Training Area and parts of the Central Corridor from the Cantonment Area and Range Complex. UAS activities are also conducted at the Goldstone Airstrip. Use of the MSRs and airstrip are coordinated with NASA.

The Goldstone Airstrip is a 6,000-foot hard surface runway within the footprint of the NASA Goldstone Complex. Fort Irwin reclaimed 1,000 acres around this airstrip in 2014 and uses the Goldstone Airstrip to support the Gray Eagle UAS mission. The airstrip includes an operation and maintenance hangar for the MQ-1 C Gray Eagle, shops, company administration and supply space, organizational vehicle parking, fire protection and alarm systems, runway, taxiway, and access apron. Supporting facilities include utilities and connections, lighting, paving, parking, walks, storm drainage, and information systems. Dry lake beds in the NASA Goldstone Complex include Goldstone Lake. The following training infrastructure is located in the NASA Goldstone Complex:

- Trails
  - MSRs: 8 miles
- Communication Infrastructure
  - FON: 22 miles
- Aircraft Support
  - Goldstone Airstrip

Leach Lake

Leach Lake covers 91,330 acres, which are off-limits to maneuver training. Leach Lake serves as a bombing range for U.S. and allied aircrews to train in the tactics, techniques, and procedures of Joint Close Air Support. The USAF Air Warrior mission is the primary user of the Leach Lake Tactical Range and more than 25 units participate in the Air Warrior program each year (USAF, 2006).

The Army has used Leach Lake as an impact area for live ammunition exercises since 1981. Aircraft training at Leach Lake can be incorporated into rotational training scenarios. No training infrastructure is located at Leach Lake other than aviation hard targets emplaced and maintained by the Air Force.

Cantonment Area

The Cantonment Area occupies approximately 14,309 acres and comprises housing areas, offices, schools, childcare facilities, maintenance and supply facilities, medical facilities, and morale, welfare, and recreation (MWR) support facilities such as sports fields, fitness centers, and other recreational areas. Limited training activities occur within the Cantonment Area because of the proximity of the living quarters and the noise and traffic sensitivities associated with schools, offices, and the hospital. The following training infrastructure is located in the Cantonment Area:

- Trails
  - MSRs: 5 miles
  - Secondary Trails: 30 miles

  - Paved Roads: 70 miles
- Communication Infrastructure
  - FON: 10 miles
- Built Environments
  - UO Sites: 1
  - Maintenance, Refueling, and Logistics Points
  - Vehicle Refueling: 3
  - Aircraft Support
  - Helipads: 4

The training activities that occur in the Cantonment Area include the following. These activities follow the definitions provided in Section 2.1.2.1, *Changes in Training Activity Alternative*.

- Maneuver
- Maneuver Support
- Sustainment
- Special Operations
- Non-scenario Activities

2.1.1.2 Range Complex

The Range Complex was constructed on an as-needed basis over decades and with sporadic funding. It currently fails to fully support home-station training requirements. The Range Complex is generally adjacent to the Cantonment Area, as shown on Figure 2-11. Use of the Range Complex is constrained by limited availability and cannot be used during rotations because of conflict between the range SDZs and rotational maneuver activity.

The Range Complex includes the Range Operations Building and static ranges, which are defined as firing areas with permanently defined SDZs. Over the past few years, changes have been made to the Range Complex, such as modifying some of the static ranges to meet Army doctrinal training standards. The activities conducted on each range are described in the following sections. Each range on Fort Irwin is discussed, though the numbering of the ranges is not sequential. For instance, Ranges 2, 3, and 4 were eliminated or consolidated and renamed based on changing mission needs. The No Mission Change Alternative includes the continued use of these ranges without modification.

The following descriptions include the Training Range Facility Category Code (FCC) for each range per Department of the Army Training Circular (TC) 25-8 (Army, 2016b).

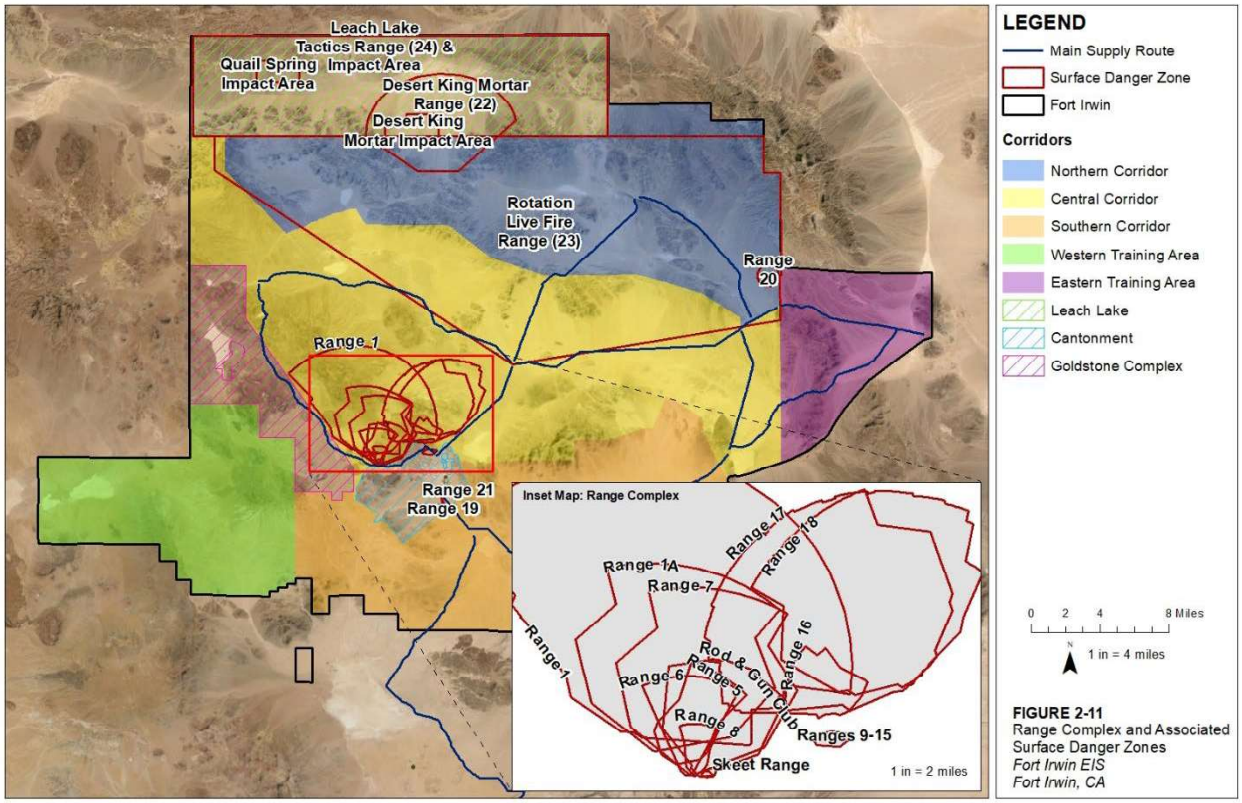


FIGURE 2-11
Range Complex and Associated Surface Danger Zones
Fort Irwin EIS
Fort Irwin, CA

Range 1 (FCC 17868)—Tank Range

At present, Range 1 serves as a Tank Range to train soldiers in using the M1 Abrams Tank vehicle. This range is used to train soldiers to identify, engage, and defeat infantry targets with the tank weapons system. Range 1 is slated to become a Multipurpose Range Complex (MPRC) in 2028.

Range 1A (FCC 17831)—Machine Gun Transition Range (Formerly Range 4)

Range 1A provides proficiency training, zeroing training, and qualification requirements with the M249 Squad Automatic Weapon and machine guns. Soldiers train on the skills necessary to identify, engage, and hit stationary infantry targets, including accuracy, range determination, and sequential engagement of multiple targets. Range 1A meets Army doctrinal standards.

The Machine Gun Transition Range (facilities and four lanes of capability) was relocated to the west side of the former Range 1 tower (the tower used on Range 1 prior to its rebuild) and redesignated as Range 1A. The relocation alleviated conflicts between SDZs at Range 4, the former Machine Gun Transition Range that no longer exists, and Range 1; historically, these conflicts prevented the simultaneous use of the ranges for training activities.

Range 5 (FCC 17805)—Auto Record Fire Range (Non-standard)

Range 5 is used to train soldiers to identify, engage, and defeat infantry targets with M16 and M4 rifles. The Auto Record Fire Range provides for both day and night qualifications.

Range 6 (FCC 17821)—Combat Pistol/Military Police Qualification Course

Range 6 is used to train soldiers to detect, identify, engage, and defeat stationary targets in a tactical array with handguns. Range 6 provides training and qualification requirements for combat pistols and revolvers. This range was recently upgraded to hardwire the targetry and provide appropriate support services, such as ammunition storage, break/modified mess, and bleacher enclosure.

Range 7 (FCC 17814)—General Purpose Range

Range 7 was formerly the Heavy Sniper Range (non-standard) (FCC 17829). This range was used to train and test soldiers on the skills necessary to detect, identify, engage, and defeat stationary infantry targets, as well as stationary and moving vehicular targets in a tactical array. This range provided training on the M107 long-range sniper rifle. Range 7 did not meet TC 25-8 doctrinal training standards for sniper training (Army, 2016b) because its configuration provided only familiarization training and not qualification capability. In addition, the use of Range 7 for heavy sniper training conflicted with concurrent use of Range 8. Range 7 was redesignated as FCC 71814 (General Purpose Range).

Range 8 (FCC 17801)—Basic 10M-25M Firing Range (Zero)

At Range 8, individual soldiers train on the skills necessary to align the sights and practice basic marksmanship techniques against stationary targets. Training is provided for shot grouping and zeroing exercises with the M16 and M4 series rifles, as well as crew-served machine guns. This range also can be used for short-range marksmanship training and qualification.

Range 9 (FCC 17966)—Rappelling Training Area

At Range 9, individual soldiers train on the skills necessary to rappel. Training includes fixed rappel, which requires a soldier to move down a vertical surface, and free rappel, which occurs when a soldier deploys from a helicopter. Structures and towers modified to simulate helicopter rappel are used for the training.

Range 10 (FCC 17816)—Bayonet Assault Course

At Range 10, individual soldiers train on the skills necessary to implement assault techniques with a rifle and bayonet applied through a series of obstacles.

Range 11 (FCC 17994)—Obstacle Course

At Range 11, individual soldiers train on the skills necessary to negotiate various obstacles to reach the objective.

Range 12 (FCC 17959)—Air Transport Mockup

Range 12 is a ramp and platform structure that simulates fixed- and rotary-wing cargo-carrying aircraft. It allows soldiers to train in loading, securing, and unloading vehicles, equipment, and personnel.

Range 13 (FCC 17999)— Field Training Area

Range 13 is a specific area intended for the training of personnel and animals in a field environment.

Range 14 (FCC 17894)— Medium/Heavy Equipment Training Area

Range 14 is an unimproved area for training in the placement, compaction, and grading of fill and construction of drainage structures.

Range 15 (no FCC classification) – Hand Grenade Range

Range 15 was relocated to be adjacent to Range 16. It is designed to train and qualify soldiers on basic skills necessary to accurately employ hand grenade throwing techniques using practice-fused grenades.

Range 16 (FCC to be determined)— Multipurpose Grenade Range

Range 16 was modified to serve as a consolidated Grenade Range that provides the functions of FCC 17883 (Hand Grenade Familiarization Range - Live), FCC 17884 (Grenade Launcher Range), FCC 17834 (40-millimeter [mm] GR/MG Range), and FCC 17841/17842 (Light Anti-armor Weapons). At Range 16, soldiers train on the skills necessary to employ all hand grenade weapons and light anti-armor weapons against stationary targets.

Range 17 (FCC 17895)—Infantry Squad Battle Course

Range 17 meets training and qualification requirements of infantry squads on individual and collective tactics, techniques, procedures, and employment in tactical situations. At this complex, infantry squads train and test on the skills necessary to conduct tactical movement techniques and to detect, identify, engage, and defeat stationary and moving armor and infantry targets in a tactical array.

Range 18 (FCC 17809)—Automated Qualification/Training Range

Range 18 provides day and night training and qualification requirements with rifles, pistols, and machine guns. Targets are fully automated, and the event-specific target scenario is computer-driven and scored from the Range Operations center.

Range 18A (FCC 17863)—Stationary Gunnery Range

Range 18A provides boresight, calibration, and verification of the 30-mm cannon on the AH-64 Apache helicopter.

Range 20 (FCC 17885)—Light Demolition Area

Range 20 provides training for research, development, testing, and evaluation of EOD personnel to destroy dud ammunition by using additional high explosives or demolitions. This range also provides demolition training for non-EOD units.

Range 21 (FCC 17170)—Gas Chamber

Range 21 provides training in the use of protective masks and the effects of chemical warfare.

Range 22 (FCC 17852)—Mortar Range

Range 22 is used to train mortar crews on the skills necessary to apply fire mission data and engage and hit stationary targets in a tactical array using live mortars.

Range 24 (FCC 17914)—Aerial Range (Leach Lake)

Range 24 supports the training and qualification requirements for fixed-wing aircraft dropping their ordnance.

Rod and Gun Range (FCC 17814)

This is an MWR range not associated with specific military training activities. Use of this range for recreational activities is not evaluated in this LEIS because the range is not associated with the military mission.

Skeet Range (FCC 75025)

This is an MWR range not associated with specific military training activities. The range consists of a bounded area with shooting stations for firing at clay targets with a shotgun. Target-firing facilities are included as part of the skeet field. Use of this range for recreational activities is not evaluated in this LEIS because the range is not associated with the military mission.

2.1.1.3 Airspace

The Federal Aviation Administration has established four categories of airspace: controlled, uncontrolled, special use, and other. The special-use airspace designated over Fort Irwin is integral to the NTC training experience. As shown on Figure 2-12, Fort Irwin has three areas designated for special-use airspace: R2502N, R2502E, and R2502A. Each area can accommodate rotary-wing and fixed-wing aircraft and UASs.

R2502N and R2502E are authorized for rotary-wing operations from surface to 6,000 feet above ground level (AGL) and fixed-wing aircraft and UASs operations up to 45,000 feet AGL. Rotary-wing and fixed-wing aircraft conduct lights-out nighttime flights, air-to-ground direct and indirect fire, and laser

designation training. In addition, artillery, mortar, and missile fire are conducted in R2502N and R2502E, with weapons reaching altitudes ranging from 1,614 feet AGL to 45,000 feet AGL.

R2502A is authorized for rotary-wing aircraft to operate at up to 6,000 feet AGL and for fixed-wing aircraft and UASs to operate between 500 feet and 16,000 feet AGL. Aircraft operations are the same as in R2502N and R2502E, except there is no use of artillery, mortar, or missiles in R2502A.

R2515 encompasses the southwestern portion of Fort Irwin and extends westward to Edwards Air Force Base (AFB). Edwards AFB controls R2515, which supports the development and evaluation of current and next generation aircraft and aerospace systems. R2515 contains unique areas designated specifically for hazardous, special use, and flight test activities. These areas include UAS operating areas, Supersonic Flight Corridors, and the Precision Impact Range Area.

Fort Irwin's Restricted Area and Military Operations Area Annual Utilization Reports compiled by the G3 Aviation Division indicate that R2502N and R2502E experience up to 96,547 aircraft take off and landings (sorties) per year and that R2502A experiences up to 45,300 aircraft sorties per year.

Fort Irwin has a hangar at the Barstow-Daggett Airport (Figure 2-12). Helicopters depart from that airport to travel to Fort Irwin to conduct training activities. In addition, the Barstow-Daggett Airport is used occasionally for visiting officer travel not associated with RTUs. No training occurs at the Barstow-Daggett Airport. Fort Irwin uses March Air Reserve Base (ARB) in Riverside (Figure 2-12) as a landing point for RTUs arriving to begin rotational training, but no training occurs at March ARB. Because the Barstow-Daggett Airport and the March ARB are not used for training exercises and no change in use of these facilities is planned, they are not discussed further in this LEIS.

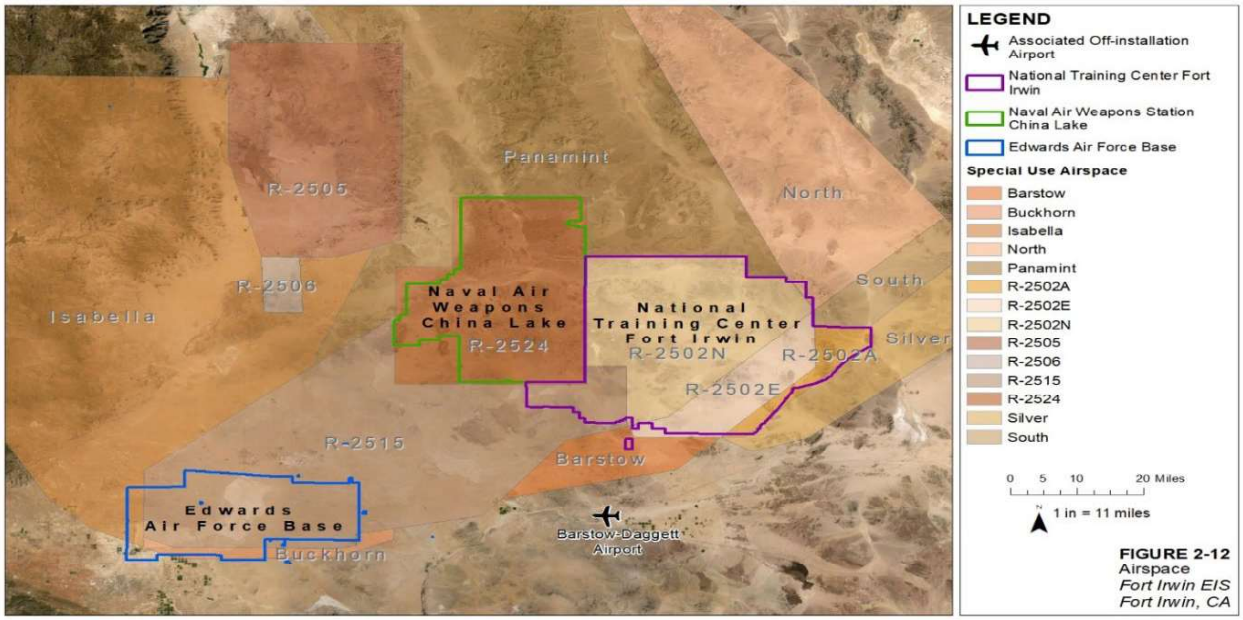


FIGURE 2-12
Airspace
Fort Irwin EIS
Fort Irwin, CA

2.1.1.4 Manix Trail

Wheeled ground vehicles and equipment travel from the Marine Corps Logistics Base Barstow to Fort Irwin via surface roads from Yermo Annex east to the community of Manix, where the equipment continues to Fort Irwin via the Manix Trail. The Manix Trail is an unpaved trail that crosses under I-15 and follows old, unpaved roads to Fort Irwin (Figure 1-1). By using the Manix Trail, RTU-associated wheeled military equipment can reach Fort Irwin without traveling on surface roads, other than the segment from the Yermo Rail Yard to the start of the Manix Trail. Tracked military equipment does not travel via the Manix Trail but is transported by carrier from the Yermo Annex to Fort Irwin. The public has access to the portion of Manix Trail between I-15 and Fort Irwin. All Army operations occur within the existing Manix Trail right-of-way.

2.1.2 Proposed Mission Change Alternatives

This section describes the reasonable alternatives for the proposed mission changes on Fort Irwin. The proposed mission changes are to continue training as described in the No Mission Change Alternative, with an increase in training activities and training infrastructure improvements, as per the Fort Irwin Range Complex Master Plan (Fort Irwin, 2017f). For efficiency, only the changes from the No Mission Change Alternative are described in this section; however, the analysis in Section 4, *Environmental Consequences - Mission Analysis,* considers the combined impacts of the "No Mission Change" baseline and the mission change actions, as described in this section. The decision maker may adopt all or less than all of the following alternatives. No changes to airspace are proposed and there would be no change to existing Federal Aviation Administration-designated special-use airspace on Fort Irwin. Therefore, airspace is not carried further in this analysis.

While the amount of maneuver activity associated with rotational training varies depending on the specific training scenario, there would be no expected change in average annual VMTs under the proposed mission changes. While activities are proposed for areas not currently heavily used for training, the average amount of training and number of military vehicles used on Fort Irwin would not increase, primarily because the distance to the Western Training Area from the Cantonment Area is no greater than the distance to the eastern and western ends of the Central Corridor.

The Proposed Mission Change Alternatives considered include the following:

- Changes in Training Activity Alternative, including four Western Training Area Alternatives (Section 2.1.2.1)
- Training Infrastructure Improvement Alternative (Section 2.1.2.2)
- Range Improvements Alternative (Section 2.1.2.3)
- Manix Trail Alternative (Section 2.1.2.4)

2.1.2.1 Changes in Training Activity Alternative

The following sections explain the proposed changes in training activities within the training corridors.

Northern Corridor

The following bullets detail the proposed changes to training activities compared to the No Mission Change Alternative for the Northern Corridor:

- **Aviation Operations** – Fort Irwin would add the capability for aircraft (fixed-wing, rotary-wing, and UAS) to engage live ground targets (targets with personnel or active equipment) in simulated attacks through an upgraded instrumentation system. The number of manned operations in rotational training would not increase in frequency but would be more dispersed over the training areas, with fewer sorties in one area and more sorties in another, without requiring a change to airspace designations. UAS operations are expected to increase, because the reliance on UAS operations has

been increasing and this trend is expected to continue. A UAS runway would be constructed in the Northern Corridor to support rotations.

- **Cyber** – When deployed, units must be capable of cyberspace operations, including both electronic warfare and information operations. Cyber training primarily occurs in a virtual environment, though cyber activities could affect how vehicles and weapon systems operate.

Central Corridor

The following bullets detail the proposed changes to training activities compared to the No Mission Change Alternative for the Central Corridor:

- **Live-fire Training** – It is expected that the frequency and amount of live-fire training would increase in the Central Corridor to support simultaneous engagement of three battalions during live-fire exercises. Live-fire scenarios are also being adjusted to allow for both north-to-south and east-to-west movement, whereas only north-to-south scenarios were utilized in the past.
- **Aviation Operations** – Fort Irwin would add the capability for aircraft (fixed-wing, rotary-wing, and UAS) to engage live ground targets in simulated attacks through an upgraded instrumentation system. The number of manned operations in rotational training would not increase in frequency but would be more dispersed over the training areas, with fewer sorties in one area and more sorties in another, without requiring a change to airspace designations. UAS operations are expected to increase, because the reliance on UAS operations has been increasing and this trend is expected to continue.

Southern Corridor

The following bullets detail the proposed changes to training activities compared to the No Mission Change Alternative for the Southern Corridor:

- **Live-fire Training** – It is expected that the frequency and amount of live-fire training would increase in the Southern Corridor as more targetry is placed here and as rotational units are expected to conduct live-fire security operations in rear support areas. Live-fire scenarios are also being adjusted to allow for both north-to-south and east-to-west movement, whereas only north-to-south scenarios were utilized in the past.
- **Aviation Operations**– Fort Irwin would add the capability for aircraft (fixed-wing, rotary-wing, and UAS) to engage live ground targets in simulated attacks through an upgraded instrumentation system. The number of manned operations in rotational training would not increase in frequency but would be more dispersed over the training areas, with fewer sorties in one area and more sorties in another, without requiring a change to airspace designations. UAS operations are expected to increase, because the reliance on UAS operations has been increasing and this trend is expected to continue.

Eastern Training Area

The following bullets detail the proposed changes to training activities compared to the No Mission Change Alternative for the Eastern Training Area:

- **Live-fire Training** – It is expected that the frequency and amount of live-fire training would increase in the Eastern Training Area as rotational units are expected to conduct live-fire security operations in rear support areas. Live-fire scenarios are also being adjusted to allow for both north-to-south and east-to-west movement, whereas only north-to-south scenarios were utilized in the past.
- **Mounted Maneuver** – To reduce training constraints associated with the spatial requirements of training scenarios and the increased ranges of modern weapons systems, the intensity of mounted

maneuver training in the Eastern Training Area would increase and include the use of live weapons and dud-producing ammunition.

- **Maintenance and Refueling** – As the Eastern Training Area is made more accessible to mechanized maneuvers, it is expected that the number of maintenance and refueling activities would increase.
- **Aviation Operations**– Fort Irwin would add the capability for aircraft (fixed-wing, rotary-wing, and UAS) to engage live ground targets in simulated attacks through an upgraded instrumentation system. The number of manned operations in rotational training would not increase in frequency but would be more dispersed over the training areas, with fewer sorties in one area and more sorties in another, without requiring a change to airspace designations. UAS operations are expected to increase, because the reliance on UAS operations has been increasing and this trend is expected to continue.

Western Training Area

Training activities may increase substantially in the Western Training Area as the Army completes the necessary mitigation measures agreed upon in the 2005 SFEIS and Record of Decision (Fort Irwin, 2005, 2006), as well as measures now being developed in consultation with the USFWS. The following alternatives, which would increase training in the Western Training Area, are being considered:

- **Alternative 1: Medium-Intensity Aviation Task Force** – Battalion-level aviation and SF units would use the Western Training Area for limited operations, including maneuver to a fixed site, sustainment operations for aviation units, and the full breadth of SF operations. Units would travel to established aviation logistics sites during training scenarios but would remain on established MSRs, and permanent assembly areas would be designated. Live ammunition would not be used in the Western Training Area. Urban operations training would also increase, with the potential establishment of a permanent UO site.
- **Alternative 2: Medium-to-High-Intensity Aviation Task Force and Brigade Support Area** – In addition to SF operations and aviation units, the Western Training Area would be used by logistics units to establish brigade support areas. Operations would be similar to those described for Alternative 1, except the number of units and types of vehicles would increase substantially, from a few hundred individuals and vehicles to approximately one thousand. Small caliber (non-dud-producing) small arms ammunition and pyrotechnics would be used during training scenarios to simulate sabotage and direct attacks on the logistics support sites. The logistics support sites would be permanently established. Urban operations training would also increase, with the potential establishment of a permanent UO site.
- **Alternative 3**: **High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition** – Full force-on-force activities similar to those conducted in the Northern, Central, and Southern Corridors would occur in the Western Training Area. These training scenarios would include the full breadth of activities associated with maneuver, maneuver support, sustainment, SF operations, and non-rotational training (Section 2.1.1.1, *Training Areas*); however, live-fire scenarios involving dud-producing ammunition would not be conducted in the Western Training Area. Small-caliber (non-dud-producing) small arms ammunition and pyrotechnics would be used during training scenarios to simulate sabotage and direct attacks on the logistics support sites. Urban operations training would also increase, with the potential establishment of a permanent UO site.
- **Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition** – Force-on-force and live-fire activities similar to those conducted in the Northern, Central, and Southern Corridors would occur in the Western Training Area. These training scenarios would include the full breadth of activities associated with maneuver, maneuver support, sustainment, SF operations, and non-rotational training (Section 2.1.1.1, *Training Areas*). Dud-producing munitions may be fired from firing points in the Western Training Area, into the dud-effects area (Figure 2-10),

but no dud-producing munitions would be deliberately fired to impact in the Western Training Area. The use of dud-producing ammunition would require coordination with the Naval Air Weapons Station (NAWS) China Lake, as SDZs would cross the Fort Irwin-China Lake boundary and targetry may be placed within China Lake. No SDZs for any weapons systems would cross the NASA Goldstone Complex or the Cantonment Area. Demolition munitions would be used during rotations and EOD may require the use of explosives to respond to UXO. Urban operations training would also increase, with the potential establishment of a permanent UO site.

NASA Goldstone Complex

Under the Mission Change Alternative, current training activities would continue at the NASA Goldstone Complex, though use of the existing route through the NASA Goldstone Complex for access to the Western Training Area would increase. This increase in travel by military vehicles and equipment from current levels would not exceed the use levels analyzed in the SFEIS (Fort Irwin, 2005). No change in the use of the Goldstone Airstrip beyond that previously analyzed under NEPA (Fort Irwin, 2014c) would occur. There is a potential for live ammunition to be shot within and from the Western Training Area, which abuts the NASA Goldstone Complex, but live-fire activities would be constructed so that no SDZ crosses the NASA Goldstone Complex boundary.

Leach Lake

Under the Mission Change Alternative, current training activities would continue at Leach Lake. No new training activities are proposed for the Leach Lake area.

Cantonment Area

Under the Mission Change Alternative, current training-related activities would continue in the Cantonment Area. No new training-related activities would occur in the Cantonment Area.

2.1.2.2 Training Infrastructure Improvement Alternative

Considerable existing infrastructure supports training activities within the training areas. To meet training requirements, this infrastructure is vital. To maintain a safe and realistic training environment, this infrastructure must be maintained and improved to meet doctrinal standards and reflect current threats. The following training infrastructure improvements are proposed (Fort Irwin, 2017f).

Northern Corridor

Training infrastructure improvements proposed for the Northern Corridor are described in the following sections.

Improve Existing UO Sites

Existing UO sites would be maintained and used for rotational and non-rotational training in the Northern Corridor. UO sites would be improved to meet changes in the potential combat environment and increase the training capacity of RTUs. Specifically, the Army proposes to:

- Upgrade UO facilities' live and virtual instrumentation to collect data for after-action reviews and provide a realistic training environment for RTUs fighting in UOs.
- Upgrade UO Shoot House Facilities to enable RTUs to train on UOs under live ammunition conditions and to allow the collection of data for after-action reviews.
- Increase the number of training objectives within UO sites.
- Install and integrate the newest Army Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) systems, which have higher control capabilities, to meet current and future unit training requirements and provide the necessary interface and interactivity with RTU C4ISR systems.

- Modernize and sustain instrumentation systems that support seamless outdoor and indoor instrumentation of dismounted forces to improve unit tracking and data collection for after-action reviews.

  These changes would be completed within the disturbed footprint of existing UO sites.

Improve Communication Capabilities

Up to three communications towers would be constructed in the Northern Corridor. Communications towers typically range from 60 to 160 feet in height, with the height dependent on the terrain near the installation site. Tower sites would cover an area of up to 50 by 75-foot area. A chemical grounding electrode grounding system and #2 American Wire Gauge solid tinned copper ground ring would be installed around each tower.

Within each tower site there would be small equipment cabinets, generators, and fuel tanks or other power sources (such as solar). The new sites would each have fiber routes and associated access roads up to 30-feet wide. Access roads and new fiber routes may extend for up to 5 miles at each tower. The locations for the access roads and new fiber routes would not be known until tower locations are determined.

Each tower site would have a protective barrier around it constructed of precast 2.46- by 2.46- by 4.92-foot concrete Enviro-Blocks stacked two high, with an approximately 13-foot-wide opening serving as the entrance and exit to the site. Two 6- by 6-foot chain-link swing gates would be installed in the opening to provide lockable access.

Legacy fiber installed during Phase 1 would be replaced and extended to meet live-fire training and safety needs. To the extent possible, conservation areas and other off-limits areas would be avoided during site selection.

Create New CBRN Training Facilities

There is a need to expand the CBRN capabilities to match real-world conflicts. The Army plans to build up to three new CBRN facilities. The locations of these facilities have not yet been determined, but one or more of these could be located in the Northern Corridor. Any new CBRN facilities would be located to avoid conservation and other off-limits areas.

Radar System Upgrades

A new instrumentation system is required to add the capability for aircraft to engage live ground targets in simulated attacks. The instrumentation system (P-5 Combat Training System/Tactical Combat Training System or other comparable systems that may be developed) may include real-time weapons simulations and live monitoring functions that require aircraft-mounted and ground infrastructure. Ground infrastructure or substations are portable and would be deployed where and when needed based on training scenarios. Up to three P-5 Combat Training System/Tactical Combat Training System instrument towers, comparable in size to telecommunications towers, would be located to provide complete coverage of downrange areas. The locations of the towers have not been determined yet, but the structures would be located to avoid conservation and other off-limits areas. Fort Irwin would add the capability for RTUs to employ ground-based radar during training exercises. The ground-based radar units would be part of the equipment that RTUs bring to the training scenario and would not require construction of new infrastructure within the corridor.

Create New UAS Runway

A new UAS runway would be completed for the OPFOR. While the size and location of the new runway is unknown at this time, it would not be placed in conservation or other off-limits areas.

ITAM Activities

The secondary trail network is a critical training asset at the NTC. ITAM maps the significant secondary trails in the Northern Corridor and coordinates with OPS GRP engineer assets to conduct repairs and maintenance. Field teams evaluate trail sections that need to be added or removed from the network based on usage, evolving training scenarios, consideration of off-limits areas, and other constraints. Because of the high potential for UXO in the Northern Corridor, trail rehabilitation and maintenance opportunities may be limited.

In the Northern Corridor, ITAM would monitor 75 miles of trails over a 3-year period. Trail/wash cross-sections and grades would be improved to prevent washouts and create safe conditions for wheeled and tracked vehicles at speeds of 10 to 15 miles per hour. Wash crossing improvements would be prioritized based on current conditions and trends indicated by monitoring data. In addition, Range Operations would maintain MSRs by grading and addressing erosion issues as necessary.

Central Corridor

Training infrastructure improvements proposed for the Central Corridor are described in the following sections.

Increase Live Ammunition Capability

The Army would continue to add live-ammunition targetry in the Central Corridor, north of the dud-effects line. Up to 750 new targets would be installed. New targetry would be comparable to existing pop-up targetry and some of the targetry could be relocatable. In addition, a new convoy live-fire range would be constructed. While the locations of the new targets and convoy live-fire range are unknown, they would not be placed in conservation or other off-limits areas.

Increase Number of Training Obstacles

Two new anti-vehicle ditches, averaging 8 meters wide by 8 meters deep by 3,200 meters long, and two trenches, averaging 40 meters wide by 6 meters deep by 60 meters long, would be constructed in the Central Corridor to add complexity to the rotational training. Training obstacles will be sited to avoid off-limits areas.

Improve Existing UO Sites

The UO site upgrades described for the Northern Corridor would be implemented at the UO sites in the Central Corridor. In addition, 20 to 30 buildings would be added to each UO site, with implementation to occur over a 5-year period. Additionally, seven plywood building would be replaced with shock-absorbing concrete structures; this action is addressed under a separate NEPA analysis (Fort Irwin, 2018b, 2020a) and is not addressed directly in this LEIS.

Improve Communication Capabilities

Legacy fiber installed during Phase 1 would be replaced and extended to meet live-fire training and safety needs. To the extent possible, conservation areas and other off-limits areas would be avoided during site selection. If it is not possible to avoid these areas completely when selecting routes for the FON network, encroachment into off-limits areas would be minimized.

Create New CBRN Training Facilities

The proposed CBRN sites described for the Northern Corridor may be implemented in the Central Corridor. One or more of the three proposed sites could be located in the Central Corridor. Any new CBRN facility would be located to avoid conservation and other off-limits areas.

Establish and Maintain FARPs and RASAs

The Army proposes to establish FARPs and RASAs in the Central Corridor, with locations determined by rotation scenarios. Historically, FARP sites were selected based on patterns observed during force-on-force training, as the logistics of the training scenarios resulted in repeated heavy use of the same general areas for these purposes. With the shift in training emphasis, it is expected that additional FARPs and RASAs would be needed to support rotational training and that the locations of these facilities would change based on the training scenario implemented.

A FARP typically encompasses a 50- by 150-meter area and an RASA typically occupies a 50- by 100-meter area. Multiple FARPs and RASAs may be needed for a given rotational training scenario. Grubbing, clearing, and establishing runoff control in the area planned for use as a FARP or RASA would be necessary, and each RASA would have berms around the ammunition storage area. RASAs also would have safety standoff distances because of the storage of live ammunition.

FARPs and RASAs must be approved through the established dig permit process, which helps ensure they are not placed in areas of environmental, safety, or cultural resource concerns. The placement of FARPs and RASAs complies with the established off-limits and dig restriction areas. Conservation areas and other off-limits areas would be avoided during site selection for FARPs.

Radar System Upgrades

BLAAF would receive a Standard Terminal Automation Replacement System (STARS) to provide air controllers with a picture of the airspace and enable controllers to manage aircraft using radar or the satellite-based Automatic Dependent Surveillance-Broadcast. STARS also would link with Edwards AFB and Naval Air Warfare Center China Lake. This radar system would be integrated with NTC command-and-control systems and the instrumentation system. STARS would interface with existing radar systems and towers but would require the construction of additional towers to prevent terrain masking. While the locations of the new towers are not yet known, they would not be placed in conservation or other off-limits areas. Fort Irwin would add the capability for the RTUs to employ ground-based radar during training exercises. The ground-based radar units would be part of the equipment brought to the training scenario by the RTUs and would not require the construction of new infrastructure within the corridor.

ITAM Activities

ITAM would continue to rehabilitate disturbed areas within the Central Corridor. ITAM would also maintain approximately 100 miles of secondary trails per year. The improvement effort is intended to provide an established trail network for logistic and administrative movement. Frequently used tactical sites would be improved to support continued training activity.

Southern Corridor

Training infrastructure improvements proposed for the Southern Corridor are described in the following sections.

Increase Live Ammunition Capability

The Army would continue to add live-fire targetry to the Southern Corridor. While the locations of the new targets are unknown, they would not be placed in conservation or other off-limits areas.

Improve Existing UO Sites

The UO site upgrades described for the Northern Corridor would be implemented at the UO sites in the Southern Corridor.

Improve Communication Capabilities

Legacy fiber installed during Phase 1 would be replaced and extended to meet live-fire training and safety needs. To the extent possible, conservation areas and other off-limits areas would be avoided

during site selection. If it is not possible to avoid these areas completely when selecting routes for the FON network, encroachment into off-limits areas would be minimized.

Create New CBRN Training Facilities

The proposed CBRN sites described for the Northern Corridor may be implemented in the Southern Corridor. One or more of the three proposed sites could be located in the Southern Corridor.

Establish and Maintain FARPs and RASAs

FARP and RASA establishment, improvement, and maintenance, as described for the Central Corridor, would be implemented in the Southern Corridor.

Radar System Upgrades

Fort Irwin would add the capability for the RTUs to employ ground-based radar during training exercises. The ground-based radar units would be part of the equipment brought to the training scenario by the RTUs and would not require the construction of new infrastructure within the corridor.

ITAM Activities

ITAM would continue to rehabilitate disturbed areas in the Southern Corridor. Additionally, ITAM would maintain approximately 100 miles of trails per year. The improvement effort is intended to provide an established trail network for all training units, thereby reducing the necessity for off-road vehicle (ORV) maneuver and improving safety for logistics and administrative movement. Frequently used tactical sites would be improved to support continued training activity.

Eastern Training Area

Training infrastructure improvements proposed for the Eastern Training Area are described in the following sections.

Increase Live Ammunition Capability

The Army would add live-fire targetry in the Eastern Training Area. The dud-effects line may be widened to include the northern areas of the Eastern Training Area. While the locations of the new targets are not yet known, they would not be placed in conservation or other off-limits areas and SDZs would be kept within the installation boundary.

Improve Existing UO Sites

The UO upgrades described for the Northern Corridor would be implemented at the UO sites in the Eastern Training Area.

Improve Communication Capabilities

Additional fiber routes would be developed within the Eastern Training Area. To the extent possible, conservation areas and other off-limits areas would be avoided during site selection. If it is not possible to avoid these areas completely when selecting routes for the FON network, encroachment into off-limits areas would be minimized. No new towers would be placed in the Eastern Training Area.

Create New CBRN Training Facilities

The proposed CBRN sites described for the Northern Corridor may be implemented in the Eastern Training Area. One or more of the three proposed sites could be located in the Eastern Training Area. In addition, a few new CBRN facilities would be constructed in the Eastern Training Area and incorporated into training.

Establish and Maintain FARPs

FARP and RASA establishment, improvement, and maintenance, as described for the Central Corridor, would be implemented in the Eastern Training Area.

ITAM Activities

As mounted maneuvers increase in the Eastern Training Area, ITAM would increase its rehabilitation efforts. Additionally, ITAM would improve accessibility to the Eastern Training Area by providing a more robust trail network capable of supporting mechanized vehicles. Approximately 25 miles of secondary trails would be identified and either established or improved to support rotations. New trails would be sited to avoid off-limits areas to the extent possible and the dig permit process would be followed for areas of new grading. Once the trail network has been established, ongoing monitoring and maintenance would be implemented.

Western Training Area

Training infrastructure improvements proposed for the Western Training Area are described in the following sections.

Increase Live Ammunition Capability

The Army would add live-fire targetry for small arms ammunition in the Western Training Area under Alternatives 2, 3, and 4. Pyrotechnics and small-caliber weapons would be used during training events. Dud-producing ammunition may be shot from firing points in the Western Training Area under Alternative 4; however, dud-producing ammunition would not deliberately be fired to impact in the Western Training Area. While the locations of the new targets or firing points are not yet known, they would not be placed in conservation or other off-limits areas.

Develop UO Site

A new, approximately 20-acre UO site would be built in the Western Training Area. The site would be built to reflect the level of infrastructure described for the UO sites in the Northern Corridor. The UO site would consist of up to 200 modular structures with facades. The location of the UO site has not yet been determined, but it would not be placed in conservation or other off-limits areas.

Improve Communication Capabilities

A new FON would be developed to connect with the Western Training Area. Approximately 45 miles of fiber optic cable would be installed. Electric power distribution collocated with the FON would be installed. Additionally, three to five instrumentation/communications towers would be constructed to enable the collection of training data and provide for communications connectivity. The sizes of the communications towers and the supporting infrastructure for each tower would be the same as described for new towers in the Northern Corridor, except for the distances of the new fiber routes. Because of the remoteness of the Western Training Area, new fiber routes may extend to up to 10 miles from each proposed tower to connect with existing lines. To the extent possible, conservation areas and other off-limits areas would be avoided during site selection. If it is not possible to avoid these areas completely when selecting routes for the FON network, encroachment into off-limits areas would be minimized.

Establish and Maintain FARPs

FARP and RASA establishment, as described for the Central Corridor, would be implemented in the Western Training Area.

ITAM Activities

As maneuvers increase in the Western Training Area, ITAM would increase rehabilitation efforts. Approximately 50 miles of trails would be improved to provide for safe use by military vehicle traffic and to accommodate the full array of RTU training activities. Improvements would consist of minor grading, installation of erosion control structures, and the application of gravel or dust suppressant. Approximately 15 miles of new trails would be developed, and some existing trails would be removed to eliminate access to off-limits areas. New trails would be sited to avoid off-limits areas to the extent

possible and the dig permit process would be followed for areas of new grading. Additionally, once the trail network has been established, ongoing monitoring and maintenance would be implemented. Tactical sites, which were frequently used, would be hardened to support recurring training activities.

NASA Goldstone Complex

Under the Mission Change Alternatives, no new infrastructure would be constructed in the NASA Goldstone Complex. No change in infrastructure from that described for the No Mission Change Alternative would occur.

Leach Lake

Under the Mission Change Alternatives, no new infrastructure would be constructed in the Leach Lake area. No change in infrastructure from that described for the No Mission Change Alternative would occur.

Cantonment Area

Under the Mission Change Alternatives, no new training-related infrastructure would be constructed in the Cantonment Area. The NEPA process was completed for the Real Property Vision Plan (Fort Irwin, 2017b) and no new infrastructure beyond that described in the Real Property Vision Plan is proposed.

2.1.2.3 Range Improvements Alternative

The NTC proposes modifications to the Range Complex to enhance the training of units stationed on Fort Irwin and other units conducting doctrinal training on Fort Irwin. In addition to the activities and facilities described under the No Mission Change Alternative, the following activities would be implemented under the Range Improvements Alternative.

Range 1 (FCC 17868)—Multipurpose Range Complex

An MPRC is scheduled to be completed in 2028. Upon completion, it will be used to train and test Armor, Infantry, Aviation, Stryker, unstabilized platforms and convoy live-fire crews, sections, squads, and platoons on skills necessary to detect, identify, engage, and defeat stationary and moving infantry and armor targets in a tactical array. The MPRC will encompass 4,000 acres (1,620 hectares) and support live ammunition training using a wide variety of weapons systems, including machine guns, grenade launchers, mortars, self-propelled and towed artillery, tanks, fighting vehicles and mobile gun systems, and attack and armed reconnaissance helicopters. The conversion of the Tank Range to an MPRC was previously analyzed under NEPA (Fort Irwin, 2018c) and is not included in this analysis.

In addition to the construction of the MPRC, the training platforms (firing position and targetry) on Range 7 that are used for heavy sniper rifle training would be relocated to Range 1. Once the platforms are relocated to Range 1, heavy sniper training would meet TC 25-8 doctrinal training standards and provide familiarization and qualification training capability. Training on the use of the heavy sniper rifle would be scheduled to avoid conflicts with other training uses of the MPRC.

An air-to-ground integration village would also be added to the MPRC to support UAS training.

Range 5 (FCC 17805)—Auto Record Fire Range (Non-standard)

Red and white lights, as well as muzzle flash simulators, would be installed at Range 5 to improve night fire capability. Additionally, the power infrastructure at Range 5 would be upgraded to support the electrical requirements for all operating systems.

Range 6 (FCC 17821)— Combat Pistol/Military Police Qualification Course

Facilities at Range 6 will be upgraded to meet new Military Police training requirements.

Range 7 (FCC 71814)—General Purpose Range

The training platforms supporting heavy sniper training would be relocated to Range 1 and the heavy sniper training requirements would be moved to Range 1, thereby eliminating the concurrent use conflict between Ranges 7 and 8. Any remaining facilities on the site would be retained for use on the General Purpose Range.

Range 20 (FCC 17885)—Light Demolition Area

A missile hardened bunker and latrine would be constructed at Range 20.

2.1.2.4 Manix Trail Alternative

Fort Irwin would implement maintenance on the Manix Trail between I-15 and the Fort Irwin Cantonment Area to support the increased transportation of military equipment from the Yermo Rail Yard to Fort Irwin. Maintenance of the Manix Trail would be limited to repairs of the existing trail; there would be no expansion of the trail footprint. Improvements would consist of minor grading, installation of erosion control structures such as check dams, and the application of gravel or dust suppressant. All proposed improvements on the Manix Trail would be within Fort Irwin-owned property or the existing BLM right-of-way.

2.2 Withdrawal Extension Analysis

2.2.1 No Withdrawal Extension Alternative

Under this alternative, the withdrawal extension of federal land in the Eastern Training Area, Western Training Area, and a portion of the Southern Corridor would not occur (Figure 2-13). The land would become available for public appropriation under federal laws and would be managed for various public uses. Maneuver training could not occur on the Army-owned federal parcels that are mixed in with the withdrawn land. The Western Training Area and Eastern Training Area include scattered parcels purchased by the Army when they were private inholdings within the larger area of withdrawn BLM land. These scattered isolated parcels are not of sufficient size to safely support military training in the absence of Army use of the surrounding land. Because these parcels are spread throughout the training areas, the entire training areas, both BLM- and Army-owned land, would be unsuitable for military training. The environmental effects of not extending the withdrawal are analyzed in Section 5, *Environmental Consequences – Withdrawal Extension Analysis*.

2.2.2 Withdrawal Extension Alternative

In 2001, Public Law 107–107, Section 2901ff, also known as the ‘‘Fort Irwin Military Land Withdrawal Act of 2001,’’ authorized the withdrawal of certain public land from all forms of appropriation under the general land laws, including the mining laws and mineral and geothermal leasing laws. Jurisdiction over this land transferred to the Secretary of the Army. The legislation had several special requirements, including the following:

Section 2902 required that the “Secretary of the Army shall consult with federally recognized Indian tribes in the vicinity of the land withdrawn under subsection (a) before taking action affecting rights or cultural resources protected by treaty or Federal law.” Fort Irwin coordinates with all federally recognized Native American tribes with interest in the land within the Fort Irwin boundary on all actions that may affect their rights or interests, or resources protected by treaty or federal law.

Section 2904(d) required that the “Secretary of the Army shall prepare and implement, in accordance with title I of the Sikes Act (16 *United States Code* [U.S.C.] 670 et seq.), an integrated natural resources management plan for the lands withdrawn and reserved by this title.” This plan must include a “requirement that the Secretary of the Army take necessary actions to prevent, suppress, and manage

brush and range fires occurring within the boundaries of Fort Irwin and brush and range fires occurring outside the boundaries of Fort Irwin that result from military activities on Fort Irwin." Fort Irwin includes the withdrawn land in its Integrated Natural Resources Management Plan (INRMP). The INRMP includes fire management prescriptions, including rapid response and effective control of fires. Further, adherence to fire safety measures during training reduces the potential for fires.

Section 2904(f) included a requirement to "consult with the Administrator of the National Aeronautics and Space Administration whenever proposed Army actions have the potential to affect the operations or the environmental management of the Goldstone Deep Space Communications Complex." Fort Irwin met this requirement by coordinating all NEPA actions with NASA Jet Propulsion Laboratory and NASA Goldstone Complex representatives.

Section 2907 stated that "the Secretary of the Interior should complete the West Mojave Coordinated Management Plan and shall ensure that it considers the impacts of the availability or nonavailability of the lands withdrawn and reserved by this title on the plan as a whole." The SFEIS for the Proposed Addition of Maneuver Training Land at Fort Irwin (Fort Irwin, 2005) was coordinated with the BLM West Mojave Planning Team to ensure consistency and to analyze fully the potential impacts each project may have on the other. The withdrawal extension is being coordinated with BLM and will include consideration of the West Mojave Coordinated Management Plan.

Section 2912 required that the Secretary of the Army "take all environmental response and restoration activities required under applicable laws and regulations with respect to such lands." In 2002 an environmental baseline study was conducted, examining potential contamination in what is now the Western Training Area and the Eastern Training Area (Fort Irwin, 2005). These studies found elevated levels of metals from natural mineral sources in the soil of various mining locations. Response and restoration activities were deemed unnecessary to safely conduct military training operations in these areas.

Under the Withdrawal Extension Alternative, the Army would have either its withdrawal extended for another 25 years or the land assigned to the control of the Secretary of the Army until such time as the Army determines it no longer needs the land for military purposes. For purposes of this LEIS, these two possibilities are treated as one NEPA alternative. Under either extension approach, the land in question would be used exclusively for military training, with the exception of specified off-limits areas, for the foreseeable future. The environmental effects of the extension of the withdrawal reflect the activities described in Section 2.1, *Mission Analysis*, for the Eastern Training Area, Western Training Area, and the Southern Corridor (which includes the Southeastern Withdrawal Area), and these effects are analyzed in Section 4, *Environmental Consequences – Mission Analysis*.

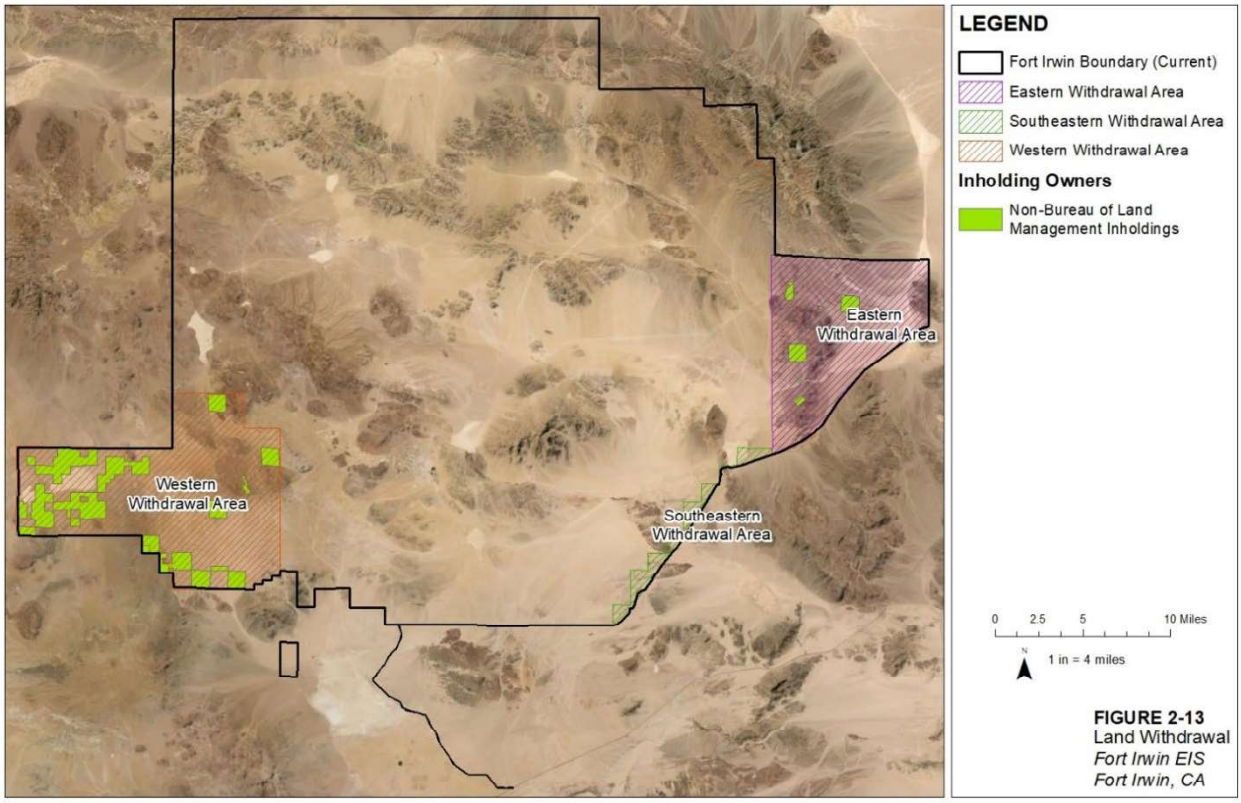


FIGURE 2-13
Land Withdrawal
Fort Irwin EIS
Fort Irwin, CA

2.3 Alternatives Considered but Not Carried Forward

This section provides brief descriptions of other alternatives that were not carried forward for detailed analysis in this LEIS. The rationale for each alternative being eliminated from consideration is explained.

2.3.1 Relocate the National Training Center

The relocation of the NTC to another Army or DoD installation has been evaluated previously and rejected as not feasible (Fort Irwin, 2005). The conditions precluding the relocation of the NTC to another installation have not changed since that evaluation. There are no suitable installations that could provide the land, infrastructure, and training features necessary to execute the NTC mission without a corresponding severe reduction in that installation's current mission and the displacement of active military units. The relocation of Fort Irwin also would not meet the purpose and need for the Proposed Actions.

2.3.2 Discontinue Use of or Close Fort Irwin for Military Training

Fort Irwin provides a unique setting for the training conducted by the NTC. The topography, size, and remote nature of Fort Irwin make it invaluable for training brigade-size units. Discontinuing the use of Fort Irwin is not considered feasible as a means of meeting Army training requirements.

Fort Irwin has not been identified for closure under the Base Closure and Realignment Act, and closure would require congressional authorization. Closure of Fort Irwin also would not meet the purpose and need for the Proposed Actions.

2.3.3 Expand the Size of Fort Irwin

Surrounding land use, including national parks and NAWS China Lake, and surrounding topography (mountains) limit the potential for expansion of Fort Irwin. At present, there are no plans to expand the

size of Fort Irwin and any effort to expand Fort Irwin would require congressional authorization. No such authorization has been proposed or requested. The expansion of Fort Irwin is not considered feasible and this action is not considered in this LEIS.

2.3.4 Spread Training Activities to Multiple Installations

Divisional training entailing larger forces than BCTs can be effectively separated and conducted across multiple installations; however, the BCT training provided on Fort Irwin cannot be separated into components, with separate training conducted at multiple locations. The training is holistic, meaning that the missions of the elements of the BCT are inextricably interconnected and must train together in the same place and at the same time. The entire BCT or joint force must participate simultaneously. This alternative was eliminated from further consideration because it is not feasible to conduct this type of training at multiple locations or at different times and because this alternative would not meet the purpose and need of the Proposed Actions.

2.4 Resources Eliminated from Further Analysis

This LEIS focuses on areas where there could be a significant environmental impact and on key issues identified through the scoping and public involvement process. U.S. Council on Environmental Quality (CEQ) guidelines state that a NEPA analysis should be proportional to the potential for effect. A number of resources were evaluated but eliminated from further consideration because the Proposed Actions would have limited to no effect on these resources. An explanation of these resources is provided in this section.

2.4.1 Environmental Justice

No one lives in the areas where any of the alternatives would be implemented. There are no minority or low-income populations immediately adjacent to the installation. There would be no effects that would disproportionately affect minority and low-income populations. Therefore, environmental justice is not considered further in this LEIS.

2.4.2 Socioeconomics

While a slight benefit from short-term construction jobs would occur, no new permanent employment would be created from the Proposed Actions. Likewise, no loss of permanent employment would occur from the Proposed Actions. There would be no change in the population of Fort Irwin and no increase in demand on public services and housing. Because there would be no potential for significant effects on the local or regional economy, socioeconomics is not considered further in this LEIS.

2.4.3 Airspace

No changes to airspace are proposed and there would be no change to existing Federal Aviation Administration-designated special-use airspace on Fort Irwin. Fort Irwin conducts manned aircraft sorties during training rotations. Manned aircraft sorties would continue, with a change in the distribution of flights across the landscape that would increase flights in the Western Training Area. Use of existing special-use airspace on Fort Irwin is expected to increase with regard to UAS operations. Any increases beyond current UAS use would be directly tied to training scenarios developed for RTU training and would not exceed any current airspace restrictions/limitations. All operations would be coordinated with the authority that controls each restricted airspace, as appropriate. Therefore, airspace is not considered further in this LEIS.

2.4.4 Visual Resources

Construction activities would be removed from the view of the public and would not affect valued view sheds. Training activities would not change the visual character of the training ranges. Some changes in locations of nighttime activities may occur, but nighttime operations would not result in a discernable change in the appearance of the night sky from off-installation areas. While portions of the Western Training Area would be visible from the installation boundary, the visual character of the landscape would not change to casual observers near the boundary. Therefore, visual resources are not considered further in this LEIS.

2.4.5 Protection of Children

No child-centric resources are located in the vicinity of the primary action areas (training areas, Range Complex, and Manix Trail). Implementation of the Proposed Actions would have no potential to disproportionately affect the environmental health and safety of children because military training and the supporting infrastructure for military training are intentionally placed away from areas where children typically occur and congregate. Therefore, the protection of children is not considered further in this LEIS.

2.4.6 Timber Production

Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001) specifically excludes the consideration of effects on timber production from the analysis for extending the withdrawal unless the Army specifically intends to develop the resource. The Army has no intention of developing timber production on the withdrawn land. Therefore, timber production is not considered in this LEIS.

2.4.7 Mineral Resources

Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001) specifically excludes the consideration of effects on mineral resources from the analysis for extending the withdrawal unless the Army specifically intends to develop the resource. The Army has no intention of developing mineral resources, other than the limited use of surficial material for construction or road maintenance, on the withdrawn land. Therefore, mineral resources are not considered in this LEIS.

2.4.8 Grazing Resources

Section 2901 of Public Law 107-107, Fort Irwin Military Land Withdrawal Act of 2001 (Public Law 107-107, 28 December 2001) specifically excludes the consideration of effects on grazing resources from the analysis for extending the withdrawal unless the Army specifically intends to develop the resource. The Army has no intention of developing grazing resources on the withdrawn land. Therefore, grazing resources are not considered in this LEIS.

SECTION 3

Affected Environment

This section provides an overview of the existing environmental and socioeconomic conditions on Fort Irwin. In compliance with NEPA and Army NEPA implementing regulations (32 CFR Part 651), the descriptions of the affected environment focus on those resources and conditions potentially impacted by the Proposed Mission Change and Withdrawal Extension Alternatives.

This section is organized by resource area and contains descriptions of the existing environment within each of the corridors, training areas, and ranges on Fort Irwin, as well as the Manix Trail. The region of influence (ROI) is also described for each resource. The ROI is defined as the area in which environmental impacts resulting from the Proposed Actions would be most greatly concentrated.

3.1 Biological Resources

Biological resources include plants and wildlife and the habitats in which they occur. Major vegetation communities are described in terms of representative species, with special attention placed on special status species afforded some level of federal, state, or local protection. The ROI for most biological resources is the land within the boundary of Fort Irwin and the land within the Manix Trail right-of-way. The ROI for protected species is the action area, as defined in the ESA. The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR Section 402.02)." General wildlife species expected to occur in the ROI are described in this section, with emphasis placed on special status species.

Federal laws concerning biological resources include the following:

- **ESA** – The ESA (16 U.S.C. Sections 1531 et seq.) was established to conserve species in danger of extinction and their associated habitat. Under the ESA, sensitive species are listed as either endangered or threatened. Endangered species include those in danger of extinction throughout all or a part of the species' range. Threatened species include those likely to become endangered within the foreseeable future. Section 7 of the ESA specifies that any agency that proposes a federal action that could jeopardize a listed species or result in the destruction or adverse modification of a species' habitat must participate in an interagency cooperation and consultation process with the USFWS or the National Oceanic and Atmospheric Administration.

  > Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency … is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available. (ESA Section 7(a)(2))

  The ESA also protects critical habitat for endangered and threatened species. Critical habitat is defined in Section 3(5)(A) of the ESA as:

  > (3) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and(ii) specific areas outside the geographical area occupied by the

species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

The Secretaries of the Departments of Interior and Commerce are prohibited from designating as critical habitat any lands or other geographical areas owned or controlled by DoD, or designated for its use, that are subject to an INRMP prepared pursuant to section 670a of the Sikes Act that addresses conservation of the species for which critical habitat is being designated.

- **Migratory Bird Treaty Act (MBTA)** – The purpose of the MBTA (16 U.S.C. Sections 703 et seq.) is to protect migratory bird species included in the terms of conventions with Canada, Japan, Mexico, and the former Union of Soviet Socialist Republics and that are native to the United States or its territories. The MBTA states that it is unlawful to pursue, hunt, take, capture, wound, or kill a migratory bird by any means, including any part, egg, or nest unless otherwise authorized, such as within legal hunting seasons. The list of bird species protected by the MBTA is included in 50 CFR Section 10.13. As per the 2003 National Defense Authorization Act Section 315 and subsequent USFWS regulation (50 CFR Part 21), the DoD is exempt for the incidental taking of migratory birds during military readiness activities. In passing the Authorization Act, Congress itself determined that allowing incidental take of migratory birds as a result of military readiness activities is consistent with the MBTA and the treaties.
- **Bald and Golden Eagle Protection Act (BGEPA)** – The purpose of the BGEPA (16 U.S.C. Sections 668–668c) is to protect the bald eagle and the golden eagle (as amended in 1962) by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit.

3.1.1 Common Vegetation

Fort Irwin is within the central Mojave Desert region of the desert floristic province. The common vegetative communities on the installation are described in the following sections and are shown on Figure 3.1-1.

- **Mojave Creosote Bush Scrub** – Creosote bush scrub, an association dominated by the large shrub creosote bush (*Larrea tridentata*), is the most dominant community in the region, dominating 70 percent of the Mojave Desert, and is the most widespread community on Fort Irwin, occurring throughout the installation below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. A sub-association of this vegetation type is described as the creosote-burrobush association based on the co-dominance between creosote bush and burrobush (*Ambrosia dumosa*). Many subdominant shrubs occur in creosote bush scrub, including range rhatany (*Krameria erecta*), silver cholla (*Opuntia echinocarpa*), Anderson's boxthorn (*Lycium andersonii*), desert straw (*Stephanomeria pauciflora*), wishbone bush (*Mirabilis bigelovii*), and cheesebush (*Hymenoclea salsola*). At higher elevations subdominants include California buckwheat (*Eriogonum fasciculatum*), hopsage (*Grayia spinosa*), winterfat (*Krasheninnikovia lanata*), and bladdersage (*Salazaria mexicana*) (Fort Irwin, 2006b).
- **Mojave Mixed Woody Scrub** – Mojave mixed woody scrub is a heterogeneous assemblage of shrubs that occurs on steep, rocky, granitic, or volcanic slopes. The lack of a dominant shrub species makes it difficult to clearly categorize this scrub type into the more common communities. Species include many cacti, Spanish bayonet (*Yucca schidigera*), and species of *Brickelia*, *Ericameria*, *Ephedra*, and *Encelia*.
- **Mojave Desert Wash Scrub** – Mojave desert wash scrub is a low, shrubby, diverse community occurring in open washes, arroyos, and canyons throughout portions of Fort Irwin and the region.

Periodic flooding maintains the open character of this community. Representative shrubs include spiny senna (*Senna armata*), rayless encelia (*Encelia frutescens*), cheesebush, desert almond (*Prunus fasciculata*), indigo bush (*Psorothamnus arborescens*), and sandpaper plant (*Petalonyx thurberi*). If moisture is sufficient, this community may have a scattering of small tree species (Fort Irwin, 2006b).

- **Saltbush Scrub** – Saltbush scrub is characterized by the dominance of one or more species of saltbush. Saltbush scrub is associated with moderately alkaline soils that are toxic enough to inhibit most desert shrubs that occur in the creosote bush scrub. Common saltbushes include shadscale (*Atriplex confertifolia*), Mojave saltbush (*Atriplex spinifera*), four-winged saltbush (*Atriplex canescens*), and allscale (*Atriplex polycarpa*). Other shrubs found in association with saltbush scrub include budsage (*Artemisia spinescens*), winterfat, hopsage, and Anderson's boxthorn. The invasive Russian thistle (*Salsola tragus*), commonly known as tumbleweed, often occurs in saltbush scrub, especially in sandy areas. Large, dense stands of Russian thistle occur all along the western edge of Langford Lake, around Drinkwater Lake, and in sandier portions of the Central Corridor (Fort Irwin, 2006b).
- **Alkali Sink Scrub** – Alkali sink scrub occurs where soil salinities are very high, restricting growth to halophytic (salt tolerant) plants. Alkali sink scrub occurs on poorly drained, usually clay soils that have a high water table and high alkalinity. Plant species that make up this community include iodine bush (*Allenrolfea occidentalis*), bush seepweed (*Suaeda mocquinii*), and saltgrass (*Distichlis spicata*) (Fort Irwin, 2006b).
- **Seep and Spring Vegetation** – These are unique assemblages of low-growing perennial herbs and deep-rooted trees and shrubs that occur in the vicinity of permanently wet or moist soils around seeps and springs. These types of species occur at most springs on Fort Irwin. Emergent aquatic species may include common reed (*Phragmites australis*), cat-tails (*Typha* spp.), rushes (*Juncus* spp.), and sedges (*Scirpus* spp.). Honey mesquite (*Prosopis glandulosa*), desert willow (*Chilopsis linearis*), and species of willow (*Salix* spp.) and cottonwoods (*Populus* spp.) are also present. Screwbean mesquite (*Prosopis pubescens*), a species less tolerant of salt, occurs at areas along with honey mesquite. Saltcedar (*Tamarix ramosissima*), an invasive, non-native species, is widespread in California deserts and occurs within areas of Fort Irwin (Fort Irwin, 2006b; Housman, pers. comm., 2020).
- **Joshua Tree Woodland** – This is an open woodland that occurs on gentle alluvial slopes with well-drained sandy, loamy, or gravely soils. When Joshua trees (*Yucca brevifolia and Yucca jaegeriana*) occur in higher densities, instead of scattered individuals, they create a woodland setting. Associated shrub species include creosote bush, bursage, California buckwheat, hopsage, bladdersage, and range rhatany. *Yucca jaegeriana* woodland occurs in the northeastern portion of Fort Irwin in the Avawatz Mountains (USFWS, 2018). *Yucca brevifolia* woodland occurs in the Granite Mountains in the northwestern portion of Fort Irwin and in the northern portion of the Western Training Area (USFWS, 2018). In the Granite and Avawatz Mountains, Joshua tree woodland is restricted to areas where historical maneuver training has not occurred.
- **Dunes** – This is an area of wind-blown sand. The dynamic action of wind and water can cause the dunes to shift. Dunes typically lack vegetation, though small shrubs and perennials may be present.
- **Developed Areas** – These areas include landscaped areas around the Cantonment Area, as well as historical and active mines. While developed areas may include native vegetation, they typically are kept in an altered state that is dominated by target non-native vegetation, such as irrigated grasses.

Climate projections are mixed on future precipitation in the Mojave Desert, with an approximately even split on whether precipitation will increase or decrease, although aridity is projected to increase under either precipitation scenario because of increased temperatures (Gonzalez, 2019). Increased temperatures and aridity resulting from climate change may cause changes in vegetation communities on Fort Irwin.

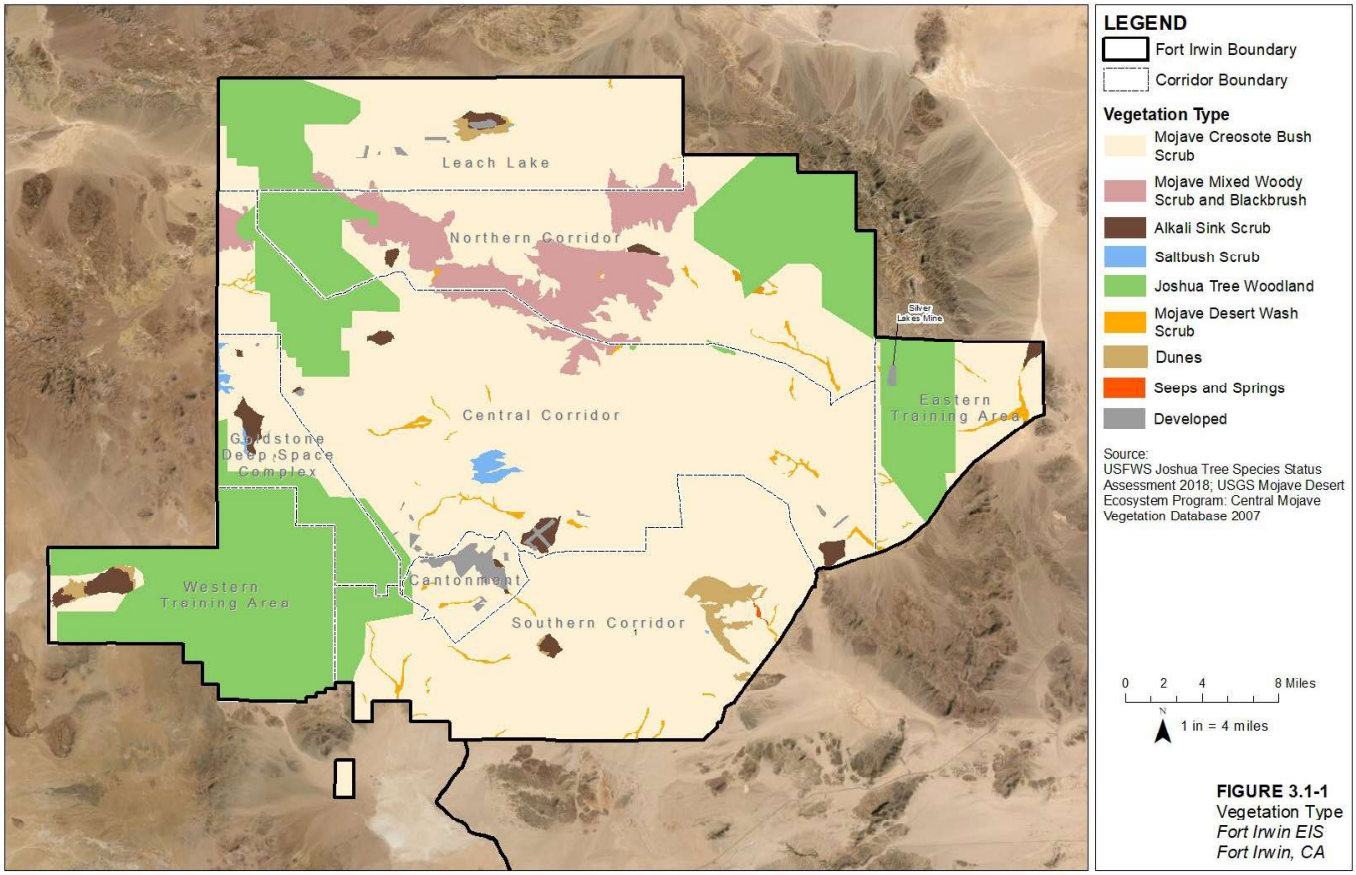


FIGURE 3.1-1
Vegetation Type
Fort Irwin EIS
Fort Irwin, CA

3.1.1.1 Northern Corridor

Common vegetation community types in the Northern Corridor include creosote bush scrub at elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. Blackbrush scrub also occurs on slopes above Drinkwater Spring in the Granite Mountains and in higher elevations of the Avawatz Mountains. Areas of saltbush scrub community species can be found along the margins of dry lakes, including McLean Lake and Drinkwater Lake. Species of Mojave mixed woody scrub communities occur on granitic soils and steep slopes of the Avawatz and Granite Mountains in the Northern Corridor. A small juniper woodland community occurs as a single stand on the highest peak in the Avawatz Mountains as well as the eastern portion of the Northern Corridor. Three springs are in the southern portion of the Leach Lake Gunnery Range and eight springs are in the Northern Corridor and Avawatz Mountains at the eastern end of the Northern Corridor. Low-growing perennial herb species and deep-rooted trees and shrubs occur in the vicinity of permanently wet or moist soils around seeps and springs, including Cave Spring and Arrastre Spring in the northeastern corner of the Northern Corridor (Fort Irwin, 2006b). The major community types in the Northern Corridor are provided on Figure 3.1-1.

3.1.1.2 Central Corridor

Common vegetation community types in the Central Corridor include creosote bush scrub at elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. Areas of saltbush scrub community species can be found along the margins of dry lakes, including Bicycle Lake, Red Pass Lake, and Nelson Lake (Fort Irwin, 2006b). The vegetation communities within the Central Corridor are generally highly disturbed. The major community types in the Central Corridor are provided on Figure 3.1-1.

3.1.1.3 Southern Corridor

Common vegetation community types in the Southern Corridor include creosote bush scrub at elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. The only known site of alkali sink scrub species on Fort Irwin is within a narrow strip of the northeastern portion of the Southern Corridor. Areas of saltbush scrub community species can be found along the margins of dry lakes including Langford Lake. Two springs occur in the Southern Corridor (Garlic Spring and Bitter Spring) and exhibit perennial herb and deep-rooted tree and shrub species. Screwbean mesquite and honey mesquite occur at Garlic Spring, where a rich assemblage of species occurs. Saltcedar (*Tamarix ramosissima*), an invasive, non-native species, is widespread in California deserts and occurs at Bitter Spring (Fort Irwin, 2006b) and Garlic Spring (Housman, pers. comm., 2020). The major community types in the Southern Corridor are provided on Figure 3.1-1.

3.1.1.4 Western Training Area

Common vegetation community types in the Western Training Area include creosote bush scrub at elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. Areas of saltbush scrub community species can be found along margins of dry lakes including Superior Lake. Joshua tree woodland is best developed in the Western Training Area, where there are extensive stands with large, many branched individuals. The major community types in the Western Training Area are provided on Figure 3.1-1.

3.1.1.5 Eastern Training Area

Common vegetation community types in the Eastern Training Area include creosote bush scrub at elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. Joshua tree woodland occurs on bajada slopes in the Avawatz Mountains in the northwestern portion of the Eastern Training Area.

3.1.1.6 Range Complex

Common vegetation community types in the Range Complex include creosote bush scrub at elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. The vegetation communities within the Range Complex are generally highly disturbed.

3.1.1.7 Manix Trail

Common vegetation community types along, and within proximity to, the Manix Trail include creosote bush scrub at the trail and continuing upslope to elevations below 3,600 feet (1,100 meters) on alluvial slopes, valley floors, and mountain slopes. The saltbush scrub community types occur along the Manix Trail where it passes by the eastern side of Coyote Lake. Mojave desert wash scrub occurs in open washes, arroyos, and canyons along the Manix Trail to the west and south of the Alvord Mountains.

3.1.2 Special Status Vegetation

Special status vegetation species of interest include the following:

- Species listed as threatened or endangered, proposed for listing, or candidate for listing under the ESA.
- Species designated by the BLM as sensitive[4], which requires special management consideration (BLM, 2010).
- Species listed as threatened or endangered under the California Endangered Species Act (CESA) or a candidate for listing under CESA by the California Department of Fish and Wildlife (CDFW).
- Species designated by the California Native Plant Society (CNPS) as Category 1B (rare, threatened, or endangered in California and elsewhere) or Category 2B (rare, threatened, or endangered in California but more common elsewhere).

Special status plant species potentially occurring on Fort Irwin are described next. A listing of these species by area is provided in Table 3.1-1, at the end of this list.

- **Lane Mountain milkvetch (*Astragalus jaegerianus*)** – a federally endangered species known to occur on Fort Irwin. It is also listed by the CNPS as California Rare Plant Rank (CRPR) 1B.1 and a BLM sensitive species. On Fort Irwin, populations occur in Mojave creosote bush scrub and Mojave mixed woody scrub communities with diverse shrub assemblages. Known populations of Lane Mountain milkvetch typically occur at elevations ranging from 3,100 to 4,200 feet (944 to 1,280 meters) above mean sea level (msl) and generally in areas of small ridges, shallow bedrock, and granitic soils. Lane Mountain milkvetch is a weak climbing plant that typically uses turpentine broom, burrobush (*Ambrosia dumosa*), California buckwheat, Cooper's goldenbush, or Nevada jointfir for support.
- **The Barstow woolly sunflower (*Eriophyllum mohavense*)** – a BLM sensitive species and a CNPS CRPR 1B.2 species. This species is known to occur in creosote bush scrub adjacent to, or within, an overstory of Joshua trees and saltbush scrub at elevations of 2,198 to 3,412 feet (670 to 1040 meters). The Barstow woolly sunflower occurs in open, flat, barren sites, most commonly on the sandy margins of alkali depressions distributed among the more common creosote bush plant community (CH2M, 2017).
- **Clokey's cryptantha (*Cryptantha clokeyi*)** – a BLM sensitive species and a CNPS CRPR 1B.2 species. This species is uncommon and typically occurs in gravelly areas of coarse colluvium substrate, most frequently on upper slopes within creosote bush scrub communities in the Mojave Desert from

[4] This designation is for information purposes only and does not imply additional consideration or management commitments by the Army beyond those included in the INRMP for State and federally protected species.

elevations of 2,919 to 5,118 feet (890 to 1,560 meters) above msl. Clokey's cryptantha also is known from the Calico Mountains south of Fort Irwin (Fort Irwin, 2006b).

- **Desert cymopterus (*Cymopterus deserticola*)** – a BLM sensitive species and a CNPS CRPR 1B.2 species. This herbaceous perennial in the carrot family (Apiaceae) typically occurs on deep, loose, well-drained, sandy soil in alluvial fans and basins. This species also occurs on stabilized low sand dune areas and occasionally on sandy slopes.
- **Mojave monkeyflower (*Mimulus mohavensis*)** – a BLM sensitive species and a CNPS CRPR 1B.2 species. This species occurs in Joshua tree woodland and creosote bush scrub, primarily in granitic soils on gravelly banks of desert washes, in sandy openings between creosote bushes, and along badland slopes above washes at elevations of 2,034 to 5,741 feet (620 to 1,750 meters) (CH2M, 2017). Suitable habitat for this species is present on Fort Irwin, although this species has not been observed on Fort Irwin (Fort Irwin, 2005).
- **Alkali mariposa lily (*Calochortus striatus*)** – a CNPS CRPR 1B.2 species. This species is uncommon and occurs in alkaline meadows and moist creosote brush scrub communities in the Mojave Desert. Alkali mariposa lily is a small, erect member of the lily family (Liliaceae) with long, narrow leaves extending from the base of the plant. The flower is bell-shaped with lavender petals that are strongly purple veined.
- **Small-flowered androstephium (*Androstephium brevifolium*)** – a white-flowered perennial herb of the lily family (Liliaceae) designated as a CNPS CRPR List 2 species. In California, small-flowered androstephium primarily occurs on rises in open, sandy flats and bajadas at low-to-moderate elevations.
- **Parish's phacelia (*Phacelia parishii*)** – a small annual of the Waterleaf family (Hydrophyllaceae) that occurs on sparsely vegetated alkaline flats, generally in dry, cracked mud flats of seasonal pools that fill up in years of high rainfall. Parish's phacelia is designated as a CNPS CRPR 1B.1 species.
- **Western Joshua Tree (*Yucca brevifolia)*** – an evergreen tree-like plant of the asparagus family (Asparagaceae) typically ranging from 5 to 20 meters in height, with plants developing branching after reaching 3 meters in height. Joshua trees are restricted to the Mojave Desert and occur in desert grasslands and shrublands that are situated on flats, mesas, bajadas, and gentle slopes, with best growth and highest densities on well-drained sandy to gravelly alluvial fans adjacent to desert mountain ranges. Western Joshua tree has been designated as a candidate species under the CESA. The species is under reconsideration for protection by the federal ESA following a ruling by California's Central District Court in September 2021. However, its status under the federal ESA remains not listed at this time.

As noted for common vegetation, increased temperatures and aridity resulting from climate change may cause changes in special status vegetation on Fort Irwin.

TABLE 3.1-1
Special Status Plant Species by Area
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Common Name	Scientific Name	Species Status	Northern Corridor Species Occurrence	Central Corridor Species Occurrence	Southern Corridor Species Occurrence	Western Training Area Species Occurrence	Eastern Training Area Species Occurrence	Range Complex Species Occurrence	Manix Trail Species Occurrence
Lane Mountain milkvetch	*Astragalus jaegerianus*	FE; CRPR 1B.1; BLM SS	Potential to occur	Potential to occur	Occurrence	Occurrence	Not Applicable	Potential to occur	Not Applicable
Barstow woolly sunflower	*Eriophyllum mohavense*	CRPR 1B.2; BLM SS	Potential to occur	Potential to occur	Not Applicable	Not Applicable	Not Applicable	Potential to occur	Not Applicable
Clokey's cryptantha	*Cryptantha clokeyi*	CRPR 1B.2; BLM SS	Not Applicable	Not Applicable	Not Applicable	Occurrence	Not Applicable	Not Applicable	Not Applicable
Desert cymopterus	*Cymopterus deserticola*	CRPR 1B.2; BLM SS	Not Applicable	Not Applicable	Not Applicable	Occurrence	Not Applicable	Not Applicable	Not Applicable
Mojave monkeyflower	*Mimulus mohavensis*	CRPR 1B.2; BLM SS	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Alkali mariposa lily	*Calochortus striatus*	CRPR 1B.2	Occurrence	Not Applicable	Occurrence	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Small-flowered androstephium	*Androstephium brevifolium*	CRPR 2	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Occurred	Not Applicable	Not Applicable
Parish's phacelia	*Phacelia parishii*	CRPR 1B.1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Occurrence
Western Joshua tree	*Yucca brevifolia*	CESA Candidate Species	Occurrence	Not Applicable	Not Applicable	Occurrence	Not Applicable	Not Applicable	Occurrence

Notes:

BLM SS = BLM Sensitive Species

CRPR = California Rare Plant Rank

FE = Federally Endangered

3.1.2.1 Northern Corridor

The CESA candidate species Western Joshua tree occurs in the Granite Mountains in areas where historically training has not occurred. The federally endangered Lane Mountain milkvetch has the potential to occur in portions of the Northern Corridor, though those areas are a significant distance from the known populations of the plant. Areas where the Lane Mountain milkvetch could occur include Joshua tree woodland, mixed Mojave scrub, and creosote bush scrub in poorly developed sandy or granitic gravely soils. The Barstow woolly sunflower, a BLM sensitive species, has the potential to occur in creosote bush scrub and saltbush scrub communities within the Northern Corridor. The State-listed alkali mariposa lily has been observed at Two Springs in the southern part of Leach Lake near the border with the Northern Corridor (Fort Irwin, 2006b).

3.1.2.2 Central Corridor

The federally endangered Lane Mountain milkvetch has the potential to occur in the Central Corridor, though there are no known populations of the plant on Fort Irwin. The Barstow woolly sunflower, a BLM sensitive species, also has the potential to occur in the Central Corridor.

3.1.2.3 Southern Corridor

There are known populations of the federally endangered Lane Mountain milkvetch in the Southern Corridor (Figure 3.1-2). In addition to these known populations, Lane Mountain milkvetch has the potential to occur in Joshua tree woodland, mixed Mojave scrub, and creosote bush scrub in poorly developed sandy or granitic gravelly soils within the Southern Corridor. There is a known occurrence of the State-listed alkali mariposa lily species at Paradise Springs, just south of the Southern Corridor, but this species occurrence is not located within the installation boundary.

3.1.2.4 Western Training Area

The CESA candidate species Western Joshua tree occurs in northern portions of the Western Training Area. Major populations of Lane Mountain milkvetch have been mapped on Fort Irwin within a 1,000-acre (8,498.4-hectare) area, mostly within the Western Training Area (Figure 3.1-2) (Fort Irwin, 2006b). In addition to these known populations, Lane Mountain milkvetch has the potential to occur in Joshua tree woodland, mixed Mojave scrub, and creosote bush scrub in poorly developed sandy or granitic gravely soils within the Western Training Area.

A population of desert cymopterus, a BLM sensitive species, has been documented in the Superior Valley in the Western Training Area, just south of the NAWS China Lake boundary. Several additional populations estimated to contain several thousand plants have been observed in the Superior Valley, outside Fort Irwin's boundary (Fort Irwin, 2006b). A 346-acre (140-hectare) area within the Western Training Area has been designated as a Desert Cymopterus Conservation Area (Figure 3.1-3).

Clokey's cryptantha, another BLM sensitive species, occurs in the Western Training Area, with the largest population extending from the south across the Paradise Range onto Fort Irwin (Fort Irwin, 2006b).

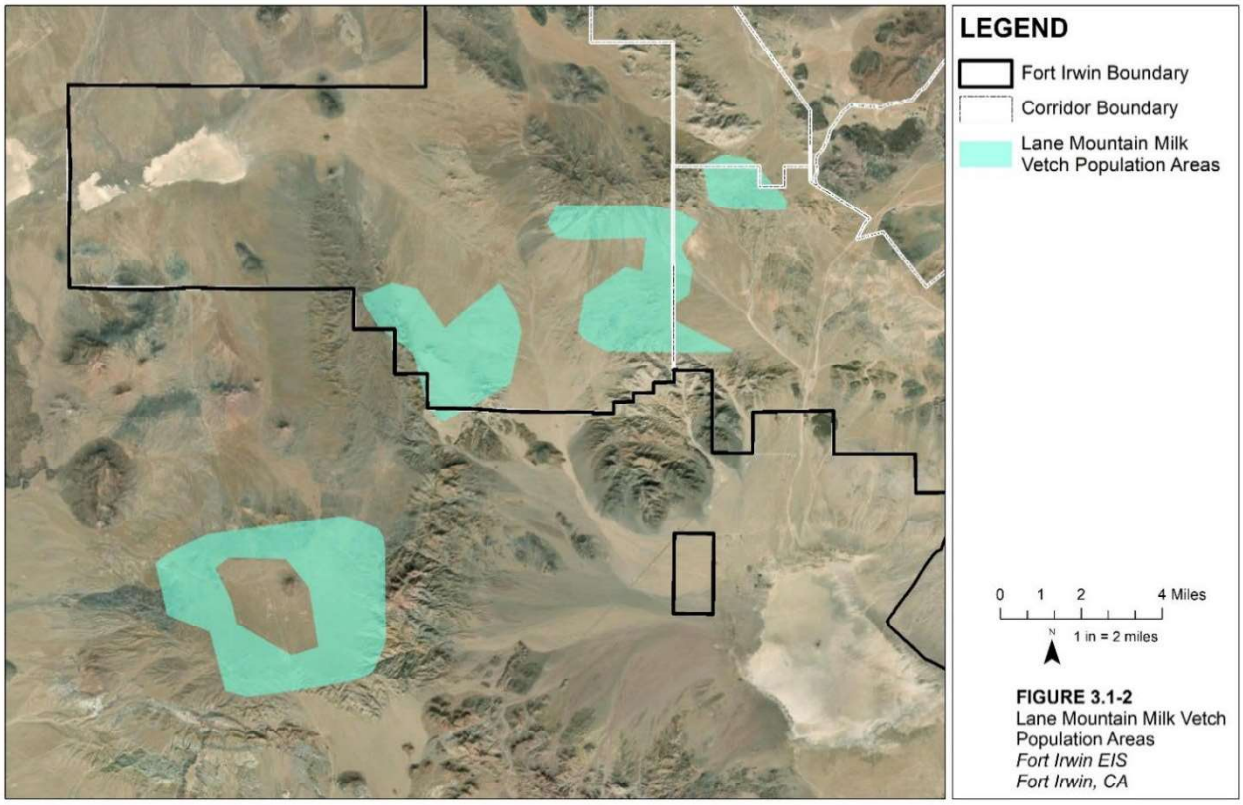


FIGURE 3.1-2
Lane Mountain Milk Vetch Population Areas
Fort Irwin EIS
Fort Irwin, CA

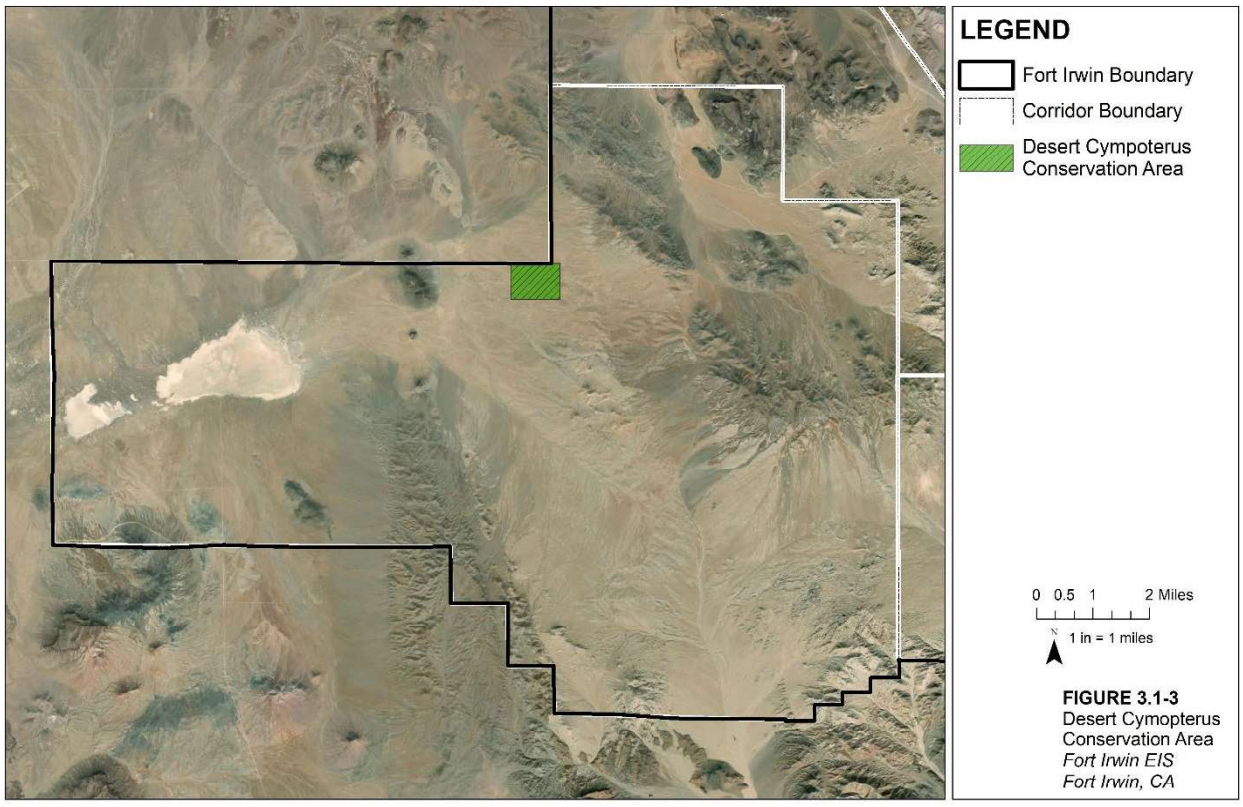


FIGURE 3.1-3
Desert Cympoterus Conservation Area
Fort Irwin EIS
Fort Irwin, CA

3.1.2.5 Eastern Training Area

The State-listed small-flowered androstephium is known to occur near the Eastern Training Area, with one recorded population in the southern Avawatz Mountains. Other populations in the vicinity occur along State Highway 127 north of Silver Lake and east of Fort Irwin (Fort Irwin, 2005; Fort Irwin, 2006b).

3.1.2.6 Range Complex

The federally endangered Lane Mountain milkvetch and the Barstow woolly sunflower, a BLM sensitive species, have the potential to occur within the Range Complex.

3.1.2.7 Manix Trail

The only extant population in California of the State-listed Parish's phacelia occurs along a string of dry lakes between the Manix Trail and Coyote Lake, approximately 12 miles northeast of Yermo. The largest subpopulation is on the west side of the lakebeds approximately 0.25 mile from the Manix Trail. A small occurrence was documented in 2004 near the point where a utility corridor crosses the Manix Trail approximately 2.1 miles northwest of I-15 (Fort Irwin, 2005).

3.1.3 Invasive, Non-native Plant Species

Most invasive, non-native plant species in the Mojave Desert are annual species that tend to outcompete native annual species due to germination earlier in the season, which allows establishment before native annuals germinate. The most common and widespread invasive, non-native annual species found in the Mojave Desert include red brome (*Bromus madritensis rubens*), split grass (*Schismus barbatus*), cheat grass (*Bromus tectorum*), red-stemmed filaree (*Erodium cicutarium*), and biennial mustard (*Hirschfeldia incana*) (Fort Irwin, 2006b). The most recent invasive, non-native species to enter the area is Sahara mustard (*Brassica tournefortii*). Sahara mustard is a weed initially introduced in the Colorado Desert that has been spreading into the central Mojave Desert along roadsides and utility corridors (Fort Irwin, 2006b).

Invasive, non-native plant species have the potential to occur throughout vegetation communities within the Northern Corridor, Central Corridor, Southern Corridor, Western Training Area, Eastern Training Area, and Range Complex and along Manix Trail. An identified population of saltcedar occurs at Bitter Spring and a few individuals occur at Garlic Spring in the Southern Corridor. Control efforts are being implemented at Bitter Spring and Garlic Spring to reduce and perhaps eradicate this species (Fort Irwin, 2006b).

3.1.4 Common Wildlife

Wildlife typical of Fort Irwin includes a variety of species adapted to desert conditions and the sparse cover characteristic of desert scrub habitats. Isolated seeps and springs provide perennial sources of water and support associated characteristic vegetative cover, leading to increased wildlife diversity in these areas. Rocky terrain provides additional cover and habitat for various reptile, rodent, bat, and bird species. Lack of specialized aquatic habitat contributes to the absence of native amphibian and fish populations on the installation. The non-native western mosquitofish (*Gambusia affinis*) has become established at Garlic Spring (Davis, pers. comm., 2020). No amphibians have been observed on Fort Irwin. The wastewater treatment plant (WWTP), southeast of the developed Cantonment Area, could provide temporary habitat for waterbirds, such as duck and wading bird species, but it would not provide suitable habitat for species that require riparian vegetation. The WWTP ponds are regularly drained and maintained and vegetation around the edges of the ponds is regularly removed for maintenance (Fort Irwin, 2006b).

The central portions of dry lake beds tend to provide little wildlife habitat because they are basically devoid of vegetation and generally lack water. Some dry lake beds contain small springs that may support vegetation. Dry lake beds contain endemic microbiological communities of algae that support

brine shrimp (*Artemia* sp.) in seasonal wetlands or pools. These areas support migratory waterbirds and serve as stopover/refueling points for other migratory birds during periods of sufficient moisture. Waterfowl and shorebirds may nest around dry lake beds during abnormally wet springs. Dry Lake beds also may be used for foraging by resident birds as an ephemeral food source (Davis, pers. comm., 2020). Large mammals may visit dry lake beds after periods of heavy rainfall (Fort Irwin, 2006b).

Thirty-five mammal species are known to occur on Fort Irwin (Fort Irwin, 2020a). Small mammals occurring on Fort Irwin include common species such as black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), white-tailed antelope ground squirrel (*Ammospermophilus leucurus*), kangaroo rats (*Dipodomys* spp.), pocket mice (*Chaetodipus formosus*, *Chaetodipus penicillatus*, *Perognathus* spp.), and field mice (*Peromyscus* spp.). Desert woodrat (*Neotoma lepida*) and Botta's pocket gopher (*Thomomys bottae*) are common on Fort Irwin. Wild burros (*Equus asinus*) occur throughout most of Fort Irwin. Game species found on Fort Irwin include quail (*Callipepla* sp.), dove (*Zenaida macroura*), chukar (*Alectoris chukar*), desert cottontail rabbit, black-tailed jackrabbit, and coyote (*Canis latrans*). Larger mammals that may occur in the Fort Irwin area include American badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), Nelson's desert bighorn sheep (*Ovis canadensis nelson*), and mountain lion (*Felis concolor*). Nelson's desert bighorn sheep occur in the northeastern portion of Fort Irwin (Fort Irwin, 2006b).

Abandoned mines, natural caves, trees, and built structures throughout the installation provide potential roosting habitat for bats. Bats also use the many cliff faces and rocky ledges of mountain ranges as sites for roosting; bats could use Joshua trees as night roosts. Bat surveys have identified eight bat species on Fort Irwin, including the canyon bat (*Parastrellus hesperus*), California myotis (*Myotis californicus*), Mexican free-tailed bat (*Tadarida brasiliensis*), Pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), hoary bat (*Lasiurus cinereus*), Red bat (*Lasiurus blossevillii*), and western mastiff bat (*Eumops perotis*) (Brown and Rainey, 2012). Based on survey data, the canyon bat, California myotis, and Mexican free-tailed bat are the most common bat species on Fort Irwin (Brown and Rainey, 2012). The canyon bat and California myotis have been observed foraging at the WWTP ponds (Fort Irwin, 2006b).

There have been 185 bird species identified on Fort Irwin (Fort Irwin, 2020a). Most bird species that occur on Fort Irwin are associated with creosote scrub habitat, the most abundant habitat on the installation. Some common bird species include the black-throated sparrow *(Amphispiza bilineata*), rock wren (*Salpinctes obsoletus*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), house sparrow (*Passer domesticus*), and greater roadrunner (*Geococcyx californianus*). The verdin (*Auriparus flaviceps*) and black-tailed gnatcatcher (*Polioptila melanura*) occur more commonly in desert wash systems. Bird activity is greatest in the immediate vicinity of water. Springs and WWTP ponds are valuable resources to resident and migratory bird species because of increased structural diversity of the vegetation and increased invertebrate abundance. Representative birds that are more common around water include the house finch (*Carpodacus mexicanus*), phainopepla (*Phainopepla nitens*), northern mockingbird (*Mimus polyglottos*), and song sparrow (*Melospiza melodia*). Birds occur as winter or summer residents or as migrants appearing during brief periods in the spring and fall. Some common species include the yellow-rumped warbler (*Dendroica coronata*), Hutton's vireo (*Vireo huttoni*), cliff swallow (*Hirundo pyrrhonata*), ruby-crowned kinglet (*Regulus calendula*), and white-crowned sparrow (*Zonotrichia leucophrys*). Raptors that have been observed near the Cantonment Area include red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), golden eagle (*Aguila chrysaetos*), prairie falcon (*Falco mexicanus*), barn owl (*Tyto alba*), burrowing owl (*Speotyto cunicularia*), and short-eared owl (*Asio flammeus*).

Thirty-three reptile species are on Fort Irwin (Fort Irwin, 2020a). Common lizards include zebra-tailed lizards (*Callisaurus draconoides*), side-blotched lizards (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), and Great Basin whiptails (*Aspidoscelis tigris tigris*). Less common species include the desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), and

desert iguana (*Dipsosaurus dorsalis*). The common night lizard (*Xantusia vigilis*) is restricted to Joshua tree woodland habitat on Fort Irwin. Common snake species include the coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), western patch-nosed snake (*Salvadora hexalepis*), western shovel-nosed snake (*Chionactis occipitalis*), and Mojave sidewinder (*Crotalus cerastes*). Other species that occur on Fort Irwin include the blind snake (*Leptotyphlops humulis*), ground snake (*Sonora semiannulata*), and Mohave rattlesnake (*Crotalus scutulatus*) (Fort Irwin, 2006b). The desert tortoise (*Gopherus agassizii*) occurs in varying densities throughout Fort Irwin.

Increased temperatures and aridity resulting from climate change may cause changes in common wildlife species composition on Fort Irwin.

3.1.4.1 Northern Corridor

Common fauna species described previously have the potential to occur throughout the Northern Corridor. Features providing suitable water quality habitat for portions of the year include McLean Lake, Drinkwater Lake, and Cave Spring. These areas may support temporary waterfowl habitat. The Northern Corridor also provides habitat for Nelson's desert bighorn sheep.

3.1.4.2 Central Corridor

Common fauna species described previously have the potential to occur throughout the Central Corridor. Features providing suitable water quality habitat for portions of the year include Bicycle Lake, Nelson Lake, and Red Pass Lake. These areas may support temporary waterfowl habitat.

3.1.4.3 Southern Corridor

Common fauna species described previously have the potential to occur throughout the Southern Corridor. Features providing suitable water quality habitat for portions of the year include Langford Well Lake, Bitter Spring, and Garlic Spring. These areas may support temporary waterfowl habitat.

3.1.4.4 Western Training Area

Common fauna species described previously have the potential to occur throughout the Western Training Area. Features providing suitable water quality habitat for portions of the year include Superior Lake and Curtis Well. These areas may support temporary waterfowl habitat.

3.1.4.5 Eastern Training Area

Common fauna species described previously have the potential to occur throughout the Eastern Training Area.

3.1.4.6 Range Complex

Common fauna species described previously have the potential to occur throughout the Range Complex.

3.1.4.7 Manix Trail

Common fauna species described previously have the potential to occur throughout the Manix Trail.

3.1.5 Special Status Wildlife

The following are considered special status wildlife species:

- Species listed as threatened or endangered, proposed for listing, or candidates for listing under the ESA.
- Species designated by the BLM as sensitive, which require special management consideration by the Barstow Field Office (BLM, 2014).
- Species listed by CDFW as threatened or endangered under the CESA.
- Species designated by CDFW as species of special concern (SSC).

Special status animal species that have been observed or have a high likelihood of occurring on Fort Irwin are described in this section. A list of the species by area where they are found is provided in Table 3.1-2.

Reptiles:

- **Desert Tortoise (*Gopherus agassizii*)**. The Mojave population of the desert tortoise is listed as threatened under the federal ESA, as a special status animal species by BLM, and threatened under the CESA. Desert tortoise most commonly occur within the desert scrub vegetation type. Optimal habitat for the desert tortoise has been characterized as creosote bush scrub with a relatively high diversity of perennial plants and high production of ephemerals and annual precipitation ranging from 2 to 8 inches. Throughout most of the Mojave region, desert tortoise occur most commonly on gently sloping terrain with sandy-gravel soils, scattered shrubs, and abundant inter-shrub space for the growth of herbaceous plants. Throughout their range, however, tortoise can be found in steeper, rockier areas. The desert tortoise is most active in the spring, summer, and autumn when daytime temperatures are below 90 degrees Fahrenheit.

  Fort Irwin falls within the Western Mojave Recovery Unit for the desert tortoise (Appendix 4.1A, Biological Opinion). In the biological opinion, the USFWS indicates that desert tortoise modeled habitat covers approximately 5,595,469 acres in the western Mojave region (i.e., 7,585,312 acres of modeled habitat minus 1,989,843 acres of impervious surfaces). Prior to the listing of the desert tortoise as threatened, training activities on Fort Irwin altered the desert tortoise's distribution within the original boundaries of the installation. Subsequent to the consultation regarding use of the Southern Corridor, the Army relocated most desert tortoise from that area. Desert tortoise continue to occur throughout the installation, with the largest concentrations in designated conservation areas, the Western Training Area, and the Range Complex. A desert tortoise exclusion fence separates the southern boundary of Fort Irwin from habitat to the south; the exclusion fence is north of the Army's conservation areas (Appendix 4.1A, Biological Opinion).

- **Mojave fringe-toed lizard (*Uma scoparia*)**. The Mojave fringe-toed lizard is a BLM special status animal species and a California SSC. The Mojave fringe-toed lizard occurs only in and immediately around areas of the Mojave Desert that contain deposits of eolian sands (fine sands deposited by winds). These sands are typically associated with dunes, washes, hillsides, and margins of dry lakes between elevations of 90 and 910 meters (295 and 2,986 feet). The species is restricted to sand dune complexes within the Mojave and Amargosa River drainages in the Mojave Desert and the Colorado River drainage in the Sonoran Desert (Norris, 1958; Murphy et al., 2006). Dispersal distance between habitat patches is unknown, but dispersal between suitable habitat patches separated by less than 1 kilometer (km) is possible (NatureServe, 2020). A population occurs adjacent to Fort Irwin south of Red Pass Lake on land managed by the BLM (Rognan, 2008). The Mojave fringe-toed lizard occurs in areas of dunes and sand sheets along the southeastern boundary of Fort Irwin. Several Mojave fringe-toed lizard populations have been observed in small sand dune pockets on Fort Irwin previously assumed to be too small to support these lizards. These small habitat patches could provide migration routes between larger habitat patches, maintaining islands of marginal habitat where Mojave fringe-toed lizards occur at low densities (Davis, pers. comm., 2020).

Mammals:

- **Desert kit fox (*Vulpes macrotis*)**. The Desert kit fox status is under review in California. Desert kit fox are considered vulnerable to habitat displacement resulting from the continued expansion of solar and wind projects into their preferred habitat. Desert kit fox generally prefer open desert, shrubby, or shrub-grass habitat. In the Mojave Desert, the species typically occurs in creosote bush vegetation community. This nocturnal species forages at night and typically resides in a den or burrow during the day. This species is known to occur throughout Fort Irwin (Fort Irwin, 2006b).

- **American badger (*Taxidea taxus*).** The American badger is a CDFW SSC. In California, this species is most abundant in drier, open stages of most shrub, forest, and herbaceous habitats with friable soils. American badgers dig burrows for cover and frequently reuse old burrows, though some are known to dig a new burrow each night during the summer. They typically give birth in March and April. Young are typically born in burrows dug in relatively dry, often sandy soils with sparse overstory vegetation. This species is known to occur on Fort Irwin and is considered localized and rare (Fort Irwin, 2006b).
- **Mohave ground squirrel (*Spermophilus mohavensis*).** The Mohave ground squirrel is a BLM special status animal species and is listed as threatened by the CESA. Its range is restricted to the Mojave Desert in San Bernardino, Los Angeles, Kern, and Inyo counties. The Mohave ground squirrel generally occurs in habitat that consists of large, alluvial-filled valleys with deep, fine- to medium-textured soils vegetated with creosote scrub, shadscale scrub, or alkali sink scrub in the absence of desert pavement and shallow eroded soils. The species primarily forages on annual grasses and herbaceous plants within creosote scrub and shadscale scrub. This species is known to occur on Fort Irwin and its abundance is greatest in the Western Training Area (Davis, pers. comm., 2020; Fort Irwin, 2006b). Mohave ground squirrels were confirmed to be present on 9 of the 10 randomly selected grids in the Western Training Area and in the Brinkman Wash Restricted Access Area. In addition, there were incidental records of Mohave ground squirrels at seven other locations within the Western Training Area (Leitner, 2007). Based on the results of this study, it appears that the Mohave ground squirrel density is greatest in the western and northern portions of the Western Training Area.
- **Nelson's desert bighorn sheep (*Ovis canadensis nelsoni*).** Nelson's desert bighorn sheep are a BLM special status animal species and are fully protected by CDFW in the Western Mojave Planning Area. This species typically occurs on or near mountainous terrain above the desert floor in visually open, steep, and rocky terrain. Nelson's desert bighorn sheep are diet generalists and shift the composition of their diet to optimize nutrient content from available forage (Wehausen, 2006). Nelson's desert bighorn sheep may use five mountain ranges on Fort Irwin, though limited data from global positioning system tracking and National Park Service surveys suggest most activity is in the Avawatz Mountain range (Davis, pers. comm., 2020).

Birds:

- **Least Bell's vireo (*Vireo bellii pusillus*)**. The least Bell's vireo is a BLM special status animal species and is listed as endangered under the federal ESA and by the State of California. The least Bell's vireo is a summer resident in the region and breeds in riparian habitat. The species typically occurs in areas of dense mulefat (*Baccharis salicifolia*) with an overstory of willows. This species is not expected to occur regularly on Fort Irwin because of limited habitat. Bell's vireos, subspecies undetermined, have been documented at Bitter Spring (Davis, pers. comm., 2020). The least Bell's vireo may occur near springs for brief periods during migration (Fort Irwin, 2006b).
- **Southwest willow flycatcher (*Empidonax traillii extimus*)**. The southwest willow flycatcher is a BLM special status animal species and is listed as endangered under the federal ESA and by the State of California. The southwest willow flycatcher breeds in riparian woodland habitats with willows, cottonwoods, and/or alders. This subspecies species has not been confirmed on Fort Irwin, but the southwest willow flycatcher is a summer resident in the region. Willow flycatchers, subspecies undetermined, have been documented at Bitter Spring and Garlic Spring (Davis, pers. comm., 2020). The southwest willow flycatcher may occur as a migrant at springs and riparian areas (Fort Irwin, 2006b).
- **Bendire's thrasher (*Toxostoma bendirei*)**. Bendire's thrasher is a BLM special status animal species and is a CDFW SSC. Joshua trees, other yuccas, and columnar cholla are required components of

Bendire's thrasher habitat in the Mojave Desert of California (England and Laudenslayer, 1989). This species is most likely to occur where there are extensive stands of Joshua trees, including the bajada slopes in the Avawatz Mountains.

- **Burrowing owl (*Athene cunicularia*).** The burrowing owl is a BLM special status animal species, a CDFW SSC, and a USFWS Bird of Conservation Concern (BCC). This ground-nesting raptor occupies burrows in open, dry grasslands, agricultural and range lands, and desert habitats. In addition to burrows, the owls require perching locations, frequently using fence posts or the top of mounds outside the burrow. These owls typically use burrows created by other animals (Fort Irwin, 2017a).
- **Gray vireo (*Vireo vicinior*).** The gray vireo is a BLM special status animal species, a USFWS BCC, and a CDFW SSC. Although uncommon, this species may occur in the Mojave Desert during breeding season. Its preferred habitat consists of dense shrubs and bushes, such as mesquite and oak scrubs, and pine juniper. Nests are commonly built in the crooks of branches 6 feet above ground and are susceptible to cowbird parasitism (Unitt, 2008; USFWS, 2008; BLM, 2014; Audubon Guide to North American Birds, 2019a; CDFW, 2019a; Cornell Lab of Ornithology, 2019a).
- **California black rail (*Laterallus jamaicensis coturniculus*).** The California black rail is listed as threatened by the State of California. In California, it is a very uncommon, local breeder inhabiting marshes, swamps, and wet meadows. Two large disjunct populations occur in California: one in the San Francisco Bay area and the other along the Colorado River drainage in Imperial County. A black rail was observed at the WWTP ponds on Fort Irwin during fall 1994, but it has not been seen on the installation since. It is extremely unusual for the species to be observed in the central Mojave Desert (Fort Irwin, 2006b).
- **Ferruginous hawk (*Buteo regalis*).** The ferruginous hawk is a USFWS BCC. This species inhabits grasslands and the edges of deserts. Breeding occurs in northeast California and overwintering occurs in the central and southern regions of California. Ferruginous hawks live in open spaces and may occur in grasslands, prairie, sagebrush steppe, scrubland, and pinyon-juniper woodland edges. This species has not been recorded on Fort Irwin, but if this species were to occur, it would most likely be during the winter months within the Mojave creosote bush scrub habitat (USFWS, 2008; Audubon Guide to North American Birds, 2019b; Cornell Lab of Ornithology, 2019b; CDFW, 2019b; University of Michigan Museum of Zoology, 2019a; USFWS, 2019).
- **Golden eagle (*Aquila chrysaetos*).** The golden eagle is a fully protected species in California. This classification represents the State of California's initial effort to identify and provide additional protection to animals that are rare or face possible extinction. This species is also protected by the BGEPA. The species is an uncommon permanent resident and migrant throughout California and can occur at elevations ranging from sea level up to 11,500 feet. Suitable habitat includes rolling foothills, mountain areas, sage-juniper flats, and desert. Golden eagles nest on cliffs and steep escarpments in grassland, chaparral, shrubland, forest, and other vegetated areas (Fort Irwin, 2006b). Golden eagle nests have been documented in the Tiefort and Granite Mountains on Fort Irwin and young have fledged during some years (Davis, pers. comm., 2020).
- **Loggerhead shrike (*Lanius ludovicianus*).** The loggerhead shrike is a CDFW SSC. This species is relatively common in lowland California and prefers open habitat with scattered shrubs and trees for nesting. Loggerhead shrike may occur throughout Fort Irwin (Fort Irwin, 2017a).
- **Northern Harrier (*Circus hudsonius*).** The Northern Harrier is a CDFW SSC. Wintering and year-round residents occur in California. Wintering occurs in most regions of California, with populations of year-round residents in the California Central Valley and on the west coast. Habitat for this species includes open areas, such as fields, marshes, prairies, and deserts. This species has not been recorded on Fort Irwin, but if this species were to occur, it would most likely be during the wintering months in Mojave Creosote Bush Scrub (Davis and Niemela, 2008; Audubon Guide to North

American Birds, 2019c; Cornell Lab of Ornithology, 2019c; CDFW, 2019a, 2019c; University of Michigan Museum of Zoology, 2019b; USFWS, 2019).

- **Peregrine falcon (*Falco peregrinus anatum*).** The peregrine falcon was delisted from federal endangered status in August 1999 but is State-listed as endangered. This subspecies of peregrine falcon occurs primarily in the western United States; during winter, they occur throughout most of California. Their summer range is restricted to northern California, along the coast from Santa Barbara northward, and the Sierra Nevada mountains. Peregrine falcons typically nest on high cliffs or, less commonly, on buildings and structures in urban areas. The species forages over wetlands or other habitats with large concentrations of birds, which are its primary food source (Fort Irwin, 2018b).
- **Prairie falcon (*Falco mexicanus*).** The prairie falcon is a USFWS BCC and is on the CDFW Watch List. The prairie falcon is an uncommon permanent resident that occurs from the southeastern deserts northwestward throughout the Central Valley and along the inner Coast Ranges and Sierra Nevada. They are distributed in habitats from annual grasslands to alpine meadows, but they primarily inhabit perennial grasslands, savannah, rangeland, and agricultural fields. They typically nest in a scrape on a sheltered ledge of a cliff overlooking a large, open area. While nesting would be limited to mountainous areas, the species may forage over much of Fort Irwin (Fort Irwin, 2017a).
- **Swainson's hawk (*Buteo swainsoni*).** Swainson's hawk is State-listed as a threatened species. Swainson's hawk was once a widespread breeder in the non-forested areas of northern California and the Central Valley. Swainson's hawks often nest on the periphery of riparian systems. They will also use lone trees in agricultural fields or pastures, or along roadsides. This species is migratory and is not expected to occur regularly on Fort Irwin or to forage in the area for prolonged periods (Fort Irwin, 2006b). Swainson's hawk has been confirmed at Bitter Spring as recently as 2015 (Davis, pers. comm., 2020).
- **Yellow-headed blackbird (*Xanthocephalus xanthocephalus*).** The yellow-headed blackbird is a CDFW SSC. Although rare, this species has been observed on Fort Irwin. This species generally occurs in California as a migrant or summer resident, and small numbers winter in the southern deserts. Its preferred breeding habitats include wetlands and marshes, and the species forages in surrounding wetlands, grasslands, and croplands. Yellow-headed blackbirds breed at scattered sites throughout the Mojave Desert. Small numbers breed regularly near Victorville, Barstow, and Newberry Springs in San Bernardino County. There is marginally suitable foraging habitat associated with the WWTP ponds, but those areas do not provide suitable nesting habitat (Fort Irwin, 2017a, 2017d).

Increased temperatures and aridity resulting from climate change may cause changes in special status wildlife species composition on Fort Irwin.

TABLE 3.1-2
Special Status Animal Species by Area
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Common Name	Scientific Name	Species Status	Northern Corridor	Central Corridor	Southern Corridor	Western Training Area	Eastern Training Area	Range Complex	Manix Trail
Desert Tortoise	*Gopherus agassizii*	FT; ST; BLM SS	Potential to occur	Potential to occur	Occurrence	Occurrence	Occurrence	Occurrence	Occurrence
Mojave fringe-toed lizard	*Uma scoparia*	CDFW SSC; BLM SS	Not Applicable	Occurrence	Occurrence	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Desert kit fox	*Vulpes macrotis*	Under review by CDFW	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur
American badger	*Taxidea taxus*	CDFW SSC	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur
Mohave ground squirrel	*Spermophilus mohavensis*	ST; BLM SS	Occurrence	Occurrence	Not Applicable	Occurrence	Not Applicable	Not Applicable	Not Applicable
Nelson's desert bighorn sheep	*Ovis canadensis nelsoni*	SE; BLM SS	Occurrence	Potential to occur	Not Applicable	Not Applicable	Occurrence	Not Applicable	Not Applicable
Least Bell's vireo	*Vireo bellii pusillus*	FE; SE; BLM SS	Not Applicable	Potential to occur	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Southwest willow flycatcher	*Empidonax traillii extimus*	FE; SE; BLM SS	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Occurrence	Occurrence	Occurrence
Bendire's thrasher	*Toxostoma bendirei*	CDFW SSC; BLM SS	Potential to occur	Not Applicable		Potential to occur	Potential to occur	Not Applicable	Not Applicable
Burrowing owl	*Athene cunicularia*	CDFW SSC; BLM SS; USFWS BCC	Occurrence	Occurrence	Occurrence	Occurrence	Potential to occur	Occurrence	Occurrence
Gray vireo	*Vireo vicinior*	CDFW SSC; BLM SS; USFWS BCC	Potential to occur	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ferruginous hawk	*Buteo regalis*	USFWS BCC	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur

Common Name	Scientific Name	Species Status	Northern Corridor	Central Corridor	Southern Corridor	Western Training Area	Eastern Training Area	Range Complex	Manix Trail
Golden eagle	*Aquila chrysaetos*	SE; Bald and Golden Eagle Protection Act	Potential to occur	Occurrence	Potential to occur	Not Applicable	Not Applicable	Not Applicable	Not Applicable
LeConte's thrasher	*Toxostoma lecontei*	CDFW SSC	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Loggerhead shrike	*Lanius ludovicianus*	CDFW SSC	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur
Long-eared owl	*Asio otus*	CDFW SSC	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Northern Harrier	*Circus hudsonius*	CDFW SSC	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur	Potential to occur
Peregrine falcon	*Falco peregrinus anatum*	SE	Not Applicable	Not Applicable	Occurrence	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Prairie falcon	*Falco mexicanus*	USFWS BCC; CDFW Watch List	Not Applicable	Occurrence	Potential to occur	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Swainson's hawk	*Buteo swainsoni*	ST	Not Applicable	Not Applicable	Occurrence	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Notes:

BLM SS = BLM Sensitive Species

CDFW SSC = CDFW Species of Special Concern

FE = Federally Endangered

FT = Federally Threatened

SE = State Threatened

ST = State Endangered

USFWS BCC = USFWS Bird of Conservation Concern

3.1.5.1 Northern Corridor

Federally listed wildlife species potentially occurring within the Northern Corridor include the southwest willow flycatcher and desert tortoise. The desert tortoise occurs throughout Fort Irwin in low numbers. The southwest willow flycatcher is not expected to occur regularly in the Northern Corridor because of limited habitat, but it may occur during migration at springs and riparian areas (Fort Irwin, 2006b).

BLM special status animal species occurring in the Northern Corridor include the following:

- Bendire's thrasher may occur in areas with Joshua tree habitat on the bajada slopes of the Avawatz Mountains in the eastern part of the Northern Corridor.
- Burrowing owl may occur throughout the Northern Corridor (Figure 3.1-4) (Fort Irwin, 2017a).
- While golden eagles are known to nest in the Granite and Tiefort Mountains in the Central Corridor (Tetra Tech, Inc., 2016), this species may also occur in the Northern Corridor.
- Gray vireo has not been recorded on Fort Irwin but would most likely occur in the juniper woodland on the highest peak in the Avawatz Mountains or in Mojave mixed woody scrub habitats in the southern passes and steep slopes of the Avawatz and Granite Mountains during migration (Fort Irwin, 2006b).
- Recent reports of Mohave ground squirrel in the Northern Corridor include the area immediately east of the Garry Owen impact area and near Drinkwater Lake (Figure 3.1-5) (Fort Irwin, 2006b).
- Nelson's desert bighorn sheep may occur in the five mountain ranges on Fort Irwin, but its activity appears to be concentrated in the Avawatz Mountains at the extreme eastern end of the Northern Corridor (Davis, pers. comm., 2020).

State-listed species with the potential to occur within the Northern Corridor include the following:

- Ferruginous hawk and Northern Harrier, though not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat in the Northern Corridor.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur throughout Fort Irwin (Fort Irwin, 2017a).
- Desert kit fox and American badger have the potential to occur throughout the Northern Corridor (Fort Irwin, 2006b).

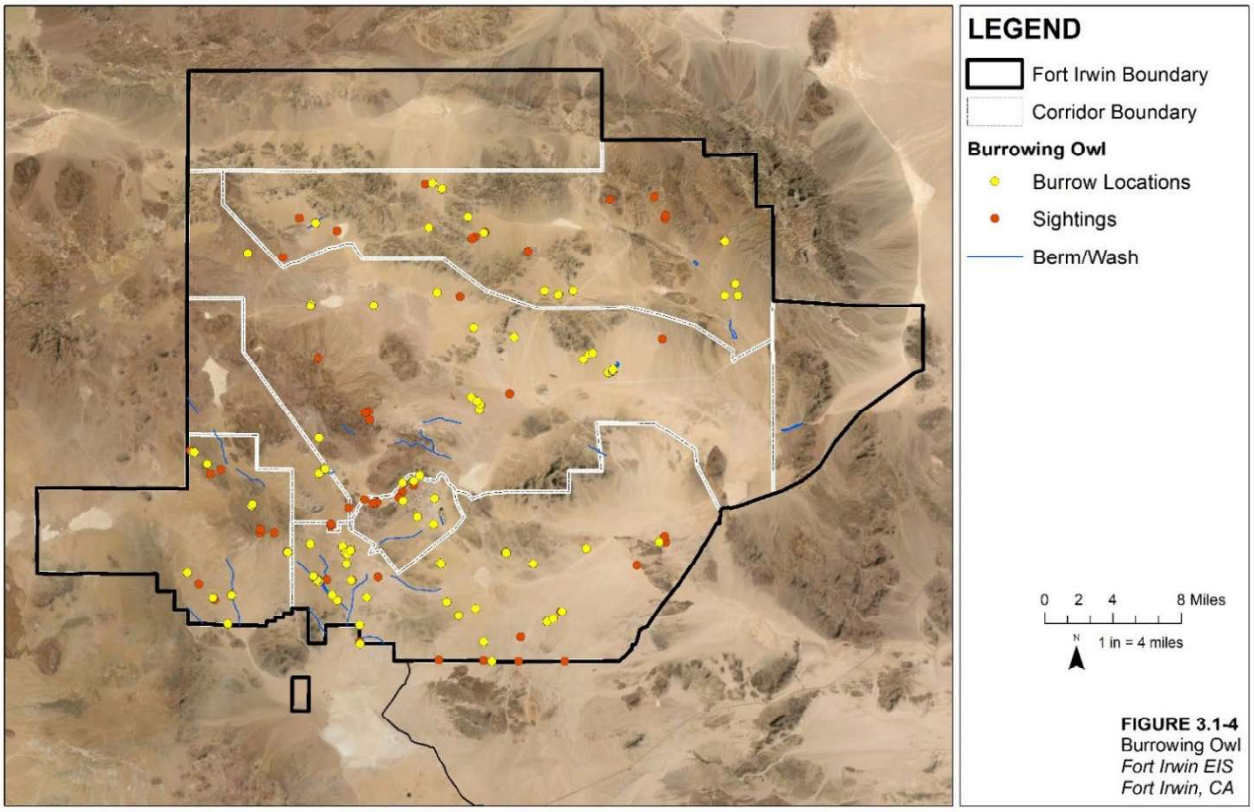


FIGURE 3.1-4
Burrowing Owl
Fort Irwin EIS
Fort Irwin, CA

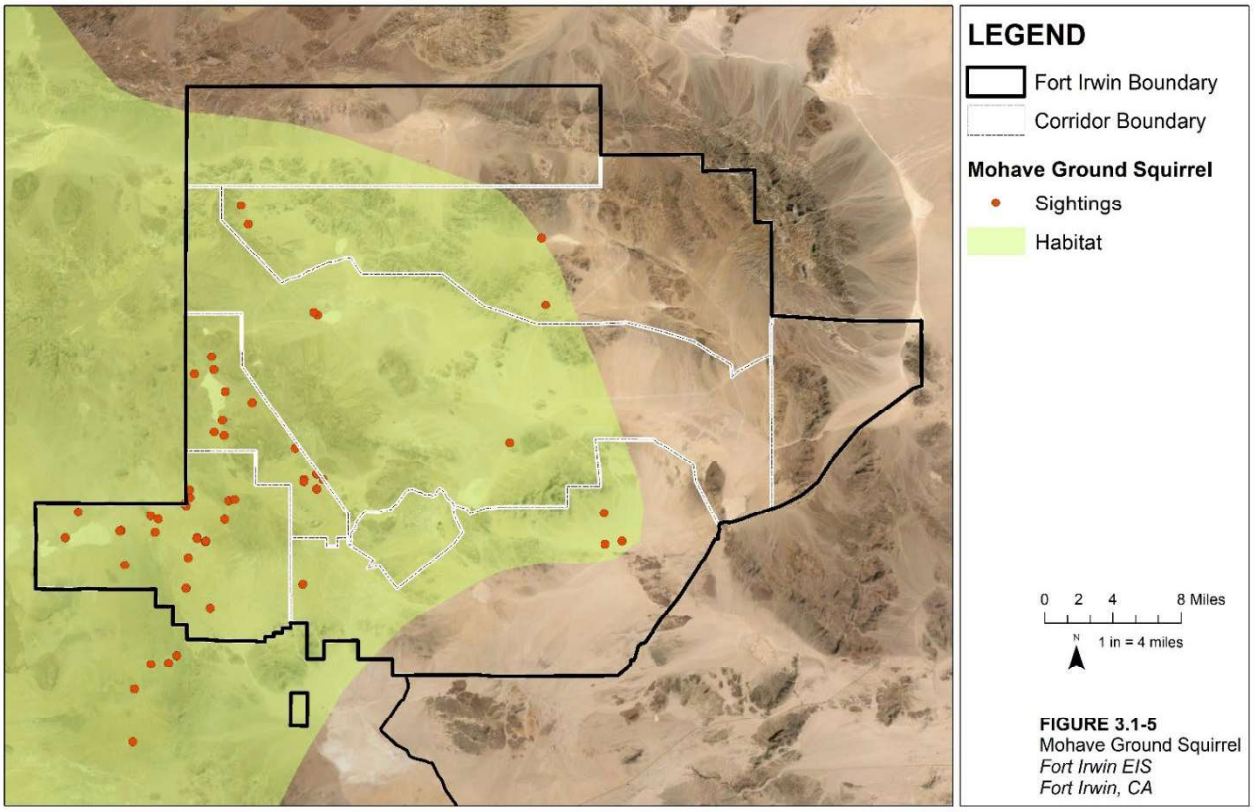


FIGURE 3.1-5
Mohave Ground Squirrel
Fort Irwin EIS
Fort Irwin, CA

3.1.5.2 Central Corridor

Federally listed wildlife species that occur or have a high potential to occur within the Central Corridor include the desert tortoise, the southwest willow flycatcher, and the least Bell's vireo. The desert tortoise occurs throughout Fort Irwin in low numbers. Bell's vireo, subspecies undetermined, was observed on Fort Irwin in 1986 at Bitter Spring in the southeastern portion of the Central Corridor (Davis, pers. comm., 2020). Willow flycatchers of undetermined subspecies have been observed at Bitter Spring (Davis, pers. comm., 2020). These two bird subspecies may occur near springs for brief periods during migration but are not expected to occur regularly on the NTC because of limited habitat (Fort Irwin, 2006b).

BLM special status animal species occurring in the Central Corridor include the following:

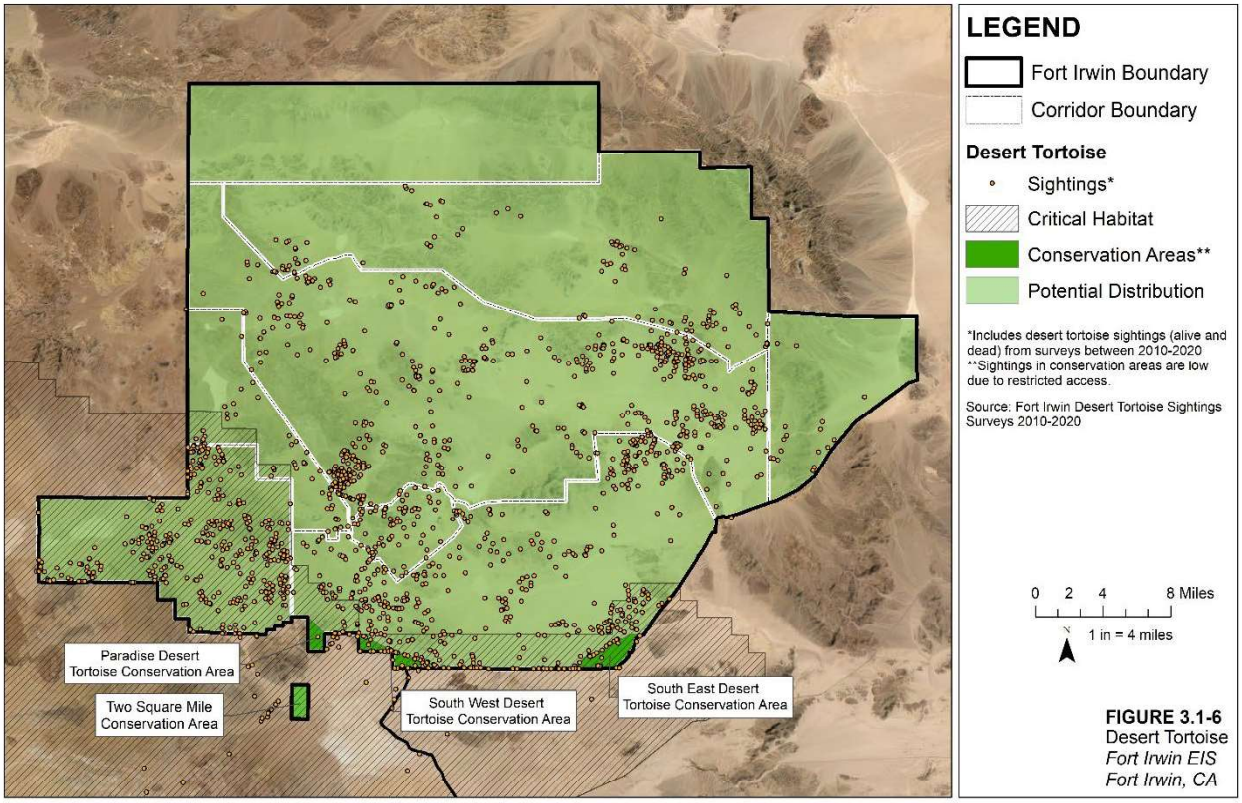
- Burrowing owls typically use burrows created by other animals and may occur throughout the Central Corridor in areas where other burrowing animals occur (Figure 3.1-4) (Fort Irwin, 2017a).
- Mohave ground squirrels may occur in areas with suitable habitat in the Central Corridor. Previous surveys indicated occurrences of this species at several sites, including the Echo site, Nelson Lake, and Bicycle Lake in the Central Corridor (Figure 3.1-5) (Fort Irwin, 2006b).
- One population of Mojave fringe-toed lizard occurs in the dunes just east of Red Pass Lake in the Central Corridor (Fort Irwin, 2006b).

State-listed species occurring within the Central Corridor include the following:

- Ferruginous hawk and Northern Harrier, though not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat in the Central Corridor.
- The golden eagle is known to occur on Fort Irwin. A helicopter survey identified two golden eagle nests, one of which was active, in the Tiefort Mountains in 2016 (Tetra Tech, Inc., 2016). These nests in the Tiefort Mountains have been used by eagles for many years, and the species also has nested in the Granite Mountains along the northern boundary of the Central Corridor.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur throughout the Central Corridor (Fort Irwin, 2017a).
- An active prairie falcon nest was observed in spring 2016 in the Tiefort Mountains (Fort Irwin, 2017a).
- Nelson's desert bighorn sheep may occur in the five mountain ranges on Fort Irwin, including the Tiefort Mountains in the Central Corridor (Davis, pers. comm., 2020).
- Desert kit fox and American badger have the potential to occur throughout the Central Corridor (Fort Irwin, 2006b).

3.1.5.3 Southern Corridor

Federally listed wildlife species potentially occurring within the Southern Corridor include the desert tortoise (Figure 3.1-6) and the southwest willow flycatcher. Historically, the highest density of desert tortoise was along the southern boundary below the 90 Universal Transverse Mercator (UTM) line, but most of the animals in this area were relocated as mitigation to enable greater training use of the Southern Corridor (Fort Irwin, 2006b). Willow flycatchers of undetermined subspecies have been observed at Garlic Spring (Davis, pers. comm., 2020). The southwest willow flycatcher may occur near springs for brief periods during migration but it is not expected to occur regularly on the NTC because of limited habitat (Fort Irwin, 2006b).



Fort Irwin has four desert tortoise conservation areas within the Southern Corridor (Figure 3.1-6):

- South East Desert Tortoise Conservation Area (2,382 acres)
- South West Desert Tortoise Conservation Area (1,650 acres)
- Paradise Desert Tortoise Conservation Area (987 acres)
- Two Square Mile Conservation Area (1,226 acres)

All four conservation areas are within the Superior-Cronese Critical Habitat Unit. These desert tortoise conservation areas are small preserves that contribute to tortoise recovery. The combined acreage of the conservation areas below the 90 UTM line is approximately 4,270 acres. Conservation areas on the installation are off-limits to all training activities; the areas are fenced and marked with signs and material that are visible day and night to military personnel (Fort Irwin, 2005).

The southwest willow flycatcher may occur for a brief period during migration (Fort Irwin, 2006b).

BLM special status animal species occurring in the Southern Corridor include the following:

- Burrowing owls typically use burrows created by other animals and may occur throughout the Southern Corridor in areas where other burrowing animals typically occur (Figure 3.1-4) (Fort Irwin, 2017a).
- One population of Mojave fringe-toed lizard is known to be present in the dunes just north of Bitter Spring, in the northeastern part of the Southern Corridor (Figure 3.1-7) (Fort Irwin, 2006b).

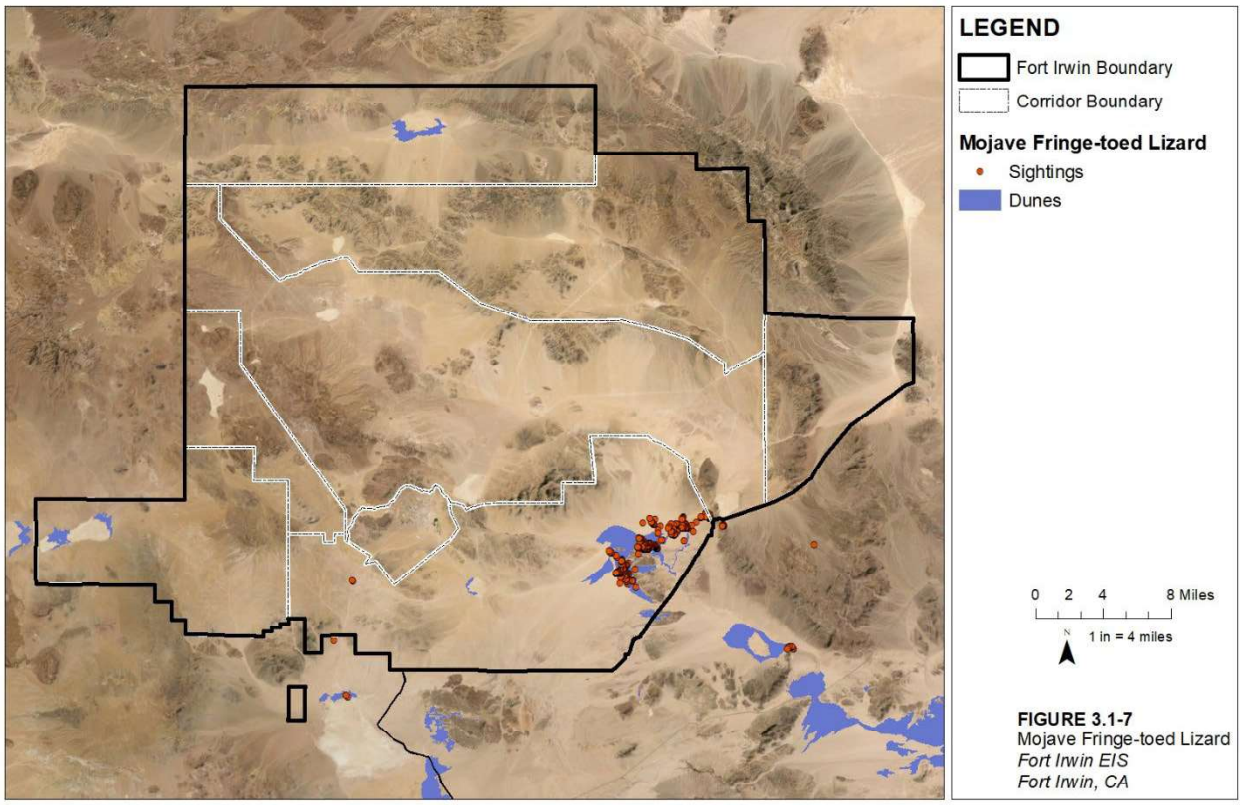


FIGURE 3.1-7
Mojave Fringe-toed Lizard
Fort Irwin EIS
Fort Irwin, CA

State-listed species occurring in the Southern Corridor include the following:

- Ferruginous hawk and Northern Harrier, though not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat in the Southern Corridor.
- While golden eagles are known to nest in the Tiefort Mountains in the Central Corridor (Tetra Tech, Inc., 2016), this species may occur in the Southern Corridor.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur in the Southern Corridor (Fort Irwin, 2017a).
- A solitary peregrine falcon was observed at Bitter Spring in the Southern Corridor in 1997. Peregrine falcons are uncommon winter migrants to the western Mojave Desert (Fort Irwin, 2018d).
- An active prairie falcon nest was observed in spring 2016 in the Tiefort Mountains and this species may occur in the Southern Corridor (Fort Irwin, 2017a).
- Swainson's hawk is migratory and is not expected to occur regularly on Fort Irwin or to forage in the area for prolonged periods; however, Swainson's hawk has been observed at Bitter Spring (Fort Irwin, 2006b).
- Desert kit fox and American badger have the potential to occur throughout the Southern Corridor (Fort Irwin, 2006b).

3.1.5.4 Western Training Area

The natural range of distribution of the desert tortoise has been documented in the Western Training Area (Figure 3.1-6). The southwest willow flycatcher may occur for brief periods during migration (Fort Irwin, 2006b).

BLM special status animal species occurring in the Western Training Area include the following:

- Mohave ground squirrels occur in areas with suitable habitat in the Western Training Area (Leitner, 2007).
- Bendire's thrasher is most likely to occur in the Western Training Area, where there are extensive stands of Joshua trees.
- Burrowing owls typically use burrows created by other animals and may occur throughout the Western Training Area in areas where other burrowing animals typically occur (Figure 3.1-4) (Fort Irwin, 2017a).

State-listed species occurring within the Western Training Area include the following:

- Ferruginous hawk and Northern Harrier, though not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat in the Western Training Area.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur throughout the Western Training Area (Fort Irwin, 2017a).
- Desert kit fox and American badger have the potential to occur throughout the Western Training Area (Fort Irwin, 2006b).

3.1.5.5 Eastern Training Area

Federally listed wildlife species occurring within the Eastern Training Area include the southwest willow flycatcher, which may occur for brief periods during migration (Fort Irwin, 2006b). The desert tortoise occurs throughout Fort Irwin in low numbers.

BLM special status animal species occurring in the Eastern Training Area include the following:

- Bendire's thrasher may occur in areas with Joshua tree habitat on the bajada slopes of the Avawatz Mountains in the northwestern part of the Eastern Training Area.
- Burrowing owls typically use burrows created by other animals and may occur throughout the Eastern Training Area in areas where burrowing animals typically occur (Figure 3.1-4) (Fort Irwin, 2017b).
- Nelson's desert bighorn sheep occur in the Avawatz Mountains in the northwestern portion of the Eastern Training Area (Fort Irwin, 2005).

State-listed species occurring within the Western Training Area include the following:

- Ferruginous hawk and Northern Harrier, although not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat in the Eastern Training Area.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur in the Eastern Training Area (Fort Irwin, 2017b).
- Desert kit fox and American badger have the potential to occur in habitat in the Eastern Training Area (Fort Irwin, 2006b).

3.1.5.6 Range Complex

Federally listed wildlife species occurring within the Range Complex include the desert tortoise and the southwest willow flycatcher. The southwest willow flycatcher may occur for brief periods during migration (Fort Irwin, 2006b). The Range Complex contains a high density of desert tortoise.

BLM special status animal species occurring in the Range Complex include the following:

- Burrowing owls typically use burrows created by other animals and may occur throughout the Range Complex in areas where burrowing animals typically occur (Figure 3.1-4) (Fort Irwin, 2017a).

State-listed species occurring within the Range Complex include the following:

- Ferruginous hawk and Northern Harrier, though not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat in the Range Complex.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur throughout the Range Complex (Fort Irwin, 2017a).
- Desert kit fox and American badger have the potential to occur throughout the Range Complex (Fort Irwin, 2006b).

3.1.5.7 Manix Trail

Federally listed wildlife species occurring within, and adjacent to, the Manix Trail include the desert tortoise and southwest willow flycatcher. Desert tortoise historically occurred along the Manix Trail between the Fort Irwin boundary and I-15, with occurrences concentrated in two areas, one immediately south of the Fort Irwin boundary and the other approximately 3 miles north of I-15 (Fort Irwin, 2005).

The southwest willow flycatcher may occur for a brief period during migration (Fort Irwin, 2006b).

BLM special status animal species occurring within, and adjacent to, the Manix Trail include the following:

- Burrowing owls typically use burrows created by other animals and may occur throughout the Manix Trail in areas where burrowing animals typically occur (Figure 3.1-4) (Fort Irwin, 2017a).

State-listed species occurring within, and adjacent to, the Manix Trail include the following:

- Ferruginous hawk and Northern Harrier, though not recorded on Fort Irwin in the past, have the potential to occur during the winter months within the Mojave creosote bush scrub habitat along the Manix Trail.
- Loggerhead shrike is relatively common in lowland California and has the potential to occur throughout Fort Irwin, including the Manix Trail (Fort Irwin, 2017a).
- Desert kit fox and American badger have the potential to occur along the Manix Trail (Fort Irwin, 2006b).

3.1.6 Wildlife Pest Species

Wildlife pest species have the potential to occur throughout Fort Irwin, including in the training corridors, Eastern Training Area, Western Training Area, and the Range Complex. They may also occur along the Manix Trail.

Common ravens and coyote are native to the Mojave Desert; however, their numbers have increased substantially as a result of expanding human use of the desert. Ravens and coyotes are routinely observed on Fort Irwin. Wild burros, feral cats (*Felis catus*), and feral dogs (*Canis lupus* ssp. *familiaris*) are not native to the Mojave Desert but have become established in the region. No other wildlife species are known to be a pest issue on Fort Irwin (Fort Irwin, 2006b).

Coyotes commonly occur in a variety of habitat types, including severely disturbed areas and urban edges. The Installation Integrated Pest Management Plan (Fort Irwin, 2017g) includes specific recommendations for the management and control of coyotes. Coyotes are known to prey on desert

tortoise and increased populations of coyote could have an adverse effect on desert tortoise populations on Fort Irwin (Fort Irwin, 2006b).

Raven populations have grown beyond the natural carrying capacity of the desert environment because of resources provided by humans. Ravens are attracted to remote training areas chiefly when soldiers are assembled; they are attracted to food, water, and any trash present. Ravens are known to prey on desert tortoise and increased populations of ravens could have an adverse effect on desert tortoise populations on Fort Irwin (Fort Irwin, 2006b).

Feral populations of domestic cats and dogs are not a significant management problem on Fort Irwin, and their occurrence is limited primarily to the Cantonment Area. Cats are not likely to survive in the arid desert environment because of the lack of cover and water and they are unlikely to be substantial predators on native wildlife populations. Feral cat numbers also are kept low because these animals likely are preyed upon by coyotes. Smaller dogs likely are preyed upon by coyotes, but larger dogs may join a coyote pack or group. The effects on native wildlife populations from feral dogs likely are minimal because they are more dependent on resources provided by humans than wild canids, and feral dogs are not well-adapted to life in the desert environment (Fort Irwin, 2006b).

Wild burros are a management concern because of the adverse effects on soils, vegetation, and water quality. The creation of frequently used trails and wallows (dust baths) and the congregation of herds around water sources lead to increased compaction and lower water infiltration rates. In addition, burros exert a direct adverse effect on native vegetation and wildlife because burros eat nearly every species of woody plant and can consume more than native herbivores such as bighorn sheep. The destruction of vegetation reduces forage, shade, and escape cover, which are important requirements of many wildlife species, affecting their short- and long-term survival. Feral burros occur throughout Fort Irwin and larger numbers tend to occur in the Leach Lake area, at Bitter Spring, the NASA Goldstone Complex, and the Western Training Area (Fort Irwin, 2006b).

3.2 Water Resources

Water resources include natural and artificial sources of water available for use by, and for the benefit of, humans and the environment. This section describes both surface water and groundwater resources within the ROI. The ROI for water resources comprises the watersheds and groundwater basins within the boundary of Fort Irwin and the additional area along Manix Trail south of Fort Irwin to I-15.

The following regulations relate to the management of water resources.

CWA. The CWA (33 U.S.C. Sections 1251 et seq.) is the primary law regulating water pollution in surface waters. It mandates the National Pollutant Discharge Elimination System (NPDES) program, which regulates the discharge of water pollution and requires a permit for any discharge of pollutants into "waters of the United States." Waters of the United States include rivers, streams, estuaries, and most ponds, lakes, and wetlands, as defined in the Navigable Waters Protection Rule (EPA and Department of the Army, 2020). Section 303(d) of the CWA mandates States to develop lists of all impaired waterbodies and prioritize these waters for establishment of plans to restore degraded areas. In addition, Section 305(b) requires States to report on the overall condition of aquatic resources. Section 319 of the CWA addresses the need for greater federal leadership to help focus State and local nonpoint source efforts. Under Section 319, States, territories, and tribes receive grant money that supports a wide variety of activities to assess the success of specific nonpoint source implementation projects. In 2013, the U.S. Army Corps of Engineers (USACE) determined that there were no waters of the United States on Fort Irwin (USACE, 2013). If the water body is not a water of the United States, the State (in this case, California) has authority under the Porter-Cologne Water Quality Control Act enacted in 1969.

Safe Drinking Water Act. The Safe Drinking Water Act (40 U.S.C. Sections 100 et seq.) directs the U.S. Environmental Protection Agency (EPA) to develop national drinking water regulations for public water systems and directs States to establish programs that protect areas around wellheads. The 1996 amendments establish a strong emphasis on source water protection and enhanced water system management.

3.2.1 Surface Water

Surface water resources are scarce on Fort Irwin and in the surrounding region. Washes descending from mountains and other elevated landforms provide ephemeral and intermittent channels that route stormwater runoff into basins that store water until percolation or evaporation occurs. All streams are ephemeral or intermittent, and naturally occurring standing water is ephemeral, evident only during and immediately after heavy rains (Fort Irwin, 2006b). Surface flows on Fort Irwin generally drain to 1 of the 13 dry lakebeds, as shown on Figure 3.2-1. No surface water lakes with standing water occur on Fort Irwin because of the high evaporative potential exceeding surface and groundwater input (Fort Irwin, 2008). Substantial water flow and accumulation occurs during large, high-intensity storm events, which typically occur in the summer months in the form of monsoon thunderstorms. Such events can cause 3 to 4 inches of rain within 24 hours and often within 6 hours (AFCCC, 2004).

Alluvial fans are a common landform in and around Fort Irwin. Soil material composed of sand, gravel, cobbles, and rocks are deposited in alluvial fans during heavy rainfall events. Significant subsurface flows may occur in the unconsolidated sand and gravel channel deposits in washes and alluvial fans, even after surface flows have ceased. Water may pool along washes or in shallow ephemeral lakes, where it either percolates to the groundwater or evaporates (Fort Irwin, 2006b).

Fort Irwin has several springs, as shown on Figure 3.2-2. These springs either produce small quantities of water or are intermittent and produce little to no water during the summer, depending on the seasonal amount of rainfall (Fort Irwin, 2008).

The nearest water body to Fort Irwin that is listed as an impaired water body in accordance with CWA Section 303(d) is the Mojave River to the south. The watersheds within the boundaries of Fort Irwin do not have surface connectivity to the Mojave River or any other impaired water.

3.2.1.1 Northern Corridor

The Northern Corridor is within the Nelson Lake-Bicycle Lake, Leach Lake, and Red Pass Lake-Salt Creek watersheds. McLean Lake and Drinkwater Lake dry lake beds are within the boundaries of the Northern Corridor. Numerous ephemeral washes occur within the Northern Corridor.

3.2.1.2 Central Corridor

The Central Corridor is primarily within the Mesquite Spring, Nelson Lake-Bicycle Lake, Red Pass Lake-Salt Creek watersheds and small portions of Cronese Valley, Langford Well Lake, and Goldstone Lake watersheds. Nelson Lake and Bicycle Lake dry lake beds are within the boundaries of the Central Corridor. Numerous ephemeral washes occur within the Central Corridor.

3.2.1.3 Southern Corridor

The Southern Corridor is primarily within the Coyote Lake, Cronese Valley, Langford Well Lake, and Goldstone Lake watersheds. Langford Lake dry lake bed is within the boundaries of the Southern Corridor. Numerous ephemeral washes occur within the Southern Corridor.

3.2.1.4 Western Training Area

The Western Training Area is primarily within the Superior Lake, Goldstone Lake, and Coyote Lake watersheds. The Superior Lake dry lake bed is within the boundaries of the Western Training Area. Numerous ephemeral washes occur within the Western Training Area. These washes and the dry lake beds may be regulated as waters of the State of California.

3.2.1.5 Eastern Training Area

The Eastern Training Area is primarily within the Red Pass Lake-Salt Creek and the Riggs Wash-Salt Creek watersheds. No lake beds occur within the boundaries of the Eastern Training Area. Numerous ephemeral washes occur within the Eastern Training Area.

3.2.1.6 Range Complex

The Range Complex is located primarily in the Nelson Lake-Bicycle Lake watershed. No lake beds occur within the boundary of the Range Complex. Ephemeral washes occur within the Range Complex.

3.2.1.7 Manix Trail

Manix Trail is located within the Coyote Lake and Manix Wash-Mojave River watersheds. The Coyote Lake watershed drains to Coyote Lake. The Manix Wash-Mojave River watershed ultimately drains to the Mojave River, and washes within this watershed will likely be regulated as waters of the State of California. Manix Wash is not an impaired water, but the Mojave River is listed as an impaired water body in accordance with CWA Section 303(d).

3.2.2 Groundwater

Several groundwater basins have been identified in the vicinity of Fort Irwin, including Bicycle Lake, Capital City, Coyote Lake, Goldstone Valley, Irwin, Langford Lake, and Superior Lake basins, as shown on Figure 3.2-2. Fort Irwin monitors the quality of its groundwater because it is the only source for local drinking water. The water supply for Fort Irwin is supplied by groundwater from the Bicycle Lake, Langford Lake, and Irwin groundwater basins. Depth to groundwater in these basins is between 200 and 500 feet (60 to 152 meters) (Fort Irwin, 2006b). Water from wells in all three basins has high fluoride concentrations, with 90 percent of wells sampled having fluoride above the California maximum contaminant level of 2 milligrams per liter. Arsenic has been detected at concentrations above the State maximum contaminant level of 10 micrograms per liter in 80 percent of the wells sampled

(CH2M, 2007). The volcanic rocks common to the area are high in fluoride and arsenic, and the natural weathering of bedrock is a potential source of these elements in groundwater. Water used for drinking is treated to required standards prior to distribution.

The long-term availability of water is a concern in desert environments. Climate projections are mixed on future precipitation in the Mojave Desert, with an approximately even split on whether precipitation will increase or decrease, although aridity is projected to increase under either precipitation scenario because of increased temperatures (Gonzalez, 2019). As a result, the following aquifers within the Fort Irwin training areas are being studied for possible development of groundwater wells: Superior Basin, Coyote Basin, Goldstone Basin, Leach Basin, Red Pass Basin, Nelson Basin, and Drinkwater Basin (USGS, 2020a) (Figure 3.2-2).

3.2.2.1 Northern Corridor

The Northern Corridor overlies portions of the Bicycle Valley, Avawatz Valley, Red Pass Valley, Leach Valley, and Denning Spring Valley groundwater basins. Several springs occur within the Northern Corridor, including Desert King, Devouge, Drinkwater, Arrastre, and Cave Springs (Figure 3.2-2). No wells are in the Northern Corridor.

3.2.2.2 Central Corridor

The Central Corridor overlies portions of the Bicycle Valley, Red Pass Valley, Goldstone Valley, and Cronese Valley groundwater basins. No springs occur within the Central Corridor (Figure 3.2-2). Numerous wells are in the Central Corridor, including water supply wells for Fort Irwin. Wells are not used in training activities and are off-limits to maneuver activities.

3.2.2.3 Southern Corridor

The Southern Corridor primarily overlies the Cronese Valley and Langford Valley-Langford Well Lake groundwater basins and small portions of the Goldstone Valley, Langford Valley-Irwin, and Coyote Lake Valley groundwater basins. Garlic and Bitter Springs are located within the Southern Corridor (Figure 3.2-2). Numerous wells are in the Southern Corridor, including water supply wells for Fort Irwin. Wells are not used in training activities and are off-limits to maneuver activities.

3.2.2.4 Western Training Area

The Western Training Area overlies portions of the Superior Valley, Goldstone Valley, and Coyote Lake Valley groundwater basins. No springs occur within the Western Training Area (Figure 3.2-2). No water supply wells are in the Western Training Area; all existing wells are used only for monitoring and testing.

3.2.2.5 Eastern Training Area

The Eastern Training Area overlies portions of the Red Pass Valley and Riggs Valley groundwater basins. No springs occur within the Eastern Training Area (Figure 3.2-2). There are no springs or wells within the Eastern Training Area.

3.2.2.6 Range Complex

The Range Complex overlies portions of the Goldstone Valley and Bicycle Valley groundwater basins. No springs occur within the Range Complex (Figure 3.2-2).

3.2.2.7 Manix Trail

The majority of the Manix Trail overlies the Coyote Lake Valley groundwater basin and a small portion of the Lower Mojave groundwater basin (Figure 3.2-2). No springs are near the trail.

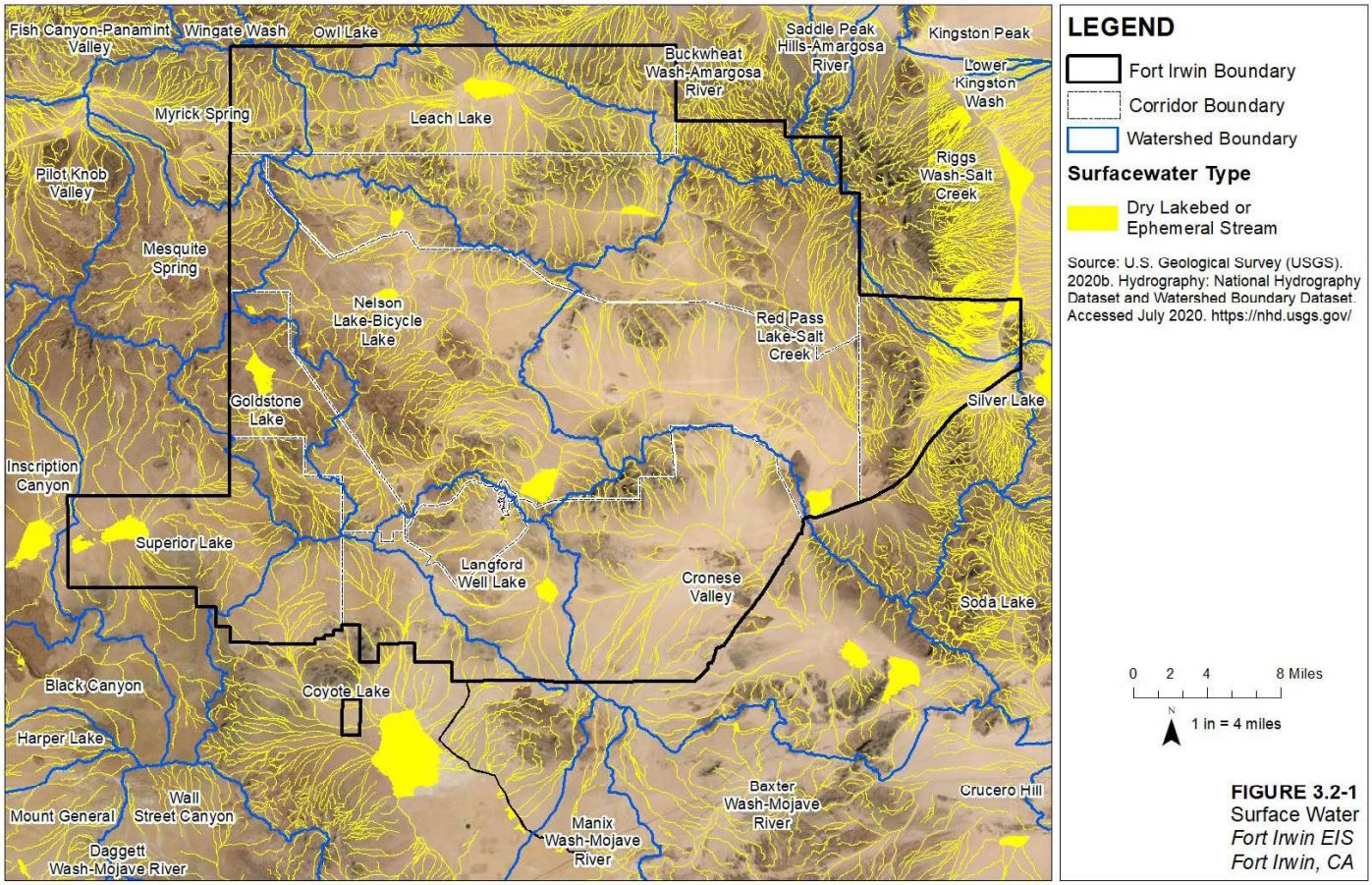


FIGURE 3.2-1
Surface Water
Fort Irwin EIS
Fort Irwin, CA

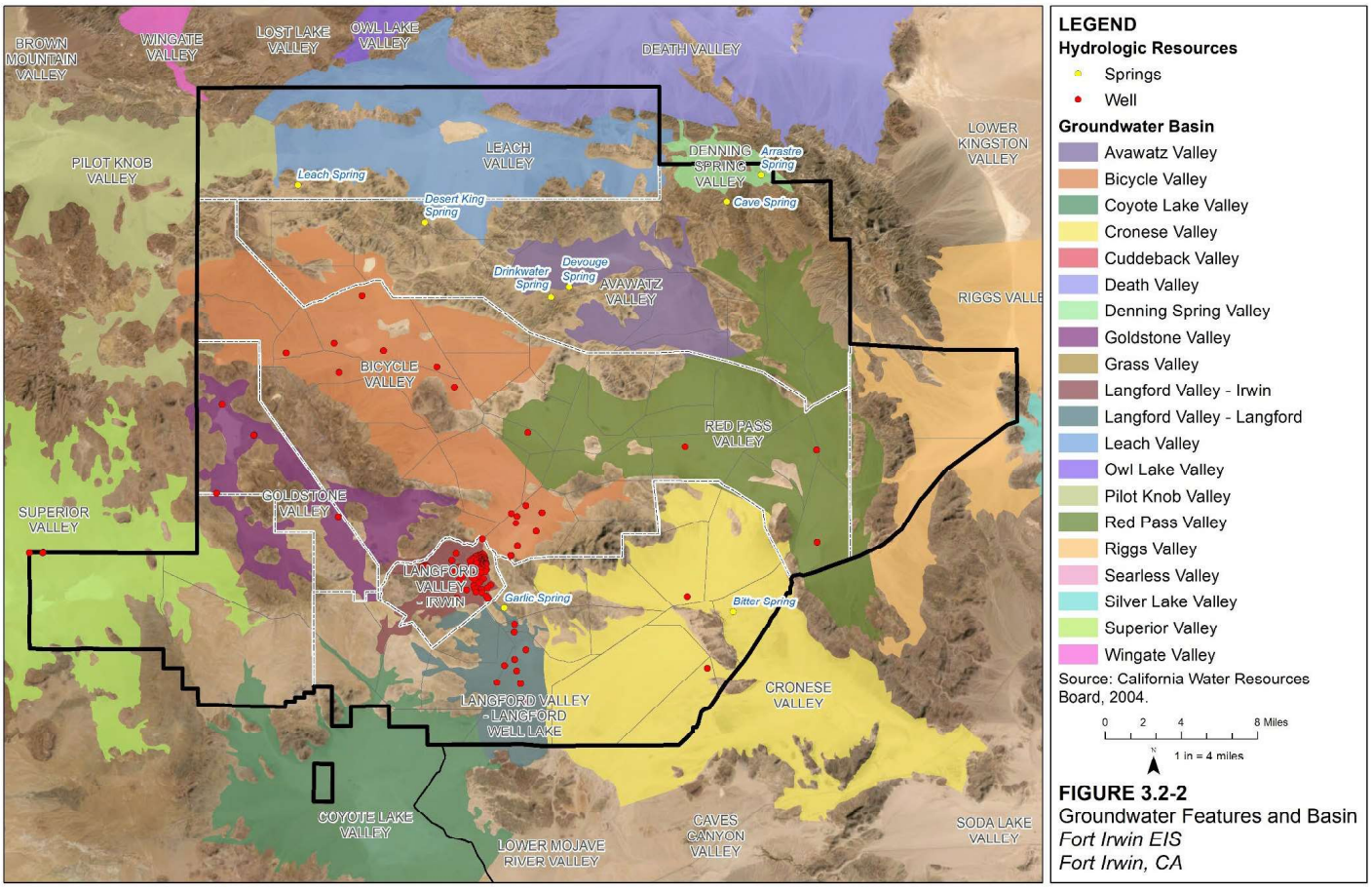


FIGURE 3.2-2
Groundwater Features and Basin
Fort Irwin EIS
Fort Irwin, CA

3.3 Geological Resources

This section presents an overview of the geology on Fort Irwin and includes topography, geologic resources, soils, seismicity, and paleontology. The ROI for determining impact to these resources includes the Fort Irwin boundary and the Manix Trail (Figures 3.3-1).

3.3.1 Topography

Fort Irwin is located in the Mojave Desert Physiographic Province. A physiographic province is a geographic region with specific character, relief, and environment. In the Mojave Desert, high mountain peaks and ridges separate broad alluvial fans and wide, flat valleys. Large basins without external drainage develop playas, which are flat, dry lakebeds. The average elevation of the Mojave Desert is approximately 2,500 feet above msl. Individual peaks of isolated mountain areas on the NTC reach elevations of up to 6,153 feet above msl (Figure 3.3-1).

3.3.1.1 Northern Corridor

Topography in the Northern Corridor is characterized by the Avawatz Mountains, which extend from the eastern boundary at elevations of up to 5,900 feet above msl to the west to join the Granite Mountains, which extend to the western boundary and along the southern boundary of the corridor at elevations of up to 5,000 feet above msl. Portions of both ranges are present throughout the corridor. The lowest elevations within the Northern Corridor are just west of the Eastern Training Area boundary at approximately 2,300 feet above msl.

3.3.1.2 Central Corridor

The Central Corridor has less mountainous terrain than the Northern Corridor, except for the Granite Mountains along the northern boundary and the Tiefort Mountains along the southern boundary, which reach elevations of up to 5,000 feet above msl in areas. Lower elevations of less than 2,000 feet above msl are located in the southeastern portion of the corridor at the base of the Soda Mountains.

3.3.1.3 Southern Corridor

Similar to the Central Corridor, the Southern Corridor has less steep and mountainous terrain than the Northern Corridor. Elevations of up to 4,000 feet above msl are associated with the Tiefort Mountains along the northern boundary of the corridor. Steeply sloping areas ranging from 2,400 to 4,300 feet above msl are located near the northwestern and southwestern corners of the corridor.

3.3.1.4 Western Training Area

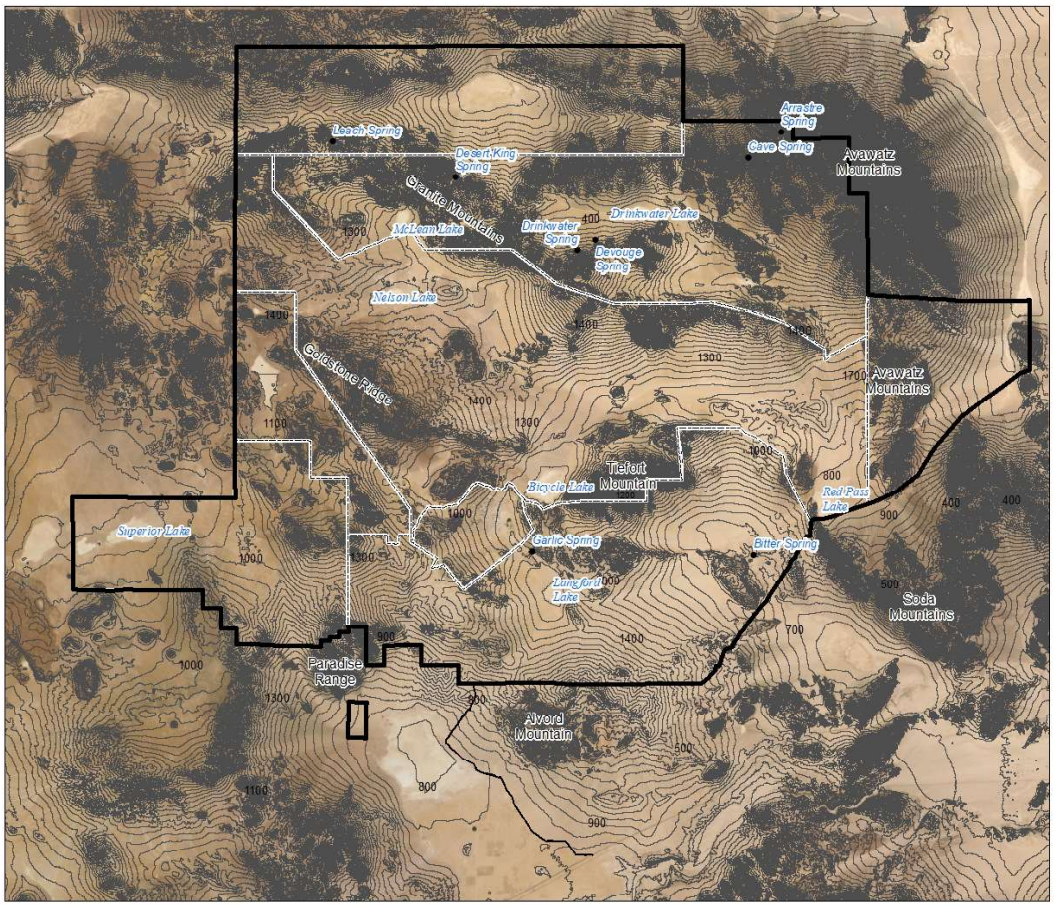
In the Western Training Area, the highest elevations, up to 4,400 feet above msl, are located in the northern area and the lowest elevations, near 2,600 feet above msl, are in the southeastern area, west of Paradise Range.

3.3.1.5 Eastern Training Area

Topography in the Eastern Training Area ranges in elevation from up to 3,500 feet above msl along the western boundary and southwestern corner to less than 800 feet above msl in the northeastern corner.

3.3.1.6 Range Complex

The Range Complex and associated SDZs are located within the Central Corridor, which is described in Section 3.3.1.2, *Central Corridor*.



LEGEND

Fort Irwin Boundary

Corridor Boundary

Topographic Feature

- Springs
- Elevation Contours 20m

Source:
NRCS STATSGO Soils Database 2020

0 2.5 5 10 Miles

1 in = 4 miles

FIGURE 3.3-1
Topography
Fort Irwin EIS
Fort Irwin, CA

3.3.1.7 Manix Trail

The northern end of the Manix Trail leaves the Southern Corridor at an elevation of approximately 2,200 feet above msl and descends to a low point of approximately 1,720 feet above msl, just east of Coyote Lake. The trail then turns toward the southeast and reaches an elevation of approximately 1,800 feet above msl at approximately the midway point. The elevation at the southern end of the Manix Trail is approximately 1,750 feet above msl.

3.3.2 Geologic Features

The geology underlying Fort Irwin reflects the Mojave Desert's dynamic depositional and erosional environments, which have resulted in complex and wide-ranging types of geological features. The types of geological features on Fort Irwin include the following (Figure 3.3-2):

- **Alluvial Fans** – Fan-shaped deposits of water-transported material (alluvium) that typically form at the base of topographic features where there is a break in slope. Alluvial fans tend to be coarse-grained at the mouth and relatively fine-grained at the edges.
- **Active Alluvial Plain** – Alluvial material that is actively and frequently moving and reforming.
- **Fluvial Floodplain** – A relatively flat surface next to a river or stream. Sediments are deposited on the surface when the adjacent river or stream overflows its banks.
- **Bajada** – Often formed by the coalescing of several alluvial fans, bajada are found at the bases of mountain ranges.
- **Wash** – A dry creek, streambed, or gulch that temporarily or seasonally fills and flows after sufficient rain.
- **Playa or Dry Lake Bed** – A flat, dry area at the lowest part of an undrained desert basin that typically does not support much vegetation. During wet periods, seasonal lakes can form in these low areas.
- **Dune Field** – Areas covered by extensive sand dunes, hills of loose sand formed by wind or water typically associated with beaches or deserts.
- **Desert Pavement** – Residual layers of large or coarse-grained soil particles with algal and chemical crusts create a dark color or "desert pavement" over a majority of soil surfaces. If intact, this surface layer is resistant to erosion (Fort Irwin, 1979).
- **Plateau Basin** – A plateau is a large area of flat upland typically surrounded by steep slopes or mountains on all sides. A plateau basin is a depression within the plateau that can be filled with water, sediment, or both.
- **Bedrock Plain** – A large expanse of solid rock that typically underlies gravel, soil, or another surface material.
- **Erosional Highland** – A mountainous area with bedrock outcroppings that are resistant to erosion.

3.3.2.1 Northern Corridor

The Northern Corridor consists predominately (approximately 85 percent) of geologic features associated with the Avawatz and Granite Mountains and bajada geologic features at the base of those ranges extending throughout most of the west-east length of the corridor. Areas of bajada associated with Leach Basin are also present in the north-central portion of the corridor. Desert pavement occurs on approximately 6,325 acres in the Northern Corridor (4 percent of the corridor), with intact desert pavement limited to areas where maneuver training has not occurred. The remainder of the corridor consists of washes.

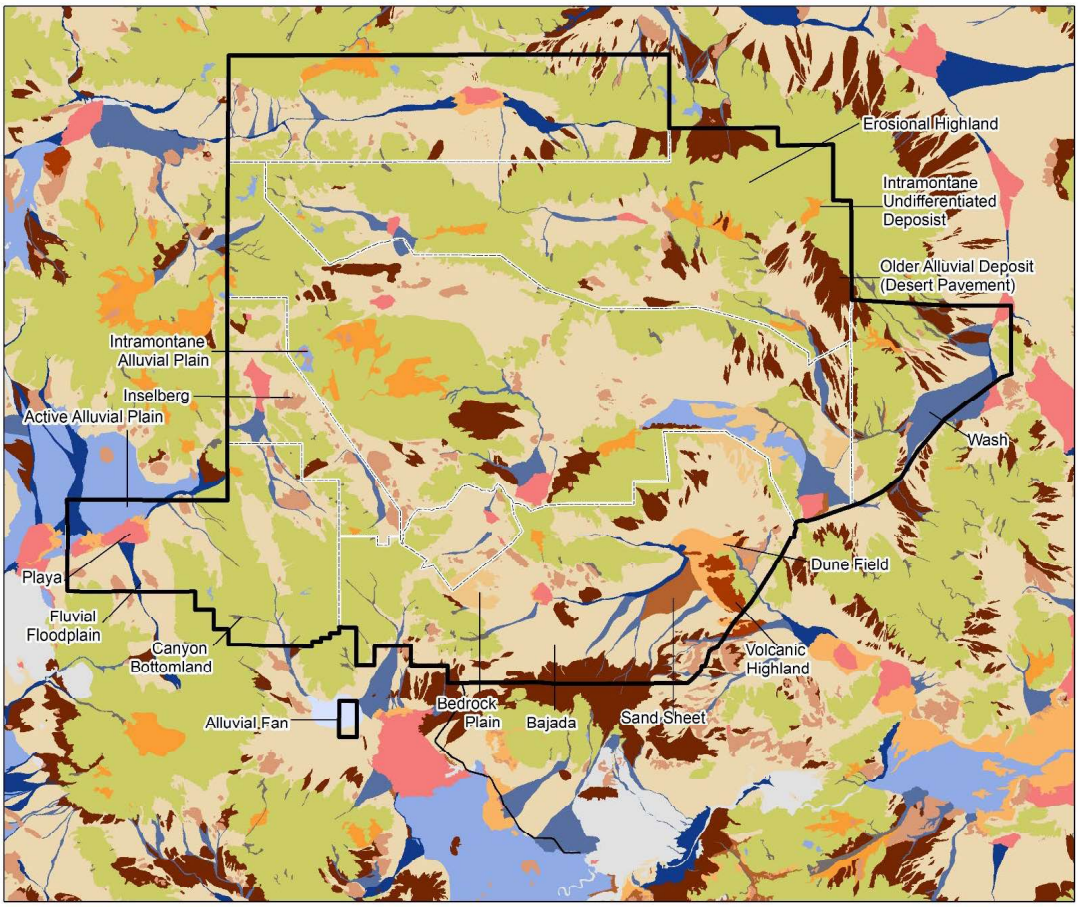


FIGURE 3.3-2
Geological Resources
Fort Irwin EIS
Fort Irwin, CA

3.3.2.2 Central Corridor

Similar to the Northern Corridor, the Central Corridor is mostly characterized by the geologic features associated with the Granite Mountains along the northern boundary and the Tiefort Mountains along the southern and western boundaries. These features account for nearly 80 percent of the geology in the corridor. Desert pavement occurs on approximately 6,400 acres in the Central Corridor (3 percent of the Corridor), with intact desert pavement limited to areas where maneuver training has not occurred. The remainder of the corridor consists of washes.

3.3.2.3 Southern Corridor

Geologic features associated with the Tiefort Mountains characterize much of the Southern Corridor. The northeastern area of the corridor to the west of the Cantonment Area is characterized as bajada. Desert pavement occurs on approximately 8,200 acres of the Southern Corridor (6 percent of the Corridor), with intact desert pavement limited to areas where maneuver training has not occurred. Bedrock plains and dune fields account for the remainder of the geologic features in the Southern Corridor.

3.3.2.4 Western Training Area

Approximately 80 percent of the Western Training Area comprises the Goldstone Ridge and Goldstone Basin in the northeast and Coolgardie Plateau in the central area. The bajada areas are located at the lower elevations on the slopes of the mountains in a northwest-to-southeast alignment. The largest bajada area is in the western portion of the training area associated with the Superior Lake, two of which are within the boundaries of the training area. Playa, active alluvial plain, and fluvial floodplain features are also present in the Western Training Area in association with the Superior Lake. Desert pavement is not a significant geological constituent in the Western Training Area.

3.3.2.5 Eastern Training Area

The Eastern Training Area is characterized by the Avawatz Mountains, which comprise nearly 65 percent of the geology in this area. Bajada geology is found in the eastern and southern areas. Desert pavement occurs on approximately 1,400 acres in the Eastern Training Area (3 percent of the Eastern Training Area), with intact desert pavement limited to areas where maneuver training has not occurred. The remainder of the corridor consists of washes.

3.3.2.6 Range Complex

The Range Complex is located within the Central Corridor and includes similar geology.

3.3.2.7 Manix Trail

Over 60 percent of the geology crossed by the Manix Trail is characterized as bajada and playa associated with the Alvord Mountain east of the trail.

3.3.3 Soils

The majority of Fort Irwin is underlain by shallow bedrock or alluvial and lakebed deposits, formed from erosion and bedrock decomposition. Predominate soil types include silty sandy gravel derived from granitic rocks, silty gravel from volcanic rocks, and rocky soils from alluvial deposits. Soil develops slowly in the desert and can be susceptible to wind and water erosion due to a lack of organic matter. Desert clay and silty soils, along with bacteria, algae, and lichens that are found in the desert, form hardened soil crusts called desert pavement. Desert pavement protects the soil from erosion while supporting plant life. Desert pavement may include many different soil associations; however, it is usually characterized by a surface crust of pebbles and rocks, often rendered dark and shiny, which protects fragile desert soils from further erosion. Once removed, this crust requires several thousands of years to reform. Desert pavement occurs in the Northern Corridor, Central Corridor, Southern Corridor, and

Eastern Training Area, but intact desert pavement is uncommon where past training activities have occurred.

Table 3.3-1 incudes soil types present in the various areas on Fort Irwin as a percentage. The most common soil type on Fort Irwin is Cajon-Arizo-Victorville Variant (Figure 3.3-3). Descriptions of the soil series on Fort Irwin are provided in Appendix 3.3A (Fort Irwin, 2005). Soils vary in their susceptibility to erode after the surface has been disturbed. The Natural Resources Conservation Service has rated each soil series as low, moderate, or high erodibility; Figure 3.3-4 shows the soil erodibility on Fort Irwin by corridor. An estimate of the amount of land currently subjected to low, moderate, and high disturbance, in relation to erodibility, is also presented in Table 3.3-1. The highland features generally correspond to areas of low erodibility, and the alluvial formations generally correspond to areas of high erodibility.

TABLE 3.3-1
Soil Series and Erodibility by Area
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Corridor	Soil Series	Percent of Area	Erodibility
Northern	Rock Outcrop-Tecopa-Lithic Torriorthents (660573)	10	Low
Northern	Rock Outcrop-Upspring-Sparkhole (660574)	4	Low
Northern	Badland-Bitterwater-Cajon (660575)	7	Moderate
Northern	Rock-Lithic Torriorthents-Calvista (660577)	33	Low
Northern	Calvista-Rock Outcrop-Trigger (660581)	6	Moderate
Northern	Nickel-Arizo-Bitter (660589)	18	Moderate
Northern	Cajon-Arizo-Victorville Variant (660590)	22	Moderate
Northern	**Percent of Low Erodibility Area**	**47**	**Not Applicable**
Northern	**Percent of Moderate Erodibility Area**	**53**	**Not Applicable**
Northern	**Percent of High Erodibility Area**	**0**	**Not Applicable**
Central	Playas-Cajon-Glendale (66048)	2	High
Central	Rock Outcrop-Tecopa-Lithic Torriorthents (660573)	3	Low
Central	Badland-Bitterwater-Cajon (660575)	7	Moderate
Central	Rock-Lithic Torriorthents-Calvista (660577)	5	Low
Central	Calvista-Rock Outcrop-Trigger (660581)	7	Moderate
Central	Nickel-Arizo-Bitter (660589)	20	Moderate
Central	Cajon-Arizo-Victorville Variant (660590)	44	Moderate
Central	Rock Outcrop-Upspring-Sparkhole (660574)	12	Low
Central	**Percent of Low Erodibility Area**	**20**	**Not Applicable**
Central	**Percent of Moderate Erodibility Area**	**78**	**Not Applicable**
Central	**Percent of High Erodibility Area**	**2**	**Not Applicable**
Southern	Playas-Cajon-Glendale (66048)	0	High
Southern	Rock Outcrop-St. Thomas-Tecopa (660572)	0	Low
Southern	Rock Outcrop-Tecopa-Lithic Torriorthents (660573)	3	Low
Southern	Rock Outcrop-Upspring-Sparkhole (660574)	2	Low
Southern	Badland-Bitter-Water-Cajon (660575)	3	Moderate
Southern	Calvista-Rock Outcrop-Trigger (660581)	26	Moderate

Corridor	Soil Series	Percent of Area	Erodibility
Southern	Cajon-Arizo-Victorville Variant (660590)	66	Moderate
Southern	**Percent of Low Erodibility Area**	**5**	**Not Applicable**
Southern	**Percent of Moderate Erodibility Area**	**95**	**Not Applicable**
Southern	**Percent of High Erodibility Area**	**0**	**Not Applicable**
Western	Playas-Cajon-Glendale (66048)	3	High
Western	Rock Outcrop-St. Thomas-Tecopa (660572)	10	Low
Western	Rock Outcrop-Upspring-Sparkhole (660574)	2	Low
Western	Calvista-Rock Outcrop-Trigger (660581)	36	Moderate
Western	Cajon-Arizo-Victorville Variant (660590)	32	Moderate
Western	Rosamond-Rosamond Variant Playas (660871)	17	High
Western	**Percent of Low Erodibility Area**	**12**	**Not Applicable**
Western	**Percent of Moderate Erodibility Area**	**68**	**Not Applicable**
Western	**Percent of High Erodibility Area**	**20**	**Not Applicable**
Eastern	Rock Outcrop-Tecopa-Lithic Torriorthents (660573)	26	Low
Eastern	Badland-Bitterwater-Cajon (660575)	11	Moderate
Eastern	Carrizo-Rositas-Gunsight (660584)	16	Moderate
Eastern	Gunsight-Rillito-Chuckawalla (660587)	30	Moderate
Eastern	Nickel-Arizo-Bitter (660589)	8	Moderate
Eastern	Cajon-Arizo-Victorville Variant (660590)	9	Moderate
Eastern	**Percent of Low Erodibility Area**	**26**	**Not Applicable**
Eastern	**Percent of Moderate Erodibility Area**	**74**	**Not Applicable**
Eastern	**Percent of High Erodibility Area**	**0**	**Not Applicable**
Range Complex	Cajon-Arizo-Victorville Variant (660590)	28	Moderate
Range Complex	Nickel-Arizo-Bitter (660589)	31	Moderate
Range Complex	Playas-Cajon-Glendale (66048)	0	High
Range Complex	Rock Outcrop-Upspring-Sparkhole (660574)	41	Low
Range Complex	**Percent of Low Erodibility Area**	**41**	**Not Applicable**
Range Complex	**Percent of Moderate Erodibility Area**	**59**	**Not Applicable**
Range Complex	**Percent of High Erodibility Area**	**0**	**Not Applicable**
Manix Trail	Cajon-Arizo-Victorville Variant (660590)	54	Moderate
Manix Trail	Cajon-Wasco-Rosamond (660471)	17	High
Manix Trail	Norob-Halloran-Cajon-Bryman (660486)	29	Moderate
Manix Trail	**Percent of Low Erodibility Area**	**0**	**Not Applicable**
Manix Trail	**Percent of Moderate Erodibility Area**	**83**	**Not Applicable**
Manix Trail	**Percent of High Erodibility Area**	**17**	**Not Applicable**

Notes:
Percentages rounded to nearest whole number; when the percentage is less than 0.5 percent, it is rounded to 0.

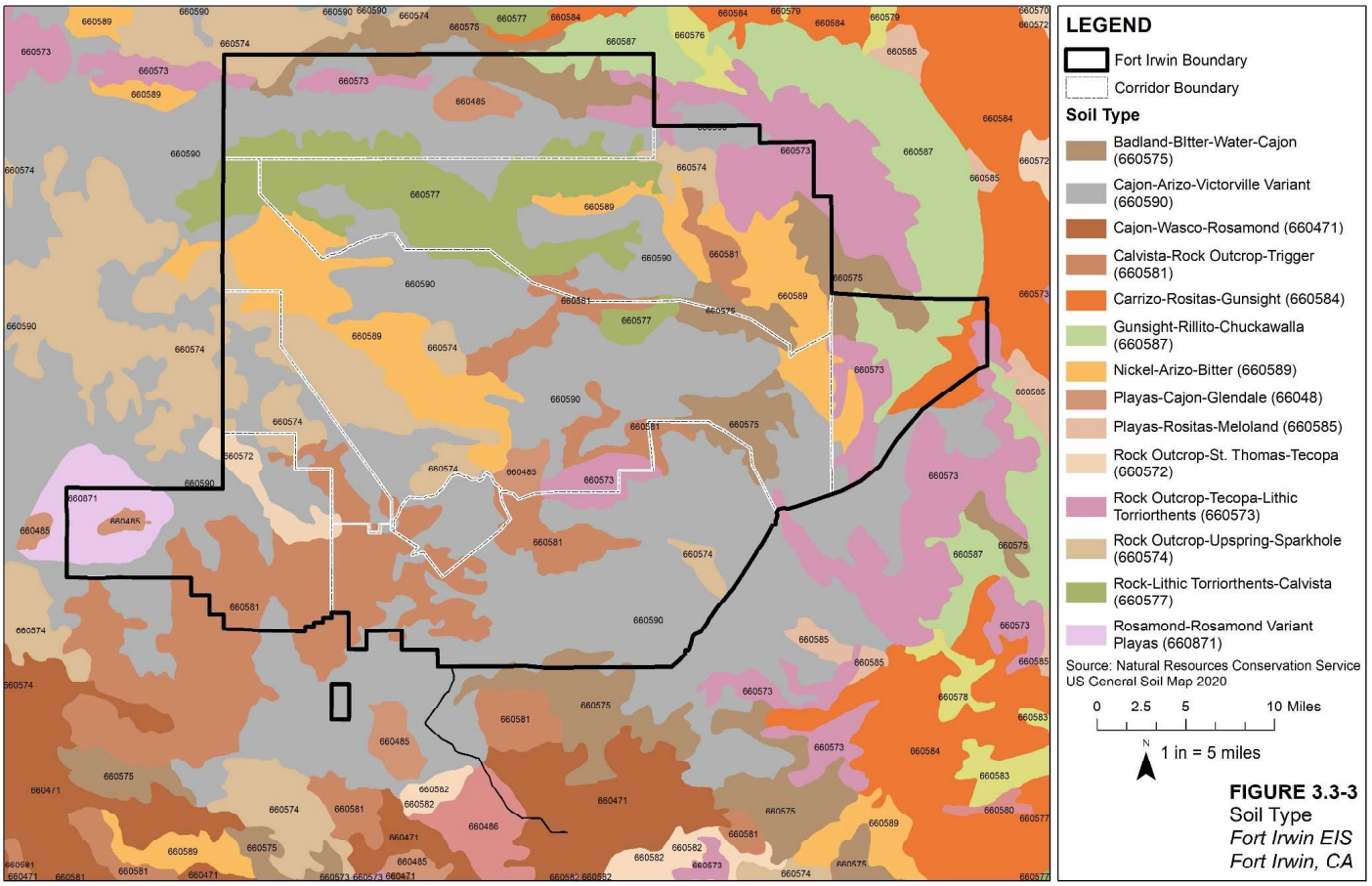


FIGURE 3.3-3
Soil Type
Fort Irwin EIS
Fort Irwin, CA

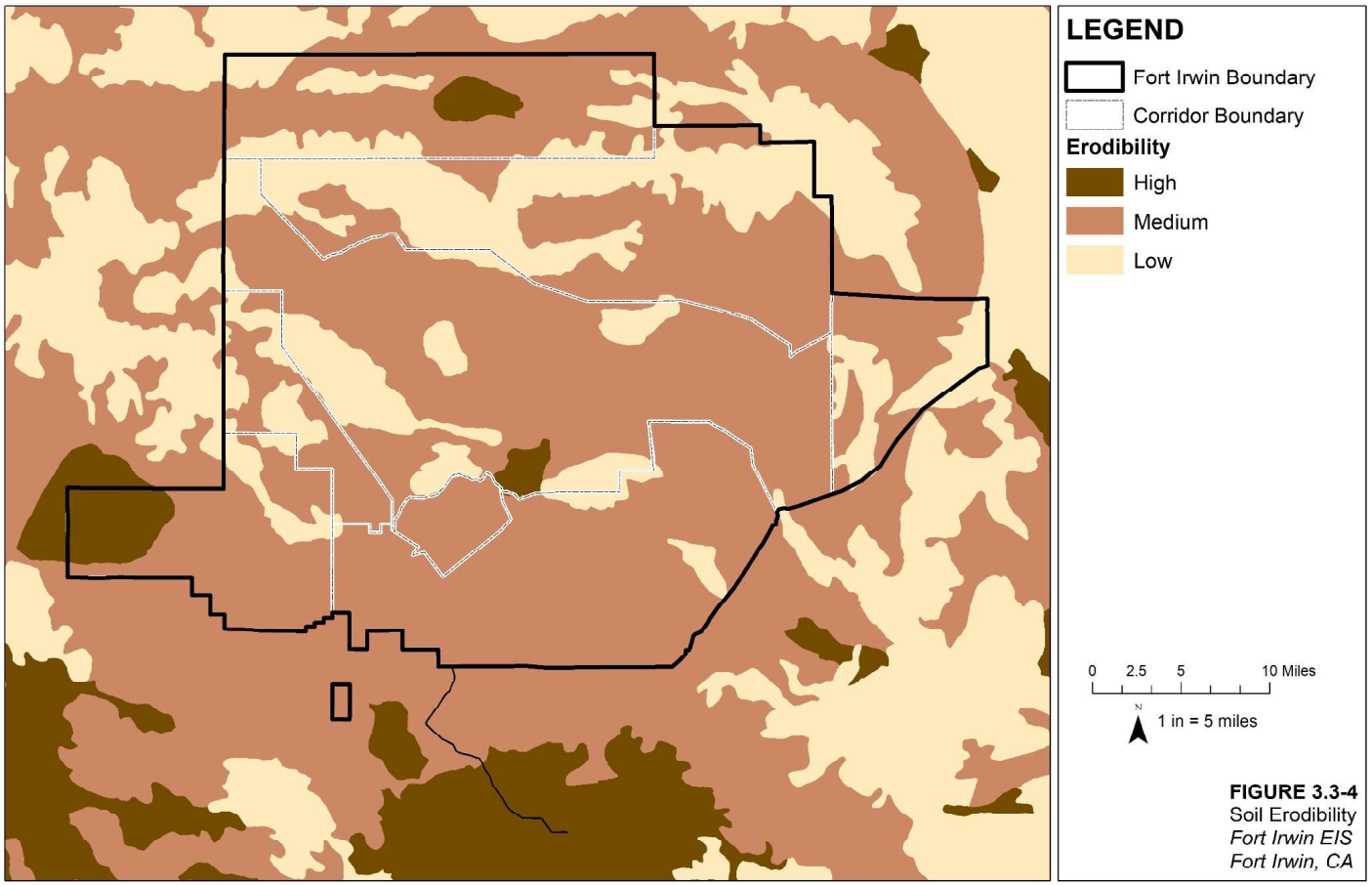


FIGURE 3.3-4
Soil Erodibility
Fort Irwin EIS
Fort Irwin, CA

3.3.4 Seismicity

Figure 3.3-5 shows the faults and earthquake shaking potential on Fort Irwin and in the surrounding areas. "Earthquake Shaking Potential for California" maps were published by the California Geological Survey in 1999 and have been revised following each update of the National Seismic Hazard Maps. The California maps incorporate anticipated amplification of ground motions by local soil conditions and show the relative intensity of ground shaking in California from anticipated future earthquakes. Many of the faults shown are inactive, meaning there is no evidence of earthquake rupture in recent geologic time (latest quaternary, or less than 15,000 years). Some faults have a high shaking potential if they were to rupture, though the probability of rupture is low. Longer, active faults such as the Garlock Fault have a higher probability for large magnitude earthquake events and are flanked in red or purple on Figure 3.3-5 because they have a greater potential for strong ground motion. The Garlock Fault is the most active fault in the Study Area, with an estimated displacement greater than 5 mm per year. The probability of an earthquake event occurring is greatest along this fault zone. The majority of Fort Irwin has low-to-moderate earthquake shaking potential. Sandy washes and springs are often evidence of fault zones. Lines of springs exists through Paradise, Jack, Garlic, and Bitter Springs (Figure 3.3-5); between Two Springs and Leach Spring, north of the Granite Range; and on the east side of the Avawatz Mountains.

3.3.4.1 Northern Corridor

While the Garlock Fault Zone is located in the Leach Lake area of Fort Irwin, just north of the Northern Corridor, the potential for strong ground shaking, categorized as 1.65 to greater than 2.20 percentage of gravity (percent g) earthquake shaking potential (Figure 3.3-5), in the Northern Corridor is relatively low because of the distance from the Garlock Fault Zone. Several unnamed faults are associated with the Granite Mountains Fault Zone and the potential for moderate shaking, categorized as 0.85 to 1.55 percent g earthquake shaking potential, exists in the western portion of the corridor. The Southern Death Valley Fault Zone runs along the northeast corner of the corridor, with limited areas of moderate earthquake shaking potential.

3.3.4.2 Central Corridor

The northeastern portion of the Central Corridor has a low earthquake shaking potential, categorized as lower than 0.05 to 1.45 percent g earthquake shaking potential, compared to the northwestern and southcentral areas of the corridor, where the Goldstone Lake Fault and unnamed faults of the Tiefort Mountains Fault Zone are located and the earthquake shaking potential is moderate.

3.3.4.3 Southern Corridor

The Southern Corridor has less earthquake shaking potential than the Central Corridor, with the exception of a few small areas in the northwestern portion of the corridor where Garlic Spring, Bicycle Lake, and Bitter Spring faults are located. Coyote Lake fault is located near, and running parallel to, the southern boundary of Fort Irwin.

3.3.4.4 Western Training Area

The Western Training Area has low earthquake shaking potential. A small portion of the Goldstone Lake Fault is located along the northeastern boundary.

3.3.4.5 Eastern Training Area

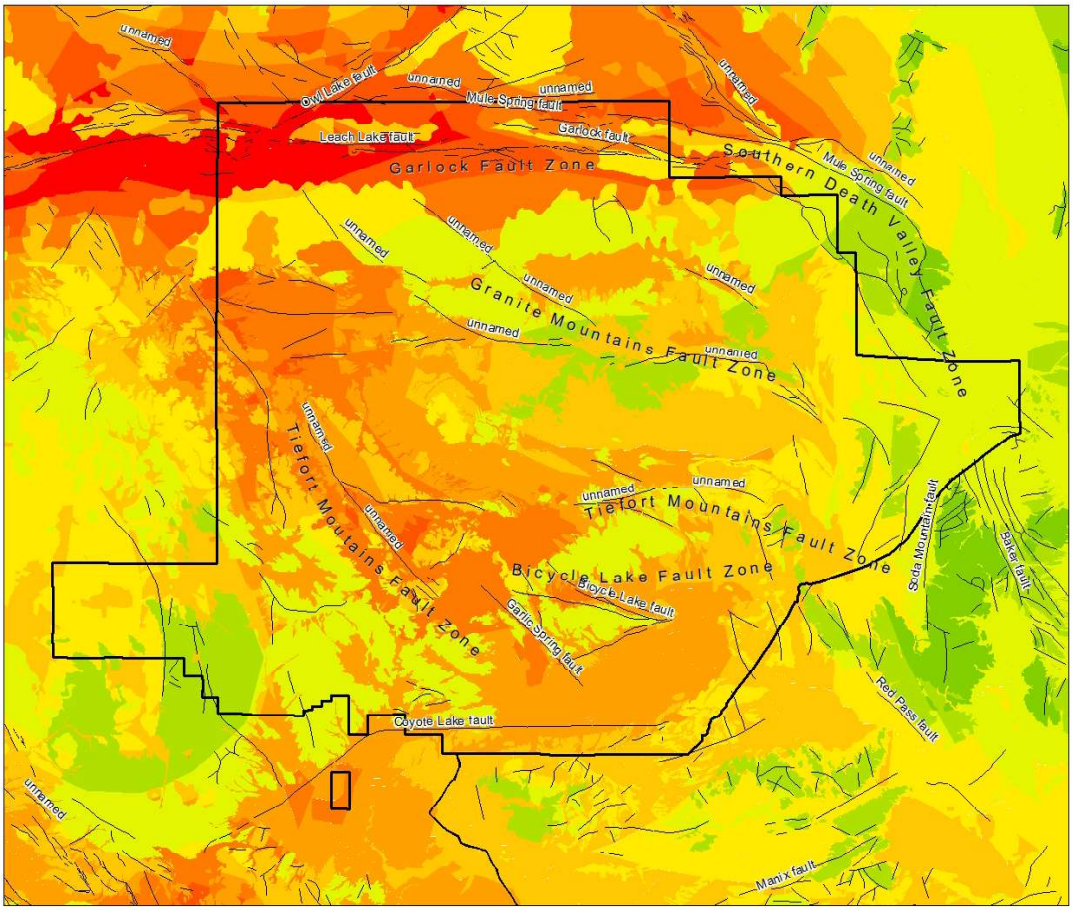
The Eastern Training Area has low earthquake shaking potential. While several unnamed faults are in the western portion of the Eastern Training Area, the shaking potential is low throughout.

3.3.4.6 Range Complex

The Range Complex has low-to-moderate earthquake shaking potential. An unnamed fault runs along the western boundary of the Range Complex and extends to the central portion.

3.3.4.7 Manix Trail

The Manix Fault is located southwest of the Manix Trail; however, this area has low earthquake shaking potential.



LEGEND

Fort Irwin Boundary

Faults

Earthquake Shaking Potential (% gravity)

- 2.15 (highest)
- 2.05
- 1.95
- 1.85
- 1.75
- 1.65
- 1.55
- 1.45
- 1.35
- 1.25
- 1.15
- 1.05
- 0.95
- 0.85
- 0.75
- 0.65
- 0.55
- 0.45
- 0.35
- 0.25
- 0.15
- 0.05 (lowest)

Source: California Open Data, Department of Conservation, CA Geological Survey, "Earthquake Shaking Potential for California" revised 2016

0 2 4 8 Miles

N

1 in = 4 miles

FIGURE 3.3-5
Seismicity
Fort Irwin EIS
Fort Irwin, CA

3.3.5 Paleontology

Paleontological resources are defined as any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust that provide information about the history of life on Earth and are considered nonrenewable scientific resources. Numerous paleontological studies have been conducted on Fort Irwin and the area was mapped for paleontological potential (Fort Irwin, 2005) (refer to Figure 3.3-6). High potential areas are further classified as either "High (A)" based on formations or mappable rock units that are known to contain or have the characteristics to contain significant paleontological resources, or "High (B)" based on topography, mountain mass, and rock type.

3.3.5.1 Northern Corridor

The majority of the Northern Corridor has low potential for paleontological resources. There is a high potential for paleontological resources near the Avawatz Mountains and several areas of unknown potential.

3.3.5.2 Central Corridor

The majority of the Central Corridor has low potential for paleontological resources. There is a high potential for paleontological resources outside the Cantonment Area and Red Pass Lake and several areas of unknown potential.

3.3.5.3 Southern Corridor

The majority of the Southern Corridor has low potential for paleontological resources. There is a high potential for paleontological resources near Bitter Spring and several areas of unknown potential.

3.3.5.4 Western Training Area

The majority of the Western Training Area has low potential for paleontological resources. There is a high potential for paleontological resources around Superior Lake and an area of unknown potential.

3.3.5.5 Eastern Training Area

The majority of the Eastern Training Area has low potential for paleontological resources. There is a high potential for paleontological resources in the southwestern corner of the Eastern Training Area to the east of Red Pass Lake.

3.3.5.6 Range Complex

The majority of the Range Complex has low potential for paleontological resources, though there is an area of unknown potential for paleontological resources and an area of high potential for paleontological resources.

3.3.5.7 Manix Trail

Areas of high and unknown potential for paleontological resources are located along the Manix Trail.

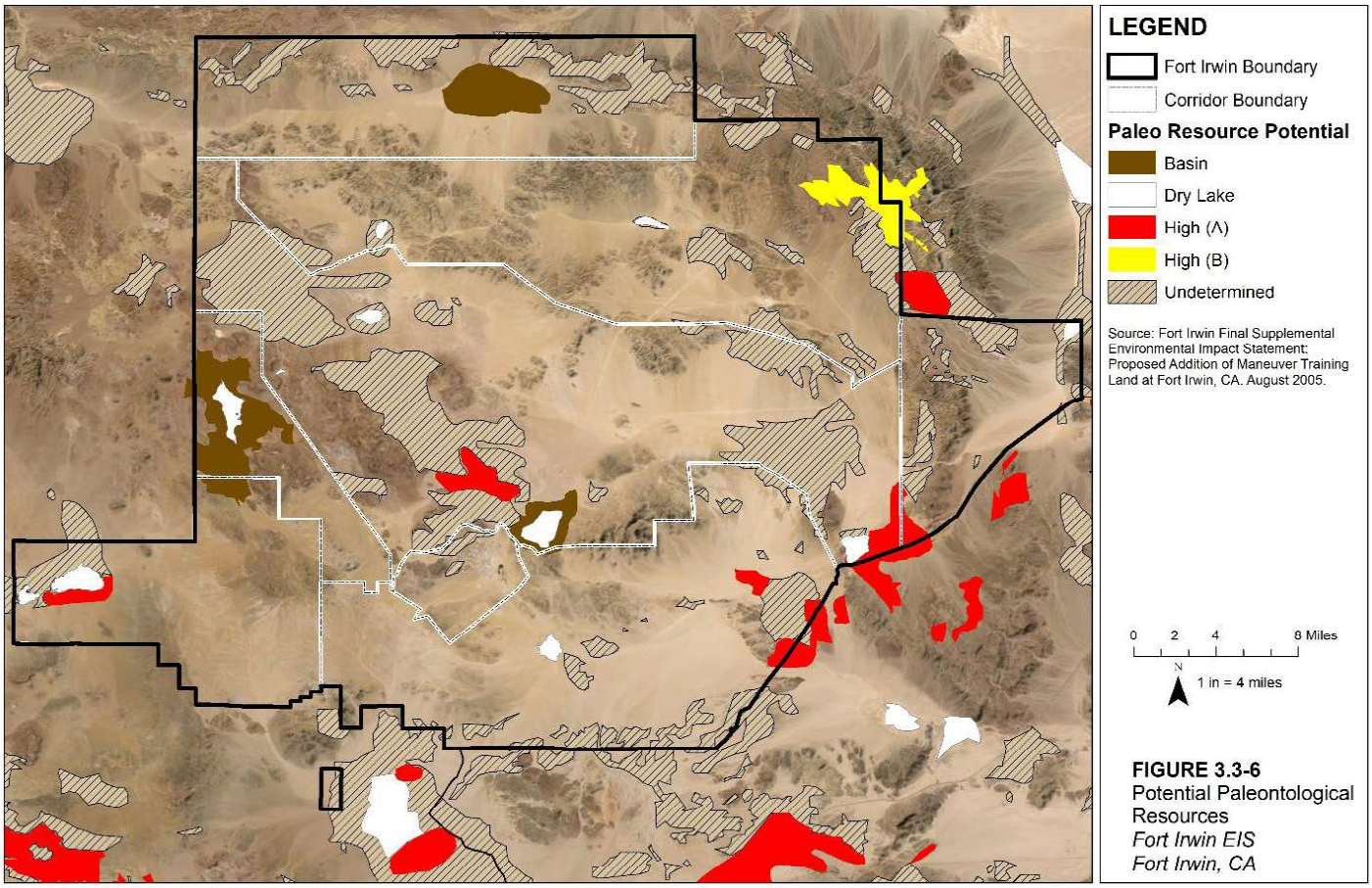


FIGURE 3.3-6
Potential Paleontological Resources
Fort Irwin EIS
Fort Irwin, CA

3.4 Cultural Resources

Cultural resources are tangible objects and intangible events, activities, beliefs, and traditions that helped shape the history of humankind during both the prehistoric and historic eras. Tangible cultural resources include buildings, structures, districts, objects, and sites. Cultural resources on Fort Irwin are generally either part of the built environment or archaeological sites. These types of cultural resources include, but are not limited to, mining resources and townsites, prehistoric and historic-era travel routes such as the Old Spanish Trail, and various locations where raw materials were used to develop flaked stone tools. This section provides information on the applicable cultural resource regulations, types of cultural resources, and the overall cultural resource environment within the ROI.

The ROI for the cultural resources analysis includes all land used by Fort Irwin for training activities and support operations, including the Manix Trail between I-15 and Fort Irwin. The ROI includes approximately 753,537 acres within the western Mojave Desert in San Bernardino County, California. Overall, the ROI is characterized by open desert and rocky hills interspersed with concentrated development. Historically, it has been used since the nineteenth century for ranching, mining, and travel/transportation uses, and since the mid-twentieth century for military purposes. The ROI is also referred to as the Area of Potential Effects (APE) under Section 106 of the NHPA, in accordance with 36 CFR Section 800.4(a)(1) and 36 CFR Section 800.16(d). It includes areas where direct or indirect effects—inclusive of visual, atmospheric, and audible effects—may occur to cultural resources.

Regulations concerning cultural resources include the following:

- **NHPA.** Section 106 of the NHPA requires federal agencies to consider the effect of their undertakings on historic properties (cultural resources listed in, or eligible for listing in, the NRHP) and affords the SHPO, Native American groups, other interested parties, and the ACHP a reasonable opportunity to comment on such undertakings. A detailed explanation of this coordination conducted to date is provided in Appendix 1A. Section 106 of the NHPA is codified 54 U.S.C. Section 306101 and its implementing regulations are at 36 CFR Part 800.

  The criteria used for evaluating the eligibility of historic properties for listing in the NRHP are as follows:

  > *The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association:*
  >
  > *A. that are associated with events that have made a significant contribution to the broad patterns of our history; or*
  >
  > *B. that are associated with the lives of persons significant in our past; or*
  >
  > *C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*
  >
  > *D. that have yielded, or may be likely to yield, information important in prehistory or history.*

- **Native American Graves Protection and Repatriation Act (NAGPRA).** NAGPRA protects human remains, funerary objects, sacred objects, and items of cultural patrimony of indigenous peoples on federal land. Cultural patrimony is defined as group-owned objects having ongoing importance to the group. NAGPRA stipulates priorities for assigning ownership or control of such cultural items excavated or discovered on federal or tribal land, or in the possession and control of an agency that has received federal funding, in accordance with 43 CFR Part 10.

- **Archaeological Resources Protection Act**. This Act provides protection for archaeological resources on public and Native American land from vandalism and other sources of destruction. Under the Act, an archaeological resource means any material remains of past human life or activities that are of archaeological interest. Examples of archaeological resources include, but are not limited to, pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items. The Act typically requires archaeological resources to be at least 100 years of age or older. Section 6 of the statute describes the range of prohibited actions, including damage or defacement, in addition to unpermitted excavation or removal of an archaeological resource. Also prohibited are selling, purchasing, and other trafficking activities, whether within the United States or internationally.
- **Native American Religious Freedom Act** (42 U.S.C. Section 1996). This Act states that the policy of the United States is to protect and preserve for Native Americans their inherent rights of freedom to believe, express, and exercise the traditional religions of the Native American, Eskimo, Aleut, and Native Hawaiians. These rights include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremony and traditional rites.
- **DoD Instruction 4715.16.** This DoD Instruction establishes DoD policy and responsibilities for the integrated management of cultural resources on DoD-managed land. The instruction was updated on 21 November 2017 and states that it is DoD policy to:
  - Manage and maintain cultural resources under DoD control in a sustainable manner through a comprehensive program that considers preservation of historic, archaeological, architectural, and cultural values; is mission supporting; and results in sound and responsible stewardship.
  - Be an international and national leader in stewardship of cultural resources by promoting and interpreting the cultural resources, inspiring DoD personnel, and encouraging and maintaining public support for the military.
  - Consult in good faith with internal and external stakeholders and promote partnerships to manage and maintain cultural resources by developing and fostering positive partnerships with federal, tribal, state, and local government agencies; professional and advocacy organizations; and the general public.
- **Executive Order (EO) 13007, Indian Sacred Sites.** This EO outlines the requirements for the accommodation of sacred sites, which mandate that federal agencies accommodate Indian sacred sites and avoid adversely affecting such sacred sites.
- **AR 200-1.** This regulation covers environmental protection and enhancement; implements federal, state, and local environmental laws and DoD policies; and requires the assessment of impacts of major actions on historic properties before the commencement of those actions.

3.4.1 Types of Cultural Resources

Cultural resources on Fort Irwin primarily consist of prehistoric and historic archaeological resources and buildings and structures, reflective of past land uses and patterns.

Prehistoric cultural resources are physical properties resulting from human activities that predate written records. Associated site types identified on Fort Irwin can be divided into five different resource categories (Army, 2011):

- Simple flaked stone assemblages
- Quarries
- Simple milling equipment

- Distinctive features/artifacts
- Complex features/artifact assemblages

Simple flaked stone assemblages are the most common types of cultural resources on Fort Irwin, consisting of small to medium accumulations of reduction debris and cores. Quarries, which were used for the reduction of raw materials, are distinguished by the occurrence of locally available toolstone with assemblages limited to a narrow range of artifacts, primarily discarded cobble cores, early stage bifaces, and debitage associated with early reduction stages. Milling equipment tends to consist of groundstone used for manos and metates. Complex features reflect a wider range of tasks and tend to be associated with features suggesting habitation or intensive procurement and processing of a resource (Army, 2011). Examples of cultural resources on Fort Irwin that reflect these site types consist of rock shelters, temporary camps, lithic scatters, lithic reduction sites, hearths and stone circles, cobbles and cores, trails, bifaces, flakes, and petroglyphs (defined as an image carved, incised, or etched directly into a rock surface).

Native American cultural resources are sites, areas, and materials important to Native Americans for religious, spiritual, or traditional reasons. No resources of religious and cultural importance (referred to by the National Park Service as Traditional Cultural Properties) to Native American tribes or other cultural groups have been identified on Fort Irwin, but they may be present. Fort Irwin continues to have ongoing conversations with Native American tribes to identify Native American cultural resources, Traditional Cultural Properties, and sacred sites. The land on Fort Irwin has a detailed ethnographic past and was traditionally occupied by the Southern Paiute, Chemehuevi, and the Vanyume. The Southern Paiute and the Chemehuevi, a closely related people, belong to the Southern Numic branch of the Uto-Aztecan language family. The Vanyume, a desert subdivision of the Serrano, are classified as belonging to the Takic linguistic branch, a subdivision of the Uto-Aztecan language family, and are considered to be a part of the Shoshonean or Takic migration into California. Physical places on Fort Irwin were fundamental to their belief systems and include watercourses like Bitter Spring, Jack Spring, and the Mojave River, and the Avawatz, Granite, and Calico Mountains (Earle, 2004).

Historic-era resources consist of physical properties, structures, and items associated with human activities that occurred during or after the contact period between the Spanish and Native Americans and continued until 50 years from the present. On Fort Irwin, historic-era resource categories include trails or transportation-related resources, such as the Old Spanish and Mormon Trail in the eastern part of the installation near Bitter Spring, and resources associated with ranching or homesteading, mining, and military uses and activities. Examples of these cultural resources include debris and structural remnants associated with World War II and later military training; prospect pits and townsites such as Crackerjack Townsite; and trails and roads used to cross the Mojave Desert (Army, 2011).

3.4.2 Cultural Resources Environment and Setting

The following sections provide more information on the overall cultural resource environment, setting, and resource types that are likely to be encountered within the cultural resources ROI.

3.4.2.1 Northern Corridor

The Northern Corridor includes the Granite Mountains, which are characterized by extremely rugged terrain and several dry lake beds, including McLean Lake and Drinkwater Lake. Past archaeological surveys suggest that the Granite Mountains and adjacent bajadas and foothills were sporadically and temporarily visited during the prehistoric and historic periods (PaleoWest Archaeology, 2017). The mountains were used for temporary habitation and storage, and likely hunting and ceremonial purposes, by prehistoric occupants. Historic-era uses included mineral prospecting (PaleoWest Archaeology, 2017). To date, approximately 49 percent of the Northern Corridor has been surveyed for cultural resources. Of this 49 percent, approximately 77 percent covers the areas that are used for

military training and support operations, which excludes off-limits areas and steep, inaccessible mountainous terrain.

Prehistoric sites include desert pavement quarries, which were sources of raw material for making flaked stone tools, and manufacturing areas for stone tools. The largest of these sites encompasses hundreds of acres. Sites displaying a wider range of activities include pottery and groundstone, usually manos and metates. Rockshelters are present in some areas and may have buried deposits, including midden, which is refuse from daily activities. Historic activities include mining, represented by a variety of sites including the townsite of Crackerjack. During the 1880s, Cave Springs was a notable stopover for miners working in the borax industry of nearby Death Valley, and it remained an important stopping point for travelers until highway construction in the late 1920s.

3.4.2.2 Central Corridor

The Central Corridor contains the Tiefort Mountains, Bonanza Mountain, Red Pass, portions of the Avawatz Mountains, and three dry lake beds: Red Pass Lake, Nelson Lake, and Pioneer Lake. Although this corridor has mountainous areas, it is primarily flat and would have been conducive to prehistoric travel. Red Pass is a gap in the Avawatz Mountains adjacent to the Silurian Valley and may have been a noteworthy prehistoric travel corridor, given that petroglyphs (or rock art) have been documented within its vicinity (Army, 2011). The Central Corridor is located near Drinkwater, Devouge, Panther, and No Name Springs, which may have been important prehistoric water sources (Solano Archaeological Services, 2011). Approximately 63 percent of the Central Corridor has been surveyed for cultural resources. Of this 63 percent, approximately 72 percent covers the areas that are used for military training and support operations, which excludes off-limits areas and steep, inaccessible mountainous terrain.

Similar to the Northern Corridor, prehistoric sites include desert pavement quarries, which were sources of raw material for making flaked stone tools, and manufacturing areas for stone tools. The largest of these sites encompasses hundreds of acres. Sites displaying a wider range of activities include pottery and groundstone, usually manos and metates. Petroglyphs are also found in this area. Within the historic period, the Old Spanish Trail and Mormon Road are believed to have passed through this area. Historic mining sites are present in the Central Corridor. Red Pass and Bonanza Mountain were included in the Crackerjack Rush of 1906, a period associated with widespread mining activity in San Bernardino County (Army, 2011). Mining activity produced ore between 1906 and 1914 (Army, 2011).

3.4.2.3 Southern Corridor

The Southern Corridor is south of the Tiefort Mountains. The terrain in this corridor is mostly level and includes the Langford Well basin and dry lake bed, which facilitate travel in the area. Within the Southern Corridor are Jack, Garlic, and Bitter Springs. Vegetation is sparse, consisting primarily of creosote brush, bur sage, needlegrass, and rice grass. During the prehistoric period, animals would have been attracted to these springs and plants around the springs would have served as important food sources (Far Western Anthropological Research Group, Inc., 2006). Approximately 61 percent of the Southern Corridor has been surveyed for cultural resources. Of this 61 percent, approximately 72 percent covers the areas that are used for military training and support operations, which excludes off-limits areas and steep, inaccessible mountainous terrain.

The Southern Corridor is believed to have been crossed by the Mojave Trail, Old Spanish Trail, and Mormon Trail, which is also known as the Mormon Road or Salt Lake Road. These were important overland routes that facilitated exploration and later settlement in southern California (Far Western Anthropological Research Group, Inc., 2006). Locating remnants of these trails on Fort Irwin has been complicated by the presence of later travel routes. Bitter Spring is considered to have been an important rest stop for early pioneers, Spanish explorers, Mormon settlers, and miners during the historic period. Travelers stopped at this spring as they continued westward along the Old Spanish Trail, which encompassed portions of the prehistoric trade routes and ran from Santa Fe to Los Angeles between

1829 and 1848 (Far Western Anthropological Research Group, Inc., 2006). The Old Spanish Trail has previously been recommended as eligible for listing in the NRHP in San Bernardino County and was also designated a National Historic Trail in 2002. The Mormon Trail on Fort Irwin has been recommended as not eligible for listing in the NRHP. In addition, the Old Spanish Trail and the Mormon Trail are registered as California Historical Landmarks Numbers 576 and 577, respectively. On Fort Irwin, no physical evidence associated with the trails has been identified during previous surveys and the trails are considered to be non-contributing segments or non-extant.

3.4.2.4 Western Training Area

The Western Training Area is mostly level, but it features elevated terrain on the eastern side and includes two main dry lake beds, Superior Dry Lake and Inferior Dry Lake. Long, low, flat alluvial fans capped by thin aeolian sand sheets characterize the area. In this type of environment, archaeological materials may be present on the surface or buried in the latest Pleistocene and Holocene depositional environments (Far Western Anthropological Research Group, Inc., 2008). Springs near the Western Training Area include Paradise Springs, Jack Rabbit Spring, and an unnamed spring approximately 2 to 4 miles southeast of the Western Training Area. These springs likely served as important water sources, particularly before approximately 8,000 years ago. Approximately 43 percent of the Western Training Area has been surveyed for cultural resources. This 43 percent includes approximately 81 percent of the areas that would be used for military training and support operations, which excludes off-limits areas and steep, inaccessible mountainous terrain.

Prehistoric resources are often flaked stone sites, including desert pavement quarries where raw materials were obtained. Pottery is present at a few sites and several sites include groundstone (usually portable, but bedrock milling features are known). Rockshelters and petroglyphs also are present. Historic resources include mining features, many of which are associated with the historic townsite of Goldstone. Segments of several historic roads and a few homesteads are present. Historic military sites, including those associated with World War II, are well-represented. Additionally, mining-related features, including stone cabins, fire rings, adits, shafts, quarries, prospect pits, and placer mining areas, have been identified (Far Western Anthropological Research Group, Inc., 2008).

3.4.2.5 Eastern Training Area

The Eastern Training Area was opened to training in 2006. This area, which is just northwest of Silver Lake, is relatively undeveloped and bounded by the steep hillslopes of the Soda Mountains and a southern extension of the Avawatz Mountains. The landforms contain high-relief, fault-block mountain fronts, erosional pediments, broad bajadas of coalesced alluvial fans, and axial washes and basin-bottom dry lake beds. Bitter and Soda Springs were main water sources near the Eastern Training Area. Prehistoric resources have been located on flat areas and terraces adjacent to seasonal washes (Far Western Anthropological Research Group, Inc., 2005). Approximately 44 percent of the Eastern Training Area has been surveyed for cultural resources. Of this 44 percent, approximately 57 percent covers the areas that are used for military training and support operations, which excludes off-limits areas and steep, inaccessible mountainous terrain.

Common prehistoric resources identified in the Eastern Training Area include relatively small quarries, which were sources of raw material for flaked stone tools, and manufacturing areas for flaked stone tools. A few rockshelters have also been documented. The Old Spanish Trail and Mormon Road are believed to have passed through this area, though no preserved segments have been conclusively identified. Also present are rock rings, dugouts, and encampments, which are likely associated with past military activities (Far Western Anthropological Research Group, Inc., 2005). As noted previously, ore-producing mining activity occurred in the Eastern Training Area between approximately 1906 and 1914 (Army, 2011), and historic mining sites have been documented within the Eastern Training Area.

3.4.2.6 Range Complex

The Range Complex is in the Central Corridor, and the resources found there are a subset of those within the Central Corridor. The most common artifacts in the Range Complex are represented by flaked stone debris associated with obtaining raw materials from desert pavement. Stone tools, many of which are likely manufacturing discards, are also present (CH2M, 2018). Approximately 55 percent of the Range Complex has been surveyed for cultural resources. Of this 55 percent, approximately 60 percent covers the areas that are used for military training and support operations, which excludes off-limits areas and steep, inaccessible mountainous terrain.

3.4.2.7 Manix Trail

The Manix Trail is an unpaved trail used to transport ground vehicles and equipment from the Yermo Rail Yard to Fort Irwin. Approximately 71 percent of the Manix Trail has been surveyed for cultural resources. Beginning at the community of Manix, the trail crosses under I-15 and follows old, unpaved roads to Fort Irwin (Geo-Marine, Inc., 2008). Portions of the trail overlap with prehistoric and historic-era trails and roads, including the Old Spanish Trail and Mormon Road. Additionally, the Los Angeles Department of Water and Power Boulder Transmission Line and a segment of the Union Pacific Railroad tracks (near Yermo) are located within and near the trail. Both the transmission line and the railroad are from the historic era.

3.5 Air Quality

Air quality for a given location is defined by ambient air concentrations of specific pollutants of concern related to the health and welfare of the public and the environment. Air quality is influenced by many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The ROI for air quality includes the training areas on Fort Irwin and the surrounding areas that would be potentially affected by emissions from the project. Air quality impacts are also evaluated at the regional level, which includes the Western Mojave Desert Nonattainment Area and the San Bernardino County Nonattainment Area.

3.5.1 Federal Requirements

The primary federal law that regulates ambient air quality is the CAA. Pursuant to the CAA, EPA established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety. The National Ambient Air Quality Standards (NAAQS) provided in 40 CFR Part 50 are the maximum allowable atmospheric concentrations for six criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) and particulate matter equal to or less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead. The NAAQS contain the primary standards to protect public health, including sensitive populations such as asthmatics, children, and the elderly, and secondary standards to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. A summary of the air quality standards is provided in Table 3.5-1.

TABLE 3.5-1
Air Quality Standards
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Pollutant (Averaging Time)	California Ambient Air Quality Standards (CAAQS)[b]	NAAQS[a] Primary[c]	NAAQS[a] Secondary[d]
Ozone (8 hours)	0.070 ppm	0.070 ppm	0.070 ppm
Ozone (1 hour)	0.09 ppm	None	None
PM_{10} (Annual arithmetic mean)	20 µg/m^3	None	None
PM_{10} (24 hours)	50 µg/m^3	150 µg/m^3	150 µg/m^3
$PM_{2.5}$ (Annual arithmetic mean)	12 µg/m^3	12 µg/m^3	15 µg/m^3
$PM_{2.5}$ (24 hours)	None	35 µg/m^3	35 µg/m^3
CO (8 hours)	9.0 ppm	9 ppm	None
CO (1 hour)	20 ppm	35 ppm	None
NO_2 (Annual arithmetic mean)	0.03 ppm	0.053 ppm	0.053 ppm
NO_2 (1 hour)	0.18 ppm	0.100 ppm	None
SO_2 (24 hours)	0.04 ppm	None	None
SO_2 (3 hours)	None	None	0.5 ppm
SO_2 (3 hours)	0.25 ppm	0.075 ppm[e]	None
Lead[f] (Calendar quarter)	None	1.5 µg/m^3 (certain areas)	1.5 µg/m^3
Lead[f] (Rolling 3-month average)	None	0.15 µg/m^3	None
Lead[f] (30-day average)	1.5 µg/m^3	None	None
Visibility-reducing Particles (8 hours)	extinction of 0.23 per kilometer [g]	None	None

Pollutant (Averaging Time)	California Ambient Air Quality Standards (CAAQS)[b]	NAAQS[a] Primary[c]	NAAQS[a] Secondary[d]
Sulfates (24 hours)	25 µg/m^3	None	None
Hydrogen Sulfide (1 hour)	0.03 ppm	None	None
Vinyl Chloride[f] (24 hours)	0.01 ppm	None	None

Source: California Air Resources Board (CARB), 2016.

[a] NAAQS other than O_3, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, is equal to or less than the standard.

[b] CAAQS for O_3, CO (except Lake Tahoe), SO_2 (1 hour and 24 hour), NO_2, and suspended particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded.

[c] NAAQS Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d] NAAQS Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[e] Final rule signed 02 June 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 parts per billion.

[f] CARB has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects determined. CARB made this determination following the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[g] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basin standards, respectively.

µg/m^3 = microgram(s) per cubic meter
ppm = part(s) per million (by volume)

EPA classifies areas as being in attainment or nonattainment with the NAAQS for each criteria pollutant. A region that meets the NAAQS for a pollutant is designated as being in “attainment” for that pollutant. If the region does not meet the NAAQS for a pollutant, it is designated as being in “nonattainment” for that pollutant. A “maintenance area” is an area that was previously designated as a nonattainment area but has recently met the standard and has been reclassified by EPA as "attainment with a maintenance plan.”

The 1977 CAA amendment requires each state to develop and maintain a State Implementation Plan (SIP) for each nonattainment criteria pollutant. The SIP serves as a tool to help avoid and minimize emissions of nonattainment criteria pollutants and their precursor pollutants to achieve compliance with the NAAQS. The 1990 CAA amendment strengthened the regulation of stationary and mobile emission sources.

The General Conformity Rule was established under CAA Section 176(c)(4) to ensure that actions taken by federal agencies in NAAQS nonattainment and maintenance areas do not interfere with a state’s plans for bringing these areas back into attainment with the air quality standards. The General Conformity Rule requires federal agencies to consider emissions from all activities associated with the proposed federal action, including new or modified stationary, mobile, and fugitive emission sources. The requirements of the General Conformity Rule do not apply to federal actions in NAAQS attainment areas. The purpose of the rule is to ensure that federal actions do not cause or contribute to:

- New violations of the NAAQS
- Worsening of existing violations of the NAAQS
- Delays in attaining the NAAQS

A general conformity assessment begins with an applicability analysis that includes screening for exemptions, and if needed, an estimate of air emissions that would be generated by the Proposed Actions compared to the *de minimis* threshold levels defined in the rule. If the total net emissions increase for any nonattainment, maintenance, or precursor pollutant associated with the proposed project would exceed any of the applicable general conformity *de minimis* levels, additional general conformity analysis and a formal conformity determination would be required prior to federal approval of the Proposed Actions. An action is exempt from further general conformity analysis (i.e., the action is assumed to conform) if the total net project-related emissions increases (construction and operation) would be less than the applicable *de minimis* thresholds listed in 40 CFR Section 93.153(b).

In addition to the criteria pollutants, EPA also regulates emissions of hazardous air pollutants (HAPs). HAPs or air toxic emissions are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Controlling air toxic emissions became a national priority with the passage of the CAA amendments in 1990, when the U.S. Congress mandated that EPA regulate 188 air toxics. EPA enforces the National Emission Standards for Hazardous Air Pollutants to regulate HAPs at major emission sources to protect the public health, with an ample margin of safety, and to prevent significant adverse environmental effects. For mobile sources, EPA has assessed the 188 HAPs listed in the Control of Hazardous Air Pollutants from Mobile Sources (*Federal Register*, Vol. 72, No. 37, page 8430, 26 February 2007). EPA has identified the high priority mobile source air toxics pollutants with significant emission contributions from mobile sources, which are among the national- and regional-scale cancer risk drivers in the 1999 National Air Toxics Assessment. The control of HAPs from mobile sources requires controls to dramatically decrease mobile source air toxics emissions, for example, by using cleaner fuels and cleaner engines.

3.5.2 State Requirements

The California Air Resources Board (CARB) oversees California air quality policies and regulations. The California Ambient Air Quality Standards (CAAQS) were first established in 1969 pursuant to the Mulford-Carrell Act. The standards are generally more stringent than the NAAQS and include the NAAQS pollutants and four additional pollutants: sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particulates. Relevant CAAQS are listed in Table 3.5-1.

The California CAA, which was approved in 1988, requires each local air district in which ambient concentrations violate the CAAQS to prepare an air quality management plan to achieve compliance with the CAAQS as a part of the SIP. CARB has ultimate responsibility for the SIP for nonattainment pollutants but relies on each local air district to adopt mandatory statewide programs and provide additional strategies tailored for sources under their jurisdiction. The SIPs are a compilation of new and previously submitted plans, programs (e.g., monitoring, modeling, and permitting), district rules, State regulations, and federal controls. Local air districts and other agencies prepare SIP elements and submit them to CARB for approval. CARB forwards SIP revisions to EPA for approval and publication in the *Federal Register*.

3.5.3 Local Requirements

As part of its planning responsibilities, the local air district prepares the air quality management plan based on the attainment status of the air basins within its jurisdiction. The air districts are also responsible for permitting and controlling stationary source criteria and air toxic pollutants as delegated by EPA.

Fort Irwin is located in San Bernardino County in the Mojave Desert Air Basin under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). MDAQMD is responsible for planning, implementing, and enforcing federal and State ambient standards in its jurisdiction. The project is subject to the requirements of MDAQMD rules, which include Rules 403 and 403.2 for fugitive dust control requirements.

3.5.4 Climate Change and Greenhouse Gas Emissions

EOs 13990 and 14008 require federal agencies to consider the impacts of climate change. The Army issued the policy *Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in Army National Environmental Policy Act Reviews* (Army, 2021) to provide guidance on the inclusion of greenhouse gas (GHG) emissions and climate change, as well as social costs, as part of the environmental baseline for NEPA analyses prepared in accordance with 32 CFR Part 651, *Environmental Analysis of Army Actions*. GHGs are compounds that may contribute to accelerated climate change by altering the thermodynamic properties of the Earth's atmosphere. GHGs consist of carbon dioxide, methane, nitrous oxide, and fluorinated gases (EPA, 2021). Activities on Fort Irwin such as training activities generate GHG emissions. GHG emissions are associated with RTUs traveling to and from Fort Irwin and their home stations. RTUs consume energy for shelter and sustenance that generates GHG emissions while at NTC. During training, the operation of military equipment, including aircraft, produce GHG emissions. Training infrastructure requires minimal energy and water, as the structures are designed to replicate the austere desert environment. The annual emissions from RTU training events are part of the baseline emissions for the NTC.

Current projections for the Mojave Desert estimate an increase of 3.4 to 5.4 degrees Celsius by 2100 (Cal-Adapt, 2020). Discussions regarding the effect of climate change on Fort Irwin's biological resources and health and safety are provided in Sections 3.1 and 3.10.

3.5.5 Existing Conditions

3.5.5.1 Attainment Status

Fort Irwin is in San Bernardino County, which is in NAAQS nonattainment for PM_{10}. The Mojave Desert tends to have high particulate matter concentrations that are typically the result of wind erosion from exposed or disturbed land areas. There is no approved PM_{10} attainment plan for the region.

The Western Mojave Desert Area, which includes the southern portion of Fort Irwin, is also in NAAQS nonattainment for O_3. The *MDAQMD Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area)* (MDAQMD, 2017) provides a framework for attaining the ozone standard by 2026 (CARB, 2018). Climate change may intensify the photochemical reactions that produce ground-level ozone and $PM_{2.5}$; however, most of the training occurs in the Mojave Desert Air Basin, which is in attainment for these pollutants.

Fort Irwin is in attainment for all other NAAQS criteria pollutants; however, because Fort Irwin is located in a federal nonattainment area for PM_{10} and O_3, it is subject to general conformity requirements.

3.6 Noise

Noise is usually defined as unwanted or undesirable sound that interferes with speech and hearing or is annoying and disruptive to human activities. Excessive noise may cause hearing loss, interfere with human activities, or otherwise affect health and well-being. This section describes existing conditions with regard to noise for the human environment. The effects of noise on wildlife are discussed under Section 4.1, *Biological Resources*.

This section describes noise terminology, noise regulations, and the noise environment within the ROI. The ROI for the noise analysis includes Fort Irwin and approximately 20 miles from the boundary of Fort Irwin in all directions, including the Manix Trail south of Fort Irwin to I-15 (Figure 3.6-1). The ROI includes the Fort Irwin Cantonment Area, as well as a number of other noise-sensitive land uses (Section 3.6.3, *Noise-Sensitive Land Uses*). The Study Area is characterized by open desert and rocky hills interspersed with concentrated development in the established communities.

3.6.1 Noise Terminology

The decibel (dB) is the standard unit for measuring sound. When describing sound and its effect on a human population, A-weighted (dBA) sound pressure levels are typically used. The "A-weighted" decibels reflect the way the human ear perceives typical environmental sounds. Table 3.6-1 provides typical A-weighted sound pressure levels for various common noise sources.

TABLE 3.6-1
Typical Noise Sound Pressure Levels
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Source	Sound Pressure Level (dBA)
Gas Lawn Mower at 3 feet	96
Fixed-wing Aircraft at 1,000 feet	96
Rotary-wing Aircraft at 200 feet	92
Driving Tank at 100 feet	84
Vacuum Cleaner at 19 feet	70
Heavy Traffic at 300 feet	60
Rotary Aircraft at 3,000 feet	60
Fixed-wing Aircraft at 10,000 feet	55
Quiet urban daytime	50
Quiet rural nighttime	25

Source: Caltrans, 2013; Fort Irwin, 2005, 2008

A common method to rate time-varying noise is the "equivalent-continuous sound pressure level." The peak pressure level assessments rely on specialized, ultra-fast detectors for measuring impulsive noise, such as weapons fire. Peak decibel units are abbreviated "dBP."

Human response to sound is not only a function of the maximum sound, but also the duration and temporal variation. As such, the "Day-Night average sound pressure Level" (DNL) was developed to evaluate noise exposure over a 24-hour period. The DNL metric applies a 10-dB "penalty" to nighttime noise from 10 p.m. to 7 a.m. and then averages the total acoustic energy over a 24-hour period. The nighttime 10-dB weighting is used to account for the increased sensitivity to nighttime noise that would be expected in a community.

Sound levels decrease with increasing distance. From a point source noise generator, the noise is reduced by 6 dBA with each doubling of distance. For example, a noise level of 100 dBA at 50 feet would be reduced to 94 dBA at 100 feet and 88 dBA at 200 feet. Terrain, vegetation, and buildings or other structures also reduce the noise between the source and the receptor. The amount of reduction varies depending on the type and size of the obstacle (Federal Transit Administration, 2018).

3.6.2 Noise Guidelines

Noise impacts are determined based on potential new and increased noise levels on noise-sensitive land uses. Noise-sensitive land uses are locations where unwanted sound would adversely affect the designated use, such as residential areas, hospitals, places of worship, libraries, schools, historic districts, and preservations areas. Several laws and regulations help protect receptors in identified sensitive land uses from noise effects. Specifically, the Army has established an Environmental Noise Management Program and developed a set of regulations in AR 200-1, Environmental Protection and Enhancement, which provides guidelines to reduce noise effects on sensitive land use areas. Additionally, Fort Irwin has developed an installation-specific Noise Management Plan. The noise limits for noise-sensitive land uses are summarized in Table 3.6-2.

TABLE 3.6-2
Noise Guidelines
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

LUPZ	Aircraft DNL Noise Limits (dB)	Impulse CDNL Noise Limits (dB)	Small Arms Noise Limits (dB)
LUPZ I: Noise-sensitive land uses such as residential areas and schools	< 65	< 62	< 87
LUPZ II: Land use accepting of some noise	65–75	62–70	87–104
LUPZ III: Land use tolerant of substantial noise	> 75	> 70	> 104

Source: AR 200-1, Environmental Protection and Enhancement

CDNL = C-weighted day-night sound level

LUPZ = Land Use Planning Zone

3.6.3 Noise-Sensitive Land Uses

The following is an explanation of the noise-sensitive land uses on and around Fort Irwin.

3.6.3.1 Onsite Noise-Sensitive Land Uses

Fort Irwin Cantonment Area: Absent the military training noise, the noise environment in the Cantonment Area is comparable to that of a moderate-sized urban area and manmade noise is present at all times. Sensitive land uses within the Cantonment Area include housing for personnel and family, medical facilities, chapels, schools, and daycares. Housing, schools, and daycares are generally located in the western portion of the Cantonment Area. Medical facilities and chapels, along with Mission support facilities, are located in the central portion of the Cantonment Area. The eastern portion of the developed Cantonment Area generally consists of industrial-type Mission support facilities and lacks sensitive receptors.

NASA Goldstone Complex: The NASA Goldstone Complex contains a series of highly sensitive radio telescopes used to receive communications from various NASA spacecraft across the solar system. The NASA Goldstone Complex typically experiences noise levels comparable to rural human development. The NASA Goldstone Complex experiences noise from training events in the Western Training Area and the Central Corridor, as well as noise from training activities on the adjacent NAWS China Lake range to the west.

3.6.3.2 Offsite Noise-Sensitive Land Uses

Small Unincorporated Communities: Daggett, Harvard, Hinkley, Manix, Baker, and Yermo are small unincorporated communities along I-15 or I-40 and one or more rail lines (California Hometown Locator, 2019a). These communities are at least 10 miles from the boundary of Fort Irwin and, therefore, within the ROI for noise. The St. Anthony's Coptic Orthodox Monastery is approximately 7 miles south of the southern boundary of Fort Irwin. Given the natural dissipation of noise, it is uncommon for these communities to experience noise from Fort Irwin, although the community of Baker occasionally experiences noise from Fort Irwin.

Barstow: Barstow is a small city of approximately 24,000 individuals (California Hometown Locator, 2019b). Areas in proximity to interstates or rail lines would typically experience a noise environment dominated by those sources. Most other parts of the city would experience typical urban sound levels, and areas near the periphery of the city would have a noise environment comparable to a typical rural area. The Marine Corps firing range at Marine Corps Logistics Base Barstow would produce noise audible in the southeastern portion of Barstow. Barstow is unlikely to experience noise from Fort Irwin, given its distance from the installation.

Death Valley National Park: Death Valley National Park is generally undeveloped, and the noise environment is typical of the natural desert, lacking most manmade noise sources. Noise from nearby military installations, including NAWS China Lake and Fort Irwin, may be audible in Death Valley National Park; however, the hiking trails, campground lodging, and picnic areas are located more than 20 miles north of the Fort Irwin property boundary.

Grass Valley Wilderness Area: The Grass Valley Wilderness Area is bordered by NAWS China Lake on the east, north, and west. Activities in the Grass Valley Wilderness Area consist of dispersed camping. While the Grass Valley Wilderness area is undeveloped desert, the noise environment is dominated by training activities at NAWS China Lake.

Soda Mountain Wilderness Area: The Soda Mountain Wilderness Area is southeast of Fort Irwin and north of I-15. Noise generated from training activities in the southeastern portion of Fort Irwin may be audible in the Soda Mountain Wilderness Area.

Avawatz Mountain Wilderness Area: The Avawatz Mountain Wilderness Area abuts the northeastern boundary of Fort Irwin. Noise generated from training activities in the northeastern portion of Fort Irwin is audible in the Avawatz Mountain Wilderness Area.

NAWS China Lake: This military range has a noise environment dominated by military overflights and the detonation of various explosive munitions during training events. When training is not occurring, the noise environment is typical of the natural desert. NAWS China Lake shares a boundary with Fort Irwin and noise from training activities on each installation would be audible on the other. NAWS China Lake base housing is more than 40 miles west of Fort Irwin and not part of the ROI.

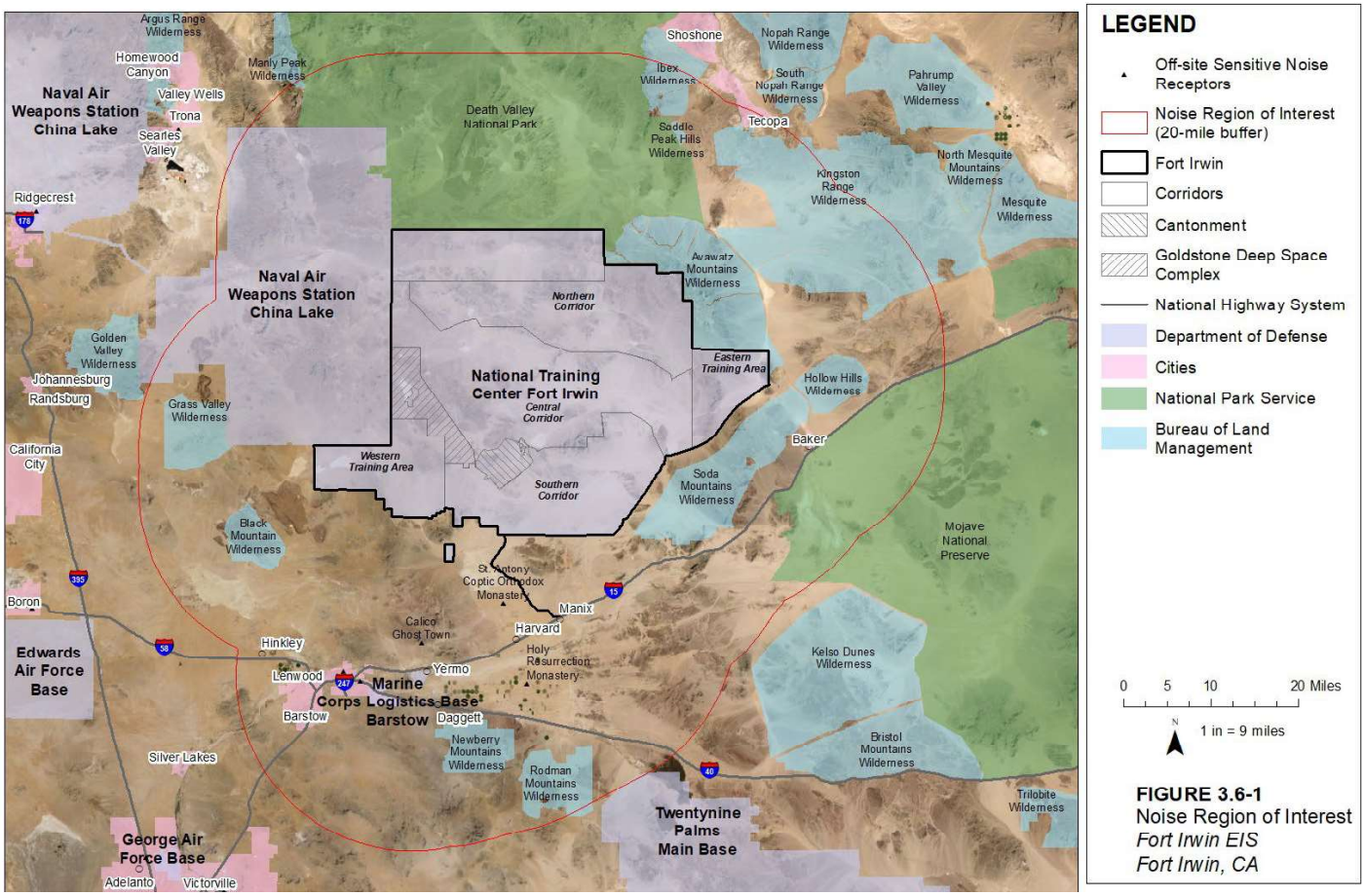


FIGURE 3.6-1
Noise Region of Interest
Fort Irwin EIS
Fort Irwin, CA

3.6.4 Current Noise Environment

The current noise environment within the corridors, training areas, and Range Complex and along Manix Trail are described in the following sections. Figure 3.6-2, located at the end of this section, depicts the current land use planning zones (LUPZs) on the installation.

3.6.4.1 Northern Corridor

The noise environment in the Northern Corridor is dominated by training activities, including the firing of the full range of military munitions, and military overflights. The Northern Corridor is subject to the most intense noise environment resulting from weapons systems, which average 70 dB during rotations, because the majority of the live-fire targetry is in the Northern Corridor. When training is not occurring, the area lacks most manmade sound sources and the noise environment is typical of the natural desert.

While there are no noise-sensitive receptors in the Northern Corridor, recreational users of the southern portion of Death Valley National Park can perceive the noise from training activities in the Northern Corridor, though this noise is below harmful noise thresholds (Figure 3.6-2). This noise could be an annoyance to those users, but users of this portion of Death Valley National Park enter that area with knowledge of its proximity to the active military ranges at both the NTC and NAWS China Lake. Therefore, the noise from adjacent military training areas is an expected component to users of this area.

From the Northern Corridor, it is more than 15 miles to the nearest sensitive receptor on Fort Irwin, more than 30 miles to the nearest sensitive receptors outside the installation (persons in Baker and the St. Anthony's Coptic Orthodox Monastery), and more than 45 miles to Barstow. These sensitive receptors could perceive the noise from military training in the Northern Corridor under certain atmospheric conditions, with the frequency of perception decreasing with distance.

3.6.4.2 Central Corridor

The noise in the Central Corridor is less than that of the Northern Corridor. Typically, during training events in the Central Corridor, munitions firing occurs less than in the Northern Corridor because the focus is full maneuver training, with more emphasis on movement and logistics. However, the training exercises include the firing of the full range of military munitions and aircraft overflights, though to a lesser extent than in the Northern Corridor. Because the Central Corridor is larger than the Northern Corridor, training noise is more dispersed across the landscape.

No sensitive receptors are located in the Central Corridor, but it is closer to the Cantonment Area and off-installation sensitive receptors with less intervening terrain than the Northern Corridor, so the training noise is louder and more frequently perceptible than training noise from the Northern Corridor. It is unlikely that recreationalists in Death Valley National Park would experience noise from the Central Corridor.

3.6.4.3 Southern Corridor

The noise environment in the Southern Corridor is comparable to that of the Central Corridor, because the focus of training is the same in both corridors.

No sensitive receptors are located in the Southern Corridor. The Southern Corridor is as close to the Cantonment Area and Baker area as the Central Corridor, and closer to Barstow and St. Anthony's Coptic Orthodox Monastery. Training noise from the Southern Corridor would be louder and more frequently perceptible than training noise from the Central Corridor, but it does not change the LUPZ I designation. St. Anthony's Coptic Orthodox Monastery, which is more than 9 miles from where training occurs in the Southern Corridor, is the closest off-installation sensitive receptor.

3.6.4.4 Western Training Area

No maneuver training currently occurs in the Western Training Area; however, there are aircraft overflights of the Western Training Area associated with training in other locations on the NTC and at NAWS China Lake. When overflights occur, the aircraft noise is the predominant sound in the noise environment.

3.6.4.5 Eastern Training Area

The noise environment in the Eastern Training Area is comparable to that of the Central Corridor, because the focus of training is the same as for the Central Corridor.

No sensitive receptors are in the Eastern Training Area. Workers at the active mineral mine in the Eastern Training Area are exposed to noise from training activities in the Eastern Training Area. With the exception of aircraft overflights, noise within the active mineral mine is comparable to noise generated by training activities, because heavy equipment and explosives are used in the mining activities. Workers in the mining facility are required to wear hearing protection in the performance of their jobs and this hearing protection would prevent physical damage from hearing noise caused by military training.

The Eastern Training Area is closer to Baker than any of the other training areas. The Eastern Training Area is farther from the Cantonment Area, Barstow, and St. Anthony's Coptic Orthodox Monastery than any of the other training areas. Training noise from the Eastern Training Area would be louder and more frequently perceptible in Baker than other training-related noise but would not change the LUPZ I designation.

3.6.4.6 Range Complex

Noise in the Range Complex is dominated by military training activities when the ranges are in use. When the ranges are not in use, the noise environment is comparable to the natural desert, although noise from the Cantonment Area would be audible in the eastern parts of the Range Complex and noise from training activities in the Central Corridor would be audible throughout. The nearest sensitive receptors to the Range Complex are the schools, as well as the housing areas in the western portion of the Cantonment Area, which are about 2,600 feet from the nearest small caliber range. Small caliber arms used at the ranges produce up to 140 dbP at 105 feet and large caliber arms (155-mm Howitzer) produce up to 126 dbP at 1,640 feet. Zone II noise contours for small and large caliber arms are less than 2 miles from the source and do not extend into the Cantonment Area (Fort Irwin, 2005).

3.6.4.7 Manix Trail

The noise environment on the Manix Trail between the Fort Irwin boundary and I-15 is comparable to natural desert, except when military equipment is being moved, which creates a noise environment comparable to a busy road. Multiple moving military vehicles in a convoy generate noise of approximately 87 dBA at 100 feet (Fort Irwin, 2005). The aircraft DNL for convoy movement is reduced with distance to 54 dBA at 6,400 feet (1.2 miles). The closest occupied structures to the Manix Trail south of Fort Irwin are more than 1.3 miles from the trail, based on measurements from Google Earth aerial imagery dated December 2016. The St. Anthony's Coptic Orthodox Monastery, which is the nearest sensitive receptor, is 2.5 miles from the trail.

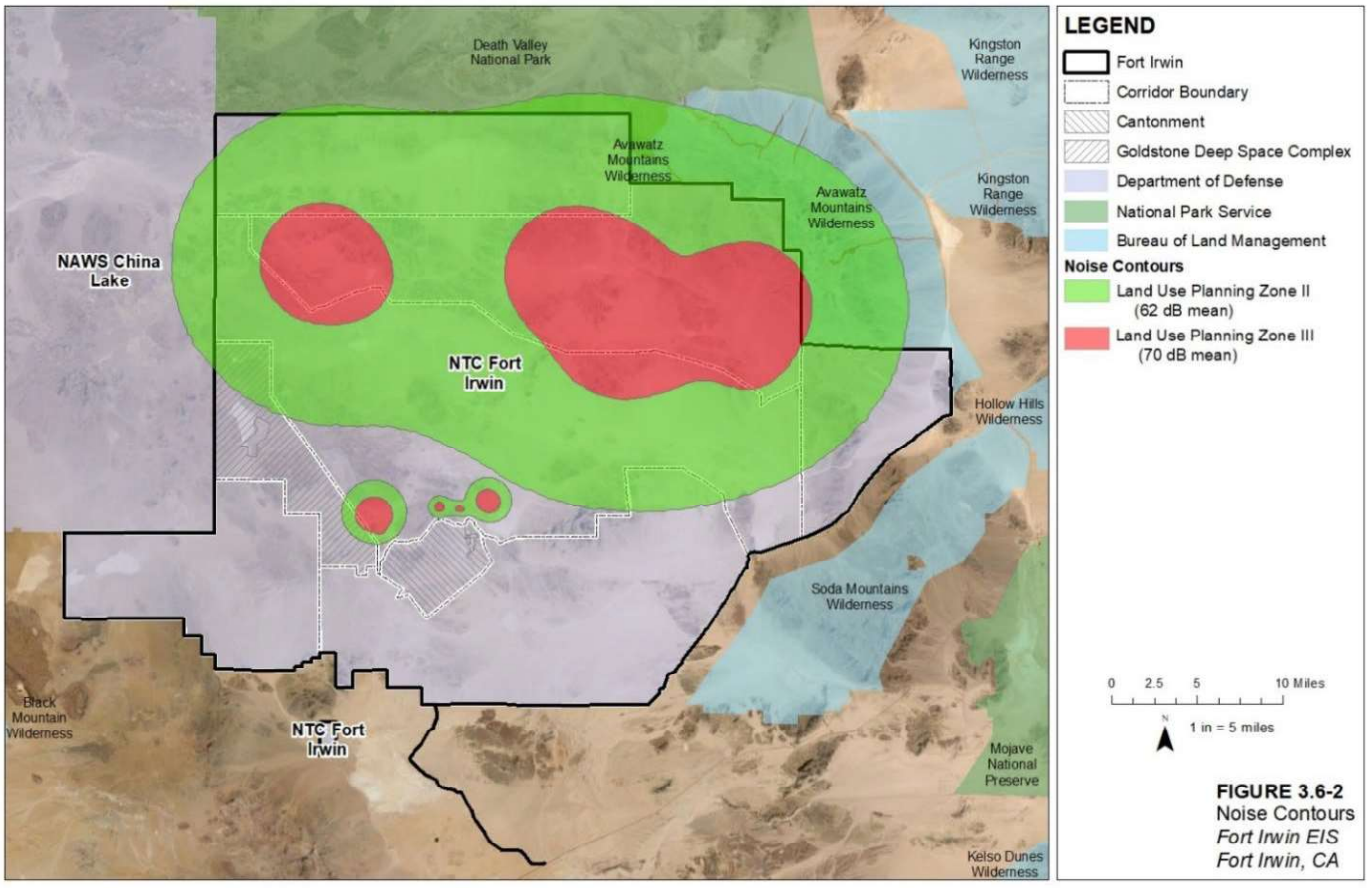


FIGURE 3.6-2
Noise Contours
Fort Irwin EIS
Fort Irwin, CA

3.7 Utilities

This section describes the existing utilities on Fort Irwin, including water treatment, water distribution, wastewater, recycled water, stormwater, energy, communications, and solid waste management. The ROI for utilities is the Fort Irwin property boundary, the Manix Trail, and the service area of any outside utilities providing services to Fort Irwin.

3.7.1 Regulatory Setting

CWA. The CWA (33 U.S.C. Sections 1251 et seq.) is the primary law regulating water pollution in surface waters. It mandates the NPDES program, which regulates the discharge of water pollution and requires a permit for any discharge of pollutants into "waters of the United States." Under the NPDES program, stormwater management regulations impose specific best management practices (BMPs) for the design and construction of facilities. If the water body is not a water of the United States, the State (in this case, California) has authority under the Porter-Cologne Water Quality Control Act enacted in 1969.

Safe Drinking Water Act. The Safe Drinking Water Act (40 U.S.C. Sections 100 et seq.) directs the EPA to develop national drinking water regulations for public water systems and directs states to establish programs that protect areas around wellheads. The 1996 amendments establish a strong emphasis on source water protection and enhanced water system management.

Energy Policy Act. Energy Policy Act of 2005 (42 U.S.C. Section 15801 and Sections 13201 et seq.) addresses energy production in the United States with the following categories: (1) energy efficiency; (2) renewable energy; (3) oil and gas; (4) coal; (5) Tribal energy; (6) nuclear matters and security; (7) vehicles and motor fuels, including ethanol; (8) hydrogen; (9) electricity; (10) energy tax incentives; (11) hydropower and geothermal energy; and (12) climate change technology.

National Energy Conservation Policy Act. This Act (42 U.S.C. Section 8251) addresses energy supply and demand in the United States.

3.7.2 Water Treatment and Distribution

The water supply for Fort Irwin is groundwater extracted through eight wells: two wells in the Bicycle Lake Basin, four wells in the Langford Lake Basin, and two wells in the Irwin Basin. The groundwater is treated at the Fort Irwin water treatment plant (WTP), which is adjacent to, and west of, the Cantonment Area. The Fort Irwin WTP was completed in 2016, has a design capacity of 6 million gallons per day (mgd), and uses an electrodialysis reversal process to reduce and/or remove arsenic, fluoride, nitrates, and total dissolved solids from the groundwater (California RWQCB, Lahontan Region, 2015).

Four storage tanks with a total capacity of 4 million gallons serve the potable water system. The annual average demand for water typically ranges from 2 mgd to slightly over 3 mgd. The water storage capacity on Fort Irwin is adequate for the level of development on the installation. The storage tanks, which are located along Goldstone Road, provide sufficient water pressure throughout the distribution system (Fort Irwin, 2017b).

The water distribution system serves the Cantonment Area. Potable water is supplied to the rest of the training areas by tanker truck or is carried by personnel.

3.7.3 Waste and Recycled Water

The WWTP on Fort Irwin is southeast of the Cantonment Area. The WWTP is permitted to treat 2 mgd of wastewater, with a peak discharge of 4 mgd (California RWQCB, Lahontan Region, 2004). Historical flow data at the Fort Irwin WWTP indicate that the average daily flow is 0.98 mgd and the maximum average flow is 1.31 mgd (Fort Irwin, 2017b).

Domestic wastewater from Fort Irwin is treated initially at the WWTP and then treated further at a tertiary treatment plant near the WWTP. The tertiary treatment plant treats wastewater effluent from the WWTP to the standards required for use as recycled water for irrigation and other non-potable uses. Recycled water is used mainly to irrigate the green spaces in the Cantonment Area and for dust control and construction purposes. Wastewater and recycled water is managed in accordance with Lahontan Board Orders R6V-2004-0005 and R6V-2004-0005-A 1 (California RWQCB, Lahontan Region, 2004, 2012).

Wastewater service in the training areas is provided by portable restrooms. Waste from the portable restrooms is transported to the WWTP for disposal.

3.7.4 Stormwater

Fort Irwin has stormwater infrastructure primarily within the Tiefort City area and the Cantonment Area, because these two areas have enough impervious surface to potentially cause localized flooding. Numerous structures, such as earthen berms, channels, and debris basins, have been constructed to control stormwater within the Tiefort City area and the Cantonment Area. Annual maintenance of the stormwater control features is required, especially after large rain events (USACE, 2014a).

3.7.5 Energy

Southern California Edison owns the electrical system on Fort Irwin and is responsible for ensuring that adequate electrical capacity and service are available for current and future needs on the installation. The overhead electrical transmission line to the offsite provider is located alongside Fort Irwin Road, away from active training areas.

Fort Irwin uses liquefied petroleum gas (LPG) as its energy source for space heating and hot water. LPG is obtained from commercial providers and is conveyed by truck to the installation. On the installation, LPG is stored in tanks for distribution to end users. There is an average of 195 propane deliveries to Fort Irwin annually.

3.7.6 Communication

A public telephone service company provides facilities and equipment for public and family housing areas in the Cantonment Area. Approximately 350 miles of cable, consisting of 2,300 paired lines for local and commercial use, serve the installation (Fort Irwin, 2017b). Figure 2-3 shows the location of the telecommunication towers and FON. The quantities of towers and FON within each training area are summarized in Section 2.1.1.1, *Training Areas*, and as follows:

- Northern Corridor has 4 telecommunication towers and approximately 32 miles of FON.
- Central Corridor has 11 telecommunication towers and approximately 74 miles of FON.
- Southern Corridor has 1 telecommunication tower and approximately 28 miles of FON.
- Western Training Area has no telecommunication towers and approximately 3 miles of FON.
- Eastern Training Area has 6 telecommunication towers and approximately 11 miles of FON.
- Range Complex has FON to each range and limited telecommunication towers.
- Manix Trail has no telecommunication towers or FON.

3.7.7 Solid Waste

The sanitary landfill on Fort Irwin is a permitted facility on the eastern edge of the developed Cantonment Area. Solid waste is collected on the installation and transported to the landfill by standard compacting garbage trucks.

The Fort Irwin sanitary landfill has a solid waste facility permit (SWFP No. 36-AA-0068) issued by the San Bernardino County Department of Environmental Health Services (2001). The sanitary landfill is permitted to receive nonliquid, nonhazardous waste. The facility does not accept hazardous materials;

hazardous waste; ammunition; oil-contaminated products; petroleum, oil, and lubricants (POL)-contaminated soil; batteries; friable asbestos; biological waste; polychlorinated biphenyls (PCBs); toxic chemicals; or lithium/magnesium batteries. Employees at the landfill entrance inspect all deliveries to ensure that only acceptable materials are disposed of at the landfill.

Because the landfill had reached capacity, Fort Irwin has begun construction of a new 8-acre waste disposal cell (Cell 1B) adjacent to the active Cell 1A (Fort Irwin, 2018d). The new landfill cell is in design and expected to be completed in 2021 (Fort Irwin, 2019). Prior to completion of the new landfill cell, Fort Irwin has arranged for domestic waste disposal at either the Barstow or Victorville Sanitary Landfills (Fort Irwin, 2018d).

Hazardous waste from training activities is separated from general waste and disposed of accordingly, as discussed in Section 3.9, *Hazardous Materials and Hazardous Waste*.

3.8 Transportation

This section describes the existing transportation network, including regional roadways, the Fort Irwin roadway/trail network, railroads, and bus service. The ROI for transportation, shown on Figure 3.8-1, includes Fort Irwin, the regional road network that serves the installation, the Manix Trail south of Fort Irwin to I-15, and the regional railroad network. As noted in Section 2.1.1.3, *Airspace*, no changes in the use of air transportation facilities are planned; therefore, those facilities are not evaluated in this section.

3.8.1 Regional Transportation

3.8.1.1 Regional Roadway Network

The major transportation corridors in the vicinity of Fort Irwin include I-15 and U.S. 395. I-15 is south of the installation and connects the City of Barstow with Las Vegas, Nevada. U.S. 395 is west of Fort Irwin, along the NAWS China Lake boundary. I-40 also serves the area, originating in the City of Barstow and continuing generally eastward to Wilmington, North Carolina. Fort Irwin Road is a two-lane defense access road, maintained by San Bernardino County, with multiple passing lanes that provide public and military access to Fort Irwin from I-15. In 2014, the average daily traffic count on Fort Irwin Road was approximately 5,900 vehicles (Fort Irwin, 2016b). While most of the traffic on Fort Irwin Road is associated with Fort Irwin, local ranches, mines, and residences contribute a small volume of traffic on this road. Other regional transportation routes in the vicinity include State Highways 14, 58, 127, 178, and 247.

3.8.1.2 Bus Service

The Victor Valley Transit Authority operates the NTC Commuter bus service, which operates between the City of Barstow and Fort Irwin, with three routes provided in the morning and four routes provided in the evening. Two additional early-morning bus routes to Fort Irwin originate in the Victorville area, with four return routes offered in the afternoon (Victor Valley Transit Authority, 2020).

3.8.1.3 Railroads

Amtrak provides passenger service to the City of Barstow area. The Union Pacific Railroad and Burlington Northern Santa Fe Railroad provide freight service into the Barstow area. The military equipment used by the RTUs during training exercises arrives by rail and is transferred at the Yermo Rail Yard east of the City of Barstow. From the railroad yard, most wheeled vehicle equipment is transported to and from Fort Irwin on the Manix Trail, as discussed in the next section. Tracked military equipment is trucked to and from Fort Irwin via Fort Irwin Road (Fort Irwin, 2018b).

3.8.1.4 Manix Trail

The Manix Trail is an unpaved trail that crosses under I-15 east of the City of Barstow and follows unpaved roads to Fort Irwin. Ground vehicles and equipment travel from the Yermo Rail Yard to Fort Irwin via surface roads from the Marine Corps Logistics Base Barstow Yermo Annex east to the Manix Trail. Equipment continues to Fort Irwin via the Manix Trail. Fort Irwin maintains the Manix Trail to allow most of the RTU-associated wheeled military equipment to reach Fort Irwin without use of surface roads, except for the portion from the Yermo Rail Yard to the start of the Manix Trail.

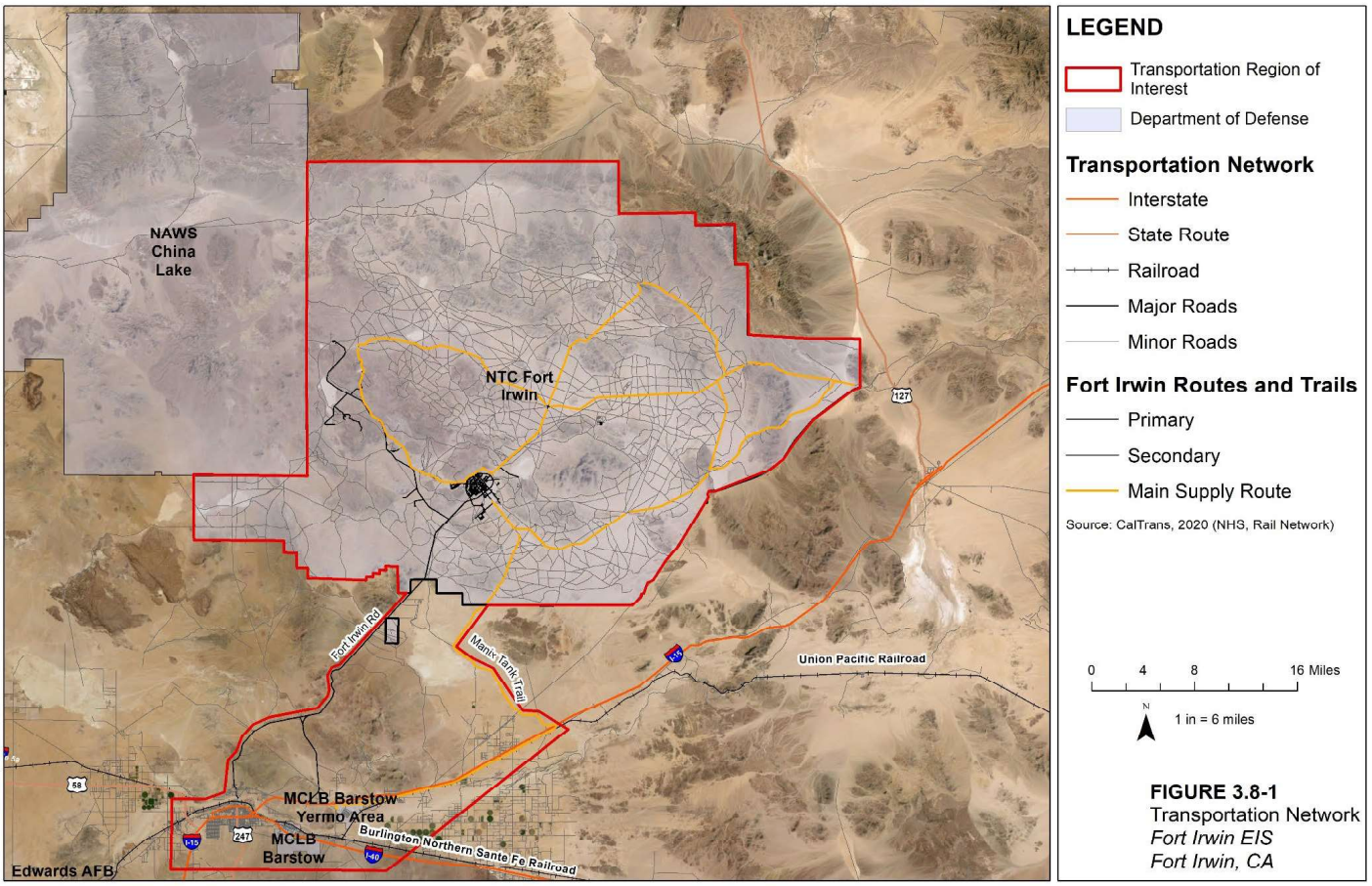


FIGURE 3.8-1
Transportation Network
Fort Irwin EIS
Fort Irwin, CA

3.8.2 Fort Irwin Transportation Network

3.8.2.1 Cantonment Area

The local transportation system in the Fort Irwin Cantonment Area and other accessible areas includes roadways, pedestrian walkways, and bicycle paths. The existing roadway network on Fort Irwin consists of an outer loop road and a grid of roadways inside the loop (Figure 3.8-2). The primary entry point into Fort Irwin is on Fort Irwin Road, south of the intersection of Fort Irwin Road with the outer loop road.

Overall, the existing Cantonment Area roadway network is adequate to meet the transportation needs of the approximately 20,000 people who live and work on Fort Irwin. Traffic within the Cantonment Area is highly influenced by rotations. When units come to Fort Irwin to train, truck and bus traffic can increase significantly. A traffic study completed by the USACE in 2016 determined that traffic volumes at the intersections on Fort Irwin and on the installation roadway network do not exceed their current operating capacity (Fort Irwin, 2016b).

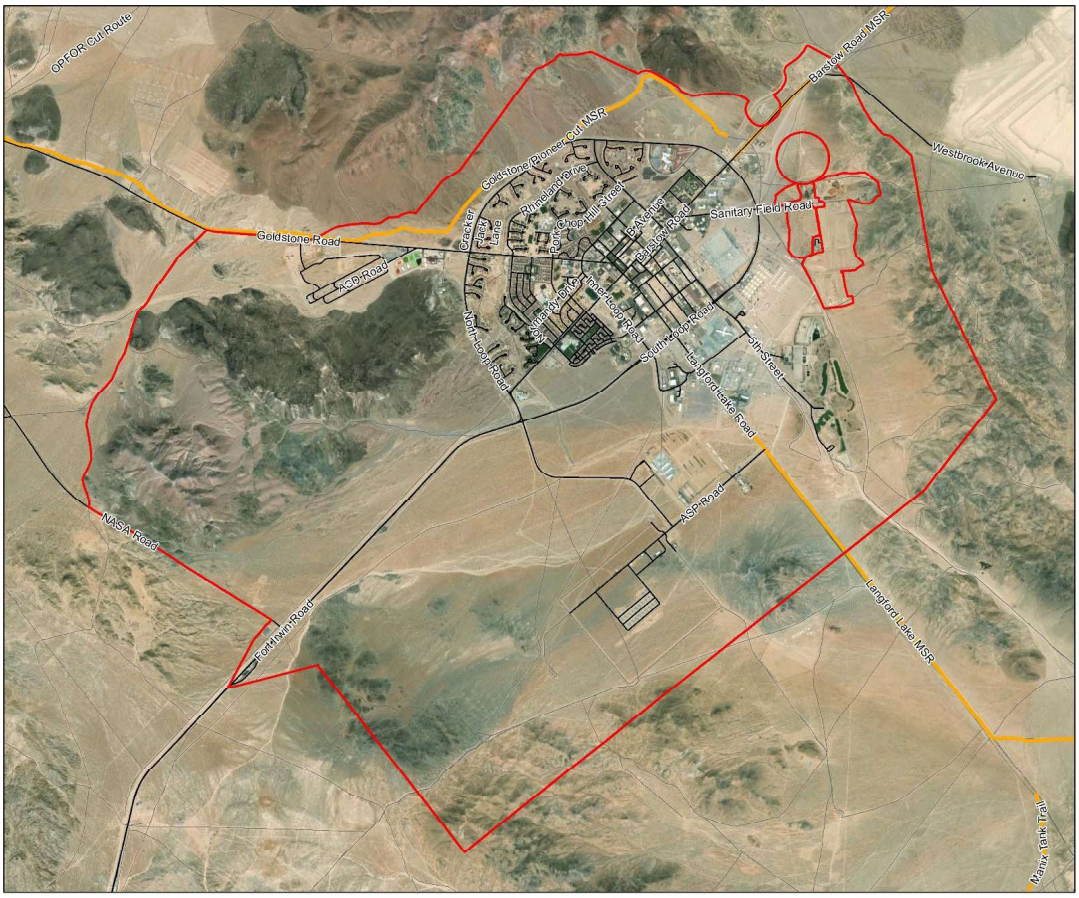
3.8.2.2 NASA Goldstone Complex

The NASA Goldstone Complex is accessed via NASA Road, Goldstone Road, or the Goldstone/Pioneer Cut MSR from the Cantonment Area. Goldstone Road extends northwest through the entire NASA Goldstone Complex; the 8 miles of MSRs within the complex are used to access the Western Training Area and parts of the Central Corridor from the Cantonment Area and Range Complex. The use of the MSRs is coordinated with NASA.

3.8.2.3 Trails

The trail network consists of primary MSRs and secondary trails. MSRs are primarily for ingress, egress, and circulation within the training area by tactical, administrative, and contractor vehicles. The trail network allows units to access training areas and maneuver relatively safely during training activities. The approximately 170 miles of MSRs serve as the primary access routes and transportation arteries throughout the training areas and allow for the efficient movement of vehicles and supplies to all points on the NTC.

Secondary trails are unpaved trails found within a maneuver corridor or training area that are used primarily by tactical vehicles for logistical and tactical movement. Once a necessary secondary trail has been identified, the trails are maintained by ITAM, which is responsible for addressing water erosion and safety concerns associated with the secondary trails. ITAM also monitors the status of the trail network to remove and revegetate unnecessary trails.



LEGEND

Cantonment

Fort Irwin Routes and Trails

Main Supply Route

Primary

Secondary

Source: CalTrans, 2020 (NHS, Rail Network)

0 0.375 0.75 1.5 Miles

N

1 in = 1 miles

FIGURE 3.8-2
Cantonment Transportation
Fort Irwin EIS
Fort Irwin, CA

3.9 Hazardous Materials and Hazardous Waste

This section describes hazardous materials and hazardous waste terminology, applicable regulations and management plans, and the existing hazardous materials and hazardous waste environment within the ROI. The ROI for the hazardous materials and hazardous waste analysis includes the land within the boundaries of Fort Irwin and within 1 mile of the installation boundaries.

Hazardous materials are defined as any substance with the physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, a serious, irreversible illness, or an incapacitating reversible illness or that might pose a substantial threat to human health or the environment. Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (43 U.S.C. Section 9606), the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. Section 6901), the Solid Waste Disposal Act (42 U.S.C. Sections 6901–6992k), and the Emergency Planning and Community Right-to-Know Act (42 U.S.C. Sections 11001 et seq.). Examples of hazardous materials include petroleum, natural gas, synthetic gas, toxic chemicals, and radioactive sources.

Hazardous wastes that are regulated under RCRA are defined as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that either exhibit one or more hazardous characteristic of ignitability, corrosivity, toxicity or reactivity, or are listed as a hazardous waste under 40 CFR Part 261 "Identification and Listing of Hazardous Waste."

Special hazards are those substances that might pose a risk to human health but are not regulated as contaminants under the hazardous waste statutes. Included in this category are asbestos, radon, lead-based paint (LBP), PCBs, and UXO.

Hazardous material and hazardous waste management is regulated by CERCLA, RCRA, or the Toxic Substances Control Act. These laws regulate substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, might present substantial danger to public health or welfare or to the environment.

Fort Irwin must also comply with AR 200-1, *Environmental Protection and Enhancement*, which regulates hazardous waste and toxic substances, and AR 385-10, *Army Safety Program,* which regulates the safe handling of UXO.

In 2019, Fort Irwin solicited interest in establishing a Restoration Advisory Board to improve public participation and involve the community in the restoration decision-making process. However, there was no public interest in forming a Restoration Advisory Board. Fort Irwin has implemented the following management plans and assessments regarding hazardous materials and waste:

- **Stormwater Management Plan** (USACE, 2014a) – The Stormwater Management Plan was prepared for the Cantonment Area to identify improvements that will protect existing and future facilities from up to a 100-year flood event. A Stormwater Management Plan was also developed for Tiefort City UO site in the Central Corridor to address severe flooding issues that caused damage to the infrastructure and resulted in the loss of training opportunities (USACE, 2014b).
- **Spill Prevention and Contingency Plan (SPCP)** (Fort Irwin, 2020b) – As a RCRA Large Quantity Generator, Fort Irwin is required to have a hazardous waste contingency plan that describes the action that facility personnel must take to minimize hazards from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste, in accordance with 40 CFR Part 112 and the California Code of Regulations. Fort Irwin has a SPCP (Fort Irwin, 2020b) that complies with the California Code of Regulations contingency plan requirements. All sites with 55 gallons or more of POL have a site-specific SPCP Action Plan that includes spill response procedures and information on that particular site, including the direction in which a spill would flow and environmental features to protect in the event of a spill.

The SPCP identifies training requirements for personnel who will be handling hazardous materials and hazardous wastes and conducting spill response activities. In addition, the SPCP identifies measures to prevent spills during field operations, such as the following:

- During training rotations, mobile refuelers operate according to Department of Transportation regulations and may park temporarily without secondary containment. During refueling operations, when the mobile refuelers are in the training areas and away from loading/ unloading racks, they are required to provide secondary containment such as large drip pans under the vehicle and under the fuel hoses. To prevent a fuel spill from contaminating the soil, 5-gallon fuel cans are placed inside the drip pans used for secondary containment during refueling. Any fuel spilled in a drip pan should be transferred to a hazardous waste container and disposed of properly.
- Each rotation is required to provide a 20-person environmental cleanup team with designated equipment to clean up any spills that occur down range, as well as any spills in the Cantonment Area for which they are responsible. Following each rotation, military personnel conduct aerial overflights of the training areas to identify any spills that were not cleaned up. Areas where a release occurred are noted, and a cleanup team is dispatched to the spill area. The contaminated soil is removed and taken to the bioremediation land farm. Additionally, following each rotation, military personnel engage in a program called "Hands Across the Desert," where soldiers walk in a line across the training areas looking for signs of released POL or other hazardous material or waste. If releases are observed, they are addressed according to the requirements indicated in the SPCP.

- **Hazardous Materials and Hazardous Waste Management Plan (HMHWMP)** (Fort Irwin, 2011) – The HMHWMP prescribes responsibilities, policies, and procedures for storing and managing hazardous materials and wastes within the NTC and on Fort Irwin (Fort Irwin, 2011). Designed to meet the objective of AR 200-1, *Environmental Protection and Enhancement*, the HMHWMP is intended to ensure compliance with all applicable federal, state, and local laws and regulations regarding hazardous materials and hazardous wastes. The HMHWMP applies to all personnel and activities under the command of NTC and Fort Irwin, including soldiers and civilian employees and any unit or activity that generates and disposes of waste while using NTC and Fort Irwin training sites.

  Hazardous materials and waste handlers training is required for all environmental officers, hazardous materials/waste managers, hazardous materials/waste handlers and their alternates in the incoming units. The 1-hour training program is presented to all incoming rotation battalions and to the environmental cleanup teams. The teams receive hazardous materials/waste spill response training required by the State of California. Fort Irwin's DPW provides a 1-hour Environmental Awareness Brief to the Leaders Training.

- **Fort Irwin's Community Involvement Plan (CIP)** (Fort Irwin, 2012) – The CIP was prepared for the Defense Environmental Restoration Program (DERP) and provides guidance for public involvement associated with the Installation Restoration Program (IRP), Military Munitions Response Program (MMRP), and Compliance Restoration cleanup sites on Fort Irwin. Active sites within these programs are in various phases of investigatory and remedial action activities. The Fort Irwin CIP was prepared in accordance with EPA guidance available at the time of the CIP's preparation, including the 2005 Superfund Community Involvement Handbook and the 1996 RCRA Public Participation Manual. These handbooks outline the community involvement requirements of CERCLA, as amended by the Superfund Amendments and Reauthorization Act, the 1976 RCRA, as amended by the Hazardous and Solid Waste Act, and as stipulated in the guidance that interprets the Superfund legislation: the 1992 National Oil and Hazardous Substances Pollution Contingency Plan.

The CIP outlines the installation's operational history and provides details about, and the status of, Fort Irwin's IRP and MMRP sites. In 2012 when the CIP was finalized, the installation had 13 active sites and 48 sites where remedy-in-place or response compete status had been achieved. At present, Fort Irwin has 14 active sites, which, except for one site, are located within either the Cantonment Area or the NASA Goldstone Complex; these sites do not overlap any of the areas proposed for training in this LEIS. The Troop Landfill is an active IRP site in the Central Corridor. Signs are posted to prevent unauthorized entry and it is considered low risk to training activities. The Troop Landfill is in the long-term monitoring phase. Refer to Figure 3.9-1 for the location of the active IRP and MMRP sites on Fort Irwin.

- **Operational Range Assessment (ORA)**: Fort Irwin operates an ORA Program, which is an effort to evaluate whether munition constituents from training are migrating from operational ranges to off-range areas at levels that pose an unacceptable risk to human health and the environment. If munition constituents are found to migrate off an operational range, remediation activities would occur. Fort Irwin conducted a Phase 1 qualitative assessment of the operational ranges in 2008 to meet the requirement of DoD policy and support the U.S. Army SRP. In 2014, Fort Irwin conducted a Phase 2 quantitative assessment on ranges for which further evaluation was needed and concluded that no ranges pose an unacceptable risk to off-range human receptors. The 2008 and 2014 ORAs are provided in Appendix 3.9A. Fort Irwin is currently conducting an advanced ORA update (EA Engineering, Science, and Technology, Inc., PBC, 2020).

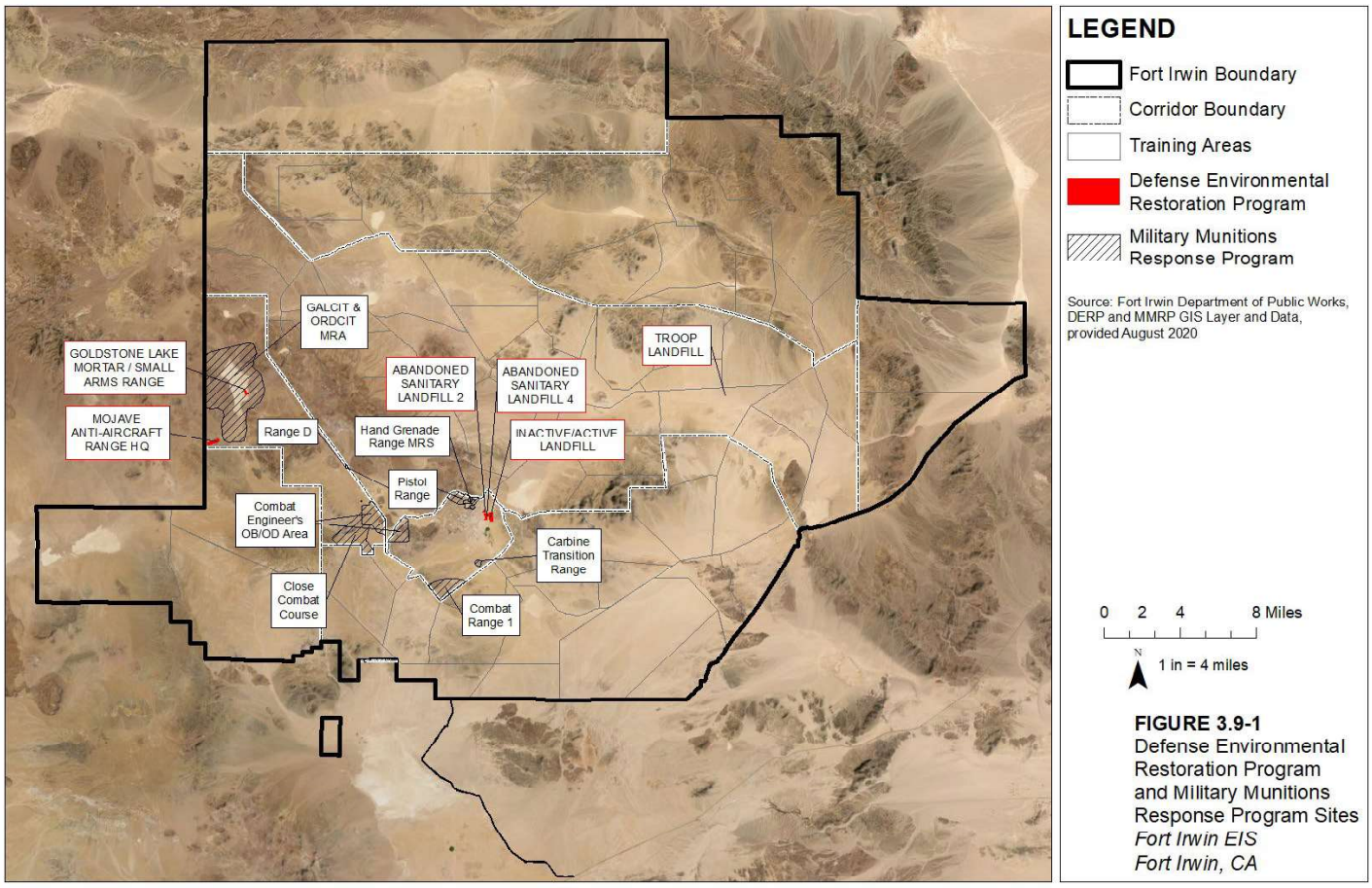


FIGURE 3.9-1
Defense Environmental Restoration Program and Military Munitions Response Program Sites
Fort Irwin EIS
Fort Irwin, CA

3.9.1 Hazardous Materials and Hazardous Wastes

3.9.1.1 Hazardous Materials

The Hazardous Material Control Center, also known as the HAZMART or HMCC, issues hazardous materials as needed to NTC and Fort Irwin personnel. The HAZMART stocks hazardous materials, POL products, as well as dry sweep, drums for used antifreeze, secondary containment pads, and brooms. Only hazardous materials included on the Authorized Use List are authorized for use on the installation. The HMHWMP provides information on how to request, manage, and turn in hazardous materials via HAZMART.

The majority of hazardous materials required for vehicle and equipment maintenance are stored within the Cantonment Area and units would not take these materials outside the Cantonment Area during training operations. The primary hazardous materials that would be used during training operations include fuels, motor oil and lubricants, antifreeze, vehicle batteries, blank rounds and pyrotechnics, and cleaners, which may include solvents, corrosives, soaps, and detergents.

3.9.1.2 Hazardous Waste

As noted previously, Fort Irwin is a RCRA Large Quantity Generator. The installation does not operate storage facilities, so hazardous waste is collected across the installation by the DPW at 90-day accumulation points and then transported to an approved, offsite hazardous waste disposal facility. Fort Irwin's hazardous waste streams fall into the following categories:

- RCRA hazardous waste
- California hazardous waste
- Universal waste
- Excluded recyclable material
- Non-RCRA regulated waste

The majority of hazardous waste generated on Fort Irwin comes from facilities and operations within the Cantonment Area. Hazardous wastes that are generated or occur within the training ranges primarily include POL and ordnance.

Fort Irwin has procedures in place for ensuring that hazardous wastes are not disposed of at the Fort Irwin sanitary landfill. If explosive ordnance or suspected explosive ordnance is found, the landfill is closed, all personnel are evacuated, and an EOD unit is dispatched to remove the suspected material prior to the resumption of work. Explosive materials are not accepted for disposal. If hazardous material is found, there are two possible outcomes: (1) if the hazardous material is discovered prior to unloading, the load will not be accepted, and (2) if the suspected material is found after unloading, the Fort Irwin hazardous material disposal team is contacted to investigate and properly remove the suspected material. Soil contaminated with POL is bioremediated at an onsite bioremediation land farm (SCS Engineers, 2014).

3.9.1.3 Ordnance

Munitions and explosive materials are stored in bunkers at the ammunition supply point on the eastern side of the Cantonment Area in a designated access-controlled area that is buffered by explosive quantity safety distance arcs. Explosive quantity safety distance arcs provide a safe zone in case of an unexpected explosion. Examples of munitions used during live-fire training exercises include smoke, artillery, small arms munitions, demolitions, and tank and mortar rounds.

UXO may result from munitions failing to detonate during training, accidents during the movement of RTUs during training, improper disposal, or from historical military actions prior to the formation of the NTC. Areas where munitions are used during training events are investigated and any identified UXO is removed or marked with a red UXO sign by a Fort Irwin EOD unit before the next rotation. While UXO

may occur throughout Fort Irwin, it is more likely to be encountered north of the dud-effects line (Figure 2-8) or in other areas that were used historically for munitions firing.

Spent rounds can result in metals in the soil on operational ranges. These metals can leach into washes and could reach dry lake beds through soil erosion. In the desert environment of Fort Irwin, lead from bullets forms insoluble secondary minerals and is not mobile within the soil (Dermatas et al., 2004).

3.9.1.4 Radiological Hazards

A radioactive commodity is any item in the DoD Supply System that contains radioactivity equal to, or in excess of, the quantities listed in 10 CFR Part 20, or contains greater than 0.002 microcuries per gram of radioactive material and is license exempt (Defense Logistics Agency, 1985). Low-level radioactive commodities may be used in support of training operations. Typical types of radioactive commodities used by Army units include radiac meters, chemical agent detectors, moisture density gauges, lensatic compasses, night-vision goggles, radio luminescent sights, and armored vehicle equipment gauges or weapons gauges. Such commodities are generally designed for extreme weather and combat conditions with a limited amount of radionuclides in a dispersible form.

3.9.2 Current Hazardous Materials and Hazardous Waste Environment

The following is a description of the current hazardous materials and hazardous waste environment within the corridors, training areas, and Range Complex on Fort Irwin. The Manix Trail is also included.

3.9.2.1 Northern Corridor

The Northern Corridor is used for firing the full range of military munitions and it contains the majority of live-fire targetry. UXO occurs in portions of the training ranges. The Northern Corridor has restricted dig and no-dig areas because of UXO concerns (Figure 2-9). No active IRP or MMRP sites are within the Northern Corridor.

Two CBRN facilities are located in the Northern Corridor, one in the southeastern corner along the border with the Central Corridor and the other in the southwestern corner along the border with the Central Corridor. CBRN training uses only simulated chemical, biological, radioactive, and nuclear materials and there is no risk of hazardous materials exposure from training with these simulated materials. Training may involve field maintenance activities on vehicles or other equipment, which involve the limited use of hazardous materials and could generate hazardous wastes.

3.9.2.2 Central Corridor

The Central Corridor is used for firing the full range of military munitions but on a smaller scale than in the Northern Corridor. UXO occurs in portions of the training ranges. The Central Corridor has limited dig and no-dig areas because of UXO concerns (Figure 2-9).

As noted previously, the Troop Landfill is an active IRP site in the Central Corridor. It is assigned a Relative-Risk Site Evaluation ranking of “low” and is in the long-term monitoring phase. Training does not occur within the landfill area.

Seven CBRN facilities are located throughout the Central Corridor; however, only simulation CBRN materials are used. Training involves refueling activities, ammunition resupply, and field maintenance activities on vehicles and other equipment, all of which involve the use of hazardous materials and could generate hazardous wastes. A FARP is located along the Central Corridor’s border with the Eastern Corridor, along with one RASA. The BLAAF includes two refueling pads.

3.9.2.3 Southern Corridor

Training may involve field maintenance activities on vehicles or other equipment, which involve the limited use of hazardous materials and could generate hazardous wastes.

The focus of training in the Southern Corridor is comparable to that of the Central Corridor. UXO occurs in portions of the training ranges.

No active IRP or MMRP sites are within the Southern Corridor. Hazardous materials associated with abandoned mines in the Southern Corridor are described in Section 3.10, *Health and Safety*.

3.9.2.4 Western Training Area

No training currently occurs in the Western Training Area. A FARP is located within the Western Training Area.

No active IRP or MMRP sites are within the Western Training Area. Hazardous materials associated with abandoned mine shafts in the Western Training Area are described in Section 3.10, *Health and Safety*.

3.9.2.5 Eastern Training Area

The focus of training in the Eastern Training Area is comparable to that of the Central Corridor, however, units are only permitted to shoot live ammunition from the Eastern Training Area across the dud-effects line and no dud-producing munitions are deliberately fired to impact in the Eastern Training Area. Training activities involve refueling activities, ammunition resupply, and field maintenance activities on vehicles or other equipment, all of which involve the use of hazardous materials and could generate hazardous wastes. A FARP is located along the Eastern Training Area's border with the Central Corridor.

There are no active IRP or MMRP sites within the Eastern Training Area.

Hazardous materials associated with active and abandoned mines in the Eastern Training Area are described in Section 3.10, *Health and Safety*.

3.9.2.6 Range Complex

The MPRC is used for the highest concentration firing of the full range of military munitions and supports live ammunition training using a wide variety of weapons systems and associated munitions. UXO occurs in portions of the training ranges.

3.9.2.7 Manix Trail

Aside from POL necessary to operate internal combustion vehicles and equipment traveling to and from Fort Irwin along the Manix Trail, hazardous materials are not used, and hazardous wastes are not generated on the Manix Trail.

3.10 Health and Safety

This section characterizes existing conditions pertaining to health and safety on Fort Irwin, including naturally and human-caused conditions. The ROI for safety is the area within the boundaries of Fort Irwin and the Manix Trail.

AR 385-10, *Army Safety Program*, sets forth the procedures for compliance with the Occupational Safety and Health Act. AR 385-10 outlines the Department of the Army's policy, responsibilities, and procedures to safeguard Army personnel. NTC Regulation 350-1 outlines the safety standards to prevent potentially hazardous conditions on Fort Irwin. NTC 350-1 requires programs to prevent accidents and implement reporting procedures. The installation's safety programs cover ammunition and explosives, motor vehicle accidents, sports and recreation, construction, personal protective equipment, hazard identification, rotational unit safety support, confined space entry, respiratory protection, radiation, and weather safety.

3.10.1 Naturally Occurring Health and Safety Conditions

The risks from naturally occurring health and safety conditions occur equally around Fort Irwin; consequently, the corridors, training areas, and other areas are not discussed individually.

Fort Irwin is located in the Mojave Desert and is recognized as an austere training environment. Terrain on Fort Irwin is rugged and includes dramatic elevation gains near mountains and sudden drops near desert washes, referred to as wadis. Temperatures in the summer can reach over 120 degrees Fahrenheit, and some of the hottest temperatures on Earth have been recorded in Death Valley National Park, which shares a boundary with Fort Irwin. Climate change may increase the demand of drinking water to avoid heat stress during training; however, the change is not expected to be significant. Temperatures in the fall and spring are normally comfortable (around 75 degrees Fahrenheit). The average rainfall on Fort Irwin is less than 4 inches a year, although when storms occur, the soils in the Mojave Desert tend not to absorb much water, causing flash floods. Winds are prominent features of Mojave Desert weather; strong winds, which can result in sandstorms, occur in fall, late winter, and early spring months (National Park Service, 2020). Numerous venomous animals, including snakes and spiders, inhabit Fort Irwin.

Wildfire is a minor safety concern on Fort Irwin. Although wildfire commonly occurs in desert areas with dense annual vegetation growth after periods of abundant rainfall, the training activities conducted on Fort Irwin typically limit the development of a fuel load sufficient to carry a wildfire.

Valley fever or coccidioidomycosis is a fungal infection caused by *Coccidioides immitis* and is known to occur in San Bernardino County. The fungus occurs in soil and can be acquired by inhaling dust particles that contain the fungus. A study conducted on Fort Irwin found a low risk for infection in military personnel training in the desert (Crum et al., 2004).

3.10.2 Human Caused Health and Safety Conditions

The training ranges on Fort Irwin are designated for military training activities and public access is restricted. Fort Irwin Range Operations oversees all activities on the training areas and ranges. Military and contractor personnel must receive clearance from Range Operations prior to entering these areas. Range Operations tracks all activities in downrange areas, including all training using live munitions or explosives. In addition to obtaining clearance prior to entry into the training ranges, persons must check in with Range Operations when changing positions on the range and upon leaving the ranges.

3.10.2.1 Northern Corridor

Historically the Northern Corridor has been used for live munitions training on Fort Irwin. Consequently, it has the highest potential for UXO on the installation.

3.10.2.2 Central Corridor

Live munitions training occurs in the Central Corridor in the areas above the dud-effects line (Figure 2-8). Consequently, UXO may be found in this area.

3.10.2.3 Southern Corridor

Live munitions training occurs in the Southern Corridor, though activities tend to focus on fixed target sites. UXO may be encountered in the Southern Corridor, though to a lesser extent than in the Northern and Central Corridors.

Abandoned mines are in the Southern Corridor. The abandoned mine shafts could present falling hazards, as well as health hazards due to inhalation of bad or noxious air, and elevated levels of metals in soil and surface water (Fort Irwin, 2005).

3.10.2.4 Western Training Area

No live munitions training occurs in the Western Training Area.

Abandoned mines are in the Western Training Area and the mine shaft hazards are comparable to that of the Southern Corridor.

3.10.2.5 Eastern Training Area

Units are only permitted to shoot live ammunition from the Eastern Training Area across the dud-effects line.

One active mineral mine and several abandoned mines are in the Eastern Training Area. The active mineral mine is off-limits to the Army and, therefore, does not pose a health and safety hazard, with the exception of traffic associated with the mine as discussed in Section 3.8, *Transportation*. The abandoned mine shaft hazards are comparable to that of the Northern Corridor.

3.10.2.6 Range Complex

The Range Complex is regularly used for live munitions training. The ranges are designed to allow for SDZs during munitions firing, and the probability of unexpectedly encountering a UXO is low.

3.10.2.7 Manix Trail

The Manix Trail south of Fort Irwin may be accessed by members of the public for recreational activities on adjacent BLM land. A portion of this land is classified for moderate use but most of the area is classified for low use. Military convoys between Yermo and Fort Irwin are escorted and human-caused health and safety hazards along the Manix Trail are unlikely.

3.11 Land Use

Land use refers to assigned classifications that indicate the types of human activity or the natural conditions on a parcel. Land use descriptions are regularly codified in local zoning laws, but no nationally recognized convention or uniform terminology exists. Natural conditions of property can be described as unimproved; undeveloped; conservation or preservation area; or natural or scenic area. Residential, commercial, industrial, agricultural, institutional, and recreational are descriptive terms often used for land use categories resulting from human activity. The institutional land use category includes military installations.

The ROI for this land use analysis includes Fort Irwin and the Manix Trail south of Fort Irwin to I-15. Applicable regulations include AR 210-20, *Real Property Master Planning for Army Installations*, and EO 13327, "Federal Real Property Asset Management" (amended by EO 13423). The BLM manages public land and subsurface estate under its jurisdiction under the 1976 Federal Land Policy and Management Act or FLPMA.

3.11.1 Existing Conditions

Fort Irwin is reserved for military usage with a Cantonment (urban) Area, airfields, and range and training areas. The Cantonment Area is the urbanized core of the installation comprising military and family housing units, community facilities, administrative buildings, a hospital, schools, and outdoor recreational facilities, along with other land uses.

3.11.1.1 Northern Corridor

The Northern Corridor supports the military mission and includes the Leach Lake Tactical Range.

3.11.1.2 Central Corridor

The Central Corridor supports the military mission and includes the SDZs associated with the Range Complex.

3.11.1.3 Southern Corridor

The Southern Corridor supports the military mission and contains inactive mineral mines. Land use controls have been implemented for the abandoned mines to prevent access to these hazards.

3.11.1.4 Western Training Area

The Western Training Area supports the military mission and contains inactive mineral mines that are continuing to be identified. Land use controls have been implemented for the abandoned mines to prevent access to these hazards. The Army is in the final stages of acquiring private holdings in the Western Training Area. The conversion of the land to military training is addressed in the 2005 FEIS (Fort Irwin, 2005).

3.11.1.5 Eastern Training Area

The Eastern Training Area supports the military mission. The Silver Lake Mine is an active mineral mine in the Eastern Training Area and an MSR passes through the mine area. Private operation of this mine constrains training in proximity to the private operation and necessitates coordination on use of the MSR with mine-related traffic. The Silver Lake Mine has an agreement with the Army to continue operations, concurrent with site rehabilitation, through 2027.

This area also contains inactive mineral mines and land use controls to prevent access to these hazards.

3.11.1.6 Range Complex

The Range Complex supports the military mission, though the ranges are designed to accommodate specific weapons systems and training activities.

3.11.1.7 Manix Trail

Approximately 15 miles of the Manix Trail is on BLM-managed land outside Fort Irwin. The Army has a right-of-way to use the Manix Trail for military operations to transport military equipment to and from Fort Irwin. As discussed in Section 3.12, *Recreation*, the land adjacent to the Manix Trail between Fort Irwin and I-15 is used for a variety of recreational activities.

3.12 Recreation

As a resource area, recreation includes activities such as camping, picnicking, wildlife observation, hiking, rock hounding, horseback riding, ORV use, and other outdoor activities. The ROI for recreation includes Fort Irwin and the Manix Trail south of Fort Irwin to I-15.

3.12.1 Existing Conditions

Fort Irwin offers a variety of recreational opportunities within, and adjacent to, the Cantonment Area, where public access is restricted. The Military MWR office operates an outdoor recreation office that facilitates the following services: equipment rentals, bicycle repair shop, recreational vehicle (RV) and mini-storage rental spaces, RV campsite, 6-hole Pitch N' Putt golf course, skeet and trap range, and desert discovery tours (Fort Irwin, 2020c). Recreational fishing is not available on Fort Irwin (Fort Irwin, 2008) because natural waters on Fort Irwin are ephemeral and do not sustain recreational fisheries.

The majority of recreational opportunities are within the developed portion of the Cantonment Area, which includes swimming pools, sports fields, bowling alley, a skate park, and a youth center. Outside the developed portion but within the boundary of the Cantonment Area are other recreational opportunities, such as the High Desert Equestrian Club, an RV park, and a driving range.

The Old Spanish National Historic Trail (NHT) was designated by the U.S. Congress in 2002. The congressionally designated alignment of the Old Spanish NHT crosses through the Southern Corridor, Central Corridor, and Eastern Training Area on Fort Irwin (Figure 3.12-1). The Department of Interior has identified the alignment of the Old Spanish NHT, including the Bitter Spring High Potential Historic Site and the Red Pass High Potential Route Segment, as areas needing assessment for potential effects with regard to historical landscapes, scenic qualities, recreational values, and visitor experience. At the time of publication of this LEIS, no public access is available to the portions of the congressionally designated alignment of the Old Spanish NHT within the boundaries of Fort Irwin. A portion of the congressionally designated route of the Old Spanish NHT crosses Manix Trail south of the Fort Irwin boundary in an area where public access is available.

3.12.2 Current Recreation Environment

The following is a description of the current recreation environment within the corridors, training areas, and Range Complex on Fort Irwin and around the Manix Trail.

3.12.2.1 Northern Corridor

Recreational opportunities are not available in the Northern Corridor because of its remote location and military usage. Death Valley National Park shares a boundary with the northern portions of Leach Lake and the Northern Corridor to the east of Leach Lake. Leach Lake bombing range is off-limits to all non-authorized personnel and is heavily marked with signs. Fort Irwin is working with the National Park Service to make sure protocols are effective in preventing the public from accessing Fort Irwin, including Leach Lake.

3.12.2.2 Central Corridor

Three areas, referred to as RA-3, RA-4, and RA-5, within the training corridor are suitable for camping and outdoor recreation. This includes the use of all-terrain RV use and hiking under specific conditions (Fort Irwin, 2020c).

3.12.2.3 Southern Corridor

Two areas, referred to as RA-1 and RA-2, within the training corridor are suitable for camping and outdoor recreation. This includes the use of all-terrain RV use and hiking under specific conditions (Fort Irwin, 2020c).

3.12.2.4 Western Training Area

No recreational opportunities are available in the Western Training Area.

3.12.2.5 Eastern Training Area

No recreational opportunities are available in the Eastern Training Area.

3.12.2.6 Range Complex

The Sportsman Club consists of rifle, pistol, and archery ranges for use by military personnel, dependents, support personnel, civilians, and visitors. The Sportsman Club can use the Range Complex when cleared by Range Operations.

3.12.2.7 Manix Trail

Off-installation recreational activities adjacent to, and accessed by, the Manix Trail include camping, picnicking, wildlife observation, hiking, rock hounding, horseback riding, and ORV use. The congressionally designated alignment of the Old Spanish NHT crosses Manix Trail south of Fort Irwin.

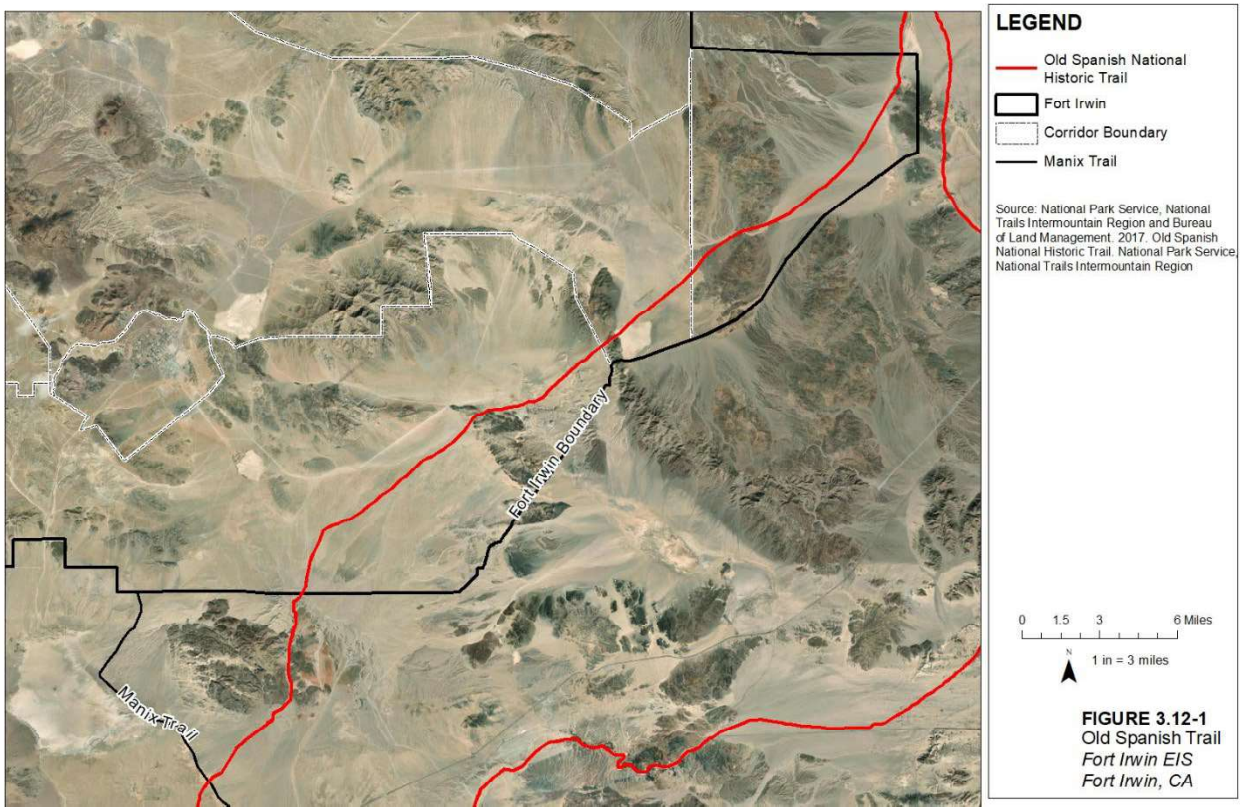


FIGURE 3.12-1
Old Spanish Trail
Fort Irwin EIS
Fort Irwin, CA

SECTION 4

Environmental Consequences - Mission Analysis

This section provides an evaluation of the potential environmental effects of the following alternatives:

- No Mission Change Alternative (Section 2.1.1)
- Proposed Mission Change Alternatives (Section 2.1.2)
  - Changes in Training Alternative (Section 2.1.2.1)
  - Training Infrastructure Improvement Alternative (Section 2.1.2.2)
  - Range Improvements Alternative (Section 2.1.2.3)
  - Manix Trail Alternative (Section 2.1.2.4)

The analysis took a hard look at the likely environmental effects within the ROI for each resource area described in Section 3, *Affected Environment*. The analysis of resource effects focused on environmental issues in proportion to their potential effects, and consideration was given to both adverse and beneficial effects. The effects identified under the No Mission Change Alternative were used as the environmental baseline for the analysis.

Pursuant to NEPA regulations (40 CFR Parts 1500–1508), the effects of the Proposed Alternatives were evaluated based on context and intensity. Context refers to the affected environment in which a proposed project occurs, which is described in the "Affected Environment" sections for each resource in Section 3. The intensity of the effect is based on type (negligible, minor, moderate, or significant), quality (adverse or beneficial), and duration (short-term or long-term). The threshold for the intensity determinations is shown in the Significance Criteria table provided in the introduction for each resource. Cumulative effects are analyzed in Section 4.13, *Cumulative Effects – Mission Analysis*.

The analysis also identifies possible mitigation measures. These mitigation measures offset the adverse effects from the Proposed Mission Change Alternatives. Throughout the effects discussion, mitigation measures are identified where appropriate. The measures for each resource type are listed and defined at the end of each resource section. In the text of the resource effects discussion, mitigation measures are flagged (e.g., **Hazardous Mitigation-1**). Many mitigation measures benefit multiple resources. For example, a mitigation measure to prevent the release of hazardous materials would be designated as a hazardous mitigation, but it also would be identified as applicable to water resources, biological resources, and any other resource areas that would receive benefit from the measure.

The No Mission Change Alternative reflects the current training environment on Fort Irwin and assumes that no activities defined under the Changes in Training Alternative, Training Infrastructure Improvement Alternative, Manix Trail Alternative, or Mitigation Measures would occur. While these activities are currently performed on Fort Irwin, this analysis focuses on the decision to continue these activities and, therefore, describes conditions moving into the future.

4.1 Biological Resources

The effects on biological resources were determined based on the potential for increased disturbance or hazards related to vegetation, including special status and invasive species, and wildlife, including special status and pest species. Table 4.1-1 identifies the impact thresholds for biological resources.

TABLE 4.1-1
Significance Criteria for Biological Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Impact Intensity	Description
Negligible	The effects related to biological resources including vegetation and wildlife would be below or at the lowest levels of detection.
Minor	Activities would result in observable changes in numbers of vegetation or wildlife, including special status plant species; however, there would be no expected effect on populations or on special status wildlife species. Activities would affect habitat quality, though the integrity of the habitat would remain. Activities would not allow for the propagation or spread of non-native plant and wildlife pest species beyond what is already occurring in the region.
Moderate	Activities would cause readily observable changes to numbers of vegetation or wildlife; however, there would be no expected effect on populations or the effects on federally listed species would not jeopardize a population. Activities would noticeably affect habitat quality and integrity. Activities would allow for the propagation or spread of some non-native plant and wildlife pest species.
Significant	Activities would jeopardize populations of federally listed vegetation or wildlife. Loss of a population of non-federally listed vegetation or wildlife species. Activities would destroy enough habitat to jeopardize regional wildlife and plant populations. Activities would cause substantial propagation or spread of non-native plant and wildlife pest species.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.1.1 No Mission Change Alternative

The following section explains the effects on biological resources resulting from current military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

The effects on biological resources are related to the intensity of military training activities within a specific area. Figure 4.1-1 displays the way units can currently use the training areas on Fort Irwin; the various polygons are influenced by terrain as well as administrative limitations. The current and historical disturbance caused by training on Fort Irwin are provided on Figure 2-1 and Figure 2-2 in Section 2.1.1.1, *Training Areas.* The effects on biological resources resulting from the current military training activities on Fort Irwin also are described in the following sections.

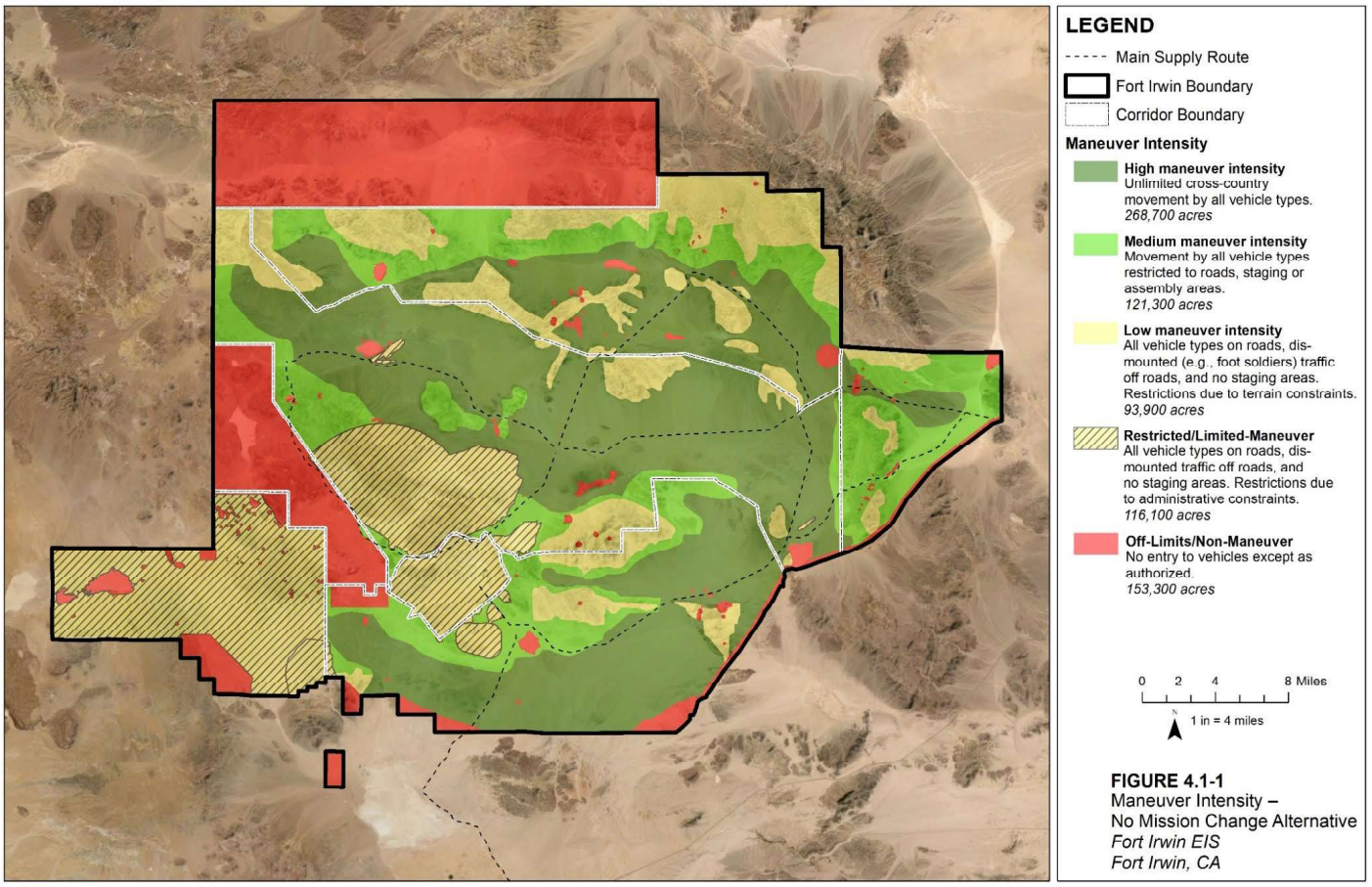


FIGURE 4.1-1
Maneuver Intensity –
No Mission Change Alternative
Fort Irwin EIS
Fort Irwin, CA

4.1.1.1 Maneuver

Mounted Maneuver: Mounted maneuver involves the use of heavy mechanized vehicles, such as tanks, highly mobile multi-wheeled vehicles, and paladins. Historically, high-intensity mounted maneuver training activities can result in extensive disturbance of vegetation where those activities were conducted. Both species composition and vegetation density are greatly reduced by high-intensity training activities throughout Fort Irwin, though many highly disturbed areas have revegetated over time when no longer in use (refer to Figure 2-1 and Figure 2-2). Vegetation disturbance (reduction in composition or density) has not occurred, or has occurred to a much lesser extent, in off-limits areas and medium- and low-intensity maneuver areas.

Invasive, non-native plant species are adapted to establish in disturbed soils, and the potential for the establishment of invasive, non-native species, particularly those readily spread by the wind, increases substantially for areas in which high-intensity maneuver training occurs.

ORV traffic causes soil compaction, decreases vegetation cover, and accelerates soil erosion, resulting in a reduction in habitat quality and habitat quantity for wildlife. The degree of historical reductions in habitat quality and quantity has been proportional to the level of maneuver intensity in a given area. Wildlife abundance, including special status species, is dependent on habitat, and species numbers are greatly reduced in areas in which intensive training has reduced habitat quality or quantity.

To minimize effects on the Lane Mountain Milkvetch, Fort Irwin maintains the NTC-Gemini and East Paradise Conservation Areas and the Brinkman Wash Restricted Access Area and incorporates information on these off-limits areas in environmental awareness briefings (**Biology Mitigation-5**).

The areas that provide the greatest wildlife habitat are in conservation or other off-limits areas, which are not disturbed by training activities. Temporary displacement of some wildlife species, including special status species, would continue to occur during high-intensity training events, typically 10 times per year for rotational training. Animals typically return to normal use of areas between training events.

Incidental mortality of common wildlife species may result from the movement of vehicles and equipment, both on-road and off-road during training events, but no loss of local populations would be expected. Maneuver training on Fort Irwin is conducted in accordance with a USFWS biological opinion (USFWS, 2014) that minimizes the effects on the desert tortoise.

Golden eagle nesting and fledging occur on Fort Irwin in proximity to training activities and have been occurring for many years. Because the species is completing its life cycle, training activities are not considered to disturb the golden eagle, as “disturb” is defined under the BGEPA. No adverse effects on the golden eagle would occur.

Wildlife are exposed to noise from mounted maneuver training. There also is noise from personnel, but the level of noise from personnel is negligible compared to the noise from the operation of equipment. Wildlife are displaced by the movement and actions of the BCT during rotational training (approximately 38 percent of the year). The noise of training contributes to displacement, but the relative contributions of noise compared to the disturbance from physical activity cannot be parsed (Shannon et al., 2015). Regardless of cause, few wildlife remain in proximity to the training exercises to experience the loud noises associated with tactical vehicle operations. Wildlife that remain in the vicinity of maneuver training likely have acclimatized to the recurrent noise associated with training, though these animals may experience increased fitness costs associated with being in proximity to the noise sources (Read et al., 2014).

Dismounted Maneuver: Dismounted maneuver involves the movement of troops, with limited use of mechanized vehicles. Dismounted maneuver creates less disturbance to the land surface than mounted maneuver and would result in fewer effects on biological resources than maneuver training. Dismounted maneuver may occur in steeper and more rugged terrain. No incidental mortality would occur from

dismounted maneuver. Noise from dismounted maneuver may cause wildlife in the area to startle and relocate.

Aviation: Aviation operations at the NTC include Army helicopters and Air Force aircraft. Helicopter field landings may require local vegetation clearing and rotor wash may dislodge some vegetation in the vicinity of a landing or takeoff. To the extent possible, these areas are sited away from sensitive resources and no effects on special status species occur. Within the context of the larger vegetation disturbance associated with maneuver training, future helicopter activities would be small. Temporary wildlife disturbance and relocation away from aircraft noise resulting from close aircraft activity may occur; however, due to the temporary displacement of most wildlife from active training areas, such relocations are likely uncommon. It is likely that wildlife that remain in proximity to training activities have acclimatized to the common occurrence of aircraft noise. Because of the low abundance of birds in the training areas on Fort Irwin and the displacement of resident animals during rotational training, aircraft strikes on birds are very rare and discountable from the standpoint of population-level effects.

Fire and Movement: Areas have been degraded by years of munitions impacts and no longer support viable populations of wildlife or plants. Continued firing into these areas would have no discernable effects on wildlife or vegetation. As discussed previously, most wildlife are temporarily displaced from the areas where munitions firing occur and few wildlife remain in proximity to the loud noises associated with munitions firing. Therefore, the sound of munitions firing has little effect on wildlife and cannot be readily discerned from the effects of the full training event.

Munitions firing has less effect on the land surface than equipment maneuvers, because the effect is localized at the point of impact. The tactical movement of forces to support munitions firing as part of fire and movement has effects on vegetation similar to those associated with mounted maneuver. Areas that have been used extensively for tactical movement to support fire and movement training activities no longer contain substantial vegetation or habitat. Tactical movement of forces to support munitions firing occurs in conjunction with mounted maneuver and the effects of noise on wildlife from these activities are not discernable from those associated with mounted maneuver.

4.1.1.2 Maneuver Support Operations

Engineer Support: Engineer support operations generally occur as part of mounted maneuver activities and include the use of heavy equipment typical of civilian construction sites. The use of heavy equipment occurs primarily in high-intensity maneuver areas, where vegetation and wildlife habitat is already degraded. The establishment of berms and trenches completely removes vegetation from the immediate area and recovery of vegetation typically is uncommon due to the slow growth rate of desert plants. Noise from engineer support activity results from the operation of heavy equipment and occurs in conjunction with other rotational training activities. Noise effects and other effects on biological resources would not be discernable from those of maneuver activities.

EOD: In the process of rendering UXO safe, an EOD unit may employ explosives. This activity creates less surface disturbance to vegetation than vehicle movement, and only localized disturbances from employed explosives would occur. Noise from explosives used to render UXO safe is episodic and can startle nearby wildlife, causing them to temporarily relocate. Other than temporary displacement, EOD activities have no effects on wildlife.

CBRN: A CBRN training event may use simulated explosives, resulting in an effect on common biological resources similar to that of EOD activities. CBRN training uses inert training materials, which has no effect on wildlife. CBRN sites are located away from sensitive resources and there are no effects on special status species.

Cyber: Cyber activities have no effect on biological resources.

UASs: Construction of field takeoff/landing sites for UASs typically involves blading a runway area to provide a suitable site. Blading removes vegetation from the area. UASs are generally smaller in scale

than manned aircraft and UAS operation has no effect on vegetation. UAS operation annoys some wildlife when flown at lower altitudes. As noted for aviation in Section 4.1.1.1, *Maneuver*, temporary wildlife disturbance and relocation away from UAS noise may result from field takeoffs and landings but such occurrences are likely uncommon because of the temporary displacement of wildlife from active training areas.

4.1.1.3 Sustainment

Re-arming: Re-arming exercises typically occur during maneuver activities in the area in which maneuver training is occurring. The effects on biological resources from re-arming exercises are not discernable from the effects of mounted maneuver, discussed in Section 4.1.1.1, *Maneuver.*

Refueling: Refueling activities typically occur during maneuver activities and have effects on vegetation similar to those described for mounted maneuver. There is potential for accidental spills of fuel from vehicles and equipment used in training and these fuels could cause stress or mortality in vegetation if the spill contents were to reach outside designated maintenance and refueling areas. RTUs are required to have and implement spill control plans to address accidental releases of vehicle fluids during training exercises and prevent spilled fluids from reaching vegetation (**Hazardous Mitigation-1**). Noise effects on wildlife associated with refueling activities are not discernable from the noise effects of maneuver training.

Field Maintenance: Vehicle repair could result in an accidental spill of coolants, fuel, lubricants, or hydraulic fluids. The effects on biological resources are similar to those for refueling.

Assembly Area Development: New assembly areas would be located in high-intensity maneuver areas (Figure 4.1-1) and areas without substantial vegetation. Assembly areas (areas routinely used for assembly) are located throughout the medium-intensity maneuver areas. While RTUs are required to properly manage and remove their trash, some trash inadvertently is missed, spilled, or otherwise left behind. Coyotes and ravens are attracted to trash and localized numbers could increase following rotational training (**Biology Mitigation-1**). Dust suppression, including the spraying of water, may be required; however, water would be applied so as not to create pools that may further attract pest species (**Biology Mitigation-2**). Noise effects on wildlife associated with establishing assembly areas are not discernable from the noise effects of maneuver training. The use of assembly areas is part of maneuver training and no additional noise effects on wildlife would result.

Medical: Medical activities include the use of medical evacuation (MEDEVAC) vehicles, such as helicopters. The effects on biological resources are similar to those described for aviation in Section 4.1.1.1, *Maneuver.*

Military Working Dogs: Military working dogs would have an effect on common biological resources similar to that of soldiers as described for assembly area development. The number of working dogs relative to personnel is extremely small. Military working dogs are highly trained, are never allowed to roam, operate in proximity of their handlers, and typically operate in controlled areas. Consequently, military working dogs would have no discernible effect on wildlife relative to the larger disturbance associated with RTU activity.

4.1.1.4 SF Operations

Airborne Operations: SF airborne activities would have no long-term effect on vegetation. Temporary wildlife disturbance and relocation away from aircraft noise resulting from field takeoffs and landings may occur, and it would be more likely than for other training-related aviation activities because units would be deployed away from the main RTU. It is likely that any wildlife that remain in proximity to field landing and takeoff sites would have acclimatized to the common occurrence of aircraft noise. Because of the low abundance of birds in the training areas on Fort Irwin and the displacement of resident animals during rotational training, aircraft strikes on birds are very rare and discountable from the standpoint of population-level effects.

JPADS: JPADS operations involve SF units deploying from high-altitude aircraft and landing in designated areas. This activity would have a limited effect on biological resources and does not generate noise appreciably above background levels. Because of the high altitude of the associated aircraft operations, aircraft bird strikes are not an issue for JPADS activities.

High-angle Movement: High-angle movement involves dismounted SF units traversing mountainous and rugged terrain. These activities would have less effect on biological resources than those described for dismounted maneuver in Section 4.1.1.1, *Maneuver*. These activities do not result in the generation of noise appreciably above background levels.

4.1.1.5 Non-rotational Training

Leach Lake Tactical Range: Leach Lake is used as a bombing range by the Air Force and has been used as an impact area for dud-producing munitions since 1981. Impacts from explosive munitions eliminate vegetation and kill any wildlife in the area of the impact; however, these areas of impact are small relative to the size of Leach Lake. It is likely that wildlife seek shelter or move away from areas where munitions are detonating. The effects on vegetation and wildlife are less than for maneuver training because of the smaller size and scattered nature of the areas affected. The alkali mariposa lily historically occurred at two springs in the southern part of Leach Lake, but the species was not observed during 2003 surveys. The area of the two springs is not in proximity to targetry in Leach Lake. Nelson's bighorn sheep occur in the Avawatz Mountains at the eastern end of Leach Lake, but the species has not been observed in the low elevation areas where targetry is placed. The desert tortoise occurs in the eastern part of Leach Lake, but no signs of desert tortoise have been observed at, or in proximity to, targetry in Leach Lake. No special status bird species have been observed in Leach Lake, but these species could occur as transients during migration. No other special status wildlife species occurs at Leach Lake (USAF, 2006). Aircraft operations in the Leach Lake Tactical Range have been determined to have no detrimental effects on wildlife, including special status avian species, Nelson's bighorn sheep, and desert tortoise (USAF, 2006).

USAF Task Force Operations: The effects on biological resources are similar to those for aviation in Section 4.1.1.1, *Maneuver*.

Personnel Recovery Operations: Personnel recovery operations can require the use of ORVs. The effects on biological resources from personnel recovery operations are generally very localized and would be similar to that described for mounted maneuver in Section 4.1.1.1, *Maneuver*. Because recovery operations are conducted in areas away from the main RTU activity, it is more likely that physical disturbance and noise associated with recovery operations would startle wildlife and cause temporary displacement from the immediate area. Because these activities would be spread across the landscape and not regularly repeated in a given area, acclimatization to these activities would not be expected.

Home-station Off-rotation Training: The effects on biological resources from home-station off-rotation training would be similar to those described for mounted maneuver in Section 4.1.1.1, *Maneuver*.

Other Organization Austere Training Requirements: The effects on biological resources from these activities (other organizations conducting training under the harsh desert conditions) would be similar to those described for mounted maneuver in Section 4.1.1.1, *Maneuver*.

4.1.1.6 Integrated Training Area Management

ITAM is tasked with managing and maintaining the training land condition and would mitigate adverse effects on vegetation and habitat caused by training activities (**Biology Mitigation-3**). Typical LRAM sites include revegetation with native Mojave Desert species and employing erosion control techniques such as check dams, which help catch seeds and increase vegetation in an area. ITAM land management activities could displace wildlife from the vicinity of work areas; however, the species would be expected to return, and no mortality is expected. Noise resulting from ITAM activities is not detrimental to wildlife and any effects are not discernable from the displacement resulting from physical activities.

4.1.1.7 Range Complex

Use of weapon-specific military training ranges in the Range Complex would have the same effects on biological resources as those described for fire and movement in Section 4.1.1.1, *Maneuver*.

4.1.1.8 Manix Trail

Use of the Manix Trail to move wheeled military equipment between Fort Irwin and the Yermo Rail Yard is confined to the footprint of the trail; therefore, there would be minimal effects on vegetation and wildlife. Incidental mortality of common wildlife may occur, but this is uncommon due to the slow speeds of the convoys and no population-level effects occur. The noise associated with the movement of convoys between Fort Irwin and the Yermo Annex (typically 40 days per year) can temporarily displace wildlife from areas adjacent to the Manix Trail. Any displaced wildlife would likely resume normal use of the area between convoys and any wildlife that remain in proximity to the Manix Trail during convoy activities likely have acclimatized to the recurrent vehicle noise.

No desert tortoise burrows occur within the footprint of the Manix Trail, but desert tortoise may wander along the Manix Trail. Desert tortoise that are crossing the trail would be at risk of being run over when military equipment pass. Arriving and departing RTUs are briefed on the desert tortoise and convoys are escorted by trained home-station soldiers. If a tortoise is in the trail, the convoy stops until the tortoise has cleared the trail or it is relocated by the trained escort (**Biology Mitigation-4**). With this training and mandate for avoidance, no mortality of desert tortoise occurs. Desert tortoise may be temporarily disturbed by the movement of military equipment along the Manix Trail, but there are no long-term effects on the behavior of the species.

There is the potential for accidental spills of coolants, fuel, lubricants, or hydraulic fluids from vehicles and equipment in transit between Fort Irwin and the Yermo Rail Yard. These chemicals could cause stress or mortality in vegetation and wildlife if the contents of the spill were to be ingested. Personnel are required to have and implement spill control plans to address accidental releases of vehicle fluids during transit and prevent the accidental ingestion of contaminants by wildlife (**Hazardous Mitigation-1**).

4.1.1.9 No Mission Change Alternative Summary

Maneuver by heavy vehicles and equipment, weapons fire, and bomb drops has altered the physical condition of the land surface on Fort Irwin; however, ITAM works to revegetate disturbed areas using Mojave Desert native species to the degree possible (**Biology Mitigation-3**). Wildlife species may be temporarily displaced because of the activities and noise associated with training. Some of these animals likely have become acclimatized to the disturbance and remain in the area during training events but may experience increased fitness costs. Any special status wildlife species displaced typically returns to the area following completion of training, and soldiers would continue to be trained to avoid affecting the desert tortoise (**Biology Mitigation-4**). Fort Irwin training operates under a biological opinion from the USFWS (**Biology Mitigation-5**), which sets forth the agreed-upon mitigation measures for ESA-listed species; a copy of the biological opinion is in Appendix 4.1A.

Incidental mortality of mammal or vertebrate species may result from the movement of vehicles and equipment both on-road and off-road during training events, but there are no population-level effects and there is no loss of local populations. Temporary disturbance and relocation away from aircraft noise may occur for some species, while others likely have acclimatized to the common occurrence of aircraft noise. Refueling and maintenance activities may result in an accidental spill of coolants, fuel, lubricants, or hydraulic fluids. These chemicals could cause stress or mortality in special status wildlife if the contents of the spill were to extend outside the designated maintenance and refueling areas. A spill response plan would be implemented in the event of an accidental spill of vehicle or equipment fluids and to prevent spilled fluids from reaching wildlife (**Hazardous Mitigation-1**). The effects on vegetation and wildlife, including special status species, resulting from the continuation of current military training

on Fort Irwin are considered to be **moderate**, **adverse**, and **long-term** in the Northern Corridor, Central Corridor, Southern Corridor, Eastern Training Area, Range Complex, and Manix Trail where the described training activities are occurring. The effects in the Western Training Area would be **negligible** as there are currently no training activities occurring in this area.

4.1.2 Changes in Training Activity Alternative

The Changes in Training Activity Alternative would have no effects in the Range Complex, Leach Lake, or the Manix Trail; therefore, these areas are not further discussed for this alternative. The discussion of effects is provided separately for the geographic areas where changes would occur. Under each geographic area, the effects on biological resources discussed for the No Mission Change Alternative would also occur, with appropriate mitigation measures also implemented. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative.

4.1.2.1 Northern Corridor

Vegetation Including Special Status Species

No changes to maneuver intensity, as shown on Figure 4.1-1, would occur in the Northern Corridor. The proposed training changes in the Northern Corridor are limited to aviation operations and cyberspace. While areas of flights would increase, there would be no change in locations of targets for air-to-ground fire and no change from current conditions regarding air-to-ground fire. Field takeoff and landings may require local vegetation clearing and rotor wash may dislodge some vegetation in the vicinity of a landing and/or takeoff. These areas would be sited away from off-limits areas. Within the context of the larger vegetation disturbance associated with maneuver training, helicopter activities would have negligible effect on vegetation. The effects on vegetation, including special status species, from the Changes in Training Activity Alternative would be **negligible**, and when combined with the effects of the No Mission Change Alternative, would continue to result in **moderate, adverse,** and **long-term** effects on common and special status vegetation.

Wildlife Including Special Status Species

Aviation operation (rotary- and fixed-wing) training activities would increase the area in which aircraft engage live ground targets in simulated attacks, but there would be no change in the number of flights. Aircraft overflights are currently common and training activities in the Northern Corridor have already altered the landscape. The activities at the live targets would displace wildlife from the area in which the aircraft engagement would occur prior to aircraft entering the engagement. Because of the ongoing disturbance and displacement associated with BCT, training activities focused on weapons firing, field takeoffs and landings in concert with that training would not have discernable effects on wildlife, including special status species. Noise effects on wildlife would be comparable to those described for mounted maneuver in Section 4.1.1.1, *Maneuver*. Therefore, any effects on wildlife, including special status species, from the Changes in Training Activity Alternative would be **negligible**, and when combined with the effects of the No Mission Change Alternative, would continue to result in **moderate, adverse,** and **long-term** effects on common and special status species wildlife.

4.1.2.2 Central Corridor

Vegetation Including Special Status Species

Increased live-fire training and aviation operation activities are expected within the Central Corridor; however, the maneuver intensity through the corridor would remain within the parameters shown on Figure 4.1-1. The number of obstacles used and digging anti-vehicle ditches and other maneuver activities to support RTU training scenarios would increase, which could further reduce vegetation cover. The use of live munitions and the impacts of dud-producing munitions from training would also increase, which would result in localized disturbance and the elimination of vegetation at the point of impact. ITAM would revegetate disturbed areas using Mojave Desert native species (**Biology**

Mitigation-3) and special status species would be managed in accordance with agreements with USFWS (**Biology Mitigation-5**)**.** Expanding the spatial extent of live-fire and aviation training in the Central Corridor would result in **minor, adverse,** and **long-term** effects on vegetation; however, compared to the impacts associated with the No Mission Change Alternative, this increase would not exceed the threshold defined for **moderate, adverse,** and **long-term** effects on common or special status vegetation, as provided in Table 4.1-1.

Wildlife Including Special Status Species

The increased activities in the Central Corridor could increase the compaction of soil, decrease vegetation, and accelerate soil erosion, resulting in reductions of habitat and habitat quality for wildlife, including special status species. ITAM would work to mitigate these effects (**Biology Mitigation-3**). Temporary displacement of some wildlife species would occur during training events, but these animals would be expected to return to normal use of the area between training events. Incidental mortality of common mammal or vertebrate species may result from the movement of vehicles and equipment both on-road and off-road during training events, but no loss of local populations would be expected. Because much of the Central Corridor has been disturbed by historical training activities and does not support substantial populations of wildlife species, the increased maneuver activities would not be expected to have a substantial effect on wildlife populations, including the desert tortoise. Noise effects on wildlife would be comparable to those described for mounted maneuver in Section 4.1.1.1, *Maneuver*. Special status species, including the desert tortoise, will continue to be managed in accordance with the USFWS biological opinion (**Biology Mitigation-5**)**.** Expanding the spatial extent of training in the Central Corridor would extend training-related disturbance and noise into a larger area. Given the relatively limited increase of training activities effects on wildlife from the increased training would result in **minor, adverse,** and **long-term** effects on wildlife, including special status species**.** This increase would not exceed the threshold defined for **moderate, adverse,** and **long-term** effects on common or special status vegetation as provided in Table 4.1-1. **Biology Mitigation-1 through -5** and **Hazardous Mitigation-1** would be implemented in the Central Corridor.

4.1.2.3 Southern Corridor

Increased live-fire training and aviation operations are expected in the Southern Corridor; however, the maneuver intensity through the corridor would remain within the parameters shown on Figure 4.1-1. Biological effects related to these activities would be similar to those described in Section 4.1.2.2 *Central Corridor*. Noise effects on wildlife would be comparable to those described for mounted maneuver in Section 4.1.1.1, *Maneuver*. With the implementation of **Biology Mitigation-1 through -5** and **Hazardous Mitigation-1,** implementing the Changes in Training Activity Alternative in the Southern Corridor would result in **minor, adverse,** and **long-term** effects on vegetation and wildlife, including special status species, and when combined with the effects of the No Mission Change Alternative, would continue to result in **moderate, adverse,** and **long-term** effects on vegetation and wildlife, including special status species.

4.1.2.4 Eastern Training Area

Increased live-fire training, maintenance, refueling, and manned aviation operations are expected within the Eastern Training Area. Noise effects on wildlife would be comparable to those described for mounted maneuver in Section 4.1.1.1, *Maneuver*. Biological effects related to increased training activities would be similar to, and greater than, those described in Section 4.1.2.2, *Central Corridor*. Implementing the Changes in Training Activity Alternative in the Eastern Training Area would result in **moderate, adverse**, and **long-term** effects on vegetation and wildlife, including special status species. This increase would not exceed the threshold defined for **moderate, adverse,** and **long-term** effects on common or special status vegetation as provided in Table 4.1-1, because the activities would not be expected to substantially effect local wildlife species or jeopardize the existence of regional wildlife populations. Special status species, including the desert tortoise, would continue to be managed in

accordance with USFWS biological opinion (**Biology Mitigation-5**)**. Biology Mitigation-1 through -4** and **Hazardous Mitigation-1** would also be implemented in the Eastern Training Area.

4.1.2.5 Western Training Area

There could be substantial changes to the Western Training Area depending on the chosen alternative. These potential changes are described in the following sections. The acreage and corresponding maneuver intensity level for each alternative are shown in Table 4.1-2.

TABLE 4.1-2
Acreage of Uses for Western Training Area Action Alternatives
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Use Category	Alternative 1 (Total Area [acres])	Alternative 2 (Total Area [acres])	Alternative 3 (Total Area [acres])	Alternative 4 (Total Area [acres])	No Mission Change Alternative (Total Area [acres])
High-Intensity Maneuver	0	500	27,700	27,700	0
Medium-Intensity Maneuver	58,100	57,600	30,400	30,400	0
Low-Intensity Maneuver	0	0	0	0	0
Off-limits	9,200	9,200	9,200	9,200	9,200
Restricted Use	3,300	3,300	3,300	3,300	61,400

Because there is currently no training occurring within the Western Training Area, there are **no effects** from the No Mission Change Alternative to combine with the effects of Western Training Area Alternatives 1 through 4.

Alternative 1: Medium-intensity Aviation Task Force

Vegetation including Special Status Species

Under Alternative 1 for the Western Training Area, brigade-level aviation units would increase their use of the area, resulting in an increase of aircraft and ground support vehicles in the area and changing the maneuver intensity level from restricted (Figure 4.1-1) to medium intensity (Figure 4.1-2). All training activities would be confined to aviation LSAs or to existing roads. There would be a long-term disturbance of vegetation habitat from the establishment of LSAs, which would represent a small portion of the total vegetation in the Western Training Area. Due to the slow growth rate of desert plants, revegetation would be incomplete in the intervals between training events. The potential for accidental spills of coolants, fuel, lubricants, or hydraulic fluids from vehicles and equipment used in training would increase. Units would be required to have and implement, as necessary, spill control plans to address prevention, reporting, and cleanup of accidental releases of vehicle fluids during training exercises and prevent spilled fluids from reaching vegetation (**Hazardous Mitigation-1**). While the potential for invasive, non-native species to be transported into the Western Training Area inadvertently on military equipment existed historically, the establishment of invasive, non-native species due to transport by military equipment has not been common on Fort Irwin. With the implementation of **Biology Mitigation-1 through -5** and **Hazardous Mitigation-1,** these activities would result in **minor, adverse,** and **long-term** effects on vegetation, including special status species.

Wildlife including Special Status Species

All training activities would be confined to established aviation LSAs or existing roads. There would be a small, long-term reduction of wildlife habitat from the establishment of permanent sites. Increased human activity and noise from aviation operations at the LSAs would have effects on wildlife similar to those described for aviation in Section 4.1.1.1, *Maneuver*, except that disturbance would be limited to the area of the LSAs instead of across the landscape. Because ground-level aviation activities would be a

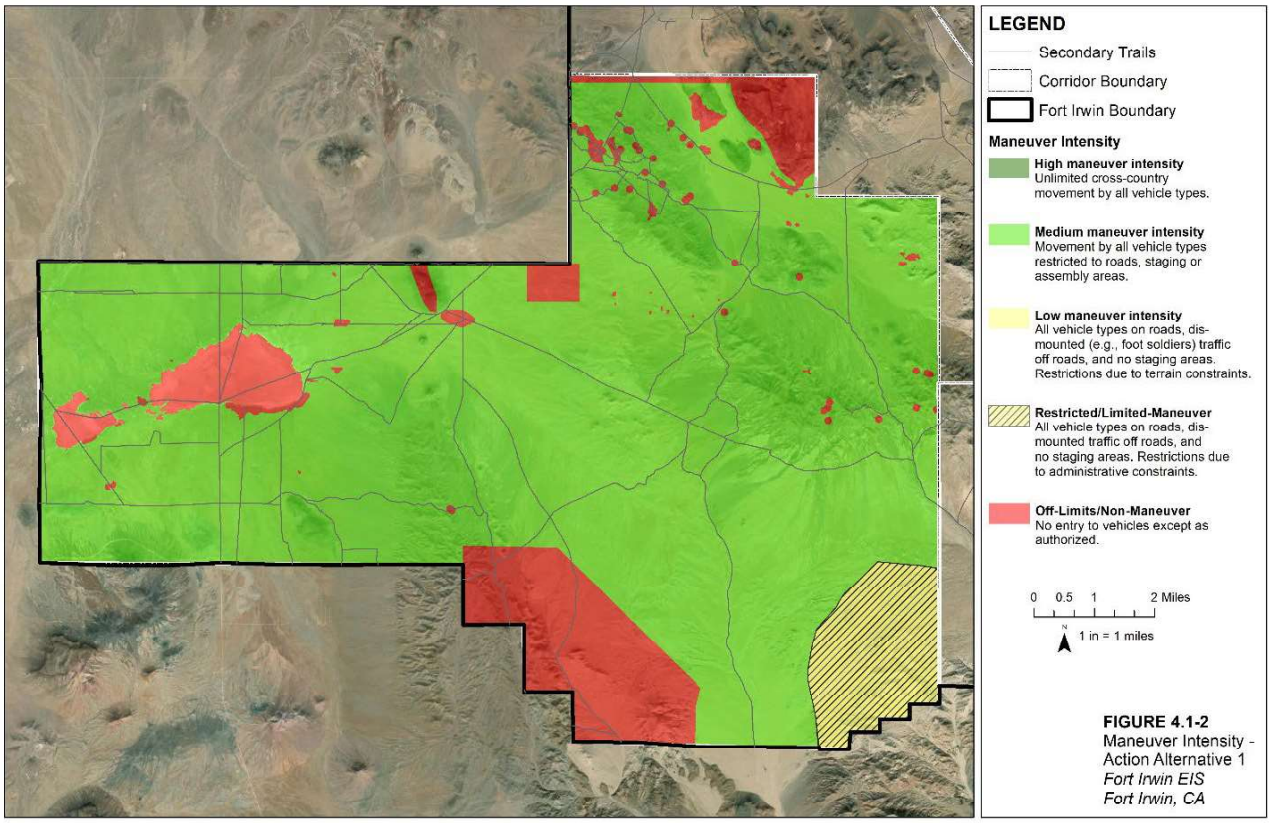
new noise source in the Western Training Area, there would be recurrent increases in ambient noise levels. The increased noise levels would contribute to wildlife displacement from the area of the LSA; however, these animals would be expected to return to normal use of the areas between training events. Some animals may acclimatize to the recurrent training-related disturbance and remain in the area. Incidental mortality of mammal or vertebrate species may result from the movement of vehicles and equipment along roads during training events.

The American badger, Mohave ground squirrel, and desert kit fox may occur in the Western Training Area and could occur in proximity to the established LSAs. These animals could be temporarily displaced by training activities, and limited mortality may occur, but no population-level effects would result. The burrowing owl occurs in the Western Training Area, but LSAs would be located away from known populations of this species and there would be no effects on burrowing owls.

Fort Irwin plans to relocate desert tortoise from the Western Training Area prior to initiating training activities. This relocation would be done per the agreements in the 2014 Biological Opinion (USFWS, 2014) and the 2021 Biological Opinion (Appendix 4.1A). Units training in the Western Training Area would follow established procedures when encountering a desert tortoise (**Biology Mitigation-4**). Fort Irwin would also implement mitigation related to special status plant species, as specified in the BO (**Biology Mitigation-5**)**.**

Increased personnel and training activities would create solid wastes, including food-related solid waste, and some of this waste could be left behind and create attractants for coyotes and ravens; however, this waste would be removed from the site following each rotation (**Biology Mitigation-1**).

With the implementation of specified mitigation measures for training activities, any effects on wildlife, including special status species, would be **minor, adverse,** and **long-term**.



Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

The level of disturbance from training activities would be slightly greater than that discussed for the Western Training Area Alternative 1 (Table 4.1-2), but the training activities would remain on established trails and occur at fixed aviation LSAs and brigade support areas, which could be placed at up to five locations (Figure 4.1-3), though only one would be used during a given training scenario. The establishment of a brigade support area would result in a substantial increase in vehicle presence and localized high-intensity maneuver within the brigade support area. Off-limits and restricted areas would be avoided during the siting of brigade support areas and LSAs. It is expected that the effects on vegetation, including special status species, would be greater than for Western Training Area Alternative 1, but they would remain **minor, adverse,** and **long-term,** because off-road training activities would be limited and **Biology Mitigation-1 through -5** and **Hazardous Mitigation-1** would be implemented.

The effects on wildlife, including special status species, would be greater than those described for Western Training Area Alternative 1 and would be **moderate, adverse**, and **long-term** with the implementation of **Biology Mitigation-4** and **-5**.

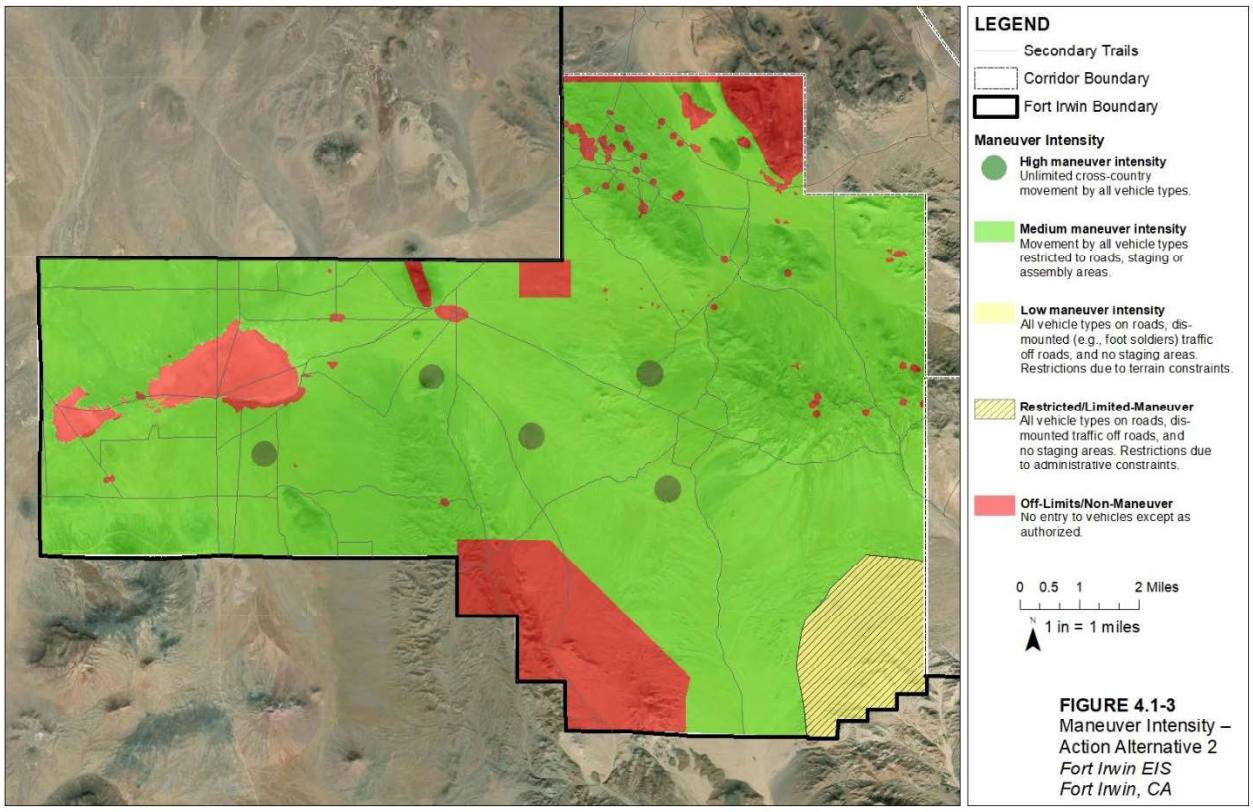


FIGURE 4.1-3
Maneuver Intensity – Action Alternative 2
Fort Irwin EIS
Fort Irwin, CA

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers – Limited Ammunition

Vegetation including Special Status Species

Implementation of Alternative 3 would result in repeated disturbance to soils and vegetation from brigade-level maneuvers and would result in high-intensity maneuvers in the Western Training Area as shown on Figure 4.1-4. Extensive loss of vegetation would be expected in areas where high-intensity training would occur and invasive, non-native species may establish in new areas. Populations of special status species, including Lane Mountain milkvetch (Figure 3.1-3) and Desert cymopterus (Figure 3.1-4), are protected through off-limits and limited use designations (**Biology Mitigation-5**). Approximately 40 percent of the western Joshua trees in the Western Training Area could be impacted by training activities, but the species would be expected to persist in the area. Because the new disturbance would

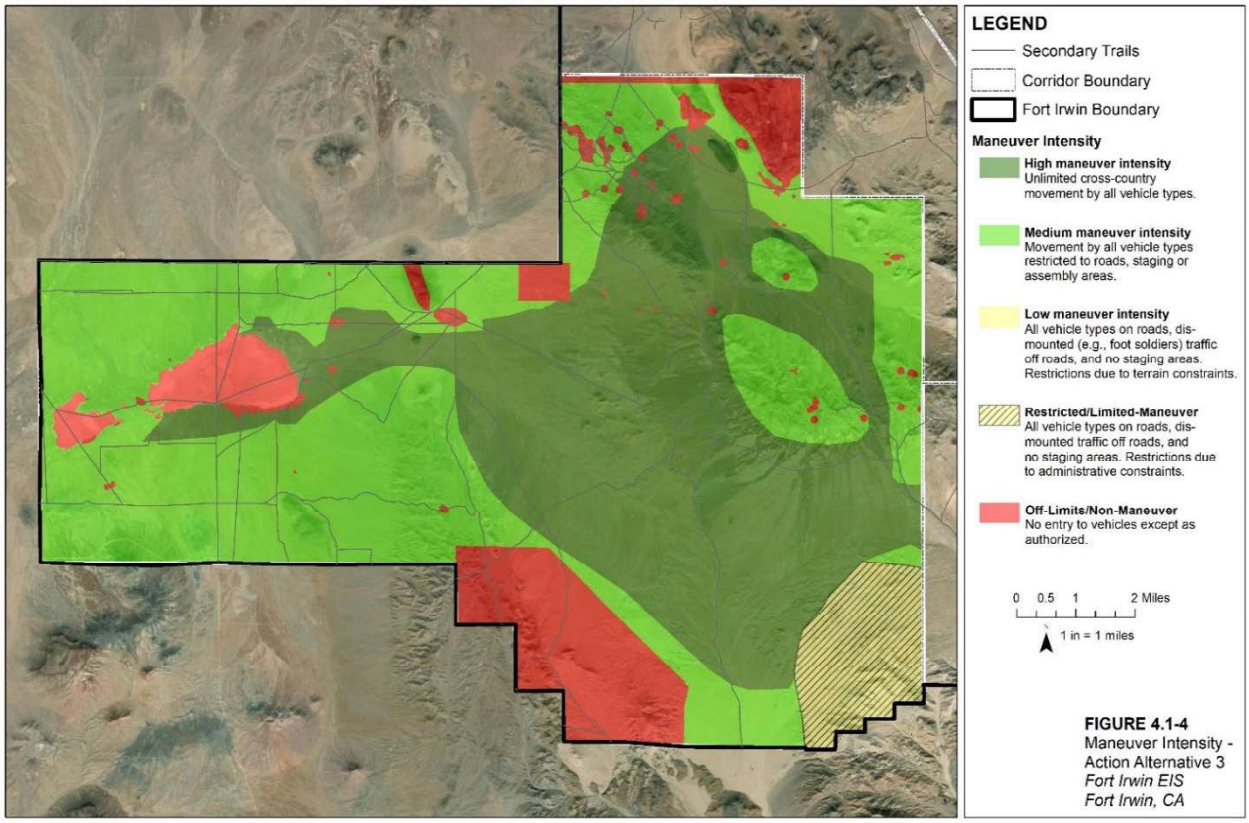
encompass much of the Western Training Area and areas of currently intact habitat would be lost, it is expected that the effects on vegetation would be **moderate, adverse**, and **long-term**. **Biology Mitigation-1 through -3** and **Biology Mitigation-5** would be implemented to avoid or minimize these effects to the degree practicable.

Wildlife including Special Status Species

The reduction in habitat quality would likely result in noticeable effects on wildlife populations, with population levels decreasing through time. Complete loss of populations would not be expected based on what has been observed in other areas of Fort Irwin that experience this level of training. Wildlife that remain in the Western Training Area would likely experience temporary displacement as a result of activity and noise associated with high-intensity training events, but these animals would be expected to return to normal use of the area between training events. Some wildlife may acclimatize to the recurrent disturbance and remain in the vicinity of training activities. Incidental mortality of wildlife species may result from the movement of vehicles and equipment during training events. Because much of the Western Training Area (approximately 40%) would be disturbed by high-intensity training, it is expected that the effects on common wildlife would be **moderate, adverse**, and **long-term**.

State of California special status species, including the American badger (SSC), desert kit fox (under review), burrowing owl (SSC), and Mohave ground squirrel (threatened) would experience displacement, habitat degradation and loss, and potential incidental mortality from training events; however, it is unlikely that brigade-level activities in the Western Training Area would affect the species at the local population level or jeopardize the continued existence of the species. These species will continue to be monitored and managed in accordance with the Fort Irwin INRMP (Fort Irwin, 2006b) (**Biology Mitigation-6**). In the future, if any of these species are designated by the USFWS to be threatened or endangered, Fort Irwin will initiate consultation with USFWS per Section 7 of the ESA. The effects on these species would be **moderate, adverse**, and **long-term**.

The federally listed threatened desert tortoise (approximately 300, Figure 3.1-6) also occurs in the Western Training Area. Fort Irwin plans to relocate desert tortoise from the Western Training Area prior to initiating training activities. This relocation would be done per the agreements in the 2014 Biological Opinion (USFWS, 2014) and 2021 Biological Opinion (Appendix 4.1A). Furthermore, units training on Fort Irwin receive training on the desert tortoise, including procedures to follow if a desert tortoise is encountered during training activities (**Biology Mitigation-4**). Units training in the Western Training Area would follow these procedures in the event of encountering a desert tortoise, and agreements with USFWS regarding the desert tortoise will continue to be implemented (**Biology Mitigation-5**). With the implementation of these mitigation measures, the effects on the desert tortoise would be **moderate, adverse**, and **long-term**. There may be some individual mortalities associated with the translocation process, but the numbers will not substantially affect the regional population. Recent trends of desert tortoise populations in the Mojave Desert suggest changes in relative abundance of tortoises were greatest among large tortoises in the western Mojave Desert, which may reflect high levels of human disturbance and raven depredation (Davis, 2021). One of the advantages to the translocation of desert tortoise to select offsite mitigation areas is the ability to strategically relocate them to optimize breeding opportunities. The USFWS is also enhancing efforts to control common raven depredation with the 2022 Monitoring and Management Plan within desert tortoise conservation areas (USFWS, 2022). The 2021 Biological Opinion concluded that the increased use of the Western Training Area would not appreciably reduce the distribution of the desert tortoise in the Western Mojave Recovery Unit or range-wide and would remove less than 1 percent of the critical habitat of the desert tortoise. The agreed-upon mitigation measures in the 2021 Biological Option will be put into place prior to the Army commencing activities in the Western Training Area.



Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Biological effects from Alternative 4 would be similar to Alternative 3 and reflect the maneuver intensity shown on Figure 4.1-4 and in Table 4.1-2. The addition of live ammunition would not result in substantially greater effects on biological resources, compared to the effects of the large-scale training activities, because dud-producing munitions would not impact within the Western Training Area. The effects from live fire would be limited to an increase in noise-related disturbance from live fire, but this increase would be barely discernable compared to the displacement resulting from the overall training activity. The implementation of Alternative 4 would require the same mitigation measures as Alternative 3 and result in **moderate, adverse**, and **long-term** effects on vegetation and wildlife, including sensitive species.

4.1.3 Training Infrastructure Improvement Alternative

The effects on biological resources discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

4.1.3.1 Northern Corridor

Vegetation Including Special Status Species

Upgrades to existing UO sites and communication capabilities, the construction of new CBRN facilities, UAS runway, and radar systems, and the development of LRAM sites would be conducted in the Northern Corridor under the Training Infrastructure Improvement Alternative. These upgrades and construction activities would affect vegetation from the construction of access roads, tower sites, and security barriers and from the extension and replacement of fiber communications lines. Depending on site-specific conditions, access roads and fiber extensions could extend for up to 5 miles, in addition to the 50-by-75-foot tower site. It is estimated that a maximum of 100 acres of vegetation would be disturbed, of which up to 80 acres (less than 0.1 percent of the area of the Northern Corridor) would be

converted to permanently unvegetated conditions for the tower sites and the access roads. The disturbed areas would be dispersed across the corridor and all current off-limits areas would be avoided. Although some areas will naturally revegetate following construction, this would be a long-term effect because of the slow rate of vegetation establishment and growth in the desert environment. While the potential for accidental spills of coolants, fuel, lubricants, or hydraulic fluids from vehicles and equipment used during construction exists, work crews would be required to implement **Hazardous Mitigation-1**. With the implementation of these mitigation measures, the effects on vegetation, including special status species, from construction would be **minor, adverse,** and **long-term**.

ITAM activities would implement maintenance on secondary trails and disturbed areas in the Northern Corridor. These maintenance activities would reduce erosion potential and increase habitat, which would result in benefits to vegetation, resulting in a **moderate, long-term benefit**.

Wildlife including Special Status Species

Construction and maintenance activities would affect wildlife. Maintenance includes inspections and any repairs needed to keep infrastructure serviceable. Animals would likely be displaced in the vicinity of the construction or maintenance activities but would be expected to return to the area when construction is complete and following maintenance activities. Noise from construction and maintenance of infrastructure would contribute to temporary displacement but would not appreciably affect wildlife. Smaller animals would be permanently displaced from the new roads and tower sites. Displacement of wildlife would cross multiple habitat types and most types of animals on Fort Irwin could be affected. Incidental mortality of some less mobile animals could occur, but no changes in population levels would be expected from construction. Vehicle-associated mortality would not be expected from maintenance activities because activities would be conducted during daytime hours when animals generally are inactive and visibility is good. Maintenance activities would be confined to existing disturbed areas and vehicle travel would be at slow speeds along established roads and trails. Maintenance personnel would receive training on the desert tortoise, including procedures to follow if a desert tortoise is encountered during maintenance activities (**Biology Mitigation-4**).

To avoid the effects on special status species, all construction will involve the implementation of the mitigation measures specified in the BO, including the following practices (**Biology Mitigation-7**).

- Before construction or maintenance begins, personnel working on the site would receive a briefing on the desert tortoise, detailing the protocol to follow if a tortoise is encountered in the project area. A trained person would conduct the briefing.
- A preconstruction survey by a trained person would be conducted prior to construction. If an endangered or threatened species is identified during the survey, appropriate measures as agreed to by USFWS, would be implemented.
- During land clearing and construction, a trained person would be onsite to observe construction activities and verify that no desert tortoise had wandered into the construction area. If an active burrow or desert tortoise is identified during work, appropriate measures as agreed to by USFWS, would be implemented.
- Workers would be required to inspect the underside of all onsite parked vehicles before moving them, unless parked in a staging or parking area protected by exclusion fencing. If a desert tortoise is detected, then a trained person would remove the animal to a safe place or workers would wait to operate the vehicle(s) until the animal moves to safety on its own.
- To the extent possible, construction activities involving vegetation clearing and/or ground disturbances would be scheduled when desert tortoises are inactive (November to mid-March).
- If channels or basins are constructed, they would be designed to allow desert tortoise to pass through them unimpeded so that desert tortoise would not be constrained in these features.

- Trenches or other excavations would be filled or covered at the end of each work day.
- If vegetation clearing is required during the breeding and nesting season, preconstruction surveys for breeding birds would be conducted. Project-identified active nests or burrows (burrowing owl) would be protected from disturbance by a 500-foot buffer, which would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season.
- If a desert kit fox or American badger burrow is identified on, or adjacent to, the project area during the preconstruction survey, Fort Irwin natural resources staff would be contacted. Fort Irwin staff would determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin would decide if fencing or flagging would suffice to delineate the exclusion zone.

Based on these commitments, **minor, adverse**, and **long-term** effects on wildlife, including special status species, would be expected in the Northern Corridor from infrastructure improvement activities. When these effects are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect in the Northern Corridor would remain **moderate, adverse,** and **long-term.**

4.1.3.2 Central Corridor

Improvements to live ammunition capabilities, training obstacles, existing UO sites, and communication capabilities, the construction of new CBRN facilities, new FARPs, and radar systems, and ITAM activities would be conducted in the Central Corridor under the Training Infrastructure Improvement Alternative. Construction activities in the Central Corridor would be conducted in a similar manner, and employ the same mitigation measures, as those described for Section 4.1.3.1, *Northern Corridor*. Training infrastructure improvement activities in the Central Corridor would result in **minor, adverse**, and **long-term** effects on vegetation and wildlife, including special status species, and a **moderate, long-term benefit** from ITAM activities. When these effects are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect in the Central Corridor would remain **moderate, adverse,** and **long-term.**

4.1.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities and the construction of new CBRN facilities and new FARPs would occur in the Southern Corridor under the Training Infrastructure Improvement Alternative. Construction activities in the Southern Corridor would be conducted in a similar manner, and employ the same mitigation measures, as those described for Section 4.1.3.1, *Northern Corridor*. With implementation of **Biology Mitigation-5**, training infrastructure improvement activities in the Southern Corridor would result in **minor, adverse**, and **long-term** effects on vegetation and wildlife, including special status species, and a **moderate, long-term benefit** from ITAM activities. When these effects are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect in the Southern Corridor would remain **moderate, adverse** and **long-term.**

4.1.3.4 Eastern Training Area

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities, the construction of new CBRN facilities and new FARPs, and ITAM activities would be conducted in the Eastern Training Area under the Training Infrastructure Improvement Alternative. Construction activities in the Eastern Training Area would be conducted in a similar manner, and employ the same mitigation measures, as those described for Section 4.1.3.1, *Northern Corridor*. Training infrastructure improvement activities in the Eastern Training Area would result in **minor, adverse**, and **long-term** effects on vegetation and wildlife, including special status species, and a **moderate, long-term benefit** from ITAM activities. When these effects are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect in the Eastern Training Area would remain **moderate, adverse,** and **long-term.**

4.1.3.5 Western Training Area

Improvements to live ammunition capabilities (under Alternative 4 for the Western Training Area) and communication capabilities, the construction of new UO sites and new FARPs, and ITAM activities would be conducted in the Western Training Area under the Training Infrastructure Improvement Alternative. Construction activities in the Western Training Area would be conducted in a similar manner, and employ the same mitigation measures, as those described for Section 4.1.3.1, *Northern Corridor*. With implementation of **Biology Mitigation-5**, training infrastructure improvement activities in the Western Training Area would result in **minor, adverse**, and **long-term** effects on vegetation and wildlife, including special status species, and a **moderate, long-term benefit** from ITAM activities. When these effects are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect in the Western Training Area would remain **moderate, adverse,** and **long-term.**

4.1.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, 7, and 20 would involve construction and increased activity at these ranges; however, these ranges are already heavily disturbed areas and the improvements would not appreciably affect vegetation or special status species. Any effects on vegetation would be **negligible**.

Common wildlife near construction activities may be displaced temporarily, but there would be no loss of habitat and no mortality is expected, as the habitat within the Range Complex is currently disturbed. Targetry and other infrastructure would be placed in areas already heavily used for training on the Range Complex. While no mortality would be expected, the sites would be surveyed for special status species prior to construction (**Biology Mitigation-5**). Range improvements would have **negligible** effects on wildlife, because the ranges are already heavily used for various training activities and the additional training would not measurably affect wildlife.

When these effects on vegetation and wildlife are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect in the Range Complex would remain **moderate, adverse,** and **long-term.**

4.1.5 Manix Trail Alternative

Limited disturbance of vegetation could occur in the immediate area of a specific maintenance activity. This disturbance would be localized and the loss of vegetation and/or habitat of a few square feet would be **negligible**.

Temporary displacement of common wildlife could occur in the immediate area of maintenance activities; however, this disturbance would be comparable to the regular use of the Manix Trail by military vehicles. Other than the desert tortoise, no special status wildlife species are known to occur along the Manix Trail. Proposed maintenance sites would be assessed for the presence of the desert tortoise and its burrows. No maintenance activities would result in the destruction of a burrow. Maintenance activities would be delayed until the desert tortoise voluntarily left the proposed work area (**Biology Mitigation-5**). **No effects** on special status vegetation would result from implementation of the Manix Trail Alternative.

When these effects are added to the No Mission Change Alternative and the Change in Training Activity Alternative, the overall effect for Manix Trail would remain **moderate, adverse,** and **long-term.**

4.1.6 Mitigation Measures

The following measures would be implemented to minimize the effects on biological resources:

- **Biology Mitigation-1**: Require soldiers and work crews operating on Fort Irwin to place trash in the appropriate containers and remove trash at the completion of work or the training event.

- **Biology Mitigation-2**: Apply water for dust suppression in a manner that does not create pools that could attract pest species.
- **Biology Mitigation-3:** Continue the ITAM program's actions to encourage revegetation to the degree practicable after training events.
- **Biology Mitigation-4:** Train soldiers to avoid impacts to the desert tortoise. If a tortoise is on a trail, instruct soldiers to stop their movement until the tortoise has cleared the trail. Within the Manix Trail, use trained home-station soldiers to escort convoys and conduct relocation if a tortoise must be moved.
- **Biology Mitigation-5:** Implement mitigation measures related to federally listed species in accordance with agreements made with the USFWS and as documented in a biological opinion.
- **Biology Mitigation-6:** Monitor species identified by the State of California as SSC and threatened or endangered species and manage populations in accordance with the Fort Irwin INRMP (Fort Irwin, 2006b). In the future, if any of these species are designated by the USFWS to be threatened or endangered, Fort Irwin will initiate consultation with the USFWS per Section 7 of the ESA.
- **Biology Mitigation-7:** To avoid any effects on special status species, ensure all construction involves the implementation of the mitigation measures specified in the BO, including the following practices:
  - Before construction or maintenance begins, brief personnel working onsite about the desert tortoise, detailing the protocol to follow if a tortoise is encountered in the project area. Have a trained person conduct the briefing.
  - Have a trained person conduct a preconstruction survey. If an active burrow or desert tortoise is identified during the survey, implement the appropriate measures as specified in the BO.
  - During land clearing and construction, have a biological monitor onsite to observe construction activities and verify that no tortoise has wandered into the construction area. If an active burrow or desert tortoise is identified during work, implement the appropriate measures as specified in the BO.
  - Require workers to inspect the underside of all onsite parked vehicles before moving them, unless parked in a staging or parking area protected by exclusion fencing. If a desert tortoise is detected, have a trained person remove the animal to a safe place or wait to operate the vehicle(s) until the animal moves to safety on its own.
  - To the extent possible, schedule construction activities involving vegetation clearing and/or ground disturbances when desert tortoises are inactive (November to mid-March).
  - If channels or basins are constructed, design them to allow desert tortoise to pass through them unimpeded so the desert tortoise would not be constrained in these features.
  - Fill or cover trenches and other excavations at the end of each work day.
  - If vegetation clearing is required during the breeding and nesting season, conduct preconstruction surveys for breeding birds. Protect project-identified active nests or burrows (burrowing owl) from disturbance with a 500-foot buffer that would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season.
  - If a kit fox or American badger burrow is identified on, or adjacent to, the project area during the preconstruction survey, contact Fort Irwin natural resources staff to determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin would decide if fencing or flagging would suffice to delineate the exclusion zone.

4.2 Water Resources

The effects on water resources were determined by evaluating whether training activities would alter existing drainage patterns, lower groundwater table levels, or diminish water quality of the water resources described in Section 3.2.1, *Surface Water*, and Section 3.2.2, *Groundwater*. The intensity and duration thresholds are described in Table 4.2-1. The effects from potential leaks and/or spills of fuel or vehicle fluids are fully addressed in Section 4.9, *Hazardous Materials and Hazardous Waste*.

TABLE 4.2-1
Significance Criteria for Water Resource
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Effect Intensity	Description
Negligible	The effect would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to water resources; however, the effect would be within historical hydrologic or desired water quality conditions.
Moderate	The Alternative would result in a readily apparent change to water resource; however, the change would not result in loss of beneficial use of water and/or permit violations.
Significant	The Alternative would result in a substantial change to water resources, resulting in a loss of beneficial use of water and/or permit violations.
Duration:	**Short-term –** Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term –** The effects of the specific activity extend well beyond the end of the activity.

4.2.1 No Mission Change Alternative

The following section explains the effects on water resources resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

4.2.1.1 Maneuver

Mounted Maneuver: Mounted maneuver involves the use of heavy mechanized vehicles, including tracked and wheeled vehicles. Dry lakebeds are off-limits to military training; however, alluvial fans and washes leading into lakebeds can be used for military training, including as temporary target locations for firing dud-producing munitions. Although equipment maneuvers result in reshaping banks of washes and broadening channels and washes within alluvial fans, they do not create sufficient disturbance to cause surface flows to be redirected to another groundwater basin. There would be no change in the amount of water available for groundwater recharge or in the basins where recharge occurs.

Equipment maneuvers may result in increased soil erosion. Because of the low topographic gradient in areas used for maneuver training, any increased erosion potential would be low and would not pose a significant threat to water resources. Permanent surface waters on Fort Irwin are off-limits to training and would not be affected by maneuver training (Fort Irwin, 2006b).

Dismounted Maneuver: Dismounted maneuvers involve the movement of troops without the use of heavy mechanized vehicles, though smaller wheeled vehicles may be employed. Dismounted maneuver creates less disturbance to the land surface than mounted maneuver and would have little to no effect on water resources.

Aviation: Aviation operations at the NTC include Army helicopters and Air Force aircraft. These operations would not affect water resources.

Fire and Movement: Munitions firing has less of an effect on the land surface than vehicle maneuvers, because the effects are localized at the point of impact. These activities could result in physical disturbance to alluvial fans but do not alter flow paths substantially. Explosives would not be used in, or adjacent to, surface water features, and small arms fire would be directed to avoid surface water features. There would be no potential for direct effects on surface waters from these activities. Lead from small-arms-fired projectiles is not considered to have an appreciable effect on surface water or groundwater resources; the lead in spent projectiles forms insoluble secondary minerals in the desert environment and could not reach surface water or groundwater resources through leaching (Dermatas et al., 2004).

4.2.1.2 Maneuver Support Operations

Engineer Support: Engineer support operations include the use of heavy equipment typical of civilian construction sites. The heavy equipment would create a similar disturbance to the land surface compared to maneuver activities.

EOD: In the process of rendering UXO safe, EOD units typically employ explosives. This activity could create a physical disturbance to alluvial fans but would not alter flow paths substantially. Studies of munitions impacts in waterways evaluated by Fort Irwin demonstrated minimal effects on water resources (Fort Irwin, 2008).

CBRN: CBRN training on Fort Irwin does not employ live agents and there is no potential to affect water resources from the use of inert agents. A CBRN training event may use simulated explosives, which would result in effects on water resources similar to those described for EOD.

Cyber: Cyber activities would not affect water resources.

UASs: UASs are generally smaller scale aircraft than manned aircraft and would not affect water resources.

4.2.1.3 Sustainment

Re-arming: Re-arming exercises would have an effect on water resources similar to that described for mounted maneuver.

Refueling: An accidental spill of fuel could occur in the area in which fuel supplies are replenished and may contaminate nearby surface water or groundwater. Units are required to have spill containment procedures in place to minimize the effects of releases and prevent any spilled fuel from reaching waters resources. The potential effects from potential leaks and/or spills of fuel or vehicle fluids are fully addressed in Section 4.9, *Hazardous Materials and Hazardous Waste*.

Field Maintenance: An accidental spill of coolants, fuel, lubricants, or hydraulic fluids could occur during system maintenance and repair. Units are required to have spill containment procedures in place to minimize the effects of releases and prevent any spilled fuel from reaching water resources. The potential effects from potential leaks and/or spills of fuel or vehicle fluids are fully addressed in Section 4.9, *Hazardous Materials and Hazardous Waste*.

Assembly Area Development: Alluvial fans would be avoided during the siting of an assembly area for safety reasons and the area occupied by a unit in preparation for an operation would not affect water resources. Springs are not used as a potable water source during training activities. Soldiers would be required to transport potable water for personal use and use portable restroom facilities, with wastewater disposed of at the WWTP as discussed in Section 3.7, *Utilities*.

Medical: Medical activities could involve the use of MEDEVAC vehicles, including helicopters. These activities would not affect water resources.

Military Working Dogs: The use of military dogs would have negligible effects on water resources. Waste generated by dogs would be cleaned up when in controlled areas and would not have an appreciable effect on the environment given the low numbers of dogs employed during operations outside controlled areas.

4.2.1.4 SF Operations

Airborne Operations: SF airborne activities would not affect water resources.

JPADS: JPADS operations involve SF units deploying from high altitude aircraft and landing in designated areas, which would not affect water resources.

High-angle Movement: High-angle movement involves dismounted SF units traversing mountainous and rugged terrain. This activity would not affect water resources.

4.2.1.5 Non-rotational Training

Leach Lake Tactical Range: Leach Lake is used as an aerial bombing range by the Air Force and as an impact area for artillery training. Bomb craters are temporarily produced during training, but they would not change the net recharge to the underlying groundwater basin. The use of Leach Lake would have an effect on water resources similar to that described for fire and movement. The effects from potential contamination by munitions would be similar to those described for EOD in Section 4.2.1.2, *Maneuver Support Operations*.

USAF Task Force Operations: USAF Task Force Operation activities would have no effect on water resources.

Personnel Recovery Operations: The effects on water resources from personnel recovery operations would be similar to those described for mounted maneuver, dismounted maneuver, and aviation.

Home-station Off-rotation Training: The effects on water resources from home-station off-rotation training would be similar to those described for mounted maneuver, dismounted maneuver, fire and movement, and aviation.

Other Organization Austere Training Requirements: The effects on water resources from these activities would be similar to those described for mounted maneuver, dismounted maneuver, fire and movement, and aviation.

4.2.1.6 Integrated Training Area Management

ITAM is tasked with rehabilitating and maintaining the condition of the training land, which would mitigate adverse effects on water resources caused by training activities.

4.2.1.7 Range Complex

The use of the weapon-specific military training ranges on Fort Irwin would have the same effect on water resources as that described for fire and movement.

4.2.1.8 Manix Trail

As an unpaved road, the Manix Trail has minor erosion issues that are frequently addressed through road maintenance. There would be minimal to no effects on water resources from the use of the Manix Trail. The portion of the Manix Trail at I-15 follows Manix Wash, which flows to the Mojave River approximately 3 miles south of I-15. The Mojave River is listed as an impaired water under CWA Section 303(d). Regular maintenance prevents excessive sedimentation. An accidental spill of coolants, fuel, lubricants, or hydraulic fluids could occur during movement of equipment along the Manix Trail. Units are required to have spill containment procedures in place to minimize the effects of releases and prevent any spilled fuel from reaching the Mojave River. The effects from potential leaks and/or spills of fuel or vehicle fluids are fully addressed in Section 4.9, *Hazardous Materials and Hazardous Waste*.

4.2.1.9 No Mission Change Alternative Summary

Maneuvers by heavy vehicles and equipment, artillery fire, and bomb drops could temporarily alter the physical condition of the land surface on Fort Irwin. ITAM works to reduce erosion caused by military training by implementing erosion control BMPs and revegetating areas when necessary (**Water Mitigation-1**). Refueling and maintenance activities may result in an accidental spill of coolants, fuel, lubricants, or hydraulic fluids. The Fort Irwin SPCP would be implemented in the event of an accidental spill of vehicle or equipment fluids to prevent any potential contaminants from reaching surface or groundwater (**Water Mitigation-2**). Given these mitigation measures, the effects on surface water and groundwater resources resulting from military training in the Northern Corridor, Central Corridor, Southern Corridor, Eastern Training Area, and Range Complex are considered to be **minor, adverse,** and **long-term**. The impacts in the Western Training Area and the Manix Trail are considered to be **negligible.**

4.2.2 Changes in Training Activity Alternative

The effects on water resources discussed for the No Mission Change Alternative would also occur under the Changes in Training Activity Alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative.

4.2.2.1 Northern Corridor

An increase in cyber and aviation activities is expected within the Northern Corridor. Cyber and aviation have no effect on water resources. Therefore, no effects on water resources would result from an increase of these activities the Northern Corridor.

4.2.2.2 Central Corridor

An increase in live-fire training and aviation operation activities is expected within the Central Corridor. The effects on the land surface caused by the training activities would be treated by ITAM as per **Water Mitigation-1**. Rotational training would not use water within the Central Corridor and there would be no increase in demand for groundwater in this corridor. The effects on water resources from the Changes in Training Activity Alternative would be **negligible**, and when combined with the effects of the No Mission Change Alternative, would continue to result in **minor, adverse,** and **long-term** effects on surface and groundwater.

4.2.2.3 Southern Corridor

An increase in live-fire training and aviation operation activities is expected within the Southern Corridor. Rotational training would not use water within the Southern Corridor and there would be no increase in demand for groundwater in this corridor. The effects on water resources from the Changes in Training Activity Alternative would be **negligible**, and when combined with the effects of the No Mission Change Alternative, would continue to result in **minor, adverse,** and **long-term** effects on surface and groundwater.

4.2.2.4 Eastern Training Area

An increase in live-fire training, maintenance, refueling, and aviation operation activities is expected within the Eastern Training Area. The effects on the land surface caused by the additional mounted maneuver and live-fire training would be treated by ITAM as per **Water Mitigation-1**. The Fort Irwin SPCP would be implemented in the event of an accidental spill of vehicle or equipment fluids from the increase in maintenance and refueling (**Water Mitigation-2**)**.** Effects on water resources from the Changes in Training Activity Alternative would be **negligible**, and when combined with the effects of the No Mission Change Alternative, would continue to result in **minor, adverse,** and **long-term** effects on surface and groundwater.

4.2.2.5 Western Training Area

Alternative 1: Medium Intensity - Aviation Task Force

Under Alternative 1 for the Western Training Area, an increased use of the area by brigade-level aviation units would occur, resulting in an increase of aircraft and other vehicles in the area. Movement of military equipment would occur along established roads and trails and would not alter the land surface. A UO site also may be established in the Western Training Area but it would not include live ammunition or be supplied with water from the Western Training Area. Rotational training would not use water produced in the Western Training Area and there would be no increase in demand for groundwater in the Western Training Area. The permanent aviation assembly area and UO would be located outside of surface water features. The resulting effect on water resources would be **negligible** relative to current conditions.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, an increased use of the area by brigade-level aviation units, as well as the establishment of brigade support areas, would occur. Rotational training and the UO sites would not use water produced from within the Western Training Area and there would be no increase in demand for groundwater in the Western Training Area. Furthermore, the permanent aviation assembly area, brigade support area, and UO site would be located away from surface water. The resulting effect on water resources would be **negligible** relative to current conditions.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition

Under Alternative 3, full-scale brigade-level maneuvers would occur in the Western Training Area, including the full breadth of activities described in Section 4.2.1.1, *Maneuver*, except for the use of large caliber ammunition. The land surface effects caused by the military training activities would be treated by ITAM as per **Water Mitigation-1**. Furthermore, units would not use water produced from within the Western Training Area and there would be no increase in demand for groundwater in the Western Training Area. Therefore, the resulting effect on water resources would be **minor, adverse,** and **long-term** relative to current conditions.

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Alternative 4 would resemble Alternative 3, except that live ammunition would be permitted during live-fire exercises. The land surface effects caused by the military training activities would be treated by ITAM as per **Water Mitigation-1,** and units would not use water produced from within the Western Training Area. Therefore, the resulting effect on water resources would be **minor, adverse,** and **long-term** relative to current conditions.

4.2.3 Training Infrastructure Improvement Alternative

The effects on water resources discussed for the No Mission Change Alternative would occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

4.2.3.1 Northern Corridor

Upgrades to UO sites and communication capabilities; the creation of new CBRN facilities, a UAS runway and radar systems; and the development of LRAM sites would be conducted in the Northern Corridor under the Training Infrastructure Improvement Alternative. Construction activities over 1 acre would take place in accordance with the statewide General Permit for Stormwater Discharges Associated with Construction Activity (Order No. 2009-0009-DWQ, updated 23 January 2013, as amended by 2010-0014-DWQ and 2012-0006-DWQ [NPDES No. CAS000002]). A Stormwater Pollution Prevention Plan (SWPPP) would be prepared that specifies site management activities to manage stormwater runoff and minimize erosion. These management activities would include stormwater BMPs, such as silt fences, sandbags,

straw waddles, and tire washes; dewatering runoff controls; containment for chemical storage areas; and construction equipment decontamination (**Water Mitigation-3**).

If construction requires water diversion and/or dewatering activities, discharge would be monitored in accordance with either the NPDES General Permit, Limited Threat Discharges to Surface Waters, Board Order R6T-2014-0049, or General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQ0-2003-0003, issued by the Lahontan Water Board (**Water Mitigation-4**).

The expected effects of the training infrastructure improvements on water resources in light of these mitigation measures would be **negligible**.

4.2.3.2 Central Corridor

Improvements to live ammunition capabilities, training obstacles, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, radar systems, and ITAM activities would be conducted in the Central Corridor under the Training Infrastructure Improvement Alternative. Because the construction activities would include the preparation and implementation of a SWPPP, including appropriate BMPs as per **Water Mitigation-3**, and if there is a water diversion and/or dewatering activities, water quality monitoring as per **Water Mitigation-4**, the effects on water resources would be **negligible**.

4.2.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, drive training, and land navigation would occur in the Southern Corridor under the Training Infrastructure Improvement Alternative. Because the construction activities would include the preparation and implementation of a SWPPP, including appropriate BMPs as per **Water Mitigation-3**, and if there is a water diversion and/or dewatering activities, water quality monitoring as per **Water Mitigation-4**, the effects on water resources would be **negligible**.

4.2.3.4 Eastern Training Area

Improvements to live ammunition capabilities, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, and ITAM activities would be conducted in the Eastern Training Area under the Training Infrastructure Improvement Alternative. Because the construction activities would include the preparation and implementation of a SWPPP, including appropriate BMPs as per **Water Mitigation-3**, and if there is a water diversion and/or dewatering activities, water quality monitoring as per **Water Mitigation-4**, the effects on water resources would be **negligible**.

4.2.3.5 Western Training Area

Improvements to live ammunition capabilities (under Alternative 4 for the Western Training Area) and construction of new UO sites, communication capabilities, new FARPs, and ITAM activities would be conducted in the Western Training Area under the Training Infrastructure Improvement Alternative. Because the construction activities would include the preparation and implementation of a SWPPP, including appropriate BMPs as per **Water Mitigation-3**, and if there is a water diversion and/or dewatering activities, water quality monitoring as per **Water Mitigation-4**, the effects on water resources would be **negligible**.

4.2.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, 7, and 20 would involve the construction of new support infrastructure at these ranges; however, because the construction activities would include the preparation and implementation of a SWPPP, including appropriate BMPs as per **Water Mitigation-3**, the effects on water resources would be **negligible**.

4.2.5 Manix Trail Alternative

Improvements to the Manix Trail would consist of minor grading, implementing erosion control structures such as check dams, and applying gravel or dust suppressant. The construction activities would include the preparation and implementation of a SWPPP, including appropriate BMPs as per **Water Mitigation-3,** and water quality monitoring if there is a water diversion and/or dewatering activities as per **Water Mitigation-4**. With these mitigations, no adverse effects to the Mojave River, a CWA Section 303(d) impaired water, would occur.

If construction activities result in excavation, discharge of fill, or other physical alteration of a surface water feature, permanently or temporarily, then either a Lahontan Water Board-issued General Waste Discharge Requirements (Permit) for dredge or fill discharges to non-federal waters or a Lahontan Water Board-issued CWA Section 401 water quality certification for impacts to federal waters, as appropriate, would be obtained (**Water Mitigation-5**).

Through the implementation of these mitigation measures, the effects on water resources under the Manix Trail Alternative would be **negligible**.

4.2.6 Mitigation Measures

The following list is a summary of the mitigation measures related to training on Fort Irwin:

- **Water Mitigation-1**: Continue ITAM's work to reduce erosion caused by military training by implementing erosion control BMPs and revegetating areas when necessary.
- **Water Mitigation-2**: Continue to implement the Fort Irwin SPCP in the event of an accidental spill of vehicle or equipment fluids to prevent any potential contaminants from reaching surface or groundwater.
- **Water Mitigation-3**: Prepare an SWPPP with appropriate BMPs for the construction activities in accordance with the NPDES Construction General Storm Water Permit, Water Quality Order (WQO) 2009-0009-DWQ.
- **Water Mitigation-4**: Monitor water diversion and/or dewatering activities in accordance with either the NPDES General Permit, Limited Threat Discharges to Surface Waters, Board Order R6T-2014-0049, or the General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQO-2003-0003, issued by the Lahontan Water Board.
- **Water Mitigation-5:** For excavation, discharge of fill, or other physical alteration of a surface water, either permanently or temporarily, obtain either a Lahontan Water Board-issued General Waste Discharge Requirements (Permit) for dredge or fill discharges to non-federal waters, or a Lahontan Water Board-issued CWA Section 401 water quality certification for impacts to federal waters.

4.3 Geological Resources

The effects on geological resources were determined based on the potential for increased disturbance or hazards related to topography, geological features, soils, seismicity, and paleontology, collectively referred to as geological resources. Table 4.3-1 identifies the impact thresholds for geological resources.

TABLE 4.3-1
Significance Criteria for Geological Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Impact Intensity	Description
Negligible	Activities related to geological resources would be below or at the lowest levels of detection.
Minor	Activities would result in a detectable change to geological resources; however, the impact would be small, localized, and of little consequence.
Moderate	Activities would result in a readily apparent change to geological resources.
Significant	Activities would result in a substantial change to geological resources. The changes would result in increased presence of geologic hazards, such as landslides or sinkholes, or result in the elimination of a valued geologic resource.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.3.1 No Mission Change Alternative

The following section explains the effects on geological resource resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

4.3.1.1 Maneuver

Maneuver training does not increase the risk or likelihood of seismic activity.

Mounted Maneuver: Current mounted maneuver training involves the movement of troops and equipment using both wheeled and tracked vehicles. While dry lakebeds are off-limits to military training, alluvial fans and washes that lead to lakebeds are used for military training. Mounted maneuver activities can result in reshaping the banks of washes and broadening the channels and washes within alluvial fans in high-intensity maneuver areas. Other effects can include soil or desert pavement disturbance, compaction, and erosion. Soil and desert pavement disturbance can affect near surface paleontological resources. Erosive forces would not extend into playas and sediment transport into playas would not affect paleontological resources. The historical degree of these effects is proportional to the level of the maneuver's intensity in a given area, as shown on Figure 4.1-1.

Dismounted Maneuver: Dismounted maneuver involves the movement of troops with limited use of vehicles. Continued training under the No Mission Change Alternative would result in substantially less effect on geological resources than those described for mounted maneuver training.

Aviation: Aviation operations on Fort Irwin can result in wind erosion related to the landing of aircraft in a desert environment. Most effects related to geological resources are limited to designated areas and roadways and are much less than those described for mounted maneuver training.

Fire and Movement: Fire and movement training includes artillery fire, small arms fire, and bomb drops. These activities can affect geological resources, but they are limited to designated areas and roadways that have been degraded from years of such use. Continued firing into these areas would have no discernable effects on geologic resources.

4.3.1.2 Maneuver Support Operations

Maneuver support operations do not increase the likelihood of seismic activity.

Engineer Support: The construction of roadways, berm obstacles, anti-tank ditches, and runways involves the use of heavy equipment and can result in effects on geological resources, such as increased erosion and the disturbance of soil or desert pavement; however, the use of heavy equipment occurs primarily in high-intensity maneuver areas, where vegetation and soil is degraded.

EOD: In the process of rendering UXO safe, EOD units may employ explosives that could result in increased erosion, soil or desert pavement disturbance, and potentially landslides. UXO is typically located around target areas where geological resources have already been affected and further effects are unlikely.

CBRN: CBRN training would result in effects on geological resources similar to those described for dismounted maneuver in Section 4.3.1.1, *Maneuver*.

Cyber: Cyber activities would have limited to no effect on geological resources on Fort Irwin.

UASs: The effects of training activities involving UASs would be less than those described for aviation in Section 4.3.1.1, *Maneuver*, because of the smaller size of the vehicles and fewer support personnel and vehicles required than for manned aircraft.

4.3.1.3 Sustainment

Sustainment operations do not increase the likelihood of seismic activity.

Re-arming: Re-arming exercises typically occur during maneuver activities and the effects on geologic resources would be similar to those described for mounted maneuver in Section 4.3.1.1, *Maneuver*.

Refueling: Refueling activities typically occur during maneuver activities and the effects on geological resources from this activity are captured in Section 4.3.1.1, *Maneuver*.

Field Maintenance: Field maintenance activities typically occur during maneuver activities and the effects on geological resources from this activity are captured in Section 4.3.1.1, *Maneuver*.

Assembly Area Development: New assembly areas would be located in high-intensity maneuver areas (Figure 4.1-1) and areas without substantial vegetation. Assembly areas (areas routinely used for assembly) are located throughout the medium-intensity maneuver areas.

Medical: Medical activities can include the use of MEDEVAC vehicles such as helicopters. The effects on geological resources would be similar to those described for dismounted maneuver and aviation in Section 4.3.1.1, *Maneuver*.

Military Working Dogs: Military working dogs would accompany military personnel on training activities and would have no effect on geological resources on Fort Irwin.

4.3.1.4 SF Operations

These activities do not increase the likelihood of seismic activity.

Airborne Operations: Airborne operations for SF units would have effects on geological resources similar to those described for aviation in Section 4.3.1.1, *Maneuver*.

JPADS: JPADS operations would have effects on geological resources similar to those described for aviation in Section 4.3.1.1, *Maneuver*.

High-angle Movement: Dismounted SF units traversing mountainous and rugged terrain would have no to minor local effect on geological resources.

4.3.1.5 Non-rotational Training

Non-rotational training does not increase the likelihood of seismic activity.

Leach Lake Tactical Range: The use of the Leach Lake Tactical Range involves military aircraft dropping bombs into the Leach Lake impact area, which can result in effects on geological resources, such as increased erosion or the disturbance of soil or desert pavement. These areas of impact are small relative to the size of Leach Lake, and the effects on geologic resources are less than for maneuver training because of the smaller size and scattered nature of the areas affected.

USAF Task Force Operations: USAF Task Force operations would have effects on geological resources similar to those described for aviation in Section 4.3.1.1, *Maneuver*.

Personnel Recovery Operations: Effects on geological resources from personnel recovery operations would be similar to those described for mounted maneuver, dismounted maneuver, and aviation in Section 4.3.1.1, *Maneuver*.

Home-station Off-Rotation Training: Effects on geological resources from home-station off-rotation training would be similar to those described for mounted maneuver, dismounted maneuver, and aviation in Section 4.3.1.1, *Maneuver*.

Other Organization Austere Training Requirements: Effects on geological resources from home-station off-rotation training would be similar to those described for mounted maneuver, dismounted maneuver, and aviation in Section 4.3.1.1, *Maneuver*.

4.3.1.6 Integrated Training Area Management

ITAM is tasked with managing and maintaining training land conditions and would mitigate adverse effects on soil resources caused by training activities (**Geology Mitigation-1**). The LRAM activities conducted as part of the ITAM program are similar to those described for engineer support in Section 4.3.1.2, *Maneuver Support Operations*. These activities could include changes to the terrain, installing stakes around off-limits areas, removing obstacles and debris, and revegetating trails. Heavy machinery may be used. The effects on geological resources would be similar to those described previously; however, ITAM activities occur at a much smaller scale compared to engineer support activities.

4.3.1.7 Range Complex

The use of weapon-specific military training ranges on Fort Irwin would have effects on geological resources similar to those described for fire and movement in Section 4.3.1.1, *Maneuver*. The ranges were designed and located to avoid effects on sensitive land areas. Use of the Range Complex does not increase the likelihood of seismic activity.

4.3.1.8 Manix Trail

The use of Manix Trail to move military equipment between Fort Irwin and the Yermo Rail Yard is confined to the footprint of the trail; therefore, there would be a minimal effect on geological resources.

4.3.1.9 No Mission Change Alternative Summary

The training activities described previously would have **moderate, adverse,** and **long-term** effects on soil and paleontological resources; however, there are **no expected effects** on topography, geologic features, or seismicity. Activities would be sited to avoid off-limits areas to the extent possible and the dig permit process would be followed for areas of new grading. The effects in the Western Training would be **negligible** given the current lack of training in this area. Because the spatial extent of training would not change, **no effects** on paleontological resources would result from future training. ITAM is tasked with controlling erosion in the training area where erosion can occur. LRAM projects include

revegetation using native vegetation and the implementation of erosion control BMPs, such as check dams and berms (**Geology Mitigation-1**).

4.3.2 Changes in Training Activity Alternative

The effects on geological resources discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative.

4.3.2.1 Northern Corridor

Increased cyber activities are expected in the Northern Corridor. Cyber activities have no effect on geological resources. Increased aviation activities are expected in the Northern Corridor. Aviation activities would result in disturbance of soils to create field takeoff and landing areas; however, this increase in aviation would be expected to have a **negligible** effect on soils, geological resources, and paleontology. There would continue to be **no effects** on topography or seismicity.

4.3.2.2 Central Corridor

Live-fire training and aviation operations activities are expected to increase within the Central Corridor. Aviation activities would result in the disturbance of soils to create field takeoff and landing areas and the dig permit process would be followed. Increased live-fire training would result in new or renewed soil disturbance in areas not used recently for training, but increased training would not occur in areas with highly erodible soils. Training would continue at the current intensity and follow the maneuver intensity displayed on Figure 4.1-1. The effects on soils caused by the additional mounted maneuver and live-fire training would be restored to the degree practicable by **Geology Mitigation-1** and new targetry would be placed outside high potential paleontological areas (**Geology Mitigation-2**).The effects resulting from increased use of the Central Corridor on soils and paleontology would remain **moderate, adverse,** and **long-term**. There would be **no effects** on topography, geological features, or seismicity.

4.3.2.3 Southern Corridor

Live-fire training, and aviation operations are expected to increase in the Southern Corridor. Geological effects related to these activities would be similar to those described for Section 4.3.2.2, *Central Corridor*, and with the implementation of **Geology Mitigation-1** and **Geology Mitigation-2,** would remain **moderate, adverse,** and **long-term** effects on soils and paleontology relative to current conditions. There would be **no effects** on topography, geological features, or seismicity.

4.3.2.4 Eastern Training Area

The intensity of mounted live-fire, maneuver training, maintenance and refueling, and manned aviation operations are expected to increase within the Eastern Training Area. Geological effects related to increased mounted maneuver training and manned aviation activities would be similar to those described for Section 4.3.2.2, *Central Corridor*, and with the implementation of **Geology Mitigation-1** and **Geology Mitigation-2,** would remain **moderate, adverse,** and **long-term** effects on soils and paleontology relative to current conditions. There would be **no effects** on topography, geological features, or seismicity.

4.3.2.5 Western Training Area

Alternative 1: Medium Intensity Aviation Task Force

Under Alternative 1 for the Western Training Area, brigade-level aviation units would increase their use of the area, resulting in an increase of aircraft and other vehicles in the area. Vehicles would remain on already established MSRs and established aviation task force areas. Because takeoff and landing areas would be within the established aviation task force area and with the implementation of **Geology Mitigation-1** and **Geology Mitigation-2**, there would be **negligible** effects on soil and paleontology, and **no effects** on topography, geological features, and seismicity from aviation operations.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, brigade-level aviation units would increase their use of the area and establish a brigade support area. Small-scale (non-dud-producing) explosives, pyrotechnics, and small arms may be used around the brigade support area during training scenarios. While this activity would increase the effects related to geological resources compared to Alternative 1, the effects from the explosives and small arms would be localized and occur in designated areas. With the implementation of **Geology Mitigation-1** and **Geology Mitigation-2**, there would be **negligible** effects on soil and paleontology, and **no effects** on topography, geological features, and seismicity from aviation and brigade support operations.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers – Limited Ammunition

Under Alternative 3, full-scale brigade-level maneuvers would occur in the Western Training Area. This would include the full breadth of activities described in Section 4.3.1.1, *Maneuver*, and result in substantial maneuver intensity throughout the Western Training Area (Figure 4.1-3). Fire and movement activities would be limited to simulated devices, small-scale (non-dud-producing) explosives, pyrotechnics, and non-dud-producing small caliber rounds. With the implementation of **Geology Mitigation-1** and **Geology Mitigation-2**, the increased use of the area by military vehicles would likely result in a **moderate, adverse,** and **long-term** change to paleontological resources and soils. There would be **no effects** on topography, seismicity, or geological features.

Alternative 4: High-Intensity, Full-Scale, Brigade-Level Maneuvers – Unrestricted Ammunition

Alternative 4 would be similar to Alternative 3, except that live ammunition would be permitted during live-fire exercises. The use of large caliber weapons would increase the effects related to geological resources compared to Alternative 3; however, the effects from the large caliber ammunition on geological resources would be localized and occur in designated areas. With the implementation of **Geology Mitigation-1** and **Geology Mitigation-2**, the increased use of the area by military vehicles would likely result in a **moderate, adverse,** and **long-term** change to paleontological resources and soils. There would be **no effects** on topography, seismicity, or geological features.

4.3.3 Training Infrastructure Improvement Alternative

The effects on geological resources discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

4.3.3.1 Northern Corridor

Upgrades to existing UO sites and communication capabilities, the construction of new CBRN facilities, a UAS runway and radar systems, and the development of LRAM sites would be conducted in the Northern Corridor under the Training Infrastructure Improvement Alternative. These activities would include ground disturbance and the use of heavy equipment. While much of the work would occur on previously developed or disturbed areas, new disturbance may be necessary for communication towers, access roads, and utility lines, such as fiber optic cables. Conservation areas and other off-limits areas, such as dry lake beds and springs, would be avoided when selecting sites and locations of new facilities. **Geology Mitigation-2**, avoidance of high potential paleontological areas, would also be implemented. As described in Section 4.2, *Water Resources*, an SWPPP would be prepared and BMPs would be incorporated for construction areas over 1 acre to manage stormwater runoff and minimize erosion (**Water Mitigation-3**). The effects on soils and paleontological resources would result in in a **minor, adverse,** and **long-term** effect. There would be **no effects** on topography, geological features, or seismicity.

4.3.3.2 Central Corridor

Improvements to live ammunition capabilities, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, radar systems and ITAM activities would be conducted in the Central Corridor under the Training Infrastructure Improvement Alternative. Conservation areas and other off-limits areas, such as dry lake beds and springs, would be avoided when selecting sites and locations of new facilities. **Geology Mitigation-2**, avoidance of high potential paleontological areas, would also be implemented. With the implementation of **Water Mitigation-3** and **Geology Mitigation-2**, the increased effects on soils and paleontological resources would be **minor, adverse,** and **long-term**. There would be **no effects** on topography, geological features, or seismicity.

4.3.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, drive training and land navigation would occur in the Southern Corridor under the Training Infrastructure Improvement Alternative. Conservation areas and other off-limits areas, such as dry lake beds and springs, would be avoided when selecting sites and locations of new facilities. **Geology Mitigation-2**, avoidance of high potential paleontological areas, would also be implemented. With the implementation of **Water Mitigation-3** and **Geology Mitigation-2**, the increased effects on soils and paleontological resources would be **minor, adverse,** and **long-term**. There would be **no effects** on topography, geological features, or seismicity.

4.3.3.4 Eastern Training Area

Improvements to live ammunition capabilities, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, and ITAM activities would be conducted in the Eastern Training Area under the Training Infrastructure Improvement Alternative. To the extent possible, conservation areas and other off-limits areas, such as dry lake beds and springs, would be avoided when selecting sites and locations of new facilities. **Geology Mitigation-2**, avoidance of high potential paleontological areas, would also be implemented. With the implementation of **Water Mitigation-3** and **Geology Mitigation-2**, the increased effects on soils and paleontological resources would be **minor, adverse,** and **long-term**. There would be **no effects** on topography, geological features, or seismicity.

4.3.3.5 Western Training Area

Improvements to live ammunition capabilities (under Alternative 4 for the Western Training Area), the construction of new UO sites, communication capabilities, and new FARPs, and ITAM activities would be conducted in the Western Training Area under the Training Infrastructure Improvement Alternative. To the extent possible, conservation areas and other off-limits areas, such as dry lake beds and springs, would be avoided when selecting sites and locations of new facilities. **Geology Mitigation-2**, avoidance of high potential paleontological areas, would also be implemented. With the implementation of **Water Mitigation-3** and **Geology Mitigation-2**, the effects on soils and paleontological resources would be **minor, adverse,** and **long-term**. There would be **no effects** on topography, geological features, or seismicity.

4.3.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, and 20 would involve the construction of new range infrastructure; however, because the construction activities would include **Water Mitigation-3** and **Geology Mitigation-2**, the effects on soils would be **minor, adverse,** and **long-term**. There would be **no effects** on topography, paleontology, geological features or seismicity.

4.3.5 Manix Trail Alternative

Improvements to the Manix Trail would consist of minor grading, implementing erosion control structures such as check dams, and applying gravel or dust suppressant within the existing right-of-way.

Because the construction activities would include the preparation and implementation of an SWPPP, including appropriate BMPs (**Water Mitigation-3**), and occur primarily in already disturbed areas, the effects on soils would be **negligible.** There would be **no effects** on topography, paleontology, geological resources or seismicity.

4.3.6 Mitigation Measures

The following list is a summary of mitigation measures related to training on Fort Irwin:

- **Geology Mitigation-1**: Continue the ITAM program's efforts to control erosion in the training area where it adversely affects training or could lead to regulatory violations. LRAM projects include revegetation of native vegetation and the installation of erosion control BMPs, such as check dams and berms.
- **Geology Mitigation-2**: Place new targetry and other training infrastructure outside of high potential paleontological areas.

4.4 Cultural Resources

The Army must consider whether the effects of a project would have an adverse effect on historic properties, defined as cultural resources listed in, or determined eligible for listing in, the NRHP, or significantly affect the quality of the human environment. This evaluation also includes significant cultural resources of religious and cultural importance (referred to by the National Park Service as Traditional Cultural Properties) to Native American tribes; however, none of these resources have been identified on Fort Irwin to date. The Army continues to complete outreach with Native American tribes to identify sacred sites and Traditional Cultural Properties.

Adverse effects include actions that may alter directly or indirectly a historic property's defining characteristics in a manner that would diminish the historic integrity of the historic property (per 36 CFR Section 800.5(a)(1)). Effects are also analyzed based on quality, proximity, and duration. Table 4.4-1 identifies and defines the impact thresholds for cultural resources used as part of this analysis.

TABLE 4.4-1
Significance Criteria for Cultural Resources
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Impact Intensity	Description
Negligible	Activities would not be detectable or would result in no effect on cultural resources.
Minor	Activities would result in an effect on historic properties, but that effect would not significantly alter the characteristics that qualify the resource for inclusion in the NRHP. Little, if any, loss of integrity would occur and would be slight but noticeable. The effect would occur in previously disturbed area or would not affect the character-defining features of a resource. Effects would not appreciably alter resource conditions or the relationship between the resource and the affiliated group's body of practices or beliefs.
Moderate	Activities would directly or indirectly alter the characteristics that qualify a historic property for inclusion in the NRHP in a manner that would diminish its historic integrity. These effects would result in some disturbance to a site, loss of integrity, alteration of resource conditions, or affect the character-defining features of a resource. Effects would alter resource conditions or the relationship between the resource and the affiliated group's body of practices or beliefs.
Significant	Activities would destroy the characteristics that qualify a historic property for inclusion in the NRHP in a manner that would diminish its integrity. These effects would result in severe disturbance to a site, loss of integrity, alteration of resource conditions, or affect the character-defining features of a resource. Effects would appreciably alter resource conditions or the relationship between the resource and the affiliated group's body of practices or beliefs.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations per year). In many instances, a short-term effect would not have a permanent effect on a cultural resource's integrity. **Long-term** – The effects of the specific activity extend well beyond the end of the activity and usually result in a permanent effect on a cultural resource's integrity and condition.

4.4.1 No Mission Change Alternative

The following section explains the effects on cultural resources resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted. As areas are scheduled to be opened for training, such as the Western Training Area, Fort Irwin considers several factors for determining the locations of large-scale surveys, including the potential for historic properties to be present, geological setting, and training activity intensity and uses.

4.4.1.1 Maneuver

Mounted Maneuver: Mounted maneuvers involve the use of heavy mechanized vehicles, such as tracked and wheeled vehicles. This type of current military training activity could result in the removal of archaeological resources from their historic location, damage or destroy resources on or slightly below the ground surface; compact soils where subsurface resources may be present; or cause the erosion or exposure of archaeological resources within previously disturbed areas. It is unlikely heavy mechanized vehicles would cause significant vibrations that would physically impact the integrity of an archaeological resource, given the establishment of off-limits areas to protect historic properties and significant cultural resources. Architectural resources are unlikely to be physically or directly affected from mounted maneuver activities because units are required to avoid these resources.

Dismounted Maneuver: Dismounted maneuvers involve the movement of troops without the use of mechanized vehicles, though wheeled vehicles are typically employed. The use of these types of vehicles in previously disturbed areas is unlikely to affect archaeological resources. Additionally, troop movement on foot has a lower likelihood of affecting archaeological resources compared to heavy vehicle use because the physical impacts would not be as severe. Dismounted maneuver activities in previously undisturbed areas have the potential to expose or erode below-ground archaeological resources or damage or destroy archaeological resources on the ground surface. Architectural resources are unlikely to be physically or directly affected from mounted maneuver activities because units are required to avoid these resources.

Aviation: Landing and takeoff operations occurring in previously undisturbed areas have the potential to expose or erode below-ground archaeological resources or damage or destroy archaeological resources on the ground surface, while takeoffs and landing from established airstrips would not disturb these resources. Petroglyphs or pictographs (or rock art) also have the potential to be impacted by vibration caused by aviation activities. Architectural resources are unlikely to be physically or directly affected by landing and takeoff operations.

Fire and Movement: Fire and movement activities include the use of artillery fire, small arms fire, and bomb drops. The effects on archaeological resources could occur if fire and movement is conducted in previously undisturbed areas, if compaction of soil occurs where subsurface resources may be present, or if the activities cause further erosion and exposure of archaeological resources on or slightly below the ground surface. Architectural resources are unlikely to be affected by fire and movement activities because they would take place in remote locations away from the built environment. Bomb drops are also unlikely to cause significant vibrations that would physically effect the integrity of an archaeological or built environment resources, given the remoteness of these activities and the establishment of off-limits areas to protect historic properties and significant cultural resources. Archaeological resources near bomb drop areas are limited to surface or subsurface artifacts and are unlikely to be damaged from vibrations caused by a bomb drop.

4.4.1.2 Maneuver Support Operations

Engineer Support: Engineer support operations include the construction of roadways, berm obstacles, anti-tank ditches, and runways in support of the larger unit mission. These activities require extensive ground disturbance and the use of heavy construction equipment. Engineer support operations

occurring within previously undisturbed areas have the potential to remove archaeological resources from their historic locations and damage or destroy archaeological resources on or slightly below the ground surface. Engineer support operations occurring in previously disturbed areas would be unlikely to affect archaeological resources. Engineer support operations could also diminish the historic integrity aspects of setting, feeling, and association of archaeological and architectural resources or affect historic viewsheds.

EOD: In the process of rendering UXO safe, EOD units may employ explosives. While primarily located around targets, a UXO response could be located throughout the training areas since there may be discoveries of UXO from past training. Overall, these activities would result in similar effects to cultural resources as those described for fire and movement in Section 4.4.1.1, *Maneuver,* though EOD activities are generally much more limited in scope and size.

CBRN: While simulated explosions may be part of a CBRN training event, these events are conducted in specific locations and away from sensitive land use areas. Therefore, these activities have a low likelihood of affecting cultural resources.

Cyber: Cyber activities occur in cyberspace and exclude the construction and maintenance of infrastructure; therefore, cyber activities are unlikely to affect cultural resources.

UASs: UASs are generally small-scale aircraft. Takeoffs and landings for UASs typically occur at established airstrips. These activities would result in fewer effects on cultural resources than those described for aviation in Section 4.4.1.1, *Maneuver*.

4.4.1.3 Sustainment

Re-arming: Re-arming exercises are generally conducted as part of larger maneuver training exercises and would result in effects similar to those described for cultural resources in mounted maneuver and dismounted maneuver in Section 4.4.1.1, *Maneuver*.

Refueling: Refueling activities are generally conducted as part of larger maneuver training exercises and would result in effects similar to those described for cultural resources in mounted maneuver and dismounted maneuver in Section 4.4.1.1, *Maneuver.*

Field Maintenance: Field maintenance activities are generally conducted as part of larger maneuver training exercises and would result in effects similar to those described for cultural resources in mounted maneuver and dismounted maneuver in Section 4.4.1.1, *Maneuve*r.

Assembly Area: Assembly area activities involve the use of engineer support; however, limited types of construction or improvements are expected to occur for the establishment of assembly areas. Consequently, these activities would result in fewer effects or similar effects to those described for cultural resources in engineer support in Section 4.4.1.2, *Maneuver Support Operations*.

Medical: Medical activities could include the use of MEDEVAC vehicles, including helicopters, and would result in fewer effects to cultural resources than those described for mounted maneuver and aviation in Section 4.4.1.1, *Maneuver*.

Military Working Dogs: Working dog teams are used in support missions, including area security; movement and mobility support operations; law and order; and force protection, including narcotic, human, landmine, firearm, ammunition, and explosive detection. These activities are unlikely to affect cultural resources.

4.4.1.4 SF Operations

Airborne Operations: Airborne operation activities would result in effects similar to those described for cultural resources in aviation in Section 4.4.1.1, *Maneuver*.

JPADS: JPADS operations involve delivering SF units and cargo from high altitude aircraft and landing in designated areas; therefore, these activities have a low likelihood of affecting historic properties or significant cultural resources because these resources would be avoided.

High-angle Movement: High-angle movement involves dismounted SF units traversing mountainous and rugged terrain. High-angle movement activities have a low likelihood of affecting historic properties or significant cultural resources because these resources would be avoided.

4.4.1.5 Non-rotational Training

Leach Lake Tactical Range: The use of the Leach Lake Tactical Range involves military aircraft dropping bombs into the Leach Lake impact area. Bombing activities that occur in previously disturbed areas and within the existing ground disturbance of an impact area have a low likelihood of affecting cultural resources.

USAF Task Force Operations: USAF Task Force Operations involve combat aircraft engaged in close air support and other offensive air operations, which would result in effects similar to those described for cultural resources in aviation in Section 4.4.1.1, *Maneuver*.

Personnel Recovery Operations: Personal recovery operations include combat search and rescue and civil efforts to prepare for, and execute, the recovery of isolated personnel. These activities would result in effects similar to those described for cultural resources in mounted maneuver and aviation in Section 4.4.1.1, *Maneuver*.

Home-station Off-rotation Training: These activities include Fort Irwin units using the training areas when they are not being used for rotational training. The effects on cultural resources from home-station off-rotation training would be similar to those described for mounted maneuver, dismounted maneuver, aviation, and fire and movement in Section 4.4.1.1, *Maneuver*.

Other Organization Austere Training Requirements: These activities include joint military branches, Army Reserve, National Guard units, and regular and transitional law enforcement units using the training areas when they are not being used for rotational training. The effects on cultural resources from these activities would be similar to those described for mounted maneuver, aviation, and fire and movement in Section 4.4.1.1, *Maneuver*.

4.4.1.6 Integrated Training Area Management

Training land management activities are conducted as part of the ITAM program. These activities could include changes to the terrain, installing stakes around off-limits areas, removing obstacles and debris, and trail maintenance, hardening sites to support recurring training activities, and revegetation of disturbed areas with native species. Heavy machinery may be used; however, ITAM activities occur at a much smaller scale compared to engineer support activities. Potential ITAM rehabilitation and maintenance avoid all off-limits areas and sites are surveyed for archaeological resources prior to any dig activities to identify historic properties or significant cultural resources as well as to establish protection measures, as appropriate. Therefore, ITAM activities have a low likelihood of affecting historic properties or significant cultural resources.

4.4.1.7 Range Complex

Military ranges are surveyed for archaeology prior to construction and were designed and situated to avoid effects on sensitive land use areas. None of the ranges have been evaluated as historic properties. Therefore, the use of weapon-specific military training ranges within previously disturbed areas of Fort Irwin have a low likelihood of affecting historic properties or significant cultural resources.

4.4.1.8 Manix Trail

The use of Manix Trail to move military equipment between Fort Irwin and the Yermo Rail Yard is confined to the footprint of the trail; therefore, there would be a minimal effect on cultural resources.

4.4.1.9 No Action Alternative Summary

Cultural resources could be affected by training activities on Fort Irwin. This is especially true if ground disturbance occurs in previously undisturbed areas or training activities cause damage, destruction, alterations, erosion, or exposure of cultural resources. Fort Irwin manages cultural resources in accordance with its ICRMP, which is an internal Army compliance and management plan integrating the entirety of the installation's cultural resources program with ongoing mission activities. The ICRMP allows for ready identification of potential conflicts between the installation's mission and cultural resources and identifies compliance actions necessary for maintaining the availability of mission-essential properties and acreage. The 2011 Fort Irwin ICRMP is in the process of being revised in compliance with DoD Instruction 4715.16. While the ICRMP update is not part of the Proposed Actions analyzed in this LEIS, the ICRMP will be used to guide cultural resources compliance activities as part of this project. In addition, the Army, California SHPO, and the ACHP are engaged in consultation regarding a PA to guide Fort Irwin's cultural resource management for training activities and support operations. This PA standardizes the Section 106 consultation process and is being developed in consultation with Native American tribes, agencies such as NASA and National Park Service, and interested members of the public.

Existing mitigation measures on Fort Irwin that would continue under the No Mission Change Alternative include the following:

- **Cultural Mitigation-1:** Continue to perform cultural resource surveys throughout the training and support operation areas, following procedures detailed in Stipulation III of the PA. Surveys will be prioritized based on the potential for historic properties and significant cultural resources to exist, the area's geology, and the intensity and location of the training activity. Surveys and other technical or specialized assistance will be completed by qualified personnel or organizations, including individuals who meet the Secretary of the Interior's Professional Qualification Standards, pursuant to 36 CFR Part 61, unless other specialized assistance is needed, as described in Stipulation II of the PA.
- **Cultural Mitigation-2:** Implement unanticipated/post-review discovery plans for unexpected finds of archaeological resources and unforeseen effects in accordance with the ICRMP and Stipulation VIII of the PA. The NTC will avoid further direct effects and develop a suitable buffer area (to be determined on a case-by-case basis, with 30 meters a commonly used minimum distance) around the discovery, demarcated with flagging, tape, or other suitable materials. The NTC will complete an NRHP evaluation and assessment of effect for the discovery and consult as necessary with SHPO and Native American tribes.
- **Cultural Mitigation-3:** Treat all Native American human remains and associated funerary objects, sacred objects, and objects of cultural patrimony that are inadvertently discovered in accordance with NAGPRA and its implementing regulations (43 CFR Part 10) and AR 200-1, *Environmental Protection and Enhancement*, as described in Stipulation VII of the PA. When such items are encountered, suspend all use of the immediate area, protect in place the remains and items, and secure the immediate area until appropriate qualified personnel, such as an osteologist, the San Bernardino County Coroner, or law enforcement personnel, determine whether the remains are human, and if they are, whether they should be considered part of a crime scene or police investigation. If determined to be Native American remains or associated funerary objects, contact tribal members and undertake consultation for appropriate disposition of the human remains and associated cultural items in accordance with the processes outlined in 43 CFR Sections 10.3 through 10.6.
- **Cultural Mitigation-4:** Conduct cultural resources surveys and significance evaluations prior to specific construction activities and opening the Western Training Area to full training in accordance with Stipulations III and IV of the PA. In addition, implement avoidance and protection in place for

NRHP-eligible archaeological resources sites to the greatest extent feasible through notation in the electronic operations control system, anti-tank obstacles, Seibert stakes, designation of no-fire or restricted-fire areas, fencing, signage, capping/hardening, condition monitoring, and other measures. If protection in place or avoidance is not feasible, the NTC will consult with Native American tribes and SHPO to resolve adverse effects in accordance with Stipulation V of the PA.

With the implementation of the ICRMP and previously mentioned mitigation measures, the overall effects on cultural resources are considered **moderate, negative,** and **long-term** in the Northern Corridor, Central Corridor, Southern Corridor, Eastern Training Area, Range Complex and Manix Trail. Given the current lack of training in the Western Training Area, the effects on archaeological and architectural there are expected to be **negligible**.

4.4.2 Changes in Training Activity Alternative

The effects on cultural resources discussed for the No Action Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative.

4.4.2.1 Northern Corridor

An increase in cyber and aviation activities within the Northern Corridor is expected. Cyber training would not result in additional effects on cultural resources. Aviation activities would increase the capability for aircraft (fixed-wing, rotary-wing, and UAS) to engage live ground targets in simulated attacks through an upgraded instrumentation system in the Northern Corridor. The number of manned operations in rotational training would not increase in frequency; therefore, this would not result in additional effects on historic properties or significant cultural resources, and the overall effect on in the Northern Corridor would remain **moderate, adverse,** and **long-term**; there would be **no effect** to architectural resources.

4.4.2.2 Central Corridor

Live-fire training and aviation operation activities would increase within the Central Corridor, resulting in more targetry within the expanded dud-effects line. Additionally, Fort Irwin would add the capability for aircraft (fixed-wing, rotary-wing, and UAS) to engage live ground targets in simulated attacks. Aviation activities and live-fire training would become more spread out geographically, but the number of flights and units training would not change. **Cultural Mitigation-1 through -3** would be implemented to help reduce any effects associated with the geographical increase in training. The effects on archaeological resources from these activities would be **negligible** and the overall effect would remain **moderate, adverse,** and **long-term**; additional effects on architectural resources are unlikely to occur, because these activities would avoid directly affecting architectural resources.

4.4.2.3 Southern Corridor

Live-fire training and aviation operation activities would increase within the Southern Corridor, similar to those described in Section 4.4.2.2, *Central Corridor*. **Cultural Mitigation-1 through -3** would be implemented to help reduce and resolve any effects. As a result, the effects on archaeological resources would remain **moderate, adverse,** and **long-term**. Additional effects on architectural resources are unlikely to occur, because these activities would avoid directly affecting architectural resources.

4.4.2.4 Eastern Training Area

Maintenance, refueling, live-fire, and aviation operation activities would increase within the Eastern Training Area, though these activities would have a **negligible** effect compared to current activities in the Eastern Training Area. **Cultural Mitigation-1 through -3** would be implemented to help reduce and resolve any effects. Therefore, the effects on cultural resources would remain **moderate, adverse,** and

long-term. Additional effects on architectural resources are unlikely to occur, because these activities would avoid directly affecting architectural resources.

4.4.2.5 Western Training Area

Fort Irwin continues to complete large-scale cultural resources surveys and the development of resource protection measures, as appropriate, for the portions of the Western Training Area that have not been surveyed and are expected to be used for training activities under these alternatives.

Alternative 1: Medium Intensity Aviation Task Force

Under Alternative 1 for the Western Training Area, battalion-level aviation units would increase their use of the area, which would increase the number of aircraft and other vehicles in the area. In addition, an increase in military equipment movement along established roads and trails would occur. Because military activities would be limited to existing roads, and the permanent assembly areas would be located away from any cultural sites, no significant cultural resources would be directly affected, and disturbances would be limited to the areas of existing ground disturbance. Additionally, there would be no indirect effects, since the overall setting, feeling, and visual context of the Western Training Area would remain intact and unaffected. Therefore, **negligible** effects on cultural resources would occur. **Cultural Mitigation-1 through -4** would still be implemented in the Western Training Area.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Activities resulting from Alternative 2 include those described for Alternative 1: Medium Intensity – Aviation Task Force in Section 4.4.2.5, *Western Training Area.* In addition to these activities, logistics support sites would be permanently established, such as supply or re-fueling areas. Small-scale (non-dud-producing) explosives and small arms may also be used around the brigade support areas during training scenarios. Because military activities would be limited to existing roads or previously disturbed or surveyed areas, and involve limited foot traffic, no cultural resources would be directly affected. Additionally, there would be no indirect effects, since the overall setting, feeling, and visual context of the Western Training Area would remain intact and unaffected. Therefore, **negligible** effects on cultural resources would occur. **Cultural Mitigation-1 through -4** would still be implemented in the Western Training Area.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition

Under Alternative 3, full-scale brigade-level maneuvers would occur in the Western Training Area. This would include the full breadth of activities described in Section 4.4.1.1, *Maneuver*. Fire and movement activities would be limited to simulated devices and non-dud-producing small caliber rounds. An increase in ground-disturbing activities within previously undisturbed areas would be expected from this alternative, and damage, destruction, erosion, or exposure of archaeological resources could occur; however **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects. Therefore, there could be a **moderate, adverse,** and **long-term** effect on archaeological resources. When needed to protect significant cultural resources, no-fire areas may be established to avoid damage to resources like petroglyphs (or rock). Additional effects on architectural resources are unlikely to occur, because these activities would avoid physically, directly, or indirectly affecting architectural resources. The overall setting, feeling, and visual character of the area would remain intact as an open desert landscape, despite some changes.

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Alternative 4 would resemble Alternative 3: High Intensity Full-scale Brigade-Level Maneuvers - Limited Ammunition, except that live ammunition would be permitted during training exercises. Therefore, effects would be similar to those described for Alternative 3, which could result in a **moderate, adverse,** and **long-term** effect on archaeological resources. **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects. Additional effects on architectural resources are

unlikely to occur, since these activities would avoid physically, directly, or indirectly affecting architectural resources. The overall setting, feeling, and visual character of the area would remain intact, as an open desert landscape, despite some changes.

4.4.3 Training Infrastructure Improvement Alternative

The effects on cultural resources discussed for the No Action Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

4.4.3.1 Northern Corridor

Within the Northern Corridor, improvements would be made to existing UO sites, including upgrades to UO Shoot House Facilities. In addition, up to three communication towers, up to three new CBRN facilities, a new UAS runway, and up to three instrument towers would be constructed. As a result, ground-disturbing activities within previously undisturbed areas could occur, as well as damage, destruction, erosion, or exposure of archaeological resources. Per the ICRMP and the PA, cultural resources surveys and significance evaluations would be conducted prior to specific construction activities, consistent with standard practices on Fort Irwin (**Cultural Mitigation-4**). Additionally, new construction activities could affect historic viewsheds and diminish the historic integrity aspects of setting, feeling, and association of architectural and archaeological resources. Therefore, **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects. Infrastructure improvements could result in a **minor, adverse,** and **long-term** effect on archaeological resources; however, the overall effects on archaeological resources would remain **moderate, adverse,** and **long-term**.

4.4.3.2 Central Corridor

Within the Central Corridor, improvements to live ammunition capabilities, existing UO sites, and communication capabilities, as well as new CBRN facilities, training obstacles, FARPs, radar systems, and ITAM activities would occur. The effects would be similar to those described in Section 4.4.3.1, *Northern Corridor*, which could result in a **minor, adverse,** and **long-term** effect on archaeological resources. **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects; however, the overall effects on archaeological resources would remain **moderate, adverse,** and **long-term**.

4.4.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities and the construction of new CBRN facilities and FARPs courses would be conducted in the Southern Corridor. The effects would be similar to those described in Section 4.4.3.1, *Northern Corridor*, which could result in a **minor, adverse,** and **long-term** effect on archaeological resources; however, the overall effects on archaeological resources would remain **moderate, adverse,** and **long-term**. **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects.

4.4.3.4 Eastern Training Area

Improvements to live-fire capabilities would be conducted in the Eastern Training Area**.** The dud-effects line could be extended and targetry could be added, but the locations are currently unknown. The effects would be similar to those described in Section 4.4.3.1, *Northern Corridor*, which could result in a **minor, adverse,** and **long-term** effect on archaeological resources; however, the overall effects on archaeological resources would remain **moderate, adverse,** and **long-term**. **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects.

4.4.3.5 Western Training Area

Improvements to communications and live ammunition capabilities, the development of new UO and FARP sites, and ITAM activities would occur in the Western Training Area. The effects would be similar to those described in Section 4.4.3.1, *Northern Corridor*, which could result in a **minor, adverse,** and **long-term** effect on cultural resources under Alternatives 1 and 2. The effects on archaeological resources would be **moderate, adverse,** and **long-term** under Alternatives 3 and 4. **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve these effects.

4.4.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, 7, and 20 within the Central Corridor are unlikely to affect intact archaeological resources, because the activities would occur in disturbed areas where archaeological resources likely do not have historic or physical integrity. Additionally, the footprint and intensity of the proposed disturbance are consistent with current conditions. **Cultural Mitigation-1 through -4** would be implemented to help reduce and resolve any effects. These range improvements could result in **minor, adverse,** and **long-term** effects on cultural resources; however, the overall effects on archaeological resources would remain **moderate, adverse,** and **long-term**.

4.4.5 Manix Trail Alternative

Improvements to the Manix Trail would be limited to repairs of the existing right-of-way and would not expand the trail footprint. Therefore, **no effect** on archaeological resources is expected. An effect on architectural resources is not likely to occur, because physical interaction with architectural resources would be avoided during these activities.

4.4.6 Mitigation Measures

The following list is a summary of mitigation measures related to training on Fort Irwin:

- **Cultural Mitigation-1:** Continue to perform cultural resource surveys throughout the training and support operation areas, following procedures detailed in Stipulation III of the PA. Surveys will be prioritized based on the potential for significant cultural resources or historic properties to exist, the area's geology, and the intensity and location of the training activity. Surveys and other technical or specialized assistance will be completed by qualified personnel or organizations, including individuals who meet the Secretary of the Interior's Professional Qualification Standards, pursuant to 36 CFR Part 61, unless other specialized assistance is needed, as described in Stipulation II of the PA.
- **Cultural Mitigation-2:** Implement unanticipated/post-review discovery plans for unexpected finds of archaeological resources and unforeseen effects in accordance with the ICRMP and Stipulation VIII of the PA. The NTC will avoid further direct effects and develop a suitable buffer area (to be determined on a case-by-case basis, with 30 meters being a commonly used minimum distance) around the discovery, demarcated with flagging, tape, or other suitable materials. The NTC will complete an NRHP evaluation and assessment of effect for the discovery and consult with SHPO and Native American tribes as necessary.
- **Cultural Mitigation-3:** Treat all Native American human remains and associated funerary objects, sacred objects, and objects of cultural patrimony that are inadvertently discovered in accordance with NAGPRA and its implementing regulations (43 CFR Part 10) and AR 200-1, *Environmental Protection and Enhancement*, as described in Stipulation VII of the PA. When such items are encountered, suspend all use of the immediate area, protect in place the remains and items, and secure the immediate area until appropriate qualified personnel, such as an osteologist, the San Bernardino County Coroner, or law enforcement personnel, will determine whether the remains are human, and if they are, whether they should be considered part of a crime scene or police investigation. If determined to be Native American remains or associated funerary objects, contact

tribal members and undertake consultation for appropriate disposition of the human remains and associated cultural items in accordance with the processes outlined in 43 CFR Sections 10.3 through 10.6.

- **Cultural Mitigation-4:** Conduct cultural resources surveys and significance evaluations prior to specific construction activities and opening the Western Training Area to full training in accordance with Stipulations III and IV of the PA. In addition, implement avoidance and protection in place for NRHP-eligible archaeological resources sites to the greatest extent feasible through notation in the electronic operations control system, anti-tank obstacles, Seibert stakes, designation of no-fire or restricted-fire areas, fencing, signage, capping/hardening, condition monitoring, and other measures. If protection in place or avoidance is not feasible, the NTC will consult with Native American tribes and SHPO to resolve adverse effects in accordance with Stipulation V of the PA.

4.5 Air Quality

Air quality impacts are evaluated at the regional level, which includes the Western Mojave Desert Nonattainment Area and the San Bernardino County Nonattainment Area. Air quality impacts from the project were evaluated based on the significance criteria as shown in Table 4.5-1.

TABLE 4.5-1
Significance Criteria for Air Quality
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Impact Intensity	Description
Negligible	The impact would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to air quality; however, the impact would be small, localized, and of little consequence. The air emissions would be below both the General Conformity *de minimis* thresholds and MDAQMD thresholds.
Moderate	The Alternative would result in a readily apparent change to air quality over a relatively wide area. The air emissions would be above the General Conformity *de minimis* and MDAQMD thresholds but would not result in new NAAQS violations.
Significant	The Alternative would result in a substantial change to the character of air quality, affecting a large area. Air emissions would exceed the general conformity *de minimis* levels or MDAQMD emission thresholds and would result in new NAAQS violations.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

In accordance with the air conformity requirements of 40 CFR Sections 51.853 and 93.153(b)(1), the *de minimis* threshold for a federal action in a severe nonattainment area of O_3 is 25 tpy for each O_3 precursor pollutant of NO_x and volatile organic compounds (VOCs). The *de minimis* thresholds for moderate nonattainment area of PM_{10} is 100 tpy. These *de minimis* thresholds and the MDAQMD air quality significance thresholds are shown in Table 4.5-2. Discussions of air impacts from the proposed alternatives are discussed in the following sections.

TABLE 4.5-2
General Conformity De Minimis Thresholds and MDAQMD Thresholds for Air Quality
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Emissions Source	VOC tpy	CO tpy	NO_x tpy	SO_2 tpy	PM_{10} tpy	$PM_{2.5}$ tpy
General Conformity De Minimis Threshold	25	NA	25	NA	100	NA
MDAQMD Thresholds	25	100	25	25	15	12

Note:

NOx and VOC *de minimis* thresholds apply only to the southern portion of Fort Irwin in the O_3 nonattainment area.

4.5.1 No Mission Change Alternative

The following section explains the effects on air quality resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

The No Mission Change Alternative would not result in a noticeable change in GHG emissions because there would be no change in current training activities and no new infrastructure would be built. Training infrastructure (targetry, UO sites, and communications) is not supplied with water and is not energy intensive during use because it lacks heating/cooling. There would be no change in the number of units training or the duration of training and there would be no significant increase in demand for water and energy under the proposed training activity changes. Training activities would not be affected by climate change at current projections for the Mojave Desert, which estimate an increase of 3.4 to 5.4 degrees Celsius by 2100 (Cal-Adapt, 2020). Discussions regarding the effect of climate change on Fort Irwin's biological resources and health and safety are provided in Sections 3.1 and 3.10. The effects on GHG emissions as a result of implementing the No Mission Change Alternative would be **negligible** compared to current conditions.

As mission requirements evolve, climate change and GHG emissions will be analyzed on a case-by-case basis for future construction, stationing actions, and mission changes.

4.5.1.1 Maneuver

Mounted Maneuver: Mounted maneuver involves the movement of troops and equipment by combat and tactical vehicles, including tanks, tracked vehicles, wheeled vehicles, and fuel tankers. The operation of these vehicles, as well as use of diesel generators, would result in exhaust emissions of NOx, CO, VOCs, SO_2, and $PM_{10}/PM_{2.5}$. In addition, movements of the vehicles on unpaved roads would cause fugitive dust and $PM_{10}/PM_{2.5}$ emissions.

Dismounted Maneuver: Dismounted maneuver involves the movement of troops and equipment mainly by foot, resulting in minimal emissions.

Aviation: Aviation operation would cause exhaust emissions and $PM_{10}/PM_{2.5}$ emissions during aircraft takeoff and landing.

Fire and Movement: Exhaust emissions and $PM_{10}/PM_{2.5}$ emissions would result mostly from the movements of combat forces using tactical vehicles.

4.5.1.2 Maneuver Support Operations

Engineer Support: Engineer units construct roadways, berm obstacles, anti-tank ditches, and runways in support of the larger unit mission. Engineering support activities could cause exhaust and $PM_{10}/PM_{2.5}$ emissions during the use of equipment and vehicles for these support activities.

EOD: EOD operations would result in increased $PM_{10}/PM_{2.5}$ and other emissions due to the use of explosives.

CBRN: Potential air emissions associated with CBRN operation would be minimal compared to most military activities and result from the movement of tactical vehicles and equipment.

Cyber: Cyber activities occur in cyberspace and, therefore, would not cause air emissions.

UASs: Similar to aviation operations, UASs may have engine exhaust emissions during takeoff and landing.

4.5.1.3 Sustainment

Re-arming: Replenishing ammunition supplies to support combat operations would involve vehicles and off-road equipment use. Exhaust and $PM_{10}/PM_{2.5}$ emissions would be associated with these activities.

Refueling: Refueling operations would cause fugitive VOC emissions during the fueling process. The vehicles would also cause exhaust and $PM_{10}/PM_{2.5}$ emissions.

Field Maintenance: Maintenance activities that involve the use of diesel-powered equipment would cause exhaust emissions. The use of VOC-containing materials for repair and maintenance would cause VOC emissions.

Assembly Area Development: Assembly area development would result in vehicle exhaust $PM_{10}/PM_{2.5}$ emissions from vehicles and the creation of the assembly area.

Medical: Medical support would have minimal air emissions, although vehicles and helicopters traveling to and from the medical support facility would cause exhaust and fugitive dust emissions.

Military Working Dogs: No air emissions would be associated with military working dogs.

4.5.1.4 SF Operations

Airborne Operations: Airborne operations would cause engine exhaust emissions and $PM_{10}/PM_{2.5}$ dust emissions during aircraft takeoff and landing.

JPADS: JPADS would cause engine exhaust emissions during aircraft takeoff and landing.

High-angle Movement: Air emissions associated with high-angle movement would be minimal because of the limited use of vehicles.

4.5.1.5 Non-rotational Training

Leach Lake Tactical Range: The use of the Leach Lake Tactical Range involves military aircraft dropping bombs into the Leach Lake impact area. Aircraft operation would cause engine exhaust during takeoff and landing and $PM_{10}/PM_{2.5}$ emission could occur at the site of the impact.

USAF Task Force Operations: USAF activities involve combat aircraft engaged in close air support and other offensive air operations. Air emissions include engine exhaust emissions and $PM_{10}/PM_{2.5}$ dust emissions caused during aircraft takeoff and landing.

Personnel Recovery Operations: The air emissions from a personnel recovery operation would be caused by the equipment, vehicles, and aircraft used during the operation. Emissions would include engine exhaust and $PM_{10}/PM_{2.5}$ caused by vehicles and aircraft.

Home-station Off-rotation Training: Depending on the training activities, air emissions from home-station off-rotation training would be similar to those described previously for the training and support activities during the rotational training.

Other Organization Austere Training Requirements: Depending on the training activities, air emissions from training by other organizations would be similar to those described previously for the training and support activities during the rotational training.

4.5.1.6 Integrated Training Area Management

ITAM regularly performs rehabilitation and maintenance activities to improve land condition in training areas. These rehabilitation and maintenance activities would involve the use of off-road construction equipment and on-road vehicles. As a result, air emissions would result from equipment and engine exhaust and $PM_{10}/PM_{2.5}$ emissions would result from vehicle travel and disturbance of the surface areas. ITAM periodically applies dust control palliatives to heavily used trails and helicopter landing sites in and around the Cantonment Area to reduce fugitive dust ($PM_{10}/PM_{2.5}$). The revegetation efforts employed by the ITAM program would also reduce fugitive dust.

4.5.1.7 Range Complex

The use of the weapon-specific military training ranges on Fort Irwin would have effects on air emissions similar to those described for fire and movement in Section 4.5.1.1, *Maneuver*.

4.5.1.8 Manix Trail

The Manix Trail is used for transporting rotational units and equipment to and from Fort Irwin. The trail is an unpaved 39-mile dirt trail between Fort Irwin and I-15. Emissions from the Manix Trail include exhaust and $PM_{10}/PM_{2.5}$ emissions from tactical vehicles traveling on the trail.

4.5.1.9 No Mission Change Alternative Summary

The No Mission Change Alternative would have temporary air emissions associated with the current training activities. Training and supporting operation activities that involve the use of off-road combustion equipment, on-road and tactical vehicles, and aircrafts would cause emissions of NOx, CO, VOC, SO_2, and $PM_{10}/PM_{2.5}$ from engine exhaust. Earth-moving activities during construction, maintenance activities, and vehicle travel on unpaved roads would cause fugitive dust ($PM_{10}/PM_{2.5}$) emissions. Helicopters would cause fugitive dust emissions if the takeoff and landing locations were unpaved. Average annual emissions from training activities are shown in Table 4.5-3, which were calculated based on a typical year with eight heavy rotational trainings and two light rotational trainings (Fort Irwin, 2005).

As shown in Table 4.5-3, air pollutant emissions of VOC, CO, and SO_2 would be below both the general conformity *de minimis* thresholds and the MDAQMD thresholds for the No Mission Change Alternative. Therefore, No Mission Change Alternative emissions of VOC, CO, and SO_2 from training activities would have limited effects on air quality. $PM_{2.5}$ does not trigger general conformity requirements because Fort Irwin is in attainment for $PM_{2.5}$.

TABLE 4.5-3
No Mission Change–Average Annual Emissions
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Emissions Source	VOC tpy	CO tpy	NO_x tpy	SO_2 tpy	PM_{10} tpy	$PM_{2.5}$ [a] tpy
No Mission Change Emissions	15.06	56.64	73.80	2.94	16,036	3,404
De Minimis Threshold	25	NA	25	NA	100	NA
MDAQMD Thresholds (tpy)	25	100	25	25	15	12

Source: Fort Irwin, 2005

[a] $PM_{2.5}$ emissions were not provided in the Supplemental EIS. $PM_{2.5}$ emission data in Table 4.5-3 were calculated based on the PM_{10} emissions reported in the Supplemental EIS, assuming $PM_{2.5}$ exhaust emissions are equal to PM_{10} exhaust emissions of 6.16 tpy, and the fugitive dust emissions of $PM_{2.5}$ is 21.2 percent of the PM_{10} fugitive dust emissions of 16,030 tpy. Fraction of $PM_{2.5}$ to PM_{10} in fugitive dust was based on the data from South Coast Air Quality Management District's Final Methodology to Calculate $PM_{2.5}$ and $PM_{2.5}$ Significance Thresholds (South Coast Air Quality Management District, 2006).

NOx and PM_{10} emissions from the No Mission Change Alternative would exceed both the general conformity *de minimis* thresholds and the MDAQMD emission thresholds. Only the NOx emissions from the O_3 nonattainment area, which covers a portion of the Southern Corridor, are subject to general conformity requirements. The O_3 nonattainment area is approximately 22,300 acres, which is 3 percent of the total Fort Irwin land area, and part of the area is off-limits to training. The NOx emissions from the training activities in this small portion of the Southern Corridor would not be expected to have emissions exceeding the general conformity threshold.

Although the No Mission Change Alternative PM_{10} emissions would be greater than the general conformity *de minimis* thresholds, the emissions represent the level of emissions of the current and historical operations on Fort Irwin. The No Mission Change Alternative has no expected emission increases compared to the existing emissions. Therefore, the No Mission Change Alternative is not expected to worsen the existing air quality, cause new violations to the air quality standards, or delay the timely attainment of the air quality standards. The No Mission Change Alternative meets the conformity requirements for PM_{10}.

The No Mission Change Alternative reflecting current military training would have a **moderate, adverse, long-term** effect from NOx emissions in the Southern Corridor and Manix Trail and a **moderate, adverse, long-term** effect from PM_{10} emissions in the Northern Corridor, Central Corridor, Southern Corridor Eastern Training Area, Range Complex, and Manix Trail. There would be **negligible** effects on air quality in the Western Training Area because of the current lack of training in that area. The following mitigation measures are regularly implemented to help reduce effects from air quality:

- Stabilizing training routes and other disturbed areas by watering and using chemical stabilizers and asphalt chip sealer when feasible (**Air Quality Mitigation-1**)
- Revegetating previously disturbed areas by ITAM (**Air Quality Mitigation-2**)
- Making dry lake beds off-limits to vehicle travel (**Air Quality Mitigation-3**)

The No Mission Change Alternative would result in a **negligible** effect on GHG emissions compared to current annual emissions because there would be no change in current training activities and no construction of new infrastructure.

4.5.2 Changes in Training Activity Alternative

The effects on air quality discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative.

4.5.2.1 Activity Changes in Training Areas

Changes in training activities in the Northern Corridor, Central Corridor, Southern Corridor, and Eastern Training Area would occur under this alternative. However, the number of rotations, units, and VMTs would not change; therefore, the emissions from training activities would remain similar to the No Mission Change Alternative. The associated vehicle and equipment use would be similar to the emissions shown in Table 4.5-3. Therefore, any additional emissions associated with the training activity changes, if any, would be **negligible** compared to the No Mission Change Alternative and overall impacts would remain **moderate, negative,** and **long-term**.

During non-training times, there could be a greater potential for wind-generated dust (PM_{10}) as a result of training activities in the Western Training Area. Under Western Training Area Alternatives 1 and 2, increases in the potential for wind-generated dust would be minimal because units would maneuver on designated trails and fixed locations, which can be easily treated with already established dust BMPs, including soil stabilizers and revegetation regularly employed by the ITAM program. Under Alternatives 1 and 2, any increase in wind-generated dust in the Western Training Area would be **negligible** at a regional level. When combined with the air quality effects of the No Mission Change Alternative, the net effect to air quality from Alternatives 1 or 2 would remain **moderate, negative,** and **long-term.**

Under Alternatives 3 and 4, the effects of wind-generated dust would be greater due to the larger percentage of effected land area. Training scenarios vary, and the areas used for high intensity maneuver training will change among rotations and over the years, allowing for natural revegetation of lesser used areas. In addition, units training in the Western Training Area would not be training in other areas of Fort Irwin, which would allow for greater revegetation opportunities elsewhere. While growth of desert plants would likely not equal the rate of vegetation reduction in the Western Training Area, there would be some offset of wind-generated dust potential from unvegetated soils. The topography of the Western Training Area, which includes hills and rolling terrain, would block some disturbed areas from the wind. Due to the mitigating factors of natural revegetation and wind blocks, as well as the established land restoration protocols already employed by the ITAM program, the effects of wind-generated dust in the Western Training Area under Alternatives 3 and 4 would be **minor, negative,** and

long-term. When combined with the air quality effects of the No Mission Change Alternative, the net effect to air quality from Alternatives 3 or 4 would be **moderate, negative,** and **long-term.**

4.5.2.2 Greenhouse Gas Emissions

Under the Changes in Training Activity Alternative, there would be no change in the number of RTUs training on Fort Irwin in a given year or in the duration of training. Proposed training infrastructure (targetry, UO sites, and communications) is not supplied with water and is not energy intensive during use because it lacks heating/cooling. There would be no significant increase in demand for water or energy under the proposed training activity changes.

There would be no expected change in average annual VMTs associated with training. While activities are proposed for areas not currently heavily used for training, the average amount of training and number of military vehicles used on Fort Irwin would not increase and no change in VMTs would result, primarily because the distance to the Western Training Area from the Cantonment Area is no greater than the distance to the eastern and western ends of the Central Corridor. Any effects on GHG emissions from conducting RTU training over a larger area would be expected to be **negligible** compared to current emissions.

The number of manned aircraft (fixed-wing and rotary-wing) operations in rotational training would not increase but would be more dispersed over the training areas. While a larger area would be used for flights, no appreciable change in flight time would be expected because average flight distance would not be expected to increase. Some of the new flight areas would be closer to existing airfields as new areas are used for training and increased use of FARPs would reduce some flight distances. Because there would be no change in the number of flights and no expected change in total flight time, effects on GHG emissions from manned flights would be expected to be **negligible** compared to current RTU training emissions.

UAS operations are expected to increase, and GHG emissions would increase as a result of increased flights. UAS operations would include a mix of combustion engine units and electrically powered units, though the exact mix is not known. There would be some offsets for emissions from increased UAS flights, as some wheeled vehicle use, such as for reconnaissance operations, would be replaced by UAS use. In addition, additional UAS strips that would allow for shorter flights compared to existing UAS strips are proposed in the training areas. While GHG emissions would increase somewhat from increased UAS operations, any effects on GHG emissions would be expected to be **negligible** compared to current RTU training emissions.

Training activities would not be affected by climate change at current projections for the Mojave Desert, which estimate an increase of 3.4 to 5.4 degrees Celsius by 2100 (Cal-Adapt, 2020). Discussions regarding the effect of climate change on Fort Irwin's biological resources and health and safety are provided in Sections 3.1 and 3.10.

4.5.3 Training Infrastructure Improvement Alternative

The effects on air quality discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

Regardless of the types and locations of the infrastructure improvements on Fort Irwin, air pollutant emissions would occur from the construction activities associated with the improvements. Construction equipment and vehicles would generate exhaust emissions of NOx, VOCs, CO, SO_2, PM_{10}, and $PM_{2.5}$. Fugitive dust (PM_{10}/$PM_{2.5}$) emissions would be generated from activities such as grading, excavation, and vehicles traveling on unpaved roads; however, construction emissions would be temporary and eliminated once construction is complete.

Infrastructure improvements would be implemented over a period of years. Detailed construction schedule and equipment information for the infrastructure improvements are not yet available. To estimate the emission levels associated the construction activities, emissions equivalent to constructing a 100,000-square-foot light industrial facility were determined using the California Emission Estimator Model (CalEEMod; California Air Pollution Control Officers Association, 2016). The 100,000-square-foot light industrial facility assumption represents a conservative upward bound of construction activity on Fort Irwin, it is unlikely that this level of construction would occur in a single year. The estimated emissions include engine exhaust from vehicle trips traveled by construction workers, haul trucks, and off-road construction equipment, as well as off-gas emissions from paving and architectural coating activities. Default settings of construction equipment and vehicle usage in the CalEEMod were used to define the facility size. In addition, demolition material hauling was added to the CalEEMod. Emissions from building a 100,000-square-foot light industrial facility are presented in Table 4.5-4.

TABLE 4.5-4
Reference Construction Annual Emissions (ton/yr)
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Construction Emissions – Equivalent to building a 100,000-square-foot light industrial facility	**1.45**	**2.09**	**2.32**	**0.004**	**0.23**	**0.14**
MDAQMD Thresholds (ton/yr)	25	100	25	25	15	12
General Conformity *De Minimis* Threshold	25	NA	25	NA	100	NA
Thresholds Exceedance	No	No	No	No	No	No

Note:

NOx and VOC *de minimis* thresholds apply only to the southern portion of Fort Irwin in the O_3 nonattainment area.

The emission data in Table 4.5-4 indicate that even if the construction activities of the project alternatives required as much as 10 times the equipment usage, VMT, and areas to be paved as constructing a 100,000-square-foot light industrial facility in a year, the construction emissions would be below both the general conformity *de minimis* thresholds and the MDAQMD thresholds for all pollutants. Therefore, it is estimated that construction activities associated with training infrastructure improvements would result in **negligible** effects on air quality. Additionally, potential effects on air quality will be minimized or avoided through the implementation of the measures defined in MDAQMD Rule 403.2 (**Air Quality Mitigation-4**), including:

- Using periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions.
- Covering loaded haul vehicles while operating on publicly maintained paved surfaces.
- Stabilizing graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed for more than 30 days.
- Reducing non-essential earth-moving activity under high wind conditions.

The timing of construction of proposed training infrastructure improvements is not known at this time and it is likely that construction would be spread over a number of years. As noted in the discussion of NAAQS, emissions from any particular infrastructure improvement would be minimal and it is expected that GHG emissions also would be minimal. Therefore, it is estimated that construction activities associated with training infrastructure improvements would result in **negligible** effects on GHG emissions.

For proposed infrastructure construction larger than the modeled scenario, climate change and GHG emissions would be analyzed on a case-by-case basis prior to construction.

4.5.4 Range Improvements Alternative

The emissions from the Range Improvements Alternative would be comparable to the reference construction emissions discussed in Section 4.5.3, *Training Infrastructure Improvement Alternative*. The mitigation measures described in Section 4.5.3 would be implemented to minimize the effects. Air quality effects from the Range Improvements Alternative would be **negligible**.

GHG emissions from implementing the Range Improvements Alternative would be minimal for general air emissions as noted previously. There would be no change in the number of soldiers using training ranges and no increase in GHG emissions from training activities. Any effects on GHG emissions from the Range Improvements Alternative would be **negligible**.

4.5.5 Manix Trail Alternative

The Manix Trail maintenance would be implemented in small areas in need of rehabilitation, as they are identified. Any one location would be smaller than the 100,000-square-foot reference construction analyzed in Section 4.5.3, *Training Infrastructure Improvement Alternative*. Mitigation measures described in Section 4.5.3 would be implemented to minimize the effects. Air quality effects from the Manix Trail Alternative would be **negligible**.

GHG emissions from implementing the Manix Trail Alternative would be minimal for general air emissions as noted previously. There would be no change in the number of RTUs using the Manix Trail and no increase in GHG emissions from RTU movement to and from the NTC. Any effects on GHG emissions from the Manix Trail Alternative would be **negligible**.

4.5.6 Mitigation Measures

Potential effects on air quality will be minimized or avoided through project planning, design, and implementation of BMPs and emission reduction measures. The following is a summary of mitigation measures related to training on Fort Irwin:

- **Air Quality Mitigation-1**: Stabilize training routes and other disturbed areas by watering and using chemical stabilizers and asphalt chip sealer when feasible.
- **Air Quality Mitigation-2:** Revegetate previously disturbed areas under the ITAM program.
- **Air Quality Mitigation-3**: Continue to designate dry lake beds off-limits to vehicle travel.
- **Air Quality Mitigation-4**: Implement the reduction measures as defined in MDAQMD Rule 403.2 for construction activities.

4.6 Noise

Noise effects were determined based on the potential increased noise levels to noise-sensitive land uses. Noise-sensitive land uses are locations in which unwanted sound would adversely affect the designated land uses, such as residential areas, schools, places of worship, and preservation areas. A detailed listing of relevant sensitive land use areas is provided in Section 3.6.3, *Noise-Sensitive Land Uses.* This section describes noise effects for the human environment. The effects of noise on wildlife are discussed in Section 4.1, *Biological Resources*.

TABLE 4.6-1
Significance Criteria for Noise
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Effect Intensity	Description
Negligible	Activities would result in a non-perceptible noise increase.
Minor	Activities would result in a barely perceptible increase in noise.
Moderate	Activities would result in a readily perceptible increase in noise; however, the increase for sensitive land use areas would remain within the current LUPZ as defined in AR 200-1 (Table 3.6-2 and Figure 3.6-2).
Significant	Activities would result in a disruptive noise increase and the increase would exceed the LUPZ limits for sensitive land use areas as defined in AR 200-1 (Table 3.6-2 and Figure 3.6-2).
Duration:	**Short-term –** Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term –** The effects of the specific activity extend well beyond the end of the activity.

4.6.1 No Mission Change Alternative

The following section explains the noise effects resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

Soldiers training on Fort Irwin are exposed to noise generated by training activities, including loud engine noises and the noise from munitions firing. Because this noise is part of the training scenario, it is not discussed for each type of activity. Soldiers are provided with appropriate hearing protection for their exposure levels.

4.6.1.1 Maneuver

Mounted Maneuver: Mounted maneuver involves the use of heavy mechanized vehicles, including tracked and wheeled vehicles. Large tanks such as the M1A2 generate a noise level of approximately 84 dBA at 100 feet (Fort Irwin, 2005). This is consistent with heavy construction vehicles that emit 83 dBA at 100 feet (EPA, 1971). Therefore, individuals in the immediate vicinity of these vehicles would experience a noise environment comparable to a construction site. Additional noise could result from the use of other vehicles; however, most vehicles are considerably quieter than a tank. The combined noise level during a training event is approximately 90 dBA at 100 feet during an exercise (Fort Irwin, 2005).

Dismounted Maneuver: Dismounted maneuvers involve the movement of troops without the use of mechanized vehicles, though smaller wheeled vehicles may be employed. The noise environment generated from dismounted maneuvers would be significantly less than that described for mounted maneuvers.

Aviation: Aviation operations at the NTC include Army helicopters and Air Force aircraft. Figure 4.6-1 shows the standard army aircraft flight routes. While some of the routes are close to the boundary of Fort Irwin, the current operations are maintained within the AR 200-1 LUPZ noise thresholds defined in Table 3.6-1.

Fire and Movement: Weapons systems are also used during rotations and include artillery fire, small arms fire, and bomb drops. Smaller caliber arms such as machine guns produce a peak sound pressure of 140 dBP at 100 feet. A detailed accounting of peak sound pressure levels from firing large caliber weapons is presented in Appendix 4.6A. The use of bombs can result in noise scenarios that exceed 100 dBA; however, the dropping of bombs is limited to the existing impact areas, which are located to minimize the effects on sensitive land uses (refer to Figure 3.6-2).

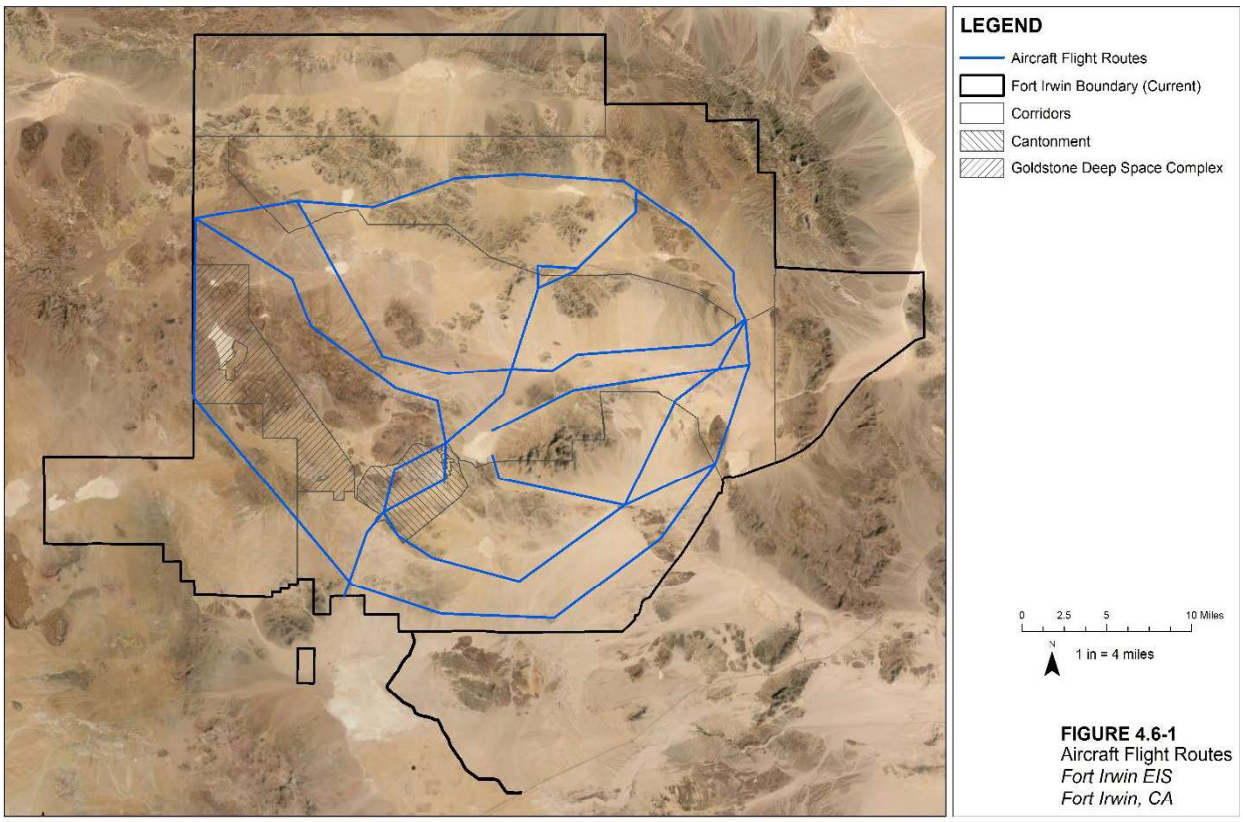


FIGURE 4.6-1
Aircraft Flight Routes
Fort Irwin EIS
Fort Irwin, CA

4.6.1.2 Maneuver Support Operations

Engineer Support: Engineer support operations include the use of heavy equipment typical of civilian construction sites. Consequently, the noise environment would be similar to a construction site consisting of heavy construction vehicles, which emit 83 dBA at 100 feet (EPA, 1971)

EOD: In the process of rendering UXO safe, EOD units may employ explosives. While primarily located around targets, a UXO response could be located throughout the installation and near the boundaries. Sensitive land use areas are generally located a reasonable distance from where UXO could be found, and the EOD would ensure civilians are located a safe distance from a UXO response. Accounting for the noise dissipating over distance, it would be unlikely for any noise receptor to perceive a single, instantaneous noise event greater than 100 dBA.

CBRN: While simulated explosions may be part of a CBRN training event, these events are conducted in the training areas and away from all sensitive land use areas.

Cyber: Cyber activities would have limited to no effect on the Fort Irwin noise environment.

UASs: UASs are generally smaller-scale aircraft than manned aircraft; consequently, the noise generated from the use of UASs would be less than that described for aviation in Section 4.6.1.1, *Maneuver*.

4.6.1.3 Sustainment

Re-arming: Re-arming exercises would result in a noise profile similar to that described for mounted maneuver and dismounted maneuver in Section 4.6.1.1, *Maneuver*.

Refueling: Refueling activities would result in a noise profile similar to that described for mounted maneuver and dismounted maneuver in Section 4.6.1.1, *Maneuver*.

Field Maintenance: Field maintenance activities would result in a noise profile similar to that described for mounted maneuver and dismounted maneuver in Section 4.6.1.1, *Maneuver*.

Assembly Area: The creation of an assembly area would involve the use of engineer support; consequently, the noise environment during construction would resemble that described for engineer support in Section 4.6.1.2, *Maneuver Support Operations*.

Medical: Medical activities can include the use of MEDEVAC vehicles, including helicopters. Therefore, the noise generated during medical activities would be similar to that described for mounted maneuver and aviation in Section 4.6.1.1, *Maneuver*.

Military Working Dogs: Military working dogs are highly trained animals, and while they may bark, it would be within the range of a normal residential area, including pet dogs.

4.6.1.4 SF Operations

Airborne Operations: SF airborne activities would result in noise environmental similar to that described for aviation in Section 4.6.1.1, *Maneuver*.

JPADS: JPADS operations involve SF units deploying from high altitude aircraft and landing in designated areas. Little to no noise would be generated from these activities.

High-angle Movement: High-angle movement involves dismounted SF units traversing mountainous and rugged terrain. Little to no noise would be generated from these activities.

4.6.1.5 Non-rotational Training

Leach Lake Tactical Range: The use of the Leach Lake Tactical Range involves military aircraft dropping bombs into the Leach Lake impact area, which is adjacent to the southern boundary of Death Valley National Park. The sizes of the bombs vary and can be very large. The noise from bombs in the Leach Lake Tactical Range can be perceptible to individuals in Death Valley National Park, though only a small portion of LUPZ II extends into Death Valley (refer to Figure 3.6-2). The Leach Lake Tactical Range is used during every rotation and occasionally for non-rotational training (typically 150 days per year); however, the noise from the training events has not resulted in noise complaints.

USAF Task Force Operations: USAF Task Force Operation activities would result in a noise environment similar to that described for aviation in Section 4.6.1.1, *Maneuver*.

Personnel Recovery Operations: Noise from personnel recovery operations would be similar to that described for mounted maneuver, dismounted maneuver, and aviation in Section 4.6.1.1, *Maneuver*.

Home-station Off-rotation Training: Noise from home-station off-rotation training would be similar to that described for mounted maneuver, dismounted maneuver, fire and movement, and aviation in Section 4.6.1.1, *Maneuver*.

Other Organization Austere Training Requirements: Noise from these activities would be similar to that described for mounted maneuver, dismounted maneuver, fire and movement, and aviation in Section 4.6.1.1, *Maneuver*.

4.6.1.6 Integrated Training Area Management

ITAM activities can include the use of construction equipment, which would result in a noise environment similar to that described for engineer support in Section 4.6.1.2, *Maneuver Support Operations*, though LRAM activities occur at a much smaller scale compared to engineer support activities.

4.6.1.7 Range Complex

The use of the weapon-specific military training ranges on Fort Irwin would reflect the noise environment described for fire and movement in Section 4.6.1.1, *Maneuver*. The ranges were designed and located to avoid effects on sensitive land use areas. LUPZ II contours are located near sensitive land use areas, such as the Cantonment Area and NASA Goldstone Complex (Figure 3.6-2); however, no LUPZ III contours reach sensitive land use areas.

4.6.1.8 Manix Trail

Noise from military convoys is above background levels up to 24 days per year (40 days in a typical training year). No sensitive receptors are adjacent to the Manix Trail. The nearest receptors are more than 1.3 miles from the Manix Trail at its closest point, as shown on Figure 3.6-1. While convoy noise may be perceptible to some noise-sensitive receptors, given the distance from the trail, these activities would not represent a readily noticeable increase.

4.6.1.9 No Mission Change Summary

Noise resulting from training activities on Fort Irwin can be perceptible to individuals on and around the installation, including sensitive land use areas. This is especially true for activities involving the use of explosives or munitions and close aviation support. While this noise may be perceptible, the activities take place primarily in remote areas, and the noise dissipates greatly before it reaches a noise-sensitive land use area. The noise effects resulting from continued military training on Fort Irwin would be **minor, adverse,** and **short-term,** given that no LUPZ adversely effects a sensitive noise receptor and Fort Irwin has not received recent noise complaints. There are **negligible** effects in the Western Training Area.

4.6.2 Changes in Training Activity Alternative

The effects of noise discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative.

While there would be changes in the locations in which training occurs, there would be no change in the number of rotations or the duration of rotational training. There would be no substantial change in exposure of soldiers to training-related noise during rotational training. Because soldiers would be provided with appropriate hearing protection for their exposure levels, any effects on soldiers from changes in training activity would be **negligible**.

4.6.2.1 Northern Corridor

There is expected to be an increase in cyber and aviation activities within the Northern Corridor. Cyber training would not create noise. Aircraft noise may become somewhat more widely dispersed, but the number of flights would be unchanged. Given the remote location of the Northern Corridor and the distance to the nearest noise receptors, it is unlikely the aviation noise would be perceptible by anyone in a sensitive land use area. Therefore, the effects resulting from increased use of the Northern Corridor would be **negligible** relative to current conditions.

4.6.2.2 Central Corridor

There is expected to be an increase in live-fire training and aviation operation activities within the Central Corridor. Manned aviation activities would become more spread out, but the number of flights would not change. The number of flights by UASs would increase, but these changes in flight activity would not appreciably alter the noise environment because the smaller engines of most UASs make less noise than manned aircraft. Noise from live-fire training would increase and occur in more areas as targetry is added south of the current dud-effects line. The number of live-fire rounds fired from the Central Corridor would increase and more rounds would impact within the Central Corridor. These activities could result in perceptible noise to sensitive land use areas within the Cantonment Area, including schools, hospitals, and places of worship. Individuals residing on Fort Irwin are generally more tolerant to military noise than the general public and any increase in noise in the Cantonment Area would be a minor disturbance. Any noise increases in the Central Corridor would be distant from the wilderness area (more than 1.5 miles) and would not cause an appreciable change in the noise environment of the Avawatz Mountains Wilderness Area because of the dissipation of sound with distance. Therefore, the effects resulting from increased use of the Central Corridor would be **minor, short-term,** and **adverse** relative to current conditions**.**

4.6.2.3 Southern Corridor

There is expected to be an increase in live-fire training and aviation operation activities within the Southern Corridor. The noise resulting from these activities would be similar to or less than that described for Section 4.6.2.2, *Central Corridor*, and result in **negligible** effects from noise.

4.6.2.4 Eastern Training Area

There is expected to be an increase in live-fire, mounted maneuver, maintenance and refueling, and aviation operation activities within the Eastern Training Area. The increases in maintenance and refueling would not appreciably change the noise environment, as refueling and maintenance would be conducted concurrent with maneuver training and the noise from these activities would be indistinguishable from the noise from maneuver training. The other activities would result in increased noise from vehicles, weapons systems, and aircraft and could be perceived in the Avawatz Mountains Wilderness Area adjacent to the Eastern Training Area. The town of Baker is more than 9 miles from the areas in which increased training intensity would occur in the Eastern Training Area. There would be no perceptible increase to sensitive noise receptors in Baker because of the dissipation of sound with distance and the intervening mountains. Therefore, the effects resulting from increased use of the Eastern Training Area would be **minor, short-term,** and **adverse** relative to current conditions**.**

4.6.2.5 Western Training Area

Alternative 1: Medium Intensity Aviation Task Force

Under Alternative 1 for the Western Training Area, there would be an increased use of the area by brigade-level aviation units, resulting in an increase of aircraft and other vehicles in the area. The primary noise effects would come from the movement of military equipment along established roads and trails and internally within the aviation logistics areas. Additional noise would be generated from training activities at a new UO site. No munitions firing would occur. Although the Western Training Area is located near the NASA Goldstone Complex, the increased use of the area by aviation units would result in a barely perceptible increase in noise, given the distances involved and the presence of mountain ranges in the Western Training Area. The resulting effects would be **negligible** relative to current conditions.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, there would be an increased use of the area by brigade-level aviation units, as well as the establishment of brigade support areas. Small-scale (non-dud-producing) explosives and small arms may also be used around the brigade support areas during training scenarios. While this would be an increase in noise compared to Alternative 1, the noise generated from

these activities is not expected to be much greater to the sensitive land use areas because the brigade support areas would be sited away from the noise-sensitive land use areas at the NASA Goldstone Complex (**Noise Mitigation-1**). The resulting effects would be **negligible** relative to current conditions.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition

Under Alternative 3, full-scale, brigade-level maneuvers would occur in the Western Training Area. This would include the full breadth of activities described in Section 4.6.1.1, *Maneuver*. Fire and movement activities would be limited to simulated devices and non-dud-producing small caliber rounds. The dramatic increase in use of the area by military vehicles, aircraft, and personnel activity would likely result in a readily perceptible increase in noise to the NASA Goldstone Complex. The resulting effects would be **moderate, adverse,** and **short-term** relative to current conditions.

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Alternative 4 would resemble Alternative 3, except that large caliber ammunition would be permitted during live-fire exercises. The use of large caliber weapons in close proximity to the NASA Goldstone Complex could result in an overlay of Zone II and III contours in areas where they did not exist before. The Army would work with NASA to ensure that any changes to the noise contours resulting from Alternative 4 for the Western Training Area would not disrupt the NASA Deep Space Communication Network at the NASA Goldstone Complex (**Noise Mitigation-2**); therefore, the resulting effects would be **moderate, adverse,** and **short-term** relative to current conditions**.**

4.6.3 Training Infrastructure Improvement Alternative

The effects of noise discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

4.6.3.1 Northern Corridor

Upgrades to UO sites and communication capabilities, the construction of new CBRN facilities, UAS runway and radar systems, and the development of LRAM sites would be conducted in the Northern Corridor. While these activities would include the use of heavy equipment, the remote location of the Northern Corridor would limit the potential for individuals within sensitive land use areas from perceiving the noise. Therefore, the expected effects would be **negligible** relative to current conditions**.**

4.6.3.2 Central Corridor

Improvements to live ammunition capabilities, training obstacles, upgrades to existing UO sites and communication capabilities, the construction of new CBRN facilities, new FARPs, and radar systems, and the development of LRAM sites would be conducted in the Central Corridor. While most of these activities would occur in remote areas with limited potential to effect sensitive land use areas, it is possible for sites to be constructed within the vicinity of the Cantonment Area. Nonetheless, while noise from these activities may be perceivable, the activities should not result in annoyance, given that construction would be temporary and similar to construction that already occurs within the Cantonment Area. The effects from training infrastructure improvements in the Central Corridor are expected to be **minor, adverse,** and **short-term.**

4.6.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities and the construction of new CBRN facilities and FARPs would be conducted in the Southern Corridor. These activities would primarily be located in remote areas, though it may be necessary to site a location near the Cantonment Area. Similar to the Central Corridor**,** the noise effects are expected to remain **minor, adverse,** and **short-term.**

4.6.3.4 Eastern Training Area

Improvements to live-fire capabilities would be conducted in the Eastern Training Area**.** While these improvements may be conducted near the town of Baker and a number of wilderness areas, the distance from the proposed locations and the mountain range in the Eastern Training Area should keep the noise levels to less than perceptible, resulting in a **negligible** noise effect.

4.6.3.5 Western Training Area

Improvements to live ammunition (Alternative 4 for the Western Training Area) and communication capabilities (all Alternatives) and the construction of new UO sites, new FARPs, and LRAM sites (all Alternatives) would be conducted in the Western Training Area. A perceptible noise level from construction related to these activities could result if they are located near the NASA Goldstone Complex; however, the new infrastructure improvement sites would be located away from the telescopes at the NASA Goldstone Complex (**Noise Mitigation-3**)**,** which would make the effects **minor, adverse,** and **short-term.**

4.6.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, 7, and 20 would be within the vicinity of the Cantonment Area. These ranges are located away from the nearest sensitive land use area and, therefore, any construction activities are not likely to be perceptible to noise-sensitive receptors. As a result, the effects related to range improvements are expected to be **negligible**.

4.6.5 Manix Trail Alternative

Noise-sensitive receptors, including the St. Anthony Coptic Orthodox Monastery and individual residents along the Manix Trail, may perceive an increase in noise as military use of the trail increases and maintenance activities are conducted. The operation of construction equipment such as a small excavator would be necessary to implement repairs along the trail. Noise elevations would be temporary, typically less than a full day, at any one location but they would change through time as different areas of the trail are maintained. The nearest receptors are more than 1.3 miles from the Manix Trail at its closest point. While noise may be perceptible to some noise-sensitive receptors, these activities would not represent a readily noticeable increase and would have a **minor, adverse,** and **short-term** effect.

4.6.6 Mitigation Measures

The following list is a summary of the mitigation measures related to training on Fort Irwin:

- **Noise Mitigation-1**: If Alternative 2 for the Western Training Area is chosen, locate the brigade support areas away from noise-sensitive land use areas at the NASA Goldstone Complex.
- **Noise Mitigation-2**: If Alternative 4 for the Western Training Area is chosen, the Army would work with NASA to ensure that any changes to the noise contours would not disrupt the NASA Deep Space Communication Network at the NASA Goldstone Complex.
- **Noise Mitigation-3**: Locate all new infrastructure improvement sites away from the telescopes at the NASA Goldstone Complex and other NASA facilities determined to be eligible for listing in the NRHP.

4.7 Utilities

The effects on utilities were determined by evaluating activities that could cause short-term or long-term disruptions to service, require unplanned upgrades, or violate permit conditions. The intensity and duration of effects are described in Table 4.7.1.

TABLE 4.7-1
Significance Criteria for Utilities
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Impact Intensity	Description
Negligible	The effect would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to utilities that fall within planned usage.
Moderate	The Alternative would result in a readily apparent change to utilities, such as a short-term interruption of service and new infrastructure must be built.
Significant	The Alternative would result in a substantial change to utilities, resulting in an exceedance of capacity that requires an unplanned upgrade to the infrastructure, a long-term interruption of service, or a violation of permit conditions.
Duration:	**Short-term** – Occurs only during a specific activity, such as a construction period or a specific training event, or during the activity and for a short adjustment/recovery period following the end of the event. Short-term effects can repeat for each training event that occurs throughout the year; each year has up to 12 rotations. **Long-term** –The effects of the specific activity extend well beyond the end of the activity.

4.7.1 No Mission Change Alternative

The following section explains the effects on utilities resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

As described in Section 1, *Purpose and Need*, Fort Irwin's daily population is approximately 27,000, which increases to approximately 33,000 during training rotations. Utilities, such as water treatment, water distribution, wastewater, recycled water, stormwater, energy, communications, and solid waste, have been designed and permitted to support this population.

4.7.1.1 Maneuver

Mounted Maneuver: The operation of approximately 2,000 military vehicles during mounted maneuver exercises would consume diesel and gasoline. Electrical power during rotations would be provided by diesel generators, as needed. The operation of telecommunications and targetry would result in the consumption of electrical energy. Water for the RTUs during training scenarios would be transported via water truck and any wastewater generated would be hauled out for treatment at the Fort Irwin WWTP. Solid waste generated by units would be collected and taken to the Fort Irwin landfill for disposal.

Dismounted Maneuver: While fewer vehicles are required for dismounted maneuver exercises, the use of utilities would be similar to that described for mounted maneuver.

Aviation: Aviation exercises would require the use of aviation gas, jet fuel, diesel, and gasoline for approximately 60 aircraft. Otherwise, the use of utilities would be similar to that described for mounted maneuver.

Fire and Movement: Fire and movement activities are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver.

4.7.1.2 Maneuver Support Operations

Engineer Support: The use of utilities for engineer support exercises would be similar to that described for mounted maneuver in Section 4.7.1.1, *Maneuver*; however, vehicles would be limited to military construction vehicles and personnel transport vehicles.

EOD: The use of utilities for EOD exercises would be similar to that described for mounted maneuver in Section 4.7.1.1, *Maneuver*; however, vehicles would typically be limited to highly mobile multi-wheeled vehicles.

CBRN: CBRN activities are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Cyber: Cyber activities would require an increase in the use of electrical power and diesel generators.

UASs: The use of UASs is typically performed in concert with larger rotational aviation scenarios; consequently, utility usage would reflect that described for aviation in Section 4.7.1.1, *Maneuver.*

4.7.1.3 Sustainment

Re-arming: Re-arming exercises are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Refueling: Refueling activities are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Field Maintenance: Field maintenance activities are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Assembly Area: The use of assembly areas are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Medical: Medical activities are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Military Working Dogs: The use of military working dogs would have minimal to no utility usage.

4.7.1.4 SF Operations

Airborne Operations: The use of utilities for airborne operations would be similar to that described for aviation in Section 4.7.1.1, *Maneuver.*

JPADS: The use of utilities for JPADS operations would be similar to that described for aviation in Section 4.7.1.1, *Maneuver.*

High-angle Movement: High-angle movement exercise would have minimal to no utility usage.

4.7.1.5 Non-rotational Training

Leach Lake Tactical Range: The use of utilities during Leach Lake Tactical Range Operations would be similar to that described for aviation in Section 4.7.1.1, *Maneuver.*

USAF Task Force Operations: The use of utilities during Leach Lake Tactical Range Operations would be similar to that described for aviation in Section 4.7.1.1, *Maneuver.*

Personnel Recovery Operations: Personnel recovery operations are typically performed in concert with larger rotational training scenarios; consequently, utility usage would reflect that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Home-station Off-Rotation Training: The use of utilities for home-station off-rotation training would be similar to that described for mounted maneuver in Section 4.7.1.1, *Maneuver.*

Other Organization Austere Training Requirements: The use of utilities for other organizations' austere training activities would be similar to that explained for mounted maneuver in Section 4.7.1.1, *Maneuver.*

4.7.1.6 Integrated Training Area Management

ITAM activities require the use of gasoline and diesel for vehicles. Non-potable water is used for watering vegetation sites.

4.7.1.7 Range Complex

Although telecommunication towers and FON are located within the Range Complex, each range in the complex is oriented to avoid communication interference between ranges. The use of utilities during the Range Complex exercises reflects that described for the mounted maneuver in Section 4.7.1.1, *Maneuver*. Electricity is available at most of the ranges, so the use of diesel generators would be limited.

4.7.1.8 Manix Trail

The Manix Trail is an unpaved dirt road that connects the Yermo Rail Yard to Fort Irwin. The only utility associated with use of the Manix Trail would be diesel and gasoline consumption during the movement of equipment between Yermo Rail Yard and Fort Irwin.

4.7.1.9 No Mission Change Alternative Summary

The utility infrastructure was designed to support the population and military training on Fort Irwin and is continually improved. Military training activities are conducted so as not to affect utility infrastructure, because dig restrictions and off-limits areas are enforced to prevent damage to utility infrastructure (**Utility Mitigation-1**). The effects on utilities resulting from military training on Fort Irwin are considered to be **negligible.**

4.7.2 Changes in Training Activity Alternative

This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative. Under this alternative, no change would occur in the number of units training on Fort Irwin or in the demand for water and wastewater services.

4.7.2.1 Northern Corridor

Cyber and aviation activities are expected to increase in the Northern Corridor. Cyber training would result in an increased usage of energy and communication utilities. Fort Irwin is planning to upgrade its energy and communication infrastructure to accommodate future demands. Therefore, the effects resulting from an increase in energy use in the Northern Corridor would be **minor, adverse,** and **long-term** relative to current conditions.

4.7.2.2 Central Corridor

Live-fire training and aviation operation activities would increase in the Central Corridor, but the number of training events conducted each year would not change. The Changes in Training Activity Alternative in the Central Corridor would have a **negligible** effect on utilities relative to current conditions.

4.7.2.3 Southern Corridor

Live-fire training and aviation operation activities would increase in the Southern Corridor, but the number of training events conducted each year would not change. The Changes in Training Activity Alternative in the Southern Corridor would result in a **negligible** effect on utilities relative to current conditions.

4.7.2.4 Eastern Training Area

Mounted maneuver, live-fire, maintenance, refueling, and aviation operation activities would increase in the Eastern Training Area, but the number of training events conducted each year would not change. Maintenance and refueling areas would not require permanent utility infrastructure. Therefore, the Changes in Training Activity Alternative in the Eastern Training Area would result in a **negligible** effect on utilities relative to current conditions.

4.7.2.5 Western Training Area

Under all alternatives being considered for the Western Training Area, no change in the number of training events conducted each year or in the utility demand for the units conducting training would occur. The following discussions address utility demands associated with infrastructure improvements in the Western Training Area.

Alternative 1: Medium Intensity Aviation Task Force

Under Alternative 1 for the Western Training Area, brigade-level aviation units would increase their use of the area, resulting in an increase of aircraft and other vehicles in the area. A UO site may be established in the Western Training Area but would not require permanent utility infrastructure. The resulting effect would be **negligible** relative to current conditions.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, brigade-level aviation units would increase their use of the area, resulting in the establishment of brigade support areas. A UO site may be established in the Western Training Area. These additional sites may require extensions of the water and electrical infrastructure, resulting in a **minor, adverse,** and **short-term** effect on utilities relative to current conditions.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers – Limited Ammunition

Under Alternative 3, full-scale, brigade-level maneuvers would occur in the Western Training Area. This would include the full breadth of activities described in Section 4.7.1.1, *Maneuver*, except for the use of large caliber ammunition. The additional support areas and UO sites may require extensions of the water and electrical infrastructure, resulting in a **minor, adverse,** and **short-term** effect on utilities relative to current conditions.

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Alternative 4 would resemble Alternative 3, except that large caliber ammunition would be permitted during live-fire exercises. The additional support areas and UO sites may require extensions of the water and electrical infrastructure, resulting in a **minor, adverse,** and **short-term** effect on utilities relative to current conditions.

4.7.3 Training Infrastructure Improvement Alternative

The effects on utilities discussed for the No Mission Change Alternative would occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative. Training infrastructure improvements would be implemented over a period of years and any demands on utility services would be spread across those years.

4.7.3.1 Northern Corridor

Upgrades to UO sites and communication capabilities, the creation of new CBRN facilities, UAS runway and radar systems, and the development of LRAM sites would be conducted in the Northern Corridor. The effects of infrastructure improvements on utilities are discussed in this section.

Water Treatment and Distribution

The construction contractor would supply water for potable uses from off the installation. The effects on water treatment and distribution would be **negligible**.

Waste and Recycled Water

Portable restrooms would likely be used during construction. Waste from the portable restrooms could be disposed of at the Fort Irwin WWTP or at an offsite facility. No notable increase in the average production of wastewater on Fort Irwin would be expected during construction; therefore, a **negligible** effect on wastewater utility would occur during construction.

Recycled water would be used for dust suppression and other non-potable purposes during construction (**Utility Mitigation-2**). Filling stations for water trucks to fill with recycled water are located near the WTP on Goldstone Road and within the Cantonment Area. The average use of recycled water was 0.2 mgd in 2014; Fort Irwin is permitted to produce and use up to 1 mgd; the maximum production rate of recycled water on Fort Irwin is 2 mgd (CH2M, 2014). The use of recycled water would not exceed the permitted capacity.

The effects on wastewater and recycled water during construction would be **negligible**.

Stormwater

No stormwater utility is in the Northern Corridor; therefore, **no effect** on stormwater would occur. Effects on the natural drainage systems are discussed in Section 4.2, *Water Resources*.

Energy

A **negligible** increase in the use of energy services would occur during construction, primarily from the use of gasoline and diesel fuel for equipment and generators.

Communication

Temporary disruptions in communication services at certain facilities could occur if new connections are made, but disruptions would not be expected. If a potential service disruption could occur, the construction contractor would coordinate with Fort Irwin staff (**Utility Mitigation-3**). A **negligible** effect on communications would be expected during construction due to potential temporary service disruptions.

Solid Waste Management

Construction activities would generate solid waste. As discussed in Section 3.7.7, *Solid Waste*, Fort Irwin is currently expanding the capacity of the sanitary landfill, which is expected to be complete in 2021. Effects related to solid waste management would be **negligible**.

4.7.3.2 Central Corridor

Improvements to live ammunition capabilities, training obstacles, upgrades to existing UO sites and communication capabilities, construction of new CBRN facilities, new FARPs, and radar systems, and the development of LRAM sites would be conducted in the Central Corridor. The construction contractor would supply water for potable uses from off the installation. The stormwater control system within Tiefort City would be protected from, and not be altered by, construction within the Central Corridor. The effects on the wastewater, recycled water, energy, communication, and solid waste management systems would be the same as those described in Section 4.7.3.1, *Northern Corridor*.

4.7.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, communication capabilities and the construction of new CBRN facilities and FARPs would occur in the Southern Corridor under the Training Infrastructure Improvement Alternative. The effects on utilities would be the same as those described in Section 4.7.3.1, *Northern Corridor*.

4.7.3.4 Eastern Training Area

Improvements to live ammunition capabilities, existing UO sites, communication capabilities, new CBRN facilities, new FARPs, and ITAM activities would be conducted in the Eastern Training Area under the Training Infrastructure Improvement Alternative. The effects on utilities would be the same as those described in Section 4.7.3.1, *Northern Corridor*.

4.7.3.5 Western Training Area

Improvements to live ammunition capabilities under Alternative 4 for the Western Training Area, new UO sites, communication capabilities, new FARPs, and ITAM activities would be conducted in the Western Training Area under the Training Infrastructure Improvement Alternative. The effects on utilities would be the same as those described in Section 4.7.3.1, *Northern Corridor*.

4.7.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, 7, and 20 would involve the construction of new range infrastructure. The effects on utilities would be similar to those described in Section 4.7.3.1, *Northern Corridor*.

4.7.5 Manix Trail Alternative

Improvements to the Manix Trail would consist of minor grading, implementing erosion control structures such as check dams, and applying gravel or dust suppressant. The effects on utilities would be similar to those described in Section 4.7.3.1, *Northern Corridor*.

4.7.6 Mitigation Measures

The following list is a summary of mitigation measures related to training on Fort Irwin:

- **Utility Mitigation-1**: Use dig restrictions and off-limits areas to prevent training activities from damaging utility infrastructure.
- **Utility Mitigation-2**: Recycled water would be used for dust suppression and other non-potable purposes during construction.
- **Utility Mitigation-3**: Plan in advance for any potential short-term utility disruptions and coordinate between the contractor and Fort Irwin staff.

4.8 Transportation

This section describes the potential effects on the transportation infrastructure for each of the alternatives in the ROI (Figure 3.8-1). The existing roadway, trail network, and rail network were evaluated to determine whether changes associated with project alternatives would result in a disruption of, or improvements to, transportation patterns and systems or a change in volume or timing of system use. Transportation of hazardous materials is discussed in Section 4.9, *Hazardous Materials and Hazardous Waste*.

Table 4.8-1 presents significance criteria for Transportation.

TABLE 4.8-1
Significance Criteria for Transportation
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Impact Intensity	Description
Negligible	The Alternative would not result in a change in traffic or transportation resources or the change would be so small that it would not be noticeable.
Minor	The Alternative would cause short-term interruptions to traffic flow (e.g., closing, rerouting, or constructing roads, changes in daily or peak-hour traffic volume) within the ROI, but would not substantially negatively affect the ability to use the Fort Irwin transportation system.
Moderate	The Alternative would permanently alter or increase use of roads or other transportation system(s) within their current capacity or temporarily exceed the capacity of a transportation system.
Significant	The Alternative would permanently alter or increase use of roads or other transportation system(s) and exceed the capacity of a transportation system.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.8.1 No Mission Change Alternative

The following section explains the effects on transportation resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

4.8.1.1 Military Training

Training activities have minimal effect on traffic outside the boundaries of Fort Irwin. All training activities occur in access-controlled areas away from the regional transportation system. Troops and equipment are transported to Fort Irwin using trucks and buses, but this specific activity has minimal effect on regional traffic volume or traffic patterns, rail service, or bus service.

The trail network within the training area would support transportation of supplies, and movement of administrative, combat, tactical, and contractor vehicles. Training activities would remain unchanged from existing conditions and would not exceed the existing capacity of the trails. ITAM would continue to conduct maintenance, improvement, and development of the secondary trail network.

Dust generated during force-on-force training in the Eastern Training Area has the potential to blow across State Highway 127, as previously documented (Fort Irwin, 2005). If this were to occur, visibility would decrease, and traffic would slow. The Silver Lake Mine is an active mineral mine in the Eastern

Training Area. Training activities in the Eastern Training Area may occasionally interrupt traffic to and from the mine. The Army has an agreement with the mine that allows the Army to limit mine operations to a maximum of 6 days per rotation and during night hours to accomplish training needs and the Army would continue to comply with this agreement.

Training activities may affect traffic within the NASA Goldstone Complex. Any interruptions would be sporadic and of short duration. The Army would provide traffic control, as warranted, during interruptions to minimize effects (**Transportation Mitigation-1**).

4.8.1.2 Range Complex

Use of the Range Complex has no effect on traffic and transportation in the ROI. There is no change in traffic volume or traffic patterns in the ROI as a result of this training.

4.8.1.3 Manix Trail

Use of the Manix Trail to transport military equipment between Fort Irwin and the Yermo Rail Yard has no adverse effects on traffic in the ROI. In fact, there is a benefit to traffic in the ROI from the use of the Manix Trail. Convoys of military equipment are separated from normal traffic on roads within the ROI, which allows for uninterrupted traffic flow on regional roadways.

4.8.1.4 No Mission Change Alternative Summary

Transportation infrastructure at the NTC has been designed to support traffic associated with training activities. Training activities could interrupt traffic at the NASA Goldstone Complex; however, the NTC would continue to coordinate with NASA in advance of planned training movements through the NASA Goldstone Complex to either the Central Corridor or the Western Training Area (**Transportation Mitigation-1**). Given the infrequent potential for training-related dust to reduce visibility on State Highway 127 and the interruption of traffic on the NASA Goldstone Complex, the effects on transportation are considered **minor**, **adverse**, and **short-term**.

4.8.2 Changes in Training Activity Alternative

The transportation effects and mitigation measures discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative. The number of units training on Fort Irwin and the number of rotations annually would not change and there would be no change to regional transportation conditions, the traffic in the Cantonment Area, or the Manix Trail resulting from implementing the Changes in Training Activities Alternative.

4.8.2.1 Northern Corridor

An increase in cyber and aviation activities is expected within the Northern Corridor. These activities would have **negligible** effects on traffic in the Northern Corridor relative to current conditions. The Northern Corridor is a restricted area that does not experience traffic except for military training, maintenance of training infrastructure, and ITAM activities. All traffic is, and will continue to be, coordinated through Range Operations.

4.8.2.2 Central Corridor

The increase in live-fire training and aviation operation activities within the Central Corridor would have **negligible** effects on traffic in the Central Corridor relative to current conditions. The Central Corridor is a restricted area that does not experience traffic except for military training, maintenance of training infrastructure, and ITAM activities. All traffic is, and will continue to be, coordinated through Range Operations.

4.8.2.3 Southern Corridor

The increase in live-fire training and aviation operation activities within the Southern Corridor would have **negligible** effects on traffic in the Southern Corridor relative to current conditions. The Southern Corridor is a restricted area that does not experience traffic except for military training, maintenance of training infrastructure, and ITAM activities. All traffic is, and will continue to be, coordinated through Range Operations.

4.8.2.4 Eastern Training Area

An increase in live-fire, maintenance, refueling, and manned aviation operations is expected within the Eastern Training Area. These activities are expected to have a **negligible** effect on traffic in the Eastern Training Area relative to current conditions. The Eastern Training Area is a restricted area that does not experience traffic except for military training, maintenance of training infrastructure, and ITAM activities. All traffic is, and will continue to be, coordinated through Range Operations.

4.8.2.5 Western Training Area

Alternative 1: Medium Intensity Aviation Task Force

The Western Training Area is a restricted area that does not experience traffic except land management activities. Under Alternative 1 for the Western Training Area, battalion-level aviation units (limited operations) would increase their use of the area, resulting in an increase in vehicles on established MSRs. Increased movement of military personnel and equipment moving to and from the Western Training Area through the NASA Goldstone Complex would affect normal traffic within the NASA Goldstone Complex. These interruptions would be sporadic and of short duration. The effect on traffic in the NASA Goldstone Complex would be **minor**, **adverse**, and **short-term**. The NTC would coordinate with NASA in advance of planned training movements through the NASA Goldstone Complex to either the Central Corridor or the Western Training Area. Traffic control would be provided during these interruptions to minimize the effects (**Transportation Mitigation-1**).

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, there would be an increase in the use of the area by SF operations and aviation units, as well as logistics units to establish brigade support areas. As with Alternative 1, this alternative would result in increased movement of military personnel and equipment to and from the Western Training Area through the NASA Goldstone Complex and would affect normal traffic conducted by NASA in operating the NASA Goldstone Complex. These interruptions would be sporadic and of short duration. The effect on traffic in the NASA Goldstone Complex would be **minor**, **adverse**, and **short-term**. The NTC would coordinate with NASA in advance of planned training movements through the NASA Goldstone Complex to either the Central Corridor or the Western Training Area. Traffic control would be provided during these interruptions to minimize effects (**Transportation Mitigation-1**).

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition

Under Alternative 3, full-scale, brigade-level maneuvers similar to those conducted in the Northern, Central, and Southern Corridors would occur in the Western Training Area. Alternative 3 would result in a substantial increase in training activities, training infrastructure improvements, and the movement of military personnel and equipment to and from the Western Training Area through the NASA Goldstone Complex. The increase in training-related traffic would result in a substantial impact to normal traffic conducted by NASA in operating the NASA Goldstone Complex. These interruptions would be sporadic and of short duration, but more frequent than in Alternatives 1 or 2 for the Western Training Area. The effect on traffic in the NASA Goldstone Complex would be **minor**, **adverse**, and **short-term**. The NTC would coordinate with NASA in advance of planned training movements through the NASA Goldstone

Complex to either the Central Corridor or the Western Training Area. Traffic control would be provided by the Army during these interruptions to minimize the effects (**Transportation Mitigation-1**).

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers - Unrestricted Ammunition

The effects on traffic under Alternative 4 for the Western Training Area would be similar to Alternative 3. The implementation of Alternative 4 would also require the same mitigation as Alternative 3 and result in **minor**, **adverse**, and **short-term** effects on traffic.

4.8.3 Training Infrastructure Improvement Alternative

The protection methods and effects on transportation discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative. Training infrastructure improvements would be implemented over a period of years and related construction traffic would be spread across those years. Infrastructure maintenance and improvements would have no effects on traffic outside Fort Irwin. Work would be comparable to small construction projects in terms of labor and would not noticeably increase daily traffic flow to and from Fort Irwin. No disruption of civilian or commercial traffic would occur on Fort Irwin Road or in the surrounding area.

4.8.3.1 Northern Corridor

Upgrades to UO sites and communication capabilities, the construction of new CBRN facilities, UAS runway, and radar systems, and the development of LRAM sites would be conducted in the Northern Corridor. Access roads would be constructed to support up to three new communications towers. ITAM would conduct trail network monitoring and light maintenance on up to 75 miles of trails per year. Construction traffic is expected to be light and improvements to transportation infrastructure under the Training Infrastructure Improvement Alternative would result in a **minor, positive**, **long-term** effect on transportation resources. All downrange work to install or maintain training infrastructure would be coordinated with Range Operations to avoid conflicts with the training mission (**Transportation Mitigation-3**).

4.8.3.2 Central Corridor

Improvements to live ammunition capabilities and training obstacles, upgrades to existing UO sites and communication capabilities, the construction of new CBRN facilities, new FARPs, and radar systems, and the development of LRAM sites would be conducted in the Central Corridor. ITAM would conduct monitoring and maintenance on approximately 100 miles of trails per year. Construction traffic is expected to be light and improvements to transportation infrastructure under the Training Infrastructure Improvement Alternative would result in a **minor, positive, long-term** effect on transportation resources. All downrange work to install or maintain training infrastructure would be coordinated with Range Operations to avoid conflicts with the training mission (**Transportation Mitigation-3**).

4.8.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities and the construction of new CBRN facilities and FARPs would be conducted in the Southern Corridor. Approximately 3 miles of trails would be improved to provide access to the land navigation training site. ITAM would conduct monitoring and maintenance on approximately 100 miles of trails per year. Construction traffic is expected to be light and improvements to transportation infrastructure under the Training Infrastructure Improvement Alternative would result in a **minor**, **positive**, **long-term** effect on transportation resources. All downrange work to install or maintain training infrastructure would be coordinated with Range Operations to avoid conflicts with the training mission (**Transportation Mitigation-3**).

4.8.3.4 Eastern Training Area

Improvements to live-fire capabilities would be conducted in the Eastern Training Area**.** ITAM would improve accessibility to the Eastern Training Area by providing a more robust trail network capable of supporting mechanized vehicles. Approximately 25 miles of secondary trails would be identified and either established or improved to support rotations. Construction traffic would be expected to be light and improvements to transportation infrastructure under the Training Infrastructure Improvement Alternative would result in a **long-term**, **positive**, **moderate** effect on transportation resources. All downrange work to install or maintain training infrastructure would be coordinated with Range Operations to avoid conflicts with the training mission (**Transportation Mitigation-3**).

4.8.3.5 Western Training Area

Improvements to live ammunition (Alternative 4 for the Western Training Area) and communication capabilities (all Alternatives) and the construction of new UO sites, new FARPs, and LRAM sites (all Alternatives) would be conducted in the Western Training Area. ITAM would improve approximately 50 miles of trails to make them safe for military vehicle traffic and to accommodate the full array of RTU training activities. Approximately 15 miles of new trails would be developed, and some existing trails would be removed to eliminate access to off-limits areas. Construction traffic is expected to be light and improvements to transportation infrastructure under the Training Infrastructure Improvement Alternative would result in a **long-term**, **positive**, **moderate** effect on transportation resources. All downrange work to install or maintain training infrastructure would be coordinated with Range Operations to avoid conflicts with the training mission (**Transportation Mitigation-3**).

4.8.4 Range Improvements Alternative

The Range Improvements Alternative would have a **negligible** effect on transportation resources. The minor construction and relocation of infrastructure proposed at Ranges 1, 5, 6, 7, and 20 would not appreciably alter daily traffic to and from Fort Irwin. No changes would occur in road, rail, or bus transportation patterns or systems; the volume or timing of the use of road, bus, and rail transportation systems; or the types of vehicles using the transportation systems. Once range modifications were completed, there would be no change to daily traffic to and from Fort Irwin, as there would be no change in the personnel training on Fort Irwin.

4.8.5 Manix Trail Alternative

Beneficial effects of the Manix Trail on traffic and transportation under the No Mission Change Alternative would occur. The Manix Trail Alternative would improve the Manix Trail to support the increased transportation of military equipment from the Yermo Rail Yard to Fort Irwin. Maintenance of the Manix Trail would be limited to repairs of the existing trail between I-15 and Fort Irwin and there would be no expansion of the trail footprint. The Manix Trail Alternative would result in **long-term**, **positive**, **minor** effects on the movement of military equipment between Fort Irwin and the Yermo Rail Yard by preventing the deterioration of the trail and improving the usability of the trail.

4.8.6 Mitigation Measures

The following list is a summary of the mitigation measures related to training on Fort Irwin:

- **Transportation Mitigation-1**: Require coordination by the NTC with NASA in advance of planned training movements through the NASA Goldstone Complex to either the Central Corridor or the Western Training Area.
- **Transportation Mitigation-2**: Coordinate traffic control during operations at the Silver Lake Mine.
- **Transportation Mitigation-3:** Coordinate all downrange work to install or maintain training infrastructure with Range Operations to avoid conflicts with the training mission.

4.9 Hazardous Materials and Hazardous Waste

The evaluation of environmental effects from hazardous materials and hazardous wastes focuses on the storage, transport, and use of a variety of chemicals. The effects also may occur through the generation, storage, transportation, and disposal of hazardous wastes.

The criteria for determining the magnitude of effects resulting from hazardous materials and hazardous wastes were determined based on the potential for the release of hazardous materials or wastes or the potential for a violation of local, state, or federal hazardous materials and hazardous waste regulations. The significance criteria is specified in Table 4.9-1.

TABLE 4.9-1
Significance Criteria for Hazardous Materials and Hazardous Waste
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Effect Intensity	Description
Negligible	The effect would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to existing hazardous materials or hazardous waste conditions, including *de minimis* or small quantity releases of hazardous materials or hazardous waste into the environment; however, the effect would be localized, and currently addressed by existing management plans.
Moderate	The Alternative would result in a readily apparent change in hazardous materials or hazardous waste conditions over a relatively wide area. This includes a measurable and consequential increase in contamination associated with hazardous materials or hazardous waste at levels that could require emergency response and cleanup action but are not likely to cause an imminent threat to human health or the environment or jeopardize the long-term viability of ecosystems and wildlife.
Significant	The Alternative would result in a substantial change to the hazardous materials and hazardous waste conditions on the installation, affecting a large area, or would violate regulatory requirements. This includes large spills that enter into surface water or groundwater, releases that could put human health and safety in immediate or long-term danger, or releases that could result in immediate or long-term damage to ecosystems and the wildlife that rely upon them.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.9.1 No Mission Change Alternative

The following sections explain the effects on hazardous materials and wastes resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

4.9.1.1 Maneuver

Mounted Maneuver: Mounted maneuver involves the movement of troops and equipment by combat and tactical vehicles. The effects related to hazardous materials and hazardous wastes are related to the potential for accidental release during operation and maintenance of these vehicles, or a vehicular accident that ruptures tanks, reservoirs, or hoses containing hazardous materials.

Dismounted Maneuver: Dismounted maneuver is conducted mainly on foot, with only limited support by vehicles. The same potential for release exists as with mounted maneuvers but is much less likely to

occur, given the limited vehicular support provided during dismounted maneuver activities and the resulting lesser volume of hazardous materials and hazardous wastes. The mitigation measures described for mounted maneuvers would be applied during dismounted maneuvers.

Aviation: The primary potential for effects from hazardous materials or hazardous wastes is related to refueling and maintenance activities, and incidents that could rupture tanks, reservoirs, or hoses containing hazardous materials.

Fire and Movement: Fire and movement activities involve the use of artillery fire and weapons systems that use munitions and could produce UXO. All activities involving the potential generation of UXO are managed in accordance with AR 385-10. Discharged munitions are managed in accordance with Fort Irwin's HMHWMP and the ORA Program. Additional potential effects and mitigation from UXO are addressed in Section 4.10, *Health and Safety*.

4.9.1.2 Maneuver Support Operations

Engineer Support: Engineer support operations include the use of heavy equipment typical of civilian construction sites. Construction activities involve the risk of releasing hazardous materials such as POL products. Equipment servicing and repair activities could temporarily generate oily and hazardous wastes, such as spent solvents, residual fuels, used oils, antifreeze, and filters. Construction activities would be conducted in conformance with Fort Irwin's SPCP and HMHWMP and with the implementation of a site-specific SWPPP (**Water Mitigation-3**), as described in Section 4.2.3, *Training Infrastructure Improvement Alternative*.

EOD: EOD units may employ explosives to render UXO safe. While primarily concentrated around targets, a UXO response could occur throughout the installation and near the boundaries. EOD activities would result in the use of hazardous materials and the generation of hazardous wastes; however, EOD activities result in an overall reduction of UXO on the installation. Additional potential effects and mitigation from UXO are addressed in Section 4.10, *Health and Safety*.

CBRN: CBRN training does not include the use of actual chemical, biological, radioactive or nuclear material; therefore, there is no effect from these materials. Simulated explosions that are part of CBRN activities could result in a small amount of hazardous materials and hazardous waste.

Cyber: Some electronics and other equipment could contain materials that are regulated as universal waste in California and require recycling or disposal in accordance with applicable laws and regulations once the equipment has reached the end of its life cycle.

UASs: UAS activities could result in a hazardous materials and hazardous waste profile similar to that described for aviation in Section 4.9.1.1, *Maneuver.*

4.9.1.3 Sustainment

Re-arming: Re-arming exercises would result in a hazardous materials and hazardous waste profile similar to that described in Section 4.9.1.1, *Maneuver*. Additionally, ammunition resupply at the RASAs would require handling of various caliber munitions. Personnel involved with munitions resupply are trained in proper handling procedures to ensure these materials are not lost, discarded, or otherwise handled in a way that could result in a release to the environment or increased explosion hazard.

Refueling: Refueling could result in an accidental spill of petroleum and other spills; however, refueling activities are conducted in accordance with the mitigation measures described in Section 4.9.1.1, *Maneuver.*

Field Maintenance: Field maintenance could result in an accidental spill of petroleum and other spills; however, field maintenance activities are conducted in accordance with the mitigation measures described in Section 4.9.1.1, *Maneuver.*

Assembly Area: The creation of an assembly area would involve the use of engineer support; consequently, the hazardous materials and hazardous waste environment during construction would resemble that described for engineer support in Section 4.9.1.2, *Maneuver Support Operations*.

Medical: Medical activities can include a real-world response to medical emergencies. Any regulated medical waste is managed in accordance with applicable regulations.

Military Working Dogs: As part of their training, dogs would be expected to detect landmines, firearms, ammunition, and explosives. This training is conducted using inert devices that lack detonators or bullets and the dogs are not placed in a hazardous situation.

4.9.1.4 SF Operations

Airborne Operations: SF airborne activities would result in a hazardous materials and hazardous waste environment similar to that described for aviation in Section 4.9.1.1, *Maneuver*.

JPADS: JPADS activities would result in a hazardous materials and hazardous waste environment similar to that described for aviation in Section 4.9.1.1, *Maneuver*.

High-angle Movement: Limited effects from hazardous materials would occur during high-angle movement activities.

4.9.1.5 Non-rotational Training

Leach Lake Tactical Range: Large ordinance are regularly employed at the Leach Lake Tactical Range, and the area is off-limits to all but specially trained personnel. The USAF has a contractor responsible for addressing UXO issues prior to target cleanup and target construction (USAF, 2006).

USAF Task Force Operations: USAF Task Force Operations activities would result in a hazardous materials and hazardous waste profile similar to that described for aviation in Section 4.9.1.1, *Maneuver*.

Personnel Recovery Operations: Limited effects from hazardous materials would occur during personnel recovery operations.

Home-station Off-rotation Training: The effects from hazardous materials and hazardous wastes related to home-station off-rotation training would be similar to those described in Section 4.9.1.1, *Maneuver*.

Other Organization Austere Training Requirements: The effects from hazardous materials and hazardous waste related to these activities would be similar to those described in Section 4.9.1.1, *Maneuver*.

4.9.1.6 Integrated Training Area Management

ITAM activities can include the use of construction equipment, which would result in a hazardous materials and hazardous waste environment similar to that described for engineer support in Section 4.9.1.2, *Maneuver Support Operations*, though ITAM activities occur at a much smaller scale compared to training activities.

4.9.1.7 Range Complex

The use of the weapon-specific military training ranges on Fort Irwin would reflect the hazardous materials and hazardous waste environment described for fire and movement in Section 4.9.1.1, *Maneuver*.

4.9.1.8 Manix Trail

Aside from POL necessary to operate internal combustion vehicles and equipment traveling to and from Fort Irwin along the Manix Trail, hazardous materials are not used, and hazardous wastes are not generated on the Manix Trail.

4.9.1.9 No Mission Change Alternative Summary

The effects resulting from the use of hazardous materials or the generation of hazardous wastes during training activities on Fort Irwin can be perceptible to individuals on, around, and in limited cases, off the installation; however, the effects tend to be small, localized, and of limited consequence. All training activities are designed to comply with applicable laws and regulations related to hazardous materials and hazardous wastes, in accordance with the Fort Irwin SPCP, ORA, and HMHWMP (**Hazardous Mitigation-1**). Prior to beginning training rotations, soldiers and associated civilian and contractor support personnel are required to complete training specific to the operational requirements and restrictions associated with the NTC's training program, which includes instruction on hazardous material and hazardous waste protocols (**Hazardous Mitigation-2**).

In addition to the training, soldiers are provided with a Rotational Unit Environmental Briefing Handbook and Field Card that provides summary-level information about the expectations and requirements during training events (**Hazardous Mitigation-3**). The Field Card includes information about off-limits and restricted areas, as well as reminders regarding hazardous materials and hazardous waste management, use, and spill response (refer to Appendix 2B). Each RTU is required to provide a 20-person environmental cleanup team with designated equipment to clean up any spills that occur down range. Following each rotation, military personnel would survey the training area using ground reconnaissance and aerial overflights to identify any spills that were not cleaned up. Areas where a release occurred are noted and a cleanup team is dispatched to the spill area. The contaminated soil is removed and taken to the Fort Irwin bioremediation land farm (**Hazardous Mitigation-4**). The effects related to hazardous materials and hazardous wastes resulting from military training within the Northern Corridor, Central Corridor, Southern Corridor, Eastern Training Area, Range Complex, and Manix Trail are considered to be **minor, adverse,** and **short-term**. Because no training activities are currently conducted in the Western Training Area, the effects would be **negligible.**

4.9.2 Changes in Training Activity Alternative

The effects related to hazardous materials and hazardous wastes discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Changes in Training Activity Alternative. No change in risks would occur to off-installation persons or off-installation areas with regard to hazardous materials or hazardous wastes.

4.9.2.1 Northern Corridor

An increase in cyber and aviation activities is expected within the Northern Corridor. No new surface training would be added under the Changes in Training Activity Alternative and no new hazards associated with hazardous materials or hazardous wastes would be created. No effects would be related to hazardous materials or hazardous wastes from cyber security training added to the Northern Corridor. UAS operations are expected to increase, resulting in a corresponding increase in the amount of hazardous materials required to operate and maintain the UASs and the hazardous waste generated from maintenance activities. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the effects resulting from increased use of the Northern Corridor would remain **minor, adverse,** and **short-term** relative to current conditions.

4.9.2.2 Central Corridor

An increase in live-fire training, and aviation operations activities is expected within the Central Corridor. Manned aviation activities would become more spread out, but the number of flights would not change. The number of UAS flights would increase, resulting in an increase in hazardous materials and hazardous waste associated with UAS operation and maintenance. Live-fire training would increase and occur in more areas as targetry is added south of the current dud-effects line. The number of dud-producing rounds fired from the Central Corridor would increase and more dud-producing rounds would impact

within the Central Corridor. Refueling activities at FARPs would be conducted in accordance with the Fort Irwin SPCP. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the hazardous materials and hazardous waste effects resulting from increased use of the Central Corridor would remain **minor, adverse,** and **short-term** relative to current conditions**.**

4.9.2.3 Southern Corridor

An increase in live-fire training and aviation operation activities is expected within the Southern Corridor. The hazardous materials and hazardous waste effects resulting from these activities would be similar to, or fewer than, those described for Section 4.9.2.2, *Central Corridor*, and would remain **minor, adverse,** and **short-term** relative to current conditions.

4.9.2.4 Eastern Training Area

An increase in live-fire, maintenance, refueling, and aviation operation activities is expected within the Eastern Training Area. The increase in maintenance and refueling would cause a corresponding increase in the use of hazardous materials and generation of additional hazardous waste, but not at levels that would exceed regulatory limits or result in new or significantly increased risks to human health and safety. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the effects resulting from the increased use of the Eastern Training Area would remain **minor, adverse,** and **short-term** relative to current conditions.

4.9.2.5 Western Training Area

Alternative 1: Medium Intensity Aviation Task Force

Under Alternative 1 for the Western Training Area, brigade-level aviation units would increase their use of the area, resulting in an increase of aircraft and ground vehicles in the area. In addition, there could be training activities associated with a UO site but there would be no munitions firing. The effects related to hazardous materials and hazardous wastes from these training activities, as well as associated construction of assembly areas and a UO site, would result from an increased use of hazardous materials, primarily POL products, and the generation of hazardous waste, but not at levels that would exceed regulatory limits or result in new or significantly increased risks to human health and safety. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the effects would be **minor, adverse,** and **short-term** relative to current conditions.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, brigade-level aviation units would increase their use of the area, as well as establish brigade support areas and a new UO. Small-scale (non-dud-producing) explosives and small arms may be used around the brigade support areas during training scenarios. While the types and intensity of the training activities and construction would increase, resulting in a corresponding increase in the use of hazardous materials and the generation of hazardous wastes compared to Alternative 1, the effects from these activities would not be expected to be much greater than those associated with Alternative 1. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the resulting effects would be **minor, adverse,** and **short-term** relative to current conditions.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition

Under Alternative 3, full-scale brigade-level maneuvers would occur in the Western Training Area. This would include the full breadth of activities described in Section 4.9.1.1, *Maneuver*; however, fire and movement activities would be limited to simulated devices and non-dud-producing small caliber rounds. The dramatic increase in the use of the area by military vehicles and aircraft would have a corresponding increase in the amount of hazardous materials necessary to support operations and the hazardous waste generated by these activities. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the resulting effects would still be **minor, adverse,** and **short-term** relative to current conditions.

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Alternative 4 would resemble Alternative 3, except that large caliber ammunition would be permitted during live-fire exercises. The use of large caliber weapons would result in an increase in munitions and potential for UXO compared to Alternative 3. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the resulting effects would still be **minor, adverse,** and **short-term** relative to current conditions.

4.9.3 Training Infrastructure Improvement Alternative

The effects related to hazardous materials and hazardous waste discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects that would result from implementing the Training Infrastructure Improvement Alternative.

4.9.3.1 Northern Corridor

Upgrades to UO sites and communication capabilities, the creation of new CBRN facilities, UAS runway and radar systems, and the development of LRAM sites would be conducted in the Northern Corridor under the Training Infrastructure Improvement Alternative. As described for water resources in Section 4.2.3.1, *Northern Corridor*, construction activities over 1 acre will comply with the statewide General Permit for Stormwater Discharges Associated with Construction Activity and a SWPPP would be prepared that specifies site management activities to manage stormwater runoff and minimize erosion (**Water Mitigation-3**).

New facilities that include aboveground storage tanks to supply fuel to generators require a Mission Change Plan that will be added to the Fort Irwin SPCP. Personnel performing improvements to existing structures that contain or may contain asbestos-containing materials, LBP, or PCB-containing equipment would follow safety precautions outlined in the project's health and safety plan. Solid waste associated with upgrades to existing facilities will be screened for hazardous materials and properly disposed of; this waste includes, but is not limited to, asbestos-containing materials, LBP, PCBs, and regulated electrical or electronics components.

UXO may be encountered while installing or upgrading range infrastructure. Areas where potential UXO could be encountered would be investigated by a Fort Irwin EOD unit. Additional potential effects and mitigation from UXO are addressed in Section 4.10, *Health and Safety*.

With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the resulting effects from the Northern Corridor training infrastructure improvements related to hazardous materials and hazardous waste would not be perceptible compared to current conditions and remain **minor, adverse,** and **short-term.**

4.9.3.2 Central Corridor

Improvements to live ammunition capabilities and training obstacles, upgrades to existing UO sites and communication capabilities, the construction of new CBRN facilities, new FARPs, and radar systems, and the development of LRAM sites would be conducted in the Central Corridor.

Construction of new targetry would avoid off-limits areas, and areas where potential UXO could be encountered would be investigated by a Fort Irwin EOD unit. Additional potential effects and mitigation from UXO are addressed in Section 4.10, *Health and Safety*. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the resulting effects from the Central Corridor training infrastructure improvements related to hazardous materials and hazardous waste would not be perceptible compared to current conditions and remain **minor, adverse,** and **short-term.**

4.9.3.3 Southern Corridor

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities and the construction of new CBRN facilities, new FARPs, and drive training and land navigation would occur in the Southern Corridor under the Training Infrastructure Improvement Alternative. The resulting effects from hazardous materials and hazardous waste would be similar to those associated with the changes in training infrastructure described in Section 4.9.3.2, *Central Corridor*. The effects would not be perceptible compared to current conditions and would remain **minor, adverse,** and **short-term**.

4.9.3.4 Eastern Training Area

Improvements to live ammunition capabilities, existing UO sites, and communication capabilities, the construction of new CBRN facilities and new FARPs, and ITAM activities would occur in the Eastern Training Area under the Training Infrastructure Improvement Alternative. The resulting effects from hazardous materials and hazardous waste would be similar to those associated with the changes in training infrastructure described in Section 4.9.3.2, *Central Corridor*. They would not be perceptible compared to current conditions and would remain **minor, adverse,** and **short-term**.

4.9.3.5 Western Training Area

Improvements to live ammunition (Alternative 4 for the Western Training Area) and communication capabilities (all Alternatives) and the construction of new UO sites, new FARPs, and LRAM sites (all Alternatives) would be conducted in the Western Training Area. The resulting effects from hazardous materials and hazardous waste would be similar to those associated with the changes in training infrastructure described in Section 4.9.3.2, *Central Corridor*, and would be **minor, adverse,** and **short-term**.

4.9.4 Range Improvements Alternative

The effects from hazardous materials and hazardous waste discussed for the No Mission Change Alternative would also occur and the existing mitigation measures would continue to be implemented. This analysis addresses the additional effects that would result from implementing the Range Improvements Alternative. The proposed improvements to Ranges 1, 5, 6, 7, and 20 would involve the construction of an air-to-ground integration village at the MPRC to support UAS training. UXO may be encountered during construction, as live munitions are fired at the ranges under certain training scenarios. Areas where potential UXO could be encountered would be investigated by a Fort Irwin EOD unit. Additional potential effects and mitigation from UXO are addressed in Section 4.10, *Health and Safety*. With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the effects from hazardous materials and hazardous wastes would remain **minor, adverse,** and **short-term**.

4.9.5 Manix Trail Alternative

The effects related to hazardous materials and hazardous waste discussed for the No Mission Change Alternative would also occur and the existing mitigation measures would continue to be implemented. This analysis addresses the additional effects that would result from implementing the Manix Trail Alternative. Improvements to the Manix Trail would consist of minor grading, implementing erosion control structures such as check dams, and applying gravel or dust suppressant.

UXO would not be expected to be encountered during maintenance activities along the Manix Trail. The immediate area of the trail is not used now and was not used historically for munitions firing; however, should unanticipated UXO be encountered, a Fort Irwin EOD unit would be called, and work would be halted until the EOD unit determines the area is cleared. Additional potential effects and mitigation from UXO are addressed in Section 4.10, *Health and Safety*.

With the implementation of **Hazardous Mitigation-1, -2, -3,** and **-4**, the effects from hazardous materials and hazardous wastes would remain **minor, adverse,** and **short-term**.

4.9.6 Mitigation Measures

Mitigation measures that would be implemented to minimize the effects from hazardous materials and hazardous wastes include:

- **Hazardous Mitigation-1**: Require all training activities to comply with applicable laws and regulations related to hazardous materials and hazardous wastes, in accordance with the Fort Irwin SPCP and HMHWMP. Train units on these requirements prior to beginning training activities.
- **Hazardous Mitigation-2**: Require all military and civilian personnel on post and all subcontractors working with potentially hazardous materials to receive a briefing on hazardous waste management protocol.
- **Hazardous Mitigation-3**: Present the Rotational Unit Environmental Briefing Handbook that addresses hazardous waste training to all personnel attending RTU training.
- **Hazardous Mitigation-4**: Require each rotation to provide a 20-person environmental cleanup team with designated equipment to clean up any spills that occur down range. Following each rotation, require military personnel to survey the training areas using ground reconnaissance and aerial overflights to identify any spills that were not cleaned up. Note areas where a release occurred and dispatch a cleanup team to the spill area. Remove the contaminated soil and take to the Fort Irwin bioremediation land farm.

4.10 Health and Safety

The effects on health and safety are evaluated based on the potential for an increase in safety risks and the severity of the risk. Table 4.10-1 identifies the evaluation criteria for health and safety.

TABLE 4.10-1
Significance Criteria for Health and Safety
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Effect Intensity	Description
Negligible	The effect would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to the risk associated with the safety of military personnel or the public; however, the effect would be small, localized, and of little consequence.
Moderate	The Alternative would result in a readily apparent change to the risk associated with the safety of military personnel or the public over a relatively wide area.
Significant	The Alternative would result in a substantial change to the risk associated with the safety of military personnel and the public, substantially hinder the ability to respond to an emergency, or introduce a new health or safety risk for which the installation is not prepared or does not have adequate management and response plans in place.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.10.1 No Mission Change Alternative

The following section explains the effects on health and safety resulting from future military training activities on Fort Irwin. The No Mission Change Alternative assumes military training will continue as it is currently conducted.

4.10.1.1 Military Training

Military training on Fort Irwin is inherently dangerous, as it requires the use of live weapons and heavy mechanized vehicles in an austere environment. The mission of the NTC is to serve as a leadership crucible prior to brigade-level deployments to combat. It is vital that Fort Irwin provide a harsh and unforgiving environment to ensure adequate training of military personnel. Prior to training on Fort Irwin, however, the RTUs train extensively at their home installations to prepare for their time on Fort Irwin. Consequently, the training activities are performed by highly trained, vetted personnel in accordance with Fort Irwin and Army safety programs.

The human health and safety hazards that could result from training include naturally occurring conditions, such as geological, hydrological, climatic, or biological hazards, and human-caused health and safety conditions, such as UXO and abandoned mines. Historical mine operations in the Southern Corridor, Eastern Training Area, and Western Training Area have been identified and may require cultural resources protective measures. Abandoned mine sites are hazards for personnel and equipment moving through the corridor. Mining operations are ongoing in the Eastern Training Area. Protective buffers have been established for each identified abandoned mine site and for the active mine, and the buffered areas are designated as off-limits to military training (**Health and Safety Mitigation-1**).

The use of wheeled and tracked vehicles in the desert can generate quantities of dust. Soldiers training on Fort Irwin would be exposed to Valley fever regardless of the training activity conducted during the rotation. The following measures to reduce the potential for soldiers training on Fort Irwin to contract Valley fever are implemented (**Health and Safety Mitigation-2**).

- A brochure detailing Valley fever, its cause, and symptoms is made available to personnel on Fort Irwin. The brochure includes information on how to control the spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials.
- Personnel are educated through briefings to recognize the symptoms of Valley fever and quickly report suspected symptoms of work-related Valley fever.

UXO may be encountered during maneuvers. Individuals working in the training areas are trained to identify UXO and contact Fort Irwin Range Operations. Once a UXO is identified, EOD personnel are contacted and the UXO is rendered safe (**Health and Safety Mitigation-3**).

Weapons systems used during rotations include artillery fire, small arms fire, and bomb drops. Artillery to small arms fire can be conducted throughout the corridors, except in the Western Training Area. When shooting live rounds, units aim toward designated targets located throughout the Northern, Central, and Southern Corridors. After a rotation ends, the areas with targets are scouted for UXO and EOD personnel are deployed to respond to identified UXO (**Health and Safety Mitigation-4**)**.** Training for bomb drops is limited to existing impact areas, and personnel are prohibited from entering these areas during training activities (**Health and Safety Mitigation-5**). The use of the Leach Lake Tactical Range involves military aircraft dropping bombs into the Leach Lake impact area, which is adjacent to the southern boundary of Death Valley National Park. Aircraft training at Leach Lake follow USAF standard operating procedures to maintain safety. A USAF contractor is responsible for addressing UXO issues prior to target cleanup and target construction (USAF, 2006).

4.10.1.2 Range Complex

The use of the weapon-specific military training ranges on Fort Irwin reflects the health and safety environment described previously for military training.

4.10.1.3 Manix Trail

The use of the Manix Trail involves the movement of vehicles on a dirt road. Personnel are exposed to dust during dryer months; however, the effects on health and safety would be limited.

4.10.1.4 No Mission Change Alternative Summary

With the implementation of **Health and Safety Mitigation-1 through -5**, the health and safety effects resulting from military training on Fort Irwin are considered to be **minor, adverse,** and **short-term**. There are **no expected effects** on the public because training occurs on a secure installation that is off-limits to unauthorized personnel.

4.10.2 Changes in Training Activity Alternative

The effects on health and safety discussed for the No Mission Change Alternative would also occur under this alternative. No change in safety risks to people off-installation would occur from changes in training activities.

4.10.2.1 Northern Corridor

An increase in cyber and aviation activities within the Northern Corridor is expected; however, no surface training would be added, no new surface hazards would be created, and no effects on safety from additional cyber security training would occur in the Northern Corridor. Because the number of aircraft sorties flown in the Northern Corridor would not change, only the distribution of sorties in space

would be different, no effects on safety from aircraft operations would occur. Therefore, the increased use of the Northern Corridor would have **no effect** relative to current conditions.

4.10.2.2 Central Corridor

An increase in live-fire training and aviation operations activities is expected within the Central Corridor. Live-fire training would increase and occur in more areas as targetry is added south of the current dud-effects line. The number of dud-producing rounds fired from the Central Corridor would increase and more dud-producing rounds would have an effect within the Central Corridor. The increase in live-fire training and the addition of surface training would not appreciably change the health and safety environment, as these activities would be conducted concurrently with existing maneuver training; therefore, the potential health and safety effects from these activities would be part of maneuver training. With the implementation of **Health and Safety Mitigation-1 through 5**, the effects resulting from increased use of the Central Corridor would be **minor, adverse,** and **short-term** relative to current conditions**.**

4.10.2.3 Southern Corridor

An increase in live-fire training and aviation operation activities is expected within the Southern Corridor. The health and safety effects resulting from these activities would be similar to, or less than, those described for Section 4.10.2.2, *Central Corridor*, and result in **minor, adverse,** and **short-term** effects relative to current conditions.

4.10.2.4 Eastern Training Area

An increase in live-fire, maintenance, refueling, and aviation operation activities is expected within the Eastern Training Area. With the implementation of **Health and Safety Mitigation-1 through -4**, the effects resulting from increased use of the Eastern Training Area would be **minor, adverse,** and **short-term** relative to current conditions**.**

4.10.2.5 Western Training Area

Alternative 1: Medium Intensity Aviation Task Force

Under Alternative 1 for the Western Training Area, brigade-level aviation units would increase their use of the area, resulting in an increase in aircraft and other vehicles on fixed routes. In addition, there would the potential for training activities associated with a UO site. Overall training rotations and the duration of rotations would not increase; only the distribution of the training activities on the installation would change. Therefore, training in the Western Training Area would cause no net safety effects on the installation. With the implementation of **Health and Safety Mitigation-1 through -3**, the resulting effects would be **minor, adverse,** and **short-term** relative to current conditions.

Alternative 2: Medium-to-High Intensity Aviation Task Force and Brigade Support Area

Under Alternative 2 for the Western Training Area, brigade-level aviation units would increase their use of the area and the establishment of brigade support areas. Small-scale (non-dud-producing) explosives and small arms may be used during training scenarios. While these activities would increase the types and intensity of the training activities and result in a corresponding increase in health and safety risk compared to Alternative 1, the health and safety effects generated from these activities are not expected to be greater than those described in Alternative 1.

Alternative 3: High-intensity, Full-scale, Brigade-level Maneuvers - Limited Ammunition

Under Alternative 3, full-scale brigade-level maneuvers would occur in the Western Training Area, including the full breadth of activities described in Section 4.10.1.1, *Military Training*. Fire and movement activities would be limited to simulated devices and non-dud-producing small caliber.

Overall training rotations and the duration of rotations would not increase; only the distribution of the training activities on the installation would change; therefore, training in the Western Training Area

would cause no net safety effects on the installation. With the implementation of **Health and Safety Mitigation-1 through -3**, the resulting effects would be **minor, adverse,** and **short-term**.

Alternative 4: High-intensity, Full-scale, Brigade-level Maneuvers – Unrestricted Ammunition

Alternative 4 would resemble Alternative 3, except that large caliber ammunition would be used during training scenarios. Overall training rotations and the duration of rotations would not increase; only the distribution of the training activities on the installation would change. Therefore, training in the Western Training Area would cause no net safety effects on the installation. With the implementation of **Health and Safety Mitigation-1 through -5**, the resulting effects would be **minor, adverse,** and **short-term**.

4.10.3 Training Infrastructure Improvement Alternative

The effects on health and safety discussed for the No Mission Change Alternative would also occur under this alternative. This analysis addresses the additional effects resulting from the implementation of the Training Infrastructure Improvement Alternative.

The risks from implementing the Training Infrastructure Improvements Alternative would be comparable across all areas of Fort Irwin where improvements are proposed. Therefore, these areas are discussed collectively. Typical occupational safety risks would be associated with small construction projects for each range infrastructure activity. These risks would be short-term and confined to the area of the activity. Workers would follow appropriate safety precautions developed in site-specific health and safety plans (**Health and Safety Mitigation-6**).

Activities would be coordinated with Range Operations to prevent the installation or upgrade of range infrastructure during training events (**Health and Safety Mitigation-7**). Workers would not be exposed to risks from training activities and no safety effects would occur from rotational training.

UXO may be encountered while installing or upgrading range infrastructure. All personnel working in the training areas are trained in the identification of UXO (**Health and Safety Mitigation-3**) and areas where potential UXO could be encountered would be cleared by an EOD unit prior to infrastructure improvement activities (**Health and Safety Mitigation-8**). No work in those areas would be conducted prior to the EOD unit determining the area is safe.

With the implementation of **Health and Safety Mitigation-3,-6,-7,** and **-8**, the resulting effects from the Training Infrastructure Improvements Alternative on health and safety would be **minor, adverse,** and **short-term**.

Because training infrastructure improvement activities would be confined to the installation, safety risks to off-installation persons or areas would not change.

4.10.4 Range Improvements Alternative

The effects on safety discussed for the No Mission Change Alternative also would occur under this alternative and existing mitigation measures would continue to be implemented. This analysis addresses the additional effects that would result from implementing the Range Improvements Alternative.

Typical occupational safety risks would be associated with small construction projects at Ranges 1, 5, 6, 7, and 20; however, workers would follow site-specific health and safety plans (**Health and Safety Mitigation-6**).

UXO may be encountered during construction activities, because live munitions are currently fired on the ranges. Areas where potential UXO could be encountered would be investigated by a Fort Irwin EOD unit, which would remove UXO threats prior to range improvement activities. No work in those areas would be conducted prior to an EOD unit determining the area is safe (**Health and Safety Mitigation-8**).

With the implementation of **Health and Safety Mitigation-6** and **-8**, the effects on health and safety resulting from the Range Improvements Alternative would be **minor, adverse,** and **short-term**.

Because the range infrastructure improvement activities would be confined to the ranges, which are in the center of the installation, safety risks to off-installation persons or areas would not change.

4.10.5 Manix Trail Alternative

The effects on safety discussed for the No Mission Change Alternative would occur under this alternative and existing mitigation measures would continue to be implemented. This analysis addresses the additional effects that would result from implementing the Manix Trail Alternative.

Typical occupational safety risks would be associated with maintenance activities. These risks would be short-term and confined to the area of the maintenance activity. Workers would follow site-specific health and safety plans (**Health and Safety Mitigation-6**), so **negligible** effects on health and safety would be expected.

Long-term beneficial safety effects would result from conducting maintenance along the Manix Trail because conditions would be improved for personnel transporting military equipment along the trail.

Because all maintenance activities would be confined to the Manix Trail, safety risks to off-installation persons or areas would not change.

4.10.6 Mitigation Measures

Mitigation measures for health and safety include the following:

- **Health and Safety Mitigation-1**: Maintain protective buffers around abandoned mine sites as off-limits to military training.
- **Health and Safety Mitigation-2**: Implement the following measures to reduce the potential exposure to, and effects of, Valley fever:
  - Make available a brochure detailing Valley fever, its cause, and symptoms and include information on how to control the spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials.
  - Educate personnel through briefings to recognize the symptoms of Valley fever and quickly report suspected symptoms of work-related Valley fever.
- **Health and Safety Mitigation-3**: Train all individuals at the site to identify UXO and how to contact Fort Irwin Range Operations. Once a UXO is identified, EOD personnel will be contacted and the UXO will be rendered safe (removed or blown in place) or marked with a red UXO sign.
- **Health and Safety Mitigation-4**: After rotations, scout areas where targets are located for UXO and deploy EOD personnel to respond to identified UXO.
- **Health and Safety Mitigation-5:** Limit bomb drops to existing impact areas and prohibit personnel from entering these areas during training activities.
- **Health and Safety Mitigation-6**: During construction activities, require personnel or contractors to develop and implement site-specific health and safety plans to manage and minimize potential human health hazards and risk.
- **Health and Safety Mitigation-7:** Coordinate activities with Range Operations to prevent the installation or upgrade of range infrastructure during training events.
- **Health and Safety Mitigation-8:** Receive confirmation that EOD personnel have cleared the areas where potential UXO could be encountered prior to infrastructure improvement activities.

4.11 Land Use

The effects on land use were determined based on the level of land use sensitivity in areas affected by Mission Change Alternatives and the compatibility with existing conditions. The evaluation criteria for the effects on land use are provided in Table 4.11-1.

TABLE 4.11-1
Significance Criteria for Land Use
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Effect Intensity	Description
Negligible	The effect of the Alternative would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to land use; however, the effect would be small, localized, and of little consequence.
Moderate	The Alternative would result in a readily apparent change to land use over a relatively wide area.
Significant	The Alternative would result in inconsistencies or would not-comply with existing land use plans or policies, would preclude the viability of existing land use, would preclude the continued use or occupation of an area, would be incompatible with adjacent land use to the extent that public health or safety would be threatened, or would conflict with planning criteria established to ensure the safety and protection of human life and property.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.11.1 No Mission Change Alternative

Under the No Mission Change Alternative, there would be **no effect** on land use designations. Currently all land on Fort Irwin, with the exception of off-limits areas, are designated for military training activities. **No effect** on land use would result from military training on Fort Irwin under the No Mission Change Alternative.

4.11.2 Changes in Training Activity Alternative

No effect on land use designations on or off Fort Irwin would result from the Changes in Training Activity Alternative.

4.11.3 Training Infrastructure Improvement Alternative

No effect on land use designations on or off Fort Irwin would result from the Training Infrastructure Improvement Alternative.

4.11.4 Range Improvements Alternative

The proposed improvements to Ranges 1, 5, 6, 7, and 20 are compatible with existing land use; therefore, range improvements would result in **no effect** relative to current conditions.

4.11.5 Manix Trail Alternative

While much of the Manix Trail is on BLM-managed land outside Fort Irwin, the proposed improvements would not affect the use of the Manix Trail or uses of the land adjacent to the trail. Therefore, improvements to the Manix Trail would result in **no effect** relative to current conditions.

4.11.6 Mitigation Measures

No mitigation measures are proposed for land use.

4.12 Recreation

The effects on recreation were determined by evaluating whether training activities would cause temporary or permanent disruption to recreational activities. The evaluation criteria for the effects on recreation are provided in Table 4.12-1.

TABLE 4.12-1
Significance Criteria for Recreation
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Effect Intensity	Description
Negligible	The effect would be below or at the lowest levels of detection.
Minor	The Alternative would result in a detectable change to recreation; however, the effect would be small, localized, and of little consequence.
Moderate	The Alternative would result in a readily apparent change to recreation over a relatively wide area.
Significant	The Alternative would result in a substantial change to the character of the recreation resource, affecting a large area, or would result in a long-term closure or major reduction in recreation opportunities.
Duration:	**Short-term** – Occurs only during a specific activity (e.g., a construction period or a specific training event) or during the activity and a short adjustment/recovery period following the end of the event. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). **Long-term** – The effects of the specific activity extend well beyond the end of the activity.

4.12.1 No Mission Change Alternative

Under the No Mission Change Alternative, recreational activities and opportunities on Fort Irwin would not change as a result of military training and there would be no change to the availability of the existing recreational opportunities within the ROI. **No effect** on recreation would result from military training on Fort Irwin.

There is no public access to any of the congressionally designated alignment of the Old Spanish NHT on Fort Irwin and these areas are not available to Fort Irwin residents for recreation. Therefore, neither visitor experience nor recreational value is provided by the congressionally designated alignment through Fort Irwin. The alignment was designated for portions of the Southern and Central Corridors and since the Record of Decision was signed in 2006 for the land expansion in the Eastern Training Area. Outside of designated off-limits areas, brigade-level training activities have occurred for decades along the designated alignment of the Old Spanish NHT within the pre-expansion boundaries of Fort Irwin; intensively since the establishment of the NTC in 1979; and intermittently for more than 30 years prior to that.

Military training activities have occurred in the Eastern Training Area away from Red Pass along the Red Pass High Potential Route Segment since the Record of Decision was signed in 2006 for the land expansion. In areas where brigade-level training has occurred historically, the desert landscape has been altered, primarily from changes to desert vegetation, and it no longer resembles the historic desert landscape from the period when the Old Spanish NHT was in use. Training in these areas will continue under the No Mission Change Alternative and is not expected to change the landscape in a noticeable way. Similarly, the scenic qualities within these areas no longer reflect the scenic environment of the

period of use of the Old Spanish NHT. No appreciable changes to the scenic character of these areas compared to those changes resulting from historical training would occur.

Areas within the designated alignment of the Old Spanish NHT that are off-limits to training have not experienced degradation of the desert landscape and retain much of the historic character. The scenic quality of the off-limits areas remains intact within the boundaries of these areas, but the surrounding scenic quality has been altered as described previously as a result of past training activities. The Bitter Spring High Potential Historic Site is designated as off-limits to training activities and would not be affected by the No Mission Change Alternative.

The Red Pass High Potential Route Segment extends from Bitter Spring northeastward to the Fort Irwin boundary. The passage through Red Pass and continuing through the Eastern Training Area has been used as an MSR during training activities since the acquisition of the Eastern Training Area and will continue to be used as such. Military training will continue to occur along the route in areas where historical training has occurred. The section of the Red Pass High Potential Route Segment from Bitter Spring to Red Pass has experienced extensive military training activities outside the off-limits area designated at Bitter Springs. As a result, the desert landscape has been altered, particularly with regard to vegetation, and this area no longer expresses the "conditions and landscapes experienced by the historic travelers." While it remains desert, it is not the desert that travelers passed through historically. The landscape level changes occurred prior to the designation of the Old Spanish NHT. Continued use of the MSR through Red Pass and into the Eastern Training Area would not affect the Red Pass High Potential Route Segment because the use of the MSR is limited to vehicles and equipment traversing the existing roadway. Military training in the Eastern Training Area has altered the desert landscape and scenic quality of the area within and surrounding the designated alignment of the Old Spanish NHT as described in this section. No additional alteration of the desert landscape and scenic quality would result.

The portion of the congressionally designated route of the Old Spanish NHT that crosses Manix Trail south of the Fort Irwin boundary would be unaffected by the No Mission Change Alternative because the Army would continue to use the Manix Trail as it does currently and there would be no effects outside the limits of Manix Trail.

4.12.2 Changes in Training Activity Alternative

While certain military activities would increase as part of this alternative, there would be no change in the number of annual training rotations. During rotations, recreation would continue to be restricted within areas where training would occur.

Under this alternative, no public access to the portions of the congressionally designated alignment of the Old Spanish NHT on Fort Irwin would continue. There would be no change in visitor experience or recreational value provided by the alignment through Fort Irwin from the Changes in Training Activity Alternative. Brigade-level training activities would continue to occur outside the designated off-limits areas and would not be expected to further alter the desert landscape or scenic quality compared to the No Mission Change Alternative. There would be no changes within designated off-limits areas. The Bitter Spring High Potential Historic Site is designated as off-limits to training activities and would not be affected by any of the Mission Change Alternatives. Military training will continue to occur along the Red Pass High Potential Route Segment in areas where historical training has occurred and there will be continued use of the MSR through Red Pass into the Eastern Training Area. No additional alteration of the desert landscape and scenic quality would result.

These changes would have **no effect** on recreational activities on or off Fort Irwin.

4.12.3 Training Infrastructure Improvement Alternative

The Training Infrastructure Improvement Alternative would have **no effect** on recreational activities.

4.12.4 Range Improvements Alternatives

The proposed improvements to Ranges 1, 5, 6, 7, and 20 would be on the north side of the Cantonment Area. Improvements to these ranges would not affect recreational activities at the skeet and trap range and the rod and gun club skeet area. No other recreational activities are conducted in the Range Complex. Therefore, range improvements would result in **no effects** relative to current conditions.

4.12.5 Manix Trail Alternative

Recreational use of BLM-managed land adjacent to the Manix Trail would not be affected by the proposed maintenance activities to the Manix Trail. There would be no potential to affect other off-installation recreational activities or opportunities. Therefore, improvements to the Manix Trail would result in **no effects** relative to current conditions.

Implementing maintenance activities within the limits of the Manix Trail would not affect access to, or visitor use of, the portion of the congressionally designated route of the Old Spanish NHT that crosses the Manix Trail south of the Fort Irwin boundary.

4.12.6 Mitigation Measures

No mitigation measures are proposed for recreation.

4.13 Cumulative Effects – Mission Analysis

Preparation of this LEIS began prior to 14 September 2020 when the CEQ Final Rule *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act* went into effect. Therefore, the analysis in this document follows original CEQ regulations and guidance regarding cumulative effects prior to 14 September 2020.

This section describes the approach used to analyze potential cumulative effects associated with the Mission Change Alternatives in the context of potential interactions with other past, present, and reasonably foreseeable actions in the region. The President's CEQ regulations implementing NEPA prior to the 14 September 2020 revisions (40 CFR Section 1508.7) define a "cumulative impact" for purposes of NEPA as follows:

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

Cumulative impacts would occur if incremental effects of the Mission Change Alternatives result in an increased effect when added to the environmental effects of past, ongoing, and reasonably foreseeable future activities. Actions that have the potential to combine with incremental effects of the Mission Change Alternatives to result in cumulative effects are those that could affect the same environmental resources and have occurred, are ongoing, or are reasonably foreseeable. Reasonably foreseeable actions include those that would occur within a reasonably close timeframe as the Mission Change Alternatives such that meaningful interaction could occur. Past activities are considered only when their impacts would still be present during implementation of the Mission Change Alternatives.

This section evaluates cumulative effects for the Proposed Mission Change Alternatives. Cumulative effects for the Withdrawal Extension Analysis are discussed in Section 5.13.

4.13.1 Methodology

The cumulative effects analysis for each resource involved the following process:

- Identifying the cumulative activities that might occur in the same area and timeframe as the Mission Change Alternatives.
- Assessing the resource-specific effects resulting from the reasonably foreseeable actions. If the cumulative effect of an activity was not found to occur in the same area, affect the same resources, or within a reasonable timeframe as the Mission Change Alternatives, it was not included in the cumulative resource analysis.
- Identifying the overall potential cumulative effects of these activities when considered together with the project-related effects.

Because there is no potential for the Mission Change Alternatives to contribute to cumulative effects for the resource areas eliminated from further consideration (Section 2.4, *Resources Eliminated from Further Analysis*), these resource areas were not evaluated for cumulative effects.

4.13.2 Cumulative Activities

A review of planning and permit programs within the various research ROIs was conducted to identify pending, planned, or recently completed projects. The following activities were identified as having a potential to interact with Mission Change Alternatives to result in a cumulative impacts.

4.13.2.1 Fort Irwin Activities

There are three activities on Fort Irwin that could interact with the Mission Change Alternatives to contribute to cumulative effects. The landfill expansion is under construction, the conversion of Range 1 into an MPRC (Fort Irwin, 2018c) is slated to occur in 2028, and Energy Security Measures projects were approved in February 2021 (Fort Irwin, 2021). The effects of the landfill expansion were analyzed previously (Fort Irwin, 2018d), as were the effects of the conversion of Range 1 into an MPRC (Fort Irwin, 2018c). The Energy Security Measures projects would increase Fort Irwin's energy security and resilience by facilitating an installation-wide fuel switch from liquid propane gas, which is currently brought onto the installation via fuel tanker trucks along Fort Irwin Road, to natural gas, which is delivered via a new 6-inch-diameter steel pipeline. The effects of these energy projects were previously analyzed (Fort Irwin, 2020d). No other projects planned on Fort Irwin are relevant for consideration for cumulative effects analysis.

4.13.2.2 Off-Installation Activities

The California Department of Transportation (Caltrans) has no pending or planned projects for the highways in the vicinity of Fort Irwin (Caltrans, 2020a); however, in June 2020 Caltrans approved a 50-year lease for a high-speed rail corridor (XpressWest) that would run adjacent to, or in the median of, I-15 (Caltrans, 2020b). The Federal Railroad Administration (FRA) issued a Record of Decision in March 2011 for the construction of an approximately 200-mile high-speed rail corridor between Southern California (Victorville) and Las Vegas, Nevada, as an alternative to automobile or air travel (FRA, 2011). The lease agreement allows XpressWest to operate largely within the median of I-15, which runs south of Fort Irwin through Barstow and covers the 135-mile section of the planned line within California. The project would have the potential to contribute to cumulative effects on air quality and cultural resources.

A review of the projects approved by the San Bernardino County Planning Commission identified seven development projects near Fort Irwin and the surrounding communities. These projects include three solar power facilities, one former water park redevelopment, and three new truck stops and/or convenience stores. Because of the size of San Bernardino County and the locations and planned timelines of the projects, only the Daggett Solar Power Facility would have the potential to affect the same resources as the Mission Change Alternatives.

The proposed Daggett Solar Power Facility project includes the construction and operation of a 3,500-acre utility-scale, solar photovoltaic electricity generation and energy storage facility. The facility would produce up to 650 megawatts of power and include up to 450 megawatts of battery storage capacity near the Barstow-Daggett Airport south of I15 (San Bernardino County, 2019). The project was approved by the San Bernardino County Planning Commission in September 2019. The effects of this action, including cumulative effects have been analyzed (San Bernardino County, 2019) and the project would have the potential to interact with the Mission Change Alternatives to contribute to cumulative effects.

4.13.3 Cumulative Effects Analysis

The Mission Change Alternatives includes both increased training activities and infrastructure improvements within the training areas, ranges, and along the Manix Trail. Resource areas for which there would be no effects from the Mission Change Alternatives (including all resources eliminated from further consideration and land use) are not considered in cumulative effects because the Mission Change Alternatives could not contribute to cumulative effects on those resources. The Mission Change Alternatives could combine with the cumulative activities identified in Section 4.13.2, *Cumulative Activities*, to result in cumulative effects on the following resources.

4.13.3.1 Biological Resources

Increased training activities and infrastructure improvement activities in the Central Corridor, Southern Corridor, Western Training Area, and Eastern Training Area would result in effects on vegetation, including special status species. These activities would degrade habitat and temporarily displace wildlife, resulting in effects on wildlife, including special status species, as described in Section 4.1, *Biological Resources*. Effects on biological resources from construction of the landfill expansion and conversion of Range 1 into a MPRC would have adverse, long-term, and minor to moderate effects on biological resources, including the Desert tortoise, within the Central Corridor and Cantonment Area on Fort Irwin. Construction of the facilities included in the Energy Security Measures projects could temporarily displace wildlife and disrupt habitat, including sensitive species and desert tortoise. However, these effects would not be significant and would be managed in accordance with existing agreements. The Daggett Solar Power Facility, with the mitigation measures proposed for biological resources (San Bernardino County, 2019), would have less than significant effects on biological resources, including special status species.

Because the identified cumulative activities as well as the Mission Change Alternative would be managed in accordance with the ESA and other applicable regulation and all projects on Fort Irwin would be managed in accordance with the Fort Irwin INRMP, the combined effect from these activities is expected to be **less than significant**.

4.13.3.2 Water Resources

There would be no increase in demand on water resources as a result of the Mission Change Alternatives and no effect on groundwater levels. Cumulative effects on groundwater quantity and levels are not discussed because the Mission Change Alternatives would have no effect on groundwater quantity.

The Mission Change Alternatives, the landfill expansion, the conversion of Range 1, the Energy Security Measures projects, and the Daggett Solar Power Facility could result in adverse effects on groundwater quality and surface water quality. The Daggett Solar Power Facility would be in a different groundwater basin and a different surface water drainage basin than the Mission Change Alternatives, with the exception of the lower portion of Manix Trail, and the potential for interaction of effects between the Daggett Solar Power Facility and activities on Fort Irwin is very low. Furthermore, the cumulative activities would include design features such as spill plans and appropriate site-specific BMPs to minimize effects on groundwater quality and surface water quality. Cumulative effects on groundwater quality and surface water quality would be **less than moderate**.

4.13.3.3 Geology

There would be no effects on geological features, seismology and topography from the Mission Change Alternatives. Accordingly, these resources are excluded from cumulative effects analysis.

Increased training activities can reshape banks and washes; broaden channels and washes within alluvial fans; cause soil or desert pavement disturbance, compaction, erosion, and wind erosion; therefore, the Mission Change Alternatives is expected to cause minor to moderate, adverse, long-term effects on soils and paleontology. In addition, the construction of training infrastructure would cause ground disturbance and involve the use of heavy equipment, which could affect soils. Similar adverse effects on soils, but on a lesser scale, would result from the landfill expansion and the conversion of Range 1. The Daggett Solar Power Facility would have less than significant effects on soils (San Bernardino County, 2019).

The landfill expansion and the conversion of Range 1 would have no effect on paleontological resources, because they are located outside of areas with a high potential for paleontological resources. The Daggett Solar Power Facility is not expected to have adverse effects on paleontological resources (San Bernardino County, 2019) and would not interact with the Mission Change Alternatives to create

additional cumulative effects on paleontological resources. Therefore, cumulative effects on paleontological resources are unlikely.

Similar effects would be expected during the implementation of the Energy Security Measures projects (approximately 235 acres), which has the potential to occur at the same time as training or infrastructure improvements included in the Proposed Action. Maintenance activities along the Manix Trail between Fort Irwin and I-15 would be beneficial to soil resources by reducing erosion potential and would not interact with the Daggett Solar Power Facility to cause adverse cumulative effects on soils. Adverse effects on soils from the Mission Change Alternatives and Fort Irwin cumulative activities would be confined within the boundaries of Fort Irwin where erosion control BMPs and revegetation by ITAM would minimize effects. Because of the spatial separation, there would be no potential for interaction with soil effects from the Daggett Solar Power Facility (San Bernardino County, 2019). The ITAM program, coupled with project-specific water quality erosion control BMPs, would minimize effects on soils. Cumulative effects on soils would be **less than significant**.

4.13.3.4 Cultural Resources

The APE for cultural resources is defined as the entirety of Fort Irwin's training land and includes the Manix Trail between I-15 and Fort Irwin. No effects on cultural resources on the portion of the Manix Trail between I-15 and the Fort Irwin boundary would occur under the Mission Change Alternatives as there would be no changes to the right-of-way. On Fort Irwin, the Mission Change Alternatives would result in adverse, moderate, and long-term effects on archaeological resources as a result of training activities and improvements to training infrastructure. The potential for effects would be managed in accordance with the Fort Irwin ICRMP and PA, and mitigation measures would be implemented. Of the cumulative activities identified in Section 4.13.2, *Cumulative Activities*, the conversion of Range 1 and the landfill expansion would have only minor effects on cultural resources (Fort Irwin, 2018c, 2018d). The Daggett Solar Power Facility is located outside the APE, so would not contribute to cultural impacts (San Bernardino County, 2019). The XpressWest high-speed rail project overlaps the APE where the Manix Trail meets I-15; however, no cultural resources have been identified in this area. The Energy Security Measures projects fall within the APE for the Proposed Action and would have the potential to contribute to cumulative effects on cultural resources. However, the project area has been surveyed for cultural resources and the historic properties are being managed in compliance with the NHPA. Consequently, with limited potential for interaction between the Mission Change Alternatives and the identified cumulative activities, cumulative effects on cultural resources would be **less than significant**.

4.13.3.5 Air Quality

The Mission Change Alternatives is within the San Bernardino County nonattainment area for PM_{10} and the southern portion of the Mission Change Alternatives area, including all of Manix Trail between Fort Irwin and I-15, is within the Western Mojave Desert Area, which is in nonattainment for O_3. The Mission Change Alternative could combine with current and reasonably foreseeable actions to affect the Western Mojave Desert Nonattainment Area and the San Bernardino County Nonattainment Area. Construction and training activities associated with the Mission Change Alternatives would be implemented over a period of years; detailed construction schedules and equipment information are not yet available. Activities are anticipated to generate exhaust emissions (NOx, VOCs, CO, SO_2, PM_{10}, and $PM_{2.5}$) and fugitive dust (PM_{10}, and $PM_{2.5}$) emissions from activities such as grading, excavation, and vehicular travel on unpaved roads.

When combined with the No Mission Change Alternative NOx and PM_{10} emissions from the Mission Change Alternatives are above general conformity *de minimis* thresholds; however, the new activities associated with the Mission Change Alternatives are well below *de minimis* thresholds and would only result in a negligible impact compared to current conditions. The landfill expansion, the conversion of Range 1, the XpressWest high-speed rail, the Energy Security Measures projects, and the Daggett Solar Power Facility could have air emissions that would occur concurrent with emissions from the Mission

Change Alternatives, but estimates indicate the combined emissions would remain well below both the *de minimis* thresholds and the MDAQMD thresholds for all pollutants (Fort Irwin, 2017a, 2018b, San Bernardino County, 2019). Given the low quantity of new emissions the cumulative effects on other air quality parameters would be **less than significant.**

GHG emissions from the new activities associated with the Mission Change Alternatives would be negligible compared to GHG emissions from the No Mission Change Alternative. The landfill expansion, the conversion of Range 1, the XpressWest high-speed rail, the Energy Security Measures projects, and the Daggett Solar Power Facility would contribute GHG emissions that would occur concurrently with emissions from the Mission Change Alternatives to contribute to cumulative effects on GHG emissions. Given the low quantity of new GHG emissions, the cumulative effects on GHG emissions would be **less than significant.**

4.13.3.6 Noise

Noise effects are generally localized, so the effects decrease rapidly in magnitude as the distance from the source to the receptor increases. Noise from the Mission Change Alternatives would be intermittent, limited to training and construction activities, and generally well removed from potential receptors. Noise from the Daggett Solar Power Facility would not interact with noise from the Mission Change Alternatives due to the distance and intervening terrain which would reduce any noise generated from one activity to indistinguishable from background at the other activity. Noise from the landfill expansion and the conversion of Range 1 would not combine with noise from the Mission Change Alternatives to create cumulative effects, as any increase in noise would be limited to 1 or 2 dBA, which is an increase that is not perceptible to the human ear. The only cumulative activity that could contribute to cumulative noise effects is the implementation of Energy Security Measures projects. There would be **no cumulative effects** from noise on the NASA Goldstone Complex or other sensitive noise receptors because these receptors would not experience a perceptible change in the noise environment as a result of the cumulative projects.

4.13.3.7 Utilities

The Mission Change Alternatives would result in negligible effects on all utilities; therefore, there would be **no cumulative effects**.

4.13.3.8 Traffic and Transportation

There would be no interaction between traffic associated with construction and operation of the Daggett Solar Power Facility and traffic associated with the Mission Change Alternatives and no potential for cumulative effects on traffic between the Daggett Solar Power Facility and the Mission Change Alternatives.

Construction-related traffic on Fort Irwin for the conversion of Range 1, the Energy Security Measures projects, and the landfill would be coordinated to avoid conflict with training-related traffic, but could contribute to a cumulative effect on traffic in the Cantonment Area. Given the limited number of construction vehicles associated with the range conversion and landfill, any cumulative effects on traffic would be **less than significant.**

4.13.3.9 Hazardous Materials and Hazardous Waste

Considering Fort Irwin's military mission, the use and generation of hazardous materials and hazardous waste are inherent with ongoing activities. Accordingly, Fort Irwin has implemented policies, plans, and programs to specifically address these various types of waste streams, such as the SWP, SPCP, ORA, HMHWMP, and the CIP. The Fort Irwin landfill would not accept hazardous wastes, but small quantities of hazardous materials may be used during construction of the new cell. Construction and operation of Energy Security Measures projects, the conversion of Range 1, and operation of the MPRC would involve the use of hazardous materials, but this use would not be substantially different than current hazardous

material usage on Fort Irwin. Construction and operation of the Daggett Solar Power Facility would involve use of hazardous materials and generation of hazardous wastes and regional disposal of hazardous wastes; however, these materials will be handled in accordance with applicable laws and regulations (San Bernardino County, 2019). Because hazardous waste management procedures will be applied to both the Mission Change Alternatives, and identified cumulative activities, cumulative effects from hazardous materials and hazardous waste would be **less than significant.**

4.13.3.10 Health and Safety

The Mission Change Alternatives would result in no potential effects on the public and potentially minor effects on soldiers and other personnel working on Fort Irwin. Potential health and safety risks associated with the three cumulative activities are independent of health and safety risks associated with the Mission Change Alternatives. There would be no interaction among these activities to further contribute to cumulative effects on health and safety; consequently, there would be **no cumulative effects**.

4.13.3.11 Land Use

The Mission Change Alternatives would result in no effects on land use; therefore, there would be **no cumulative effects**.

4.13.3.12 Recreation

The Mission Change Alternatives would result in no effects on recreation; therefore, there would be **no cumulative effects**.

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SECTION 5

Environmental Consequences - Withdrawal Extension Analysis

This section provides an evaluation of the potential environmental effects of the No Withdrawal Extension Alternative. Under this alternative, the U.S. Congress would not authorize a withdrawal extension of federal land in the Eastern Training Area, Western Training Area, and a portion of the Southern Corridor.

If the withdrawal is not extended, the Army would no longer be able to utilize the land for training and the realism of training would be constrained. There would be less ability to adapt training needs and requirements as the tactics and technology used by enemies change.

If the withdrawal is not extended, the currently withdrawn land would become available for public appropriation under federal laws and would be managed for various public uses.

While it is not known how BLM would manage the land should the withdrawal not be extended, the analysis of potential effects under the No Withdrawal Extension Alternative assumes that future management would be consistent with The Federal Land Policy and Management Act (Public Law 94-579), as amended. The Federal Land Policy and Management Act requires BLM to manage land for multiple uses:

> …a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.

The withdrawn areas will be used in some capacity if the withdrawal is not extended. Potential future land uses may include mining, energy development, and recreation, including motorized and non-motorized recreational activities, or a combination of these uses. Any future uses of the areas would have adverse effects on resources and reduce the beneficial effects of not conducting Army training, as discussed in the following sections.

The effects on environmental resources associated with approving the withdrawal extension are addressed through the analysis of effects for the previously discussed alternatives in Section 4.0, *Environmental Consequences - Mission Analysis*. These analyses describe the range of effects that may occur under a withdrawal extension, depending on the alternatives selected for the withdrawn land (Eastern Training Area, Western Training Area, and eastern portion of the Southern Corridor; Figure 2-12). Because these potential effects have been previously presented, they are not repeated in this section.

5.1 Biological Resources—No Withdrawal Extension Alternative

The following sections explain the potential effects of not extending the Fort Irwin land withdrawal. If the withdrawal is not extended, it would be unfeasible not to use these areas in some capacity. If the

areas revert to BLM-managed land, future use would be consistent with a management plan that would be developed by BLM for this area. Potential future land uses may include mining, energy development, and recreation, including motorized and non-motorized recreational activities, or a combination of these uses. While removing the land from military training would result in beneficial effects for most resources, any future uses of the area would have adverse effects on vegetation and wildlife, including special status species, and would reduce the beneficial effects of not conducting Army training. The discussion of effects considers the likely net effect of discontinuing Army training in concert with potential future uses.

5.1.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts to BLM-managed land, consistent with a management plan that would be developed by BLM for this area. Potential future land uses may include mining, energy development, and recreation, including motorized and non-motorized recreational activities, or a combination of these uses. As there is an active mine in the area, it is possible that some level of mining would occur if the land withdrawal is not extended.

The effect on vegetation in the Eastern Training Area would depend on the combination and intensity of future land uses and the requirements of BLM's management plan for the area. Mining and energy development would have greater potential to affect vegetation communities than recreational land use. Depending on the requirements in BLM's management plan, energy development or recreational areas might be sited to avoid known occurrences of special status vegetation, which would minimize the potential for adverse effects on special status vegetation. Because invasive, non-native species are adapted to establishing in disturbed soils, the establishment of invasive, non-native species, particularly those that are readily spread by the wind, could occur because of disruptive activities such as energy development. BLM might implement mitigation measures to reduce the potential for the establishment and spread of invasive, non-native species. The resulting effect on vegetation, including sensitive species, from not extending the withdrawal would likely be **negligible** compared to current military training activities on the land.

The effect on wildlife in the Eastern Training Area would depend on the combination and intensity of future land uses and the requirements of BLM's management for the area. Mining and energy development would have greater potential to affect wildlife habitat than recreational land use. Wildlife would be displaced from areas of intensive land use but would be expected to acclimatize to the activity once the activity becomes established. Incidental mortality of mammal or vertebrate species may result from the movement of vehicles and equipment both on-road and off-road, but no loss of local populations would be expected. Depending on the requirements in BLM's management plan, energy development, mining, or concentrated recreational areas might be sited to avoid known occurrences of special status wildlife, which would minimize the potential for adverse effects. Any activity resulting in an increase in human presence increases the potential for trash and food-related solid wastes to accumulate, creating attractants for coyotes and ravens and resulting in at least temporary increases in the numbers of these pest species. The resulting effect on wildlife from not extending the withdrawal would likely be **negligible** compared to current military training activities on the land**.**

5.1.2 Western Training Area

The Western Training Area would be expected to experience a combination of land uses should it revert to BLM management. The same constraints and opportunities discussed in Section 5.1.1, *Eastern Training Area*, would exist. The resulting effect on vegetation and wildlife in the Western Training Area from not extending the withdrawal would likely be **negligible** compared to proposed military training activities on the land. The Army would no longer maintain the Paradise Valley Conservation Area for Lane Mountain Milkvetch, as this area would no longer be under Army control. In addition, most of the

Brinkman Wash Restricted Access Area is within the Western Training Area and the Army would no longer be able to enforce access restrictions on this part of the Lane Mountain Milkvetch population.

5.1.3 Southeastern Withdrawal Area

The Southeastern Withdrawal Area has additional constraints on future land uses. The Southeastern Withdrawal Area could be added to the Superior-Cronese Area of Critical Environmental Concern (ACEC) for the desert tortoise, which would constrain future land uses for mining and energy development. This narrow area lies between an established utility corridor and Fort Irwin, which makes access more difficult for mining operations. The boundary within Fort Irwin is a stairstep pattern that would inhibit linear energy projects and be problematic for the development of large-scale renewable energy projects. BLM would be expected to develop a management plan for this area, which would dictate future land uses and mitigation for adverse effects. Recreational uses, including motorized and non-motorized recreational activities, would likely have the largest effect on vegetation communities in this area, though these activities may be limited if the area is designated an ACEC. The resulting effect from not extending the withdrawal would likely be a **long-term, minor benefit** to vegetation and wildlife compared to the current military training activities**.**

5.2 Water Resources—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.2.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area would revert back to BLM-managed land that could be used for various land uses, such as mining, energy development, and recreation, including motorized and non-motorized recreational activities, or a combination of these uses. The effect on surface water and groundwater resources would depend on the combination and intensity of future land uses and the requirements of any management plan developed by BLM for the area. Mining and energy development would have greater potential to affect water resources than recreational use; however, any future uses would include permitting and mitigation measures. The resulting effect on water resources from not extending the withdrawal would likely be **negligible** compared to current military training activities**.**

5.2.2 Western Training Area

The Western Training Area would be expected to experience a combination of land uses if it reverts to BLM management. The same constraints and opportunities discussed in Section 5.2.1, *Eastern Training Area*, would exist for the Western Training Area. The resulting effects on surface water and groundwater resources in the Western Training Area from not extending the withdrawal would likely be **negligible** compared to proposed military training activities.

5.2.3 Southeastern Withdrawal Area

The Southeastern Withdrawal Area has additional constraints on future land uses. The Southeastern Withdrawal Area could be added to the Superior-Cronese ACEC for the desert tortoise, which would constrain future land uses for mining and energy development. This narrow area lies between an established utility corridor and Fort Irwin, which makes access more difficult for mining operations. The boundary with Fort Irwin is a stairstep pattern that would inhibit linear energy projects and be problematic for the development of large-scale renewable energy projects. It is expected that future

land uses in the Southeastern Withdrawal Area would be less likely to affect surface water and groundwater resources in this area compared to military training activities. BLM would be expected to develop a management plan for this area, which would constrain future land uses. **Minor, beneficial,** and **long-term** effects on surface water and groundwater resources in the Southeastern Withdrawal Area would be expected from not extending the withdrawal.

5.3 Geological Resources—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.3.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely result in the area reverting back to BLM-managed land that could be subject to mining, energy development, or recreational land use, including motorized and non-motorized recreational activities, or a combination of these uses. The effect on geology, including topography, geological features, soils, seismicity, and paleontological resources would depend on the combination and intensity of the future land uses and the requirements of the management plan developed by BLM for the area. Mining and energy development would have a greater potential to affect geology than recreational land use; however, any future land use would require permits and mitigation measures. The resulting effects on geology from not extending the withdrawal would likely be **negligible** compared to current military training activities on the land.

5.3.2 Western Training Area

The Western Training Area would be expected to include a combination of land uses if it reverts to BLM management. The same constraints and opportunities discussed in Section 5.3.1, *Eastern Training Area*, would exist for the Western Training Area. The resulting effects on topography, geological features, soils, seismicity, and paleontological resources in the Western Training Area from not extending the withdrawal would likely be **negligible** compared to proposed military training activities on the land.

5.3.3 Southeastern Withdrawal Area

The Southeastern Withdrawal Area has additional constraints on future land uses. The Southeastern Withdrawal Area could be added to the Superior-Cronese ACEC for the desert tortoise, which would constrain future land uses for mining and energy development. This narrow area lies between an established utility corridor and Fort Irwin, which makes access more difficult for mining operations. The boundary with Fort Irwin is a stairstep pattern that would inhibit linear energy projects and be problematic for the development of large-scale renewable energy projects. It is expected that future land uses in the Southeastern Withdrawal Area would be less likely to affect topography, geological features, soils, seismicity, and paleontological resources in this area. BLM would be expected to develop a management plan for this area, which would constrain future land uses and require mitigation for adverse effects. The effects on topography, geological resources, soils, and seismicity in the Southeastern Withdrawal Area from not extending the withdrawal would likely result in a **minor, long-term benefit** compared to current conditions.

5.4 Cultural Resources—No Withdrawal Extension Alternative

The following sections explain the potential impacts resulting from not extending the Fort Irwin land withdrawal.

5.4.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely lead to the area reverting to BLM-managed land that could be subject to mining, energy development, or recreational land use. While the scope and intensity of these activities would likely be less severe than those associated with military training, the cultural resources environment would be similar. Mining involves the use of explosives and large construction equipment and recreational activities would involve the use of ORVs in remote areas. These activities could affect cultural resources in the same way that military training affects cultural resources. There is also the potential for mining to cause impacts to buried cultural resources due to extensive ground disturbance from blasting or excavation activities. Furthermore, because these activities would remain on federal property, any activities would still be managed in accordance with Section 106 of the NHPA. Therefore, there would be **negligible** effects compared to current military training activities on the land.

5.4.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would result in changes similar to those described for the Eastern Training Area.

5.4.3 Southeastern Withdrawal Area

Not extending the land withdrawal in the Southeastern Withdrawal Area would result in changes similar to those described for the Eastern Training Area.

5.5 Air Quality—No Withdrawal Extension Alternative

The following sections explain the potential effects on air quality resulting from not extending the Fort Irwin land withdrawal.

5.5.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely result in the area reverting to BLM-managed land that could be subject to mining, energy development, or recreational land use, including motorized and non-motorized recreational activities, or a combination of these uses. The effect on air quality would depend on the combination and intensity of future land uses and the resulting air emissions.

Training in the Eastern Training Area currently includes refueling activities, ammunition resupply, and field maintenance activities on vehicles and other equipment, which involve the use of combustion equipment and mobile vehicles that would generate air pollutants emissions. If the property reverted to BLM-managed land, Fort Irwin would no longer generate air emissions associated with training and support activities in this area.

Depending on the requirements of the management plan developed by BLM for the area, air quality effects from the BLM-authorized activities could result from construction equipment and vehicles used for mining and/or energy development projects and from recreational use of ORVs in remote areas. The resulting effects from not extending the withdrawal can be determined only when more detailed land

use information becomes available. While air emissions associated with training and support activities would be eliminated from the Eastern Training Area, the regional emissions associated with training on Fort Irwin would not substantially change. Depending on the requirements in BLM's management plan, the scope and intensity of BLM-authorized activities could be less than those associated with military training, but from a regional perspective, they would be additive to emissions from training continuing to be conducted on Fort Irwin. Therefore, not extending the withdrawal would likely result in **negligible** effects compared to current military training activities on the land.

5.5.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would result in changes similar to those described for the Eastern Training Area.

5.5.3 Southeastern Withdrawal Area

The Southeastern Withdrawal Area has additional constraints on future land uses. The Southeastern Withdrawal Area could be added to the Superior-Cronese ACEC for the desert tortoise, which would constrain future land uses for mining and energy development. In addition, more than 40 percent of this area is designated as off-limits to training because of the BLM utility corridor adjacent to the boundary. The potential for future uses that would generate substantial emissions is low; therefore, the resulting effects are **negligible** compared to current military training activities on the land**.**

5.5.4 Greenhouse Gas Emissions

Not extending the land withdrawal would result in the Army conducting training over a smaller area, but it would not change the number or duration of RTU training events. The reduction in training area would not appreciably reduce GHG emissions from training events because units would still travel the same number of miles, except over a smaller space. Therefore, not extending the land withdrawal would likely result in **negligible** effects on GHG emissions compared to current military training activities.

5.6 Noise–No Withdrawal Extension Alternative

The following sections explain the potential impacts resulting from not extending the Fort Irwin land withdrawal.

5.6.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts back to BLM-managed land and could be used for various land uses, such as mining, energy development, and recreation. While the scope and intensity of these activities would likely be less than those associated with military training, the noise environments would be similar. Mining involves the use of explosives and large construction equipment and recreational activities would involve the use of ORVs in remote areas. The resulting effect from not extending the withdrawal would likely be a **minor, long-term benefit** to the noise-sensitive land uses around the Eastern Training Area, including wilderness areas and the town of Baker.

5.6.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would result in changes similar to those described for the Eastern Training Area. Not extending the withdrawal would likely result in **negligible** effects compared to proposed military training activities on the land.

5.6.3 Southeastern Withdrawal Area

No noise-sensitive land uses are located in the immediate vicinity of the Southeastern Withdrawal Area; therefore, there would be a **negligible** effect from noise in this area if the land withdrawal is not extended.

5.7 Utilities—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.7.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts back to BLM-managed land that could be subject to mining, energy development, or recreational land use, including motorized and non-motorized recreational activities, or a combination of these uses. The effect on utilities would depend on the combination and intensity of the future land uses and the requirements of any management plan developed by BLM for the area. Mining and energy development would have a greater potential to affect utilities than recreational land use. If any future land use requires increased utility services, utility expansion would require permits and appropriate mitigation measures, as determined by BLM. The effect on utilities from not extending the withdrawal would likely be **minor, adverse,** and **long-term**.

5.7.2 Western Training Area

The Western Training Area would be expected to experience a combination of land uses if it reverts to BLM management. The same constraints and opportunities discussed in Section 5.7.1, *Eastern Training Area*, would exist for the Western Training Area. The effects on utilities in the Western Training Area from not extending the withdrawal would likely be **minor, adverse,** and **long-term**.

5.7.3 Southeastern Withdrawal Area

The Southeastern Withdrawal Area has additional constraints on future land uses. The Southeastern Withdrawal Area could be added to the Superior-Cronese ACEC for the desert tortoise, which would constrain future land uses for mining and energy development. This narrow area lies between an established utility corridor and Fort Irwin, which makes access more difficult for mining operations. The boundary with Fort Irwin is a stairstep pattern that would inhibit linear energy projects and be problematic for the development of large-scale renewable energy projects. It is expected that future land uses in the Southeastern Withdrawal Area would be less likely to affect utilities in this area. BLM would be expected to develop a management plan for this area, which would constrain future land uses and require mitigation for adverse effects. The effects on utilities in the Southeastern Withdrawal Area from not extending the withdrawal would likely be **negligible** compared to current conditions.

5.8 Transportation—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.8.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use, including motorized and non-motorized recreational activities, or a combination of these uses. The effect on transportation and traffic would depend on the combination and intensity of future land uses

and the requirements of any management plan developed by BLM for the area. Traffic related to military training would no longer be present, and the potential effects on visibility and traffic flow on State Highway 127 from training-related dust generation would no longer occur, resulting in a **minor, beneficial,** and **long-term effect** to traffic on State Highway 127.

Maintenance of the trail network would no longer be conducted by the Army and ongoing maintenance would become the responsibility of the BLM or a third-party for any trails that are necessary to provide access to future uses in the Eastern Training Area. Mining and recreational traffic could increase on the regional roadway system in proximity to the Eastern Training Area. This level of traffic would likely be the same as, or less than, military traffic.

5.8.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would result in changes similar to those described for the Eastern Training Area. Military training exercises would no longer be conducted in the Western Training Area, which would reduce conflicts with traffic at the NASA Goldstone Complex. The resulting effects on transportation and traffic at the NASA Goldstone Complex from not extending the withdrawal would likely be **minor**, **beneficial**, and **long-term**.

Mining and recreational traffic could increase on the regional roadway system in proximity to the Western Training Area. This level of traffic would likely be the same as, or less than, military traffic.

5.8.3 Southeastern Withdrawal Area

This parcel consists of small segments of land along the southeastern border of Fort Irwin that are adjacent to BLM-controlled land, which is part of the Superior-Cronese ACEC for the desert tortoise. This parcel is less likely to be used for public use than the training areas because of the difficulty in accessing this area; therefore, the resulting effect on transportation and traffic from not extending the withdrawal would likely be **negligible**.

5.9 Hazardous Materials and Hazardous Waste—No Withdrawal Extension Alternative

The following sections explain the potential impacts resulting from not extending the Fort Irwin land withdrawal.

5.9.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely result in the area reverting back to BLM-managed land that could be used for various public land uses, such as mining, energy development, and recreation, including motorized and non-motorized recreational activities, or a combination of these uses. The effects related to hazardous materials and hazardous waste would depend on the combination and intensity of the future land uses and the requirements of the management plan developed by BLM for the area.

At present, training in the Eastern Training Area includes refueling activities, ammunition resupply, and field maintenance activities on vehicles and other equipment, which involve the use of hazardous materials and could potentially generate hazardous wastes. Additionally, UXO occurs in portions of the training ranges. The Eastern Training Area has limited dig and no-dig areas. If the property reverted to BLM-managed land, Fort Irwin would no longer use these hazardous materials in this location and would be required to remediate any contamination to meet applicable regulatory standards prior to use for other purposes designated by BLM.

While the scope and intensity of BLM-authorized activities would likely be less than those associated with military training, the potential for effects from hazardous materials and hazardous wastes would remain. Mining involves the use of explosives and large construction equipment and recreational activities would involve the use of ORVs in remote areas. The effect from not extending the land withdrawal would likely be **negligible** compared to current military training activities on the land.

5.9.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would result in changes similar to those described for the Eastern Training Area. The effects would likely be **negligible** compared to proposed military training activities on the land.

5.9.3 Southeastern Withdrawal Area

The Southeastern Withdrawal Area has additional constraints on future land uses. The Southeastern Withdrawal Area could be added to the Superior-Cronese ACEC for the desert tortoise, which would constrain future land uses such as mining and energy development. The effect would likely be a **minor, long-term benefit** from a slight reduction in the use of hazardous materials and the generation of hazardous wastes.

5.10 Health and Safety—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.10.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use. While the scope and intensity of these activities would likely be less than those associated with military training, health and safety risks would remain and the safety environment would be similar. Mining involves the use of explosives and large construction equipment and recreational activities would involve the use of ORVs in remote areas. The effects on health and safety from not extending the land withdrawal would likely be **negligible** compared to current military training activities on the land.

5.10.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would result in effects similar to those described for the Eastern Training Area. The effects on health and safety from not extending the land withdrawal would likely be **negligible** compared to proposed military training activities on the land.

5.10.3 Southeastern Withdrawal Area

Not extending the land withdrawal in the Southeastern Withdrawal Area would result in small segments of land along the southeastern border being pulled into the BLM-controlled land adjacent to this parcel. The parcel is less likely to be managed for public use because of the difficulty in accessing this area. The effect on health and safety from not extending the land withdrawal would likely be a **minor, long-term benefit** if the land reverted to BLM management.

5.11 Land Use—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.11.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use. Approximately 43,683 acres would be added to the more than 1,117,080 acres of publicly managed land in the surrounding area (less than 4 percent increase). A **minor, long-term benefit** to land use would result if the land reverted to BLM management.

5.11.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use. Approximately 71,249 acres would be added to the more than 1,117,080 acres of publicly managed land in the surrounding area (less than 7 percent increase). A **minor, long-term benefit** to land use would result if the land reverted to BLM management.

5.11.3 Southeastern Withdrawal Area

Not extending the land withdrawal in the Southeastern Withdrawal Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use. Approximately 4,557 acres would be added to the more than 1,117,080 acres of publicly managed land in the surrounding area (less than 1 percent increase), but as small discontinuous segments of land along the southeastern border. The BLM-controlled land adjacent to this parcel is designated as a utility corridor and is included in the Superior-Cronese ACEC for the desert tortoise. This parcel is less likely to be managed for public use than the training areas because of the difficulty in accessing this area. Furthermore, the Southeastern Withdrawal Area could be added to the Superior-Cronese ACEC. A **minor, long-term benefit** to land use would result if the land reverted to BLM management.

5.12 Recreation—No Withdrawal Extension Alternative

The following sections explain the potential effects resulting from not extending the Fort Irwin land withdrawal.

5.12.1 Eastern Training Area

Not extending the land withdrawal in the Eastern Training Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use. While the scope and intensity of these activities would likely be less than those associated with military training, the recreational opportunities would likely revert to some or all of the pre-2006 recreational activities, such as camping, picnicking, wildlife observation, sightseeing, hiking, and rock hounding (Fort Irwin, 2006b). The effect of not extending the land withdrawal would likely be a **minor, long-term benefit** to the recreational opportunities in the Eastern Training Area.

5.12.2 Western Training Area

Not extending the land withdrawal in the Western Training Area would likely mean the area reverts to BLM-managed land that could be subject to mining, energy development, or recreational land use. While the scope and intensity of these activities would likely be less than those associated with military training, the recreational opportunities would likely revert to some or all of the pre-2006 recreational

activities, such as camping, picnicking, wildlife observation, sightseeing, hiking, rock hounding, land sailing, ORV use, and horseback riding (Fort Irwin, 2006b). The effect of not extending the land withdrawal would likely be a **minor, long-term benefit** to the recreational opportunities in the Western Training Area.

5.12.3 Southeastern Withdrawal Area

If the Southeastern Withdrawal Area is added to the Superior-Cronese ACEC, concentrated recreational activities and ORV use would be unlikely. The effect would likely be a **minor, long-term benefit** to the recreational opportunities in the Southeastern Withdrawal Area.

5.13 Cumulative Effects – No Withdrawal Extension Alternative

This section describes the approach used to analyze potential cumulative effects associated with the No Withdrawal Extension Alternative in the context of potential interactions with other past, present, and reasonably foreseeable actions in the region. The definition of a "cumulative impact" as per CEQ regulations is described in Section 4.13, *Cumulative Effects – Mission Analysis*.

Under the No Withdrawal Extension Alternative, it is assumed that not extending the land withdrawal for the Eastern Training Area, Western Training Area, and Southeastern Withdrawal Area would likely result in the land reverting to BLM-managed land uses such as mining, energy development, motorized and non-motorized recreational activities, or a combination of these uses. The Southeastern Withdrawal Area would have more constraints on future land uses because of the adjacent utility corridor and the potential to add this area to the Superior-Cronese ACEC, which would constrain future land uses for mining or energy development.

The cumulative activities discussed in Section 4.13.2, *Cumulative Activities*, were used to assess potential cumulative effects associated with the No Withdrawal Extension Alternative.

5.13.1 Biological Resources

The No Withdrawal Alternative would result in only negligible and beneficial effects on biology; therefore, there would be **no adverse cumulative effects**.

5.13.2 Water Resources

The No Withdrawal Alternative would result in only negligible and beneficial effects on water resources; therefore, there would be **no adverse cumulative effects**.

5.13.3 Geological Resources

The No Withdrawal Alternative would result in only negligible and beneficial effects on geological resources; therefore, there would be **no adverse cumulative effects**.

5.13.4 Cultural Resources

The No Withdrawal Alternative would result in only negligible effects on cultural resources; therefore, there would be **no adverse cumulative effects**.

5.13.5 Air Quality

The No Withdrawal Alternative would result in only negligible effects on air quality; therefore, there would be **no cumulative effects**.

5.13.6 Noise

The No Withdrawal Alternative would result in only negligible and beneficial effects on noise; therefore, there would be **no adverse cumulative effects**.

5.13.7 Utilities

Only minor effects are associated with the No Withdrawal Extension Alternative. The activities described in Section 4.13.2, *Cumulative Activities*, would result in minimal effects on utilities; therefore, the cumulative effects are expected to be **less than moderate**.

5.13.8 Traffic and Transportation

The No Withdrawal Alternative would result in only negligible and beneficial effects on traffic and transportation; therefore, there would be **no adverse cumulative effects**.

5.13.9 Hazardous Materials and Hazardous Waste

The No Withdrawal Alternative would result in only negligible and beneficial effects from hazardous materials and waste; therefore, there would be **no adverse cumulative effects**.

5.13.10 Health and Safety

The No Withdrawal Alternative would result in only negligible and beneficial effects on health and safety; therefore, there would be **no adverse cumulative effects**.

5.13.11 Land Use

The No Withdrawal Alternative would result in only beneficial effects on land use; therefore, there would be **no adverse cumulative effects**.

5.13.12 Recreation

The No Withdrawal Alternative would result in only beneficial effects on recreation; therefore, there would be **no adverse cumulative effects**.

SECTION 6

Other Required Analyses

As per NEPA and AR 200-1, Environmental Protection and Enhancement, dated 13 December 2007, and 32 CFR Part 651 (AR 200-2), Environmental Analysis of Army Actions, dated 29 March 2002, this section discusses two mandatory subsections of NEPA analysis:

- The relationship between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, which addresses possible conflicts with the objectives of federal, state, tribal, and local land use plans and policies or private party plans for the affected area.
- Irreversible and irretrievable commitments of resources, which addresses the use of nonrenewable energy resources, natural and depletable resources, and scarce materials and the conservation potential of the action under evaluation, including associated mitigation measures.

6.1 Relationship between Local Short-term Use of the Human Environment and the Maintenance and Enhancement of Long-term Productivity

NEPA requires an analysis of the relationship between a project's short-term effects on the environment and the effects of the maintenance and enhancement of the long-term productivity of the environment. The analysis also considers whether a project alternative might commit a resource to a certain use, thereby eliminating the possibility for other uses of that resource.

"Short term" occurs only during a specific activity, such as a construction period or a specific training event, or during a specific activity and for a short adjustment/recovery period following the end of the activity. Short-term effects can repeat as training events occur numerous times throughout the year (up to 12 rotations a year). "Long term" refers to the effects of the specific activity extending well beyond the end of an activity.

Short-term effects on the environment would be similar for all Alternatives. Increased soil erosion could result from soil disturbance during construction activities. Increased dust and vehicle emissions from construction activities could affect air quality. However, the following environmental protection measures would be used to lessen these effects:

- Implementation of design features, BMPs, mitigation measures, and standard construction practices.
- Adherence to management plans and programs.
- Compliance with federal, state, and local regulations.

The No Withdrawal Extension Alternative may result in long-term effects depending on the future uses of the Western Training Area.

6.2 Irreversible and Irretrievable Commitments of Resources

NEPA requires that a lead agency analyze the extent to which the Alternatives could commit nonrenewable resources to uses that would be irreversible or irretrievable by future generations. A

commitment would be irreversible if its effect limits future options for a resource. An irretrievable commitment refers to the consumption of resources that are not renewable or recoverable for future use.

Military training activities would consume energy and ammunition. Aircraft and wheeled and tracked vehicles would consume fuel, oil, and lubricants required for maintenance. Ammunition would consume metals and propellant substances.

Construction would consume energy and building materials. Fuels would be used by construction equipment (e.g., backhoes, bulldozers, front-end loaders, and dump trucks), transportation vehicles, and crew vehicles. Potable water would be consumed by personnel. Recycled water instead of potable water would be used for dust suppression and would reduce the demand for higher quality water.

Construction may result in the loss of mature Joshua tree woodland and other vegetation communities that could not be replaced within the foreseeable future.

The loss of cultural resources would represent an irreversible commitment, but any such loss that may result from implementing the Proposed Actions would be mitigated through appropriate measures developed through consultation with the SHPO, interested Native American tribes, and other Consulting Parties.

The No Withdrawal Extension Alternative may result in future land uses within the Western and Eastern Training Areas that could result in the irretrievable loss of mineral and energy resources.

SECTION 7

Distribution List

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15095 Amargosa Road
Building 2, Suite 210
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SECTION 8

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The primary persons responsible for preparing this LEIS are listed in Table 8-1.

TABLE 8-1
List of Preparers
LEIS for Military Training and Public Land Withdrawal Extension, Fort Irwin, California

Name	Degree(s)	Years of Experience
[redacted]	M.H.P. Historic Preservation; B.A. Architectural History	17
[redacted]	M.S. Geosciences; B.S. Biological Science	25
[redacted]	B.S. Civil Engineering	20
[redacted]	B.A. Environmental Studies; B.A. Geography	3
[redacted]	M.A. Public History; B.A. History (Environmental)	17
[redacted]	B.S. Environmental Studies	20
[redacted]	M.S. Environmental Science; B.S. Botany	16
[redacted]	B.S. Biology	14
[redacted]	M.S. Environmental Engineering; B.S. Civil Engineering	28
[redacted]	M.S. Preservation Studies; B.A. Political Science	21
[redacted]	Ph.D. Zoology; M.S. Natural and Environmental Resources; B.S. Wildlife Management	34
[redacted]	M.S. Business Administration; B.S. Ecology and Evolutionary Biology	24
[redacted]	Ph.D. Wetland and Wildlife Ecology; B.S. Wildlife Ecology and Resource Management	30
[redacted]	J.D. Law; B.A. Anthropology	27
[redacted]	M.A. Urban and Regional Planning; B.A. Urban Studies	26
[redacted]	M.S. Chemical Engineering, Environmental Science and Engineering	24

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SECTION 9

References

Air Force Combat Climatology Center (AFCCC). 2004. *National Training Center (NTC), Fort Irwin, California–A Full-Year Climatology*. AFCCC/CCD-04/006. 21 March.

Association of the United States Army. 2020. "Army Exceeds Fiscal Year 2020 End Strength Goal." 09 October. https://www.ausa.org/news/army-exceeds-fiscal-year-2020-end-strength-goal.

Audubon Guide to North American Birds. 2019a. Gray Vireo. Accessed 20 November 2019. https://www.audubon.org/field-guide/bird/gray-vireo.

Audubon Guide to North American Birds. 2019b. Ferruginous Hawk. Accessed 20 November 2019. https://www.audubon.org/field-guide/bird/ferruginous-hawk.

Audubon Guide to North American Birds. 2019c. Northern Harrier. Accessed 20 November 2019. https://www.audubon.org/field-guide/bird/northern-harrier.

Brown, P. D., and W. E. Rainey. 2012. *The Distribution and Status of Bats at Fort Irwin National Training Center*. U.S. Army Research Office Report Number 58843-EV.1.

Bureau of Land Management (BLM). 2010. *Special Status Plants in California, Including BLM Designated Sensitive Species*. https://www.blm.gov/ca/dir/pdfs/2010/im/CAIM2010-008ATT2B.pdf.

Bureau of Land Management (BLM). 2014. *BLM Special Status Animal Species by Field Office*. 23 September 2014. https://www.blm.gov/programs/fish-and-wildlife/threatened-and-endangered/state-te-data/California.

Cal-Adapt. 2020. "Maps of Projected Change." The California Energy Commission. https://cal-adapt.org/tools/maps-of-projected-change.

California Air Pollution Control Officers Association. 2016. California Emissions Estimator Model (CalEEMod). http://www.caleemod.com/

California Air Resources Board (CARB). 2016. California Ambient Air Quality Standards https://ww2.arb.ca.gov/sites/default/files/2020-07/aaqs2.pdf.

California Air Resources Board (CARB). 2018. *2018 Updates to the California State Implementation Plan*. Adopted 25 October 2018. https://ww3.arb.ca.gov/planning/sip/2018sipupdate/2018update.pdf?_ga=2.59970411.775361418.1611777923-779985098.1611777923.

California Department of Fish and Wildlife (CDFW). 2019a. *Bird Species of Special Concern*. Accessed 18 November 2019. https://www.wildlife.ca.gov/Conservation/SSC/Birds.

California Department of Fish and Wildlife (CDFW). 2019b. *Life History Account for Ferruginous Hawk*. California Wildlife Habitat Relationships System California Department of Fish and Wildlife California Interagency Wildlife Task Group. Accessed 3 November 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1677&inline=1.

California Department of Fish and Wildlife (CDFW). 2019c. *Life History Account for Northern Harrier*. California Wildlife Habitat Relationships System California Department of Fish and Wildlife California Interagency Wildlife Task Group. Accessed 20 November 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1663&inline=1.

California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September. https://www.dtsc-ssfl.com/files/lib_ceqa/ref_draft_peir/Chap4_10-Noise/Caltrans_2013a_Tech_Noise_Supplement.pdf.

California Department of Transportation (Caltrans). 2020a. *Caltrans District 8: Featured Projects*. Accessed 21 September 2020. http://www.district8.dot.ca.gov/.

California Department of Transportation (Caltrans). 2020b. Notice of Exemption: DesertXpress High-Speed Rail Project – Apple Valley to California/Nevada Border Segment. 24 June. Accessed 21 September 2020. https://ceqanet.opr.ca.gov/2020060540/2

California Hometown Locator. 2020a. San Bernardino County Cities, Towns, and Neighborhoods: Other Populated Places. Accessed 21 January 2021. https://california.hometownlocator.com/counties/cities,cfips,071,c,san%20bernardino.cfm

California Hometown Locator. 2020b. Barstow, California, Basic Facts. Accessed 21 January 2021. https://california.hometownlocator.com/ca/san-bernardino/barstow.cfm

California Regional Water Quality Control Board (RWQCB), Lahontan Region. 2004. Revised W*aste Discharge Requirements Including Water Recycling Requirements Fort Irwin U.S. Army National Training Center, Wastewater Treatment Facility, San Bernardino County*. Board Order No. R6V-2004-0005. 10 February. https://www.waterboards.ca.gov/rwqcb6/board_decisions/adopted_orders/2004/docs/r6v-2004-0005_ft_irwin_wtf_wdr.pdf

California Regional Water Quality Control Board (RWQCB), Lahontan Region. 2012. Amendment to W*aste Discharge Requirements and Water Recycling Requirements Fort Irwin U.S. Army National Training Center, Wastewater Treatment Facility, San Bernardino County*. 14 November. https://www.waterboards.ca.gov/lahontan/board_info/agenda/2012/nov/fort_irwin.pdf

California Regional Water Quality Control Board (RWQCB), Lahontan Region. 2015. *Waste Discharge Requirements Fort Irwin U.S. Army National Training Center, Irwin Water Works, San Bernardino County*. Board Order No. R6V-2015-0004. 11 February. https://www.waterboards.ca.gov/lahontan/board_decisions/adopted_orders/2015/docs/r6v_2015_0004.pdf

CH2M HILL, Inc. (CH2M). 2007. *Regional Water Supply Investigation, Fort Irwin Military Reservation.* Final. March.

CH2M HILL, Inc. (CH2M). 2014. *Report Fort Irwin CIP 45–Fire Flow Assessment Summary Report*. Final. September.

CH2M HILL, Inc. (CH2M). 2017. *Natural Resources Report for the Fort Irwin Multipurpose Range Complex, Fort Irwin, California*. Final.

CH2M HILL, Inc. (CH2M). 2018. *Cultural Resources Inventory Report for the Multipurpose Range Complex Project*. Revised Final. Prepared for Fort Irwin Installation Management Command. Confidential version on file at Fort Irwin.

Cornell Lab of Ornithology. 2019a. Gray Vireo. Accessed 22 November 2019. https://birdsoftheworld.org/bow/species/gryvir/cur/introduction

Cornell Lab of Ornithology. 2019b. Ferruginous Hawk. Accessed 22 November 2019. https://birdsoftheworld.org/bow/species/ferhaw/cur/introduction

Cornell Lab of Ornithology. 2019c. Hen/Northern Harrier. Accessed 22 November 2019. https://birdsoftheworld.org/bow/species/norhar2/cur/introduction

Crum, N., M. Potter, and D. Pappagianis. 2004. "Seroincidence of coccidioidomycosis during Military Desert Training Exercises." *Journal of Clinical Microbiology*. Vol. 42, No. 10. pp. 4552-4555. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC522372/

Davis, D. 2020. Personal communication with CH2M HILL.

Davis, D. 2021. Memo on Desert Tortoise Status.

Davis, J. N., and C. A. Niemela. 2008. *Studies of Western Birds*. Species Accounts. Northern Harrier. pp. 149–155. Accessed 03 November 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=10393&inline.

Defense Logistics Agency. 1985. Radioactive Commodities in the DoD Supply Systems. April.

Dermatas, D., M. Dadachov, P. Dutko, N. Menounou, P. Arenti, and G. Shen. 2004. Weathering of Lead in Fort Irwin Range Soils. *Global Nest: The International Journal*. Vol. 6, No. 2. pp. 174–179.

EA Engineering, Science, and Technology, Inc., PBC. 2020. Read-Ahead Package for the United States (U.S.) Army Fiscal Year (FY) 18-22 Operational Range Assessment (ORA) Cycle – Fort Irwin, California. May.

Earle, David D. 2004. *Ethnohistorical and Ethnographic Overview and Cultural Affiliation Study of the Fort Irwin Region and the Central Mojave Desert*. Prepared for TRC Environmental Corporation. On file with Fort Irwin DPW.

England, A. S., and W. F. J. Laudenslayer. 1989. "Review of the Status of Bendire's Thrasher in California USA." *Western Birds*. Vol. 20, No 3. pp. 97–124.

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. 2021. Service layer credits.

Far Western Anthropological Research Group, Inc. 2005. *Volume I: Report Archaeological and Geomorphic Investigations along the South Edge of the Avawatz Mountains: A 6,945 Acre Archaeological Survey and Evaluation of 58 Sites, the National Training Center, Fort Irwin, San Bernardino County, California*. Prepared for Fort Irwin Department of Public Works. On file at Fort Irwin.

Far Western Anthropological Research Group, Inc. 2006. *Cultural Resources Inventory and Evaluation of Select High Probability Areas in the Southern Corridor Area, Fort Irwin National Training Center, San Bernardino County, California*. Prepared for Fort Irwin Department of Public Works. On file at Fort Irwin.

Far Western Anthropological Research Group, Inc. 2008. *Volume I: Report and Appendices Archaeological, Geomorphic, and Historical Investigations in Superior Valley: A 3,000-Acre Archaeological Survey and Evaluation of 112 Sites, Superior Valley Expansion Area, the National Training Center, Fort Irwin, San Bernardino County, California. Prepared for Fort Irwin Department of Public Works*. On file at Fort Irwin.

Federal Railroad Administration (FRA). 2011. Record of Decision: DesertXpress High-Speed Passenger Train. July. Accessed 21 September 2020. https://railroads.dot.gov/elibrary/desertxpress-fra-record-decision

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual.* Prepared by John A. Volpe National Transportation Systems Center. September.

Fort Irwin. 2005. *Supplemental Final Environmental Impact Statement for the Proposed Addition of Maneuver Training Land at Fort Irwin, California* (SFEIS) *Supplement and Biological Assessment Supplement.*

Fort Irwin. 2006a. *Record of Decision: Supplemental Final Environmental Impact Statement for the Proposed Addition of Maneuver Training Land at Fort Irwin, California* (SFEIS).

Fort Irwin. 2006b. *Integrated Natural Resources Management Plan and Environmental Assessment*. 2006-2011. National Training Center at Fort Irwin. Environmental Division, Directorate of Public Works.

Fort Irwin. 2008. *Brigade Combat Team Transformation Draft Programmatic Environmental Impact Statement.* June.

Fort Irwin. 2011. *National Training Center and Fort Irwin Hazardous Materials and Hazardous Waste Management Plan*. May.

Fort Irwin. 2012. *Community Involvement Plan for Fort Irwin, CA*. Prepared under contract by PB&A, Inc. June.

Fort Irwin. 2014a. *Environmental Assessment for the Construction and Operation of a C-17-Capable Flight Landing Strip, Fort Irwin, California.*

Fort Irwin. 2014b. *Environmental Assessment for Construction, Operation, and Maintenance of Combat Training Center-Instrumentation Systems Range Communication System, Fort Irwin, California*. February.

Fort Irwin. 2014c. *Environmental Assessment Stationing of Company B, 229th Aviation Regiment (Extended Range/Multi-purpose), Fort Irwin, California.*

Fort Irwin. 2015. *Environmental Assessment for Capital Improvement Project W46 for Fire Flow Improvements to the Ammunition Supply Point*, *Fort Irwin, California.*

Fort Irwin, 2016a. *Environmental Assessment for the Verizon–Fort Irwin Fiber Optic Cable Project at Fort Irwin, California.*

Fort Irwin. 2016b. *Fort Irwin Draft Traffic Study Report*.

Fort Irwin. 2017a. *Environmental Assessment for the Construction and Maintenance of Stormwater Controls at Tiefort City, Fort Irwin, California.*

Fort Irwin. 2017b. *Environmental Assessment Implementation of the Fort Irwin Real Property Vision Plan, Fort Irwin, California.*

Fort Irwin. 2017c. *Environmental Assessment for the Implementation of Integrated Pest Management Plan, Fort Irwin, California.*

Fort Irwin. 2017d. *Environmental Assessment for the Fort Irwin Stormwater Management Plan for the Cantonment Area, Fort Irwin, California.*

Fort Irwin. 2017e. *Programmatic Environmental Assessment for Capital Improvement Project WW62, Implementation of the Recycled Water Master Plan, Fort Irwin, California*.

Fort Irwin. 2017f. *National Training Center and Fort Irwin Range Complex Master Plan*. FY17.

Fort Irwin. 2017g. *Integrated Pest Management Plan for The National Training Center and Fort Irwin, Fort Irwin, California.* January.

Fort Irwin. 2018a. Serving and Supporting. May. Andrea Wooley, PAI.

Fort Irwin. 2018b. *Environmental Assessment for the Construction, Operation and Maintenance of a Dense Urban Terrain Complex, Fort Irwin, California*.

Fort Irwin. 2018c. *Environmental Assessment for the Construction and Operation of a Multipurpose Range Complex, Fort Irwin, California.* Final.

Fort Irwin. 2018d. *Environmental Assessment for Landfill Operations, Fort Irwin, California*. Final. September.

Fort Irwin. 2019. Letter to County of San Bernardino Public Health–Local Enforcement Agency, Attention: Ms. Kimberly Tra. 10 October.

Fort Irwin. 2020a. Wildlife Species Known_Expected to Occur on FINTC. Unpublished Document.

Fort Irwin. 2020b. *Spill Prevention and Contingency Plan for United States Army National Training Center and Fort Irwin, San Bernardino County, California. Update*. April.

Fort Irwin. 2020c. Fort Irwin Outdoor Recreation. Accessed 30 July 2020. https://irwin.armymwr.com/programs/outdoor-recreation.

Fort Irwin. 2020d. *Environmental Assessment Implementation of Energy Security Measures, Fort Irwin, California*. Final. October.

Fort Irwin. 2021. *Final Finding of No Significant Impact: Implementation of Energy Security Measures, Fort Irwin, California*. February.

Geo-Marine, Inc. 2008. *Cultural Resources Inventory and Evaluation, Including Geomorphic and Paleontological Characterization, of the Proposed Manix to Fort Irwin Rail Spur and Staging Areas, San Bernardino County, California*. Prepared for U.S. Army Corps of Engineers. On file at Fort Irwin.

Gonzalez, P. 2019. *Anthropogenic Climate Change in Joshua Tree National Park, California, USA*. U.S. National Park Service Natural Resource Stewardship and Science.

Housman, D. 2020. Personal Communication with Rich Reaves regarding observation that Saltcedar occurs at Garlic Springs.

Leitner, P. 2007. "Mohave ground squirrel surveys at the Western Expansion Area of the National Training Center and Fort Irwin, California." Prepared for ITS Corporation, San Bernardino, California. Endangered Species Recovery Program, California State University, Stanislaus, Fresno, California. 26 pp. + appendices. Unpublished report. On file at Fort Irwin.

Mojave Desert Air Quality Management District. 2017. *MDAQMD Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area)*. https://ww3.arb.ca.gov/planning/sip/planarea/wmdaqmp/2016sip_mdplan.pdf

Murphy, R. W., T. L. Trepanier, and D. J. Morafka. 2006. "Conservation genetics, evolution and distinct population segments of the Mojave fringe-toed lizard, Uma scoparia." *J. Arid Environ*. Vol. 67. pp. 226–247. https://www.sciencedirect.com/science/article/abs/pii/S0140196306003004

National Park Service. 2020. Mojave National Preserve California – *Weather and Precipitation Data*. November. https://www.nps.gov/moja/planyourvisit/weather.htm

NatureServe. 2020. Uma scoparia: Mojave Fringe-toed Lizard. Accessed 20 November 2020. https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.101909/Uma_scoparia

Norris, K. S. 1958. "The evolution and systematics of the iguanid genus Uma and its relation to the Evolution of other North American desert reptiles." *Am. Mus. Nat. Hist. Bull*. Vol. 114. pp. 151–326. http://digitallibrary.amnh.org/handle/2246/1257

PaleoWest Archaeology. 2017. *Cultural Resources Inventory Survey of 10,000 Acres and National Register of Historic Places (NRHP) Evaluation of Archaeology Sites on Fort Irwin, San Bernardino County, California*.

Read, J., G. Jones, and A. N. Radford. 2014. "Fitness costs as well as benefits are important when considering responses to anthropogenic noise." *Behavioral Ecology*. Vol. 25, No. 1. pp. 4–7.

Rognan, C. 2008. "Monitoring efforts of the Mojave fringe-toed lizard (*Uma scoparia*) at the National Training Center and Fort Irwin." Fort Irwin Directorate of Public Works Environmental Management System: Fort Irwin, CA. Unpublished report. On file at Fort Irwin.

San Bernardino County. 2019. *Daggett Solar Power Facility Final Environmental Impact Report*. September 2019. Accessed 21 September 2019. http://www.sbcounty.gov/uploads/LUS/Environmental/Daggett%20Solar%20Power%20Facility_Final%20EIR%2009-04-2019%20(1).pdf

San Bernardino County Department of Environmental Health Services. 2001. Solid Waste Facility Permit No. 36-AA-0068. https://www2.calrecycle.ca.gov/SolidWaste/SiteDocument/Index/2674

SCS Engineers. 2014. *Report, Amended Joint Technical Document for Fort Irwin Sanitary Landfill, U.S. Army Garrison, Fort Irwin, California*. May.

Shannon, G., M. F. McKenna, L. M. Angeloni, K. R. Crooks, K. M. Fristrup, E. Brown, K. A. Warner, M.D. Nelson, C. White, J. Briggs, S. McFarland, and G. Wittemyer. 2015. "A synthesis of two decades of research documenting the effects of noise on wildlife." *Biological Reviews*. Vol. 91. pp. 982–1005.

Solano Archaeological Services. 2011. *Fort Irwin Uplands Cultural Resources Survey Project, San Bernardino County, California*. Prepared for Fort Irwin. On file at Fort Irwin.

South Coast Air Quality Management District. 2006. *Methodology to Calculate $PM_{2.5}$ and $PM_{2.5}$ Significance Thresholds.* Final. October.

Tetra Tech, Inc. 2016. *Nest surveys (helicopter) conducted for Fort Irwin in Spring 2016*. On File at Fort Irwin.

U.S. Air Force (USAF). 2006. *Environmental Assessment, Target Upgrades on Leach Lake Tactical Range at the National Training Center, Fort Irwin, California.* June.

U.S. Army (Army). 1979. *Environmental Impact Statement for the National Training Center, Fort Irwin Site, Fort Irwin, California.* Final.

U.S. Army (Army). 2005. Army Regulation (AR) 350-19, Army Sustainable Range Program. Headquarters, Department of the Army, Washington, DC. 30 August.

U.S. Army (Army). 2007. Army Regulation (AR) 200-1. *Environmental Protection and Enhancement*. Headquarters, Department of the Army, Washington, DC. August. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/r200_1.pdf

U.S. Army (Army). 2011. *Integrated Cultural Resources Management Plan 2011 – 2015 and Environmental Assessment for Fort Irwin and the National Training Center*.

U.S. Army (Army). 2013. Field Manual (FM) 3-90-1. *Offense and Defense*. Headquarters, Department of the Army, Washington, DC. October.

U.S. Army (Army). 2014. Army Regulation (AR) 350-52. Army Training Support System. Headquarters, Department of the Army, Washington, DC. 17 August.

U.S. Army (Army). 2015. National Training Center (NTC) Regulation 350-1. 11 February.

U.S. Army (Army). 2016a. Army Techniques Publication (ATP) 3-90.97. *Mountain Warfare and Cold Weather Operations*. Headquarters, Department of the Army, Washington, DC. April.

U.S. Army (Army). 2016b. Training Circular (TC) 25-8. *Training Ranges*. Headquarters, Department of the Army, Washington, DC. April.

U.S. Army (Army). 2017a. Army Doctrine Reference Publication (ADRP) 3-0. *Operations*. Headquarters, Department of the Army, Washington, DC. October.

U.S. Army (Army). 2017b. Army Regulation (AR) 350-1. Army Training and Leader Development. Headquarters, Department of the Army, Washington, DC.

U.S. Army (Army). 2018a. Army Regulation (AR) 350-50. Combat Training Center Program. Headquarters, Department of the Army, Washington, DC. 02 May.

U.S. Army (Army). 2018b. Army Doctrine Publication (ADP) 1-02. *Terms and Military Symbols*. Headquarters, Department of the Army, Washington, DC. August.

U.S. Army (Army). 2018c. Army Techniques Publication (ATP) 3-04.17. *Techniques for Forward Arming and Refueling Points*. Headquarters, Department of the Army, Washington, DC. 04 June.

U.S. Army (Army). 2019. Statement by the Honorable Mark T. Esper Secretary of the Army and General Mark A. Milley Chief of Staff United States Army, before the Senate Armed Services Committee, First Session, 116th Congress, on the Posture of the United States Army. 26 March.

U.S. Army (Army). 2020a. Statement by the Honorable Ryan D. McCarthy Secretary of the Army and General James P. McConville of Staff United States Army, before the House Armed Services Committee, Second Session, 116th Congress, on the Posture of the United States Army. 03 March. https://www.army.mil/e2/downloads/rv7/aps/aps_2020.pdf

U.S. Army (Army). 2020b. Field Manual (FM) 4-02. *Army Health System*. Headquarters, Department of the Army, Washington, DC.

U.S. Army (Army). 2021. Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in Army National Environmental Policy Act Reviews. March.

U.S. Army Corps of Engineers (USACE). 2013. *Fort Irwin, National Training Center: Jurisdictional Delineation Report*. 01 December.

U.S. Army Corps of Engineers (USACE). 2014a. *Fort Irwin Stormwater Management Plan, Cantonment Area*. USACE, Los Angeles District. September.

U.S. Army Corps of Engineers (USACE). 2014b. *Fort Irwin Stormwater Management Plan, Tiefort City.* USACE, Los Angeles District. September.

U.S. Department of Defense (DoD). 2018. *Summary of the 2018 National Defense Strategy of the United States of America*. Washington, D.C. January.

U.S. Environmental Protection Agency (EPA) and U.S. Department of Army. 2020. The Navigable Waters Protection Rule: Definition of "Waters of the United States." *Federal Register*. Vol. 85, No. 77. https://www.govinfo.gov/content/pkg/FR-2020-04-21/pdf/2020-02500.pdf

U.S. Environmental Protection Agency (EPA). 1971. Noise from Construction Equipment and Operations, and Home Appliances.

U.S. Environmental Protection Agency (EPA). 2021. Greenhouse Gases. https://www.epa.gov/report-environment/greenhouse-gases

U.S. Fish and Wildlife Service (USFWS). 2008. *Birds of Conservation Concern*. Division of Migratory Bird Management. Accessed 21 November 2019. https://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf

U.S. Fish and Wildlife Service (USFWS). 2014. *Biological Opinion for the Operations and Activities at Fort Irwin, San Bernardino County, California*. August.

U.S. Fish and Wildlife Service (USFWS). 2018. Joshua Tree Species Status Assessment. 113 pp. plus Appendices A-C. 20 July. https://ecos.fws.gov/ServCat/DownloadFile/169734

U.S. Fish and Wildlife Service (USFWS). 2019. List of Migratory Bird Species Protected by The Migratory Bird Treaty Act as of 02 December 2013. Accessed 18 November 2019. https://www.fws.gov/migratorybirds/pdf/policies-and-regulations/ListofMBTAProtectedSpecies1312.pdf

U.S. Fish and Wildlife Service (USFWS). 2022. *Common Raven Monitoring and Management within Desert Tortoise Conservation Areas/ California CORA Monitoring and Management Strata*. In Preparation.

U.S. Geological Survey (USGS). 2020a. *Water-Resources Study of Fort Irwin National Training Center*. Accessed 14 February 2020. https://www.usgs.gov/centers/ca-water/science/water-resources-study-fort-irwin-national-training-center

U.S. Geological Survey (USGS). 2020b. *Hydrography: National Hydrography Dataset and Watershed Boundary Dataset*. Accessed July 2020. https://nhd.usgs.gov/

U.S. Government Accountability Office (GAO). 2019. Army Readiness: Progress and Challenges in Rebuilding Personnel, Equipping, and Training. Testimony before the subcommittee on readiness and management support, committee on Armed Services, U.S. Senate. 06 February.

Unitt, P. 2008. "Gray Vireo (*Vireo vicinior*)." *California Bird Species of Special Concern*. W. D. Shuford and T. Gardali, eds. pp. 284–288. *Studies in Western Birds 1*. Western Field Ornithologists, Camarillo, CA, and Calif. Dept. Fish and Game, Sacramento.

University of Michigan Museum of Zoology. 2019a. *Animal Diversity Web. Ferruginous Hawk*. Accessed 20 November 2019. https://animaldiversity.org/accounts/Buteo_regalis/

University of Michigan Museum of Zoology. 2019b. *Animal Diversity Web. Northern Harrier*. Accessed 20 November 2019. https://animaldiversity.org/accounts/Circus_cyaneus/

Victor Valley Transit Authority. 2020. *NTC Commuter Route Bus Schedule*. Accessed 10 August 2020. https://vvta.org/wp-content/uploads/2019/11/VVTA_NTC_20190630.pdf

Wehausen, J. D. 2006. Nelson Bighorn Sheep *Ovis canadensis nelsonii*. BLM. http://www.blm.gov/ca/pdfs/cdd_pdfs/Bighorn1.pdf

SECTION 10

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Note: The electronic version of the *Final Legislative Environmental Impact Statement for Training and Public Land Withdrawal Extension, Fort Irwin, California* can be searched for keywords at https://aec.army.mil/index.php/irwin-nepa-meeting.

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