PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR THE FIELDING OF THE MANEUVER - SHORT RANGE AIR DEFENSE CAPABILITY

Prepared by

UNITED STATES ARMY ENVIRONMENTAL COMMAND
JOINT BASE SAN ANTONIO - FORT SAM HOUSTON

December 2021

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Reviewed and Approved by the U.S. Army Environmental Command

Matthew F. Kelly
Colonel, US Army
Commanding

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SECTION 1. PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

In 2019, the United States (U.S.) Army issued the Army Modernization Strategy (AMS) that describes how it will transform into a multi-domain force by 2035, meeting its enduring responsibility as part of the Joint Force (all U.S. and allied military forces) to provide for the defense of the U.S. and retain its position as the globally dominant land power. The primary end state of the 2019 AMS is a modernized Army capable of conducting Multi-Domain Operations (MDO) as part of an integrated Joint Force in one major action by 2028 and ready to conduct MDO across an array of scenarios in multiple theaters by 2035. The MDO concept describes how the Army will support the Joint Force in the rapid and continuous integration of all domains of warfare—land, sea, air, space, and cyberspace—to deter and prevail as we compete short of conflict and fight and win if deterrence fails. The 2018 National Defense Strategy states that we must prioritize long-term strategic competition with China and Russia, while deterring regional adversaries and sustaining irregular warfare and anti-terrorism competency. Political, economic, social, and technological changes will continue to create challenges and opportunities for the U.S. Army as we maintain our land dominance. Future warfare will only expand in geographic scale, domains, and types of actors while decision cycles and reaction times compress.

In support of the AMS, the Army has six modernization priorities driving materiel development for the MDO-capable force:

- Long-Range Precision Fires
- Next-Generation Combat Vehicles
- Future Vertical Lift
- Network Technology
- Air and Missile Defense
- Soldier Lethality.

The whole is greater than the sum of the parts—it is the combination of these capabilities that will allow the Army to fight using MDO.

The Maneuver Short-Range Air Defense (M-SHORAD) system and associated battalion addressed in this Programmatic Environmental Assessment (PEA) is a key component of Air and Missile Defense modernization.

Maneuvering formations require air defense capabilities to counter air threats. The Chief of Staff of the Army directed an effort to improve the Air Defense Artillery (ADA) capability to protect the maneuver force and field four M-SHORAD battalions. The M-SHORAD capability and the

associated ADA battalions are being activated to provide improved air defense to the maneuver commander.

1.2 PURPOSE AND NEED

The purpose of the proposed action is to improve the protection of tactical maneuver forces from current and future aerial threats. The M-SHORAD capability is part of the implementation of an Air and Missile Defense modernization strategy that incorporates improvements in systems across the air defense portfolio. M-SHORAD systems will employ a variety of sensors and shooters (missiles and guns) to protect maneuvering forces. The M-SHORAD capability will provide maneuver forces the ability to detect and engage aerial threats. The M-SHORAD is a versatile system that conducts dedicated air defense operations, organized as battalions, and assigned to a division.

The proposed action is needed to improve the dedicated air defense capability in current maneuver formations to counter short-range aerial threats. Combatant commanders require M-SHORAD capabilities to provide air defense and force protection by maneuvering with and directly supporting divisional maneuver forces.[1] The M-SHORAD capability will operate with current air defense systems and communications architecture on a Stryker vehicle platform.

1.3 PROPOSED ACTION

In line with these modernization efforts, the Army plans to field[2] M-SHORAD battalions to enhance the defensive capability of divisions against aerial threats. While currently assessing a small selection of active Army installations, M-SHORAD may be fielded to other active Army installations or U.S. Army Reserve and National Guard units as a complete battalion or in smaller subsets of the full battalion. If this is the case, they will tier from this document and produce a site-specific Environmental Assessment (EA) or Record of Consideration (REC), consistent with Section 1.4 of this PEA.

The primary warfighting component of the M-SHORAD battalion will be the M-SHORAD capability provided by about 40 Stryker vehicles modified to the M-SHORAD configuration. Each M-SHORAD battalion will also field approximately 20 additional Strykers. They will be the infantry carrier vehicles (ICV) serving as platoon leader vehicles, and the Stryker medical evacuation (MEDEVAC) vehicles. The Army may field the MaxxPro mine resistant ambush protected (MRAP) vehicle in lieu of some or all of the additional 20 Strykers. Fielding also includes approximately 100 joint light tactical vehicles (JLTVs), about 150 support vehicles and

[1] Divisional maneuver forces currently consist of Armor Brigade Combat Teams (ABCT) and Stryker Brigade Combat Teams (SBCT). The primary vehicles of an ABCT are the Abrams tank and Bradley fighting vehicle. The primary vehicle of an SBCT is the Stryker combat vehicle. The combatant commander will assign M-SHORAD battalion assets to protect their division forces as needed.

[2] "Field" refers to sending new equipment and technology to an installation(s). As part of the fielding action, Soldiers will be stationed at an installation(s) to train with and maintain the M-SHORAD capability.

trailers, plus individual weapons, sensors, communications equipment, and support and maintenance equipment to facilitate operation, storage, and maintenance of all systems. The M-SHORAD battalion may field with the high-mobility multipurpose wheeled vehicles (HMMWV) instead of the JLTVs depending on procurement timelines and priorities. The proposed action also includes the stationing of approximately 550 M-SHORAD battalion soldiers. The Army may field this technology at one or more installations that meet the selection criteria below.

The M-SHORAD shown in Figure 1.3-1 will use the Stryker vehicle platform. M-SHORAD provides the capability to detect, track, identify, and destroy low-altitude air targets using onboard acquisition and tracking sensor capability, in a wide variety of combat conditions. The M-SHORAD also has the capability to accept cueing and tracking information from other sources. Weapons on the M-SHORAD Stryker include:

1. Stinger missile
2. Longbow Hellfire missile
3. 30mm autocannon
4. 7.62mm coaxial machine gun.

Figure 1.3-1. M-SHORAD Configuration

Table 1-1 provides a summarized list of approximate numbers of vehicles, systems, and equipment that are already in use at Army installations that battalion soldiers will train with and utilize; the quantities would likely increase as a result of stationing the M-SHORAD battalion.

Approximately 170 vehicles and trailers; 680 weapons; 650 sensors, emitters, and radios; and 85 electrical generators are currently in use at the installation and would be used by the M-SHORAD battalion for training. Increased use of these vehicles, weapons, and equipment has the potential to cause additional environmental impacts.

Table 1-1. M-SHORAD Systems and Equipment Currently in Use at Army Installations

Vehicles & Trailers	Approximate Quantity
Stryker Infantry Carrier Vehicle: Double V Hull[1]	12
Stryker Medical Evacuation Vehicle: Double V Hull[1]	8
Trucks & Vans (All Types)	75
Trailers (All Types)	75
Individual Weapons	
Small Caliber Carbines, Machine Guns, & Pistols	600
Grenade Launchers & Machine Guns	40
Crew-Served Weapons	
Missile: Stinger	N/A[2]
Machine Gun: 7.62mm M240	40
Sensors, Emitters, & Radios	
Communication & Navigation Radios	550
Other Emitters	85
Radar Sets	15
Electrical Generators	
Generators	40
Trailer Mounted Generators	45

[1] The Army may field the MaxxPro MRAP vehicle in lieu of some or all the additional 20 Strykers.
[2] The Stinger missile is not normally stored or maintained at the M-SHORAD battalion. When required for training, missiles are issued from the installation ammunition supply point (ASP), and any unused munitions are returned.

Table 1-2 provides a list of approximate numbers of systems and equipment that battalion soldiers will train with and utilize that are new to the installation or are being employed in new ways.

Table 1-2. M-SHORAD New Systems and Equipment

Vehicles	Approximate Quantity
Joint Light Tactical Vehicle: Two Seat[1]	70
Joint Light Tactical Vehicle: Four Seat[1]	30
M-SHORAD Fighting Vehicle	40
Crew Served Weapons	
Missile: Longbow Hellfire	N/A[2]
Machine Gun: 30mm XM914	40
Sensors, Emitters, & Radios	
Radar Set	40
MX-GCS EO/IR Sight	40

[1] The Army may field the HMMWV in lieu of some or all of the JLTVs.

[2] The Longbow Hellfire missile is not normally stored or maintained at the M-SHORAD battalion. When required for training, missiles are issued from the installation ASP, and any unused munitions are returned.

The M-SHORAD battalion will complete training events and exercises as individual soldiers and collectively in groups as large as the full battalion of approximately 550 soldiers. Battalion soldiers will train to maintain physical fitness and to employ individual and crew-served weapons effectively and properly, drive and maintain assigned vehicles, utilize assigned sensors and communications equipment, and integrate into the supported division and brigade combat teams to provide an effective defense against aerial threats.

At the assigned home station, M-SHORAD battalion soldiers and their families will reside in barracks, on-post housing, or in the nearby communities. Soldiers and their families will utilize the facilities, shopping, and support services on post and in the local community in a manner similar to civilian residents providing economic benefit to the community.

1.4 SCOPE AND METHODOLOGY

This PEA evaluates potential direct, indirect, and cumulative effects of fielding the M-SHORAD battalion at Army installations in the United States to support division's maneuver forces. If the consideration and analyses in the PEA are applicable to local conditions and if no additional issues are identified, requirements of the National Environmental Policy Act (NEPA) can be met through the use of this PEA and the completion of the specific REC. Consistent with Title 32 of the Code of Federal Regulations (32 CFR) Part 651.19, a REC can be used for the installations discussed in this PEA, if the analysis fully addressed the proposed action and was sufficient to determine the environmental impacts. A PEA REC checklist is located in Appendix D.

Tiering by adopting this PEA and preparing an abbreviated EA is most appropriate if specific information regarding the fielding, stationing, training, and maintenance of this capability is not

currently available for adequate analysis of environmental effects at the installations discussed in this PEA. In addition, tiering from this PEA can be done for installations that were not discussed in this document should the mission and needs of the Army require fielding this capability to other installations. The PEA REC checklist can be used to as a tool to determine whether tiering is needed.

At installations receiving the M-SHORAD Battalion, or where the M-SHORAD battalion may conduct training, this PEA will facilitate compliance with the Army's NEPA regulations (32 CFR Part 651 Environmental Analysis of Army Actions) by providing (1) a framework to address the impacts of this type of action, (2) a procedure to certify a complete understanding for all impacts addressed in this PEA through the use of the installation-specific REC, and (3) a procedure to facilitate the preparation of a focused, tiered, or supplemental NEPA document when the need is identified.

1.5 REGULATORY AUTHORITY

This PEA is prepared in compliance with NEPA, as implemented by the President's Council on Environmental Quality regulations governing NEPA (40 CFR Part 1500-1508 (1978, as amended in 1986 and 2005)) and the U.S. Army's rule governing NEPA, Environmental Analysis of Army Actions (32 CFR Part 651).

1.6 PUBLIC AND AGENCY INVOLVEMENT

In accordance with 32 CFR Part 651, the Army provides opportunities for the public and agencies to participate in the NEPA process, to promote open communication and improve the decision-making process. Persons and organizations having potential interest in the proposed action are encouraged to participate in the PEA process.

On May 19, 2021, a Notice of Availability (NOA) was published in the *Federal Register* and local newspapers announcing a 30-day public review and comment period for this PEA, the draft Finding of No Significant Impact (FONSI), and the draft Finding of No Practicable Alternative (FONPA). Direct mailings to inform organizations, agencies, and Native American Tribes of the NOA publication were issued to those affiliated with each of the assessed installations.

Electronic copies of the PEA, draft FONSI, and draft FONPA are available for download from the U.S. Army Environmental Command's website at *https://aec.army.mil/index.php?cID=352*. Copies of these documents have been provided to local libraries near the affected installation.

Please send electronic comments via email to *usarmy.jbsa.aec.nepa@mail.mil* using the subject line M-SHORAD Public Comment or mail written comments to*:*

U.S. Army Environmental Command
Attn: M-SHORAD Public Comments
2455 Reynolds Road, Mail Stop 112
Joint Base San Antonio-Fort Sam Houston, TX 78234-7588

Inquiries may also be made via phone by calling the U.S. Army Environmental Command Public Affairs Office at 443-243-0313, 210-792-6683, or toll-free at 855-846-3940, or via email to *usarmy.jbsa.aec.mbx@mail.mil*. Comments submitted within the 30-day public comment period will be made part of the administrative record and will be considered before a final decision is made.

1.7 DECISION TO BE MADE

This NEPA process will end with an Army decision documented in a FONSI or a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS). Prior to making a final decision, the decision-maker will consider both the environmental and socioeconomic impacts analyzed in this PEA, along with all other relevant information, such as public issues of concern identified during the comment period. If the decision-maker determines that there are no significant environmental impacts, that decision will be documented in the final FONSI, which will be signed no earlier than 30 days from the publication of the NOA for this PEA and the draft FONSI. The Army may initiate a NOI for an EIS if new information warrants the need for additional analysis of potentially significant environmental impacts. The Army decision-maker for this PEA is the Department of Army's Deputy Chief of Staff, G-9.

SECTION 2. ALTERNATIVES

This section discusses the screening criteria used to identify installations for analysis, as well as alternatives carried forward and not carried forward for analysis in Section 3.

2.1 SCREENING CRITERIA

The Army established screening criteria to identify the range of potential alternatives that would support the purpose of and the need for the Proposed Action and to assess whether an alternative was reasonable and would be carried forward for evaluation in this PEA. Reasonable alternatives must meet the following five criteria:

1. Installations must have an Armor Brigade Combat Team (ABCT) or a Stryker Brigade Combat Team (SBCT) present or provide initial training for M-SHORAD-assigned soldiers.

   The primary purpose of the M-SHORAD battalion is to provide dedicated air defense and force protection while supporting divisional maneuver forces. Co-location with supported forces enhances the training and effectiveness of the supporting and supported force, and is a requirement for the initial fielding actions. Initial M-SHORAD training is limited to a specific installation based on the required efficiencies to meet external constraints.

2. Adequate maneuver space is available to support the minimum requirements for the M-SHORAD battalion training[3] as designated in authoritative Army training documents. The training requirements can be met on existing maneuver areas, new maneuver areas under construction or planned, or through selective scheduling as facilitated by the Sustainable Readiness Model (SRM) or the Regionally Aligned Readiness and Modernization Model (ReARMM), as discussed in Section 2.2.1. Institutional training sites will not require the full amount of maneuver space as student training will provide basic abilities that will be honed at the M-SHORAD battalion.

   Maneuver space designated as light, heavy, or amphibious is measured in km^2 and km^2-days,[4] and it may be contiguous or noncontiguous. Light maneuver training may be accomplished on land designated for heavy maneuver training but the converse is not true. M-SHORAD battalions, batteries, and smaller units must have sufficient space on the installation to meet the maneuver training required by Army training doctrine.

[3] The M-SHORAD maneuver training requirements are derived from a review of Army training requirements and Army Force Management System (FMS) data. Using this information, a hypothetical scenario was built in the Army Range Requirements Model (ARRM) using elements of existing battalions aligned with the M-SHORAD battalion element missions and equipment to derive the maneuver requirements from authoritative Army doctrine and training requirements.

[4] The number of km^2-days is calculated by multiplying the area a training exercise requires in km^2 times the number of days a training exercise requires times the number of iterations a training exercise requires annually. For example, a unit may be required to train on a 5 km^2 area for one day and repeat that five times during the year; this would result in 25 km^2-days.

3. Adequate live-fire ranges are available to support the minimum requirements for the M-SHORAD crew certification and training[5] as designated in authoritative Army training documents. The training requirements can be met on existing ranges, new ranges under construction or planned, or through selective scheduling as facilitated by the SRM or ReARMM. In addition, certain live-fire training may be accomplished through appropriate simulations. Institutional training sites will not require the full complement of live-fire ranges as student training will provide basic abilities that will be honed at the M-SHORAD battalion.

   Installations must have the range types required to accommodate the live-fire training events and crew certification for the M-SHORAD crews and units. The ranges may be the primary range type or one or more of the alternate range types designated in Training Circular (TC) 25-8 for each live-fire training event. Table 2-1 shows the expected annual live-fire range requirements for the M-SHORAD battalion derived from a review of the requirements of the Divisional supported units and an existing ADA battalion that provides capabilities similar to the M-SHORAD battalion. Acceptable alternate range types are listed in Appendix B.

4. Adequate protected airspace of lateral and vertical extent. However, institutional training sites will not require the full amount of airspace as student training will provide basic abilities that will be honed at the M-SHORAD battalion.

   Tactics and weapons of the M-SHORAD system will require training using aerial targets that will be detected, tracked, engaged, and destroyed. Targets must be free to maneuver in a manner similar to an enemy threat. The M-SHORAD must be free to bring all sensors and weapons to bear on the target. The airspace must overlay the ground footprint of ranges where the training will occur and extend vertically to a minimum of 25,000–30,000 feet above ground level. Such activity must be contained within airspace that is monitored by the governing range control or land/airspace governing agency visually or with radar so non-participating aircraft can be detected. The controlling agency must have communications capability to warn and prevent the entry of non-participating aircraft or suspend M-SHORAD operations if a non-participating aircraft are detected within the protected airspace. All training events involving live fire of Stinger or Longbow Hellfire missiles or the flight of unmanned aerial vehicles (tactical or targetry) will require airspace clearance uniquely established by the governing range control or land/airspace governing agency.

[5] The M-SHORAD live fire training requirements are derived from a review of Army training requirements and Army FMS data. Using this information, a hypothetical scenario was built in ARRM using elements of existing battalions aligned with the M-SHORAD battalion element missions and equipment to derive the live-fire requirements from authoritative Army doctrine and training requirements.

Table 2-1. Expected Annual Live-Fire Range Requirements for M-SHORAD

FCC Description	Requirements (RD)[1, 2]	Minimum Range area[3]
CONVOY LIVE FIRE RANGE/ENTRY CONTROL POINT (CLF/ECP)	8.4	No minimum range area specified
BASIC 10M-25M FIRING RANGE (ZERO)	57.0	0.8 acres
AUTOMATED RECORD FIRE (ARF) RANGE	61.2	23.7 acres
AUTOMATED MULTIPURPOSE MACHINE GUN (MPMG) RANGE	19.4	370 acres
SCOUT/RECCE GUNNERY COMPLEX	14.6	337 acres
DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)	10.8	865 acres
DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)	8	4942 acres
AUTOMATED MULTIPURPOSE TRAINING RANGE (AMPTR)	0.2	865 acres
MULTIPURPOSE RANGE COMPLEX-HEAVY (MPRC-H), AUTOMATED	34.7	4942 acres
BATTLE AREA COMPLEX (BAX)	20	2372 acres
AIR DEFENSE MISSILE FIRING RANGE	52.5	463 acres
HAND GRENADE QUALIFICATION COURSE (NONFIRING)	15.4	No minimum range area specified
HAND GRENADE FAMILIARIZATION RANGE (LIVE)	7.7	2.5 acres
GRENADE LAUNCHER RANGE	28.4	8.65 acres
COMBINED ARMS COLLECTIVE TRAINING FACILITY (CACTF)	0.3	556 acres

Data from Army Range Requirements Model (ARRM) and TC 25-8. ARRM Fiscal Year 2020 Data accessed on 15 May 2020.

[1]Requirements are measured in range days (RD). RDs are computed by multiplying the number of days on the range times the number of iterations a training event requires each year. For example, a six RD requirement may be 6 one-day events, 3 two-day events, or 12 half-day events.

[2]Computed from a review of Army training requirements and Army FMS data. Using this information, a hypothetical scenario was built in ARRM using elements of existing battalions aligned with the M-SHORAD battalion element missions and equipment to derive the live-fire requirements from authoritative Army doctrine and training requirements.

[3]If the Army provides an exception to standard smaller areas are acceptable.

5. Adequate cantonment facilities for administrative, maintenance, motor pool, housing, and personnel support.

   The installation must have appropriate vacant or vacatable facilities, the ability to modify facilities prior to occupancy to meet the required standards, or construction of appropriate

facilities underway or planned. Facilities with an exception to standard are also considered adequate.

Infrastructure that meets Army standards required to meet the Proposed Action includes:

- One battalion HQ facility of approximately 1.1 acres.
- Company/battery HQ facilities:
  - One maintenance company HQ of approximately 0.8 acres and
  - Four HQs, one per battery totaling approximately 2.4 acres or one unitary HQ for all batteries of approximately 2.25 acres.
- One tactical equipment maintenance facilities (TEMF) of approximately 2.3 acres.
- One hazardous material storage facility with 480 GSF.
- Tactical vehicle parking apron of approximately 10.3 acres.
- Sufficient Ammunition Supply Point (ASP) facilities for M-SHORAD munitions.
- Available unaccompanied personnel housing[6] of approximately 1.7 acres to accommodate approximately 33 percent[7] of the 550 M-SHORAD battalion soldiers.
- Sufficient available dining facilities (DFAC) of approximately 0.9 acres to accommodate up to approximately 550 M-SHORAD battalion soldiers.

The estimated area for facilities is approximately 19.6 acres.

At institutional training sites the facility requirements differ and to meet the preferred alternative include:

- Available unaccompanied personnel housing approximately 1.25 acres to accommodate 130 students (50 percent of the approximate 260 annual M-SHORAD battalion students).
- One general instruction building (GIB) of approximately 2.0 acres to accommodate 130 students and 20 instructors.
- Sufficient available DFACs of approximately 0.1 acres to accommodate 130 students.

The estimated area for facilities at institutional training sites is approximately 3.3 acres.

Although not a requirement, information on whether or not an installation can accommodate the fielding, stationing, training, and maintenance of the M-SHORAD capability within existing infrastructure versus new construction may provide useful information on scheduling the stationing and fielding of the capability.

[6] Across the full range of ranks in the M-SHORAD battalion, each unaccompanied Soldier is entitled to an average of 133 sq. ft. of living space.
[7] The Department of Defense Selected Military Compensation Tables of 1 January 2019 show 33 percent of military personnel live on base receiving quarters in kind.

Table 2-2 provides a list of Army installations that meet the criteria mentioned above for M-SHORAD training. All listed installations meet the selection criteria. This table, however, may not represent an all-inclusive list.

Table 2-2 Army Installations Which Meet M-SHORAD Fielding Requirements

Installation Name, State
Fort Bliss, Texas
Fort Hood, Texas
Fort Riley, Kansas
Fort Stewart, Georgia
Joint Base Lewis-McChord and Yakima Training Center, Washington*
Fort Carson and Piñon Canyon Maneuver Site, Colorado
Fort Sill, Oklahoma
***** A separate EA is being performed to assess Joint Base Lewis McChord and Yakima Training Center, therefore this installation will not be discussed further in this PEA.

2.2 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

2.2.1 Proposed Action Alternative

Proposed Action Alternative: To field M-SHORAD units to installations at which the unit can be accommodated within planned or existing temporary or permanent infrastructure and training can be accomplished through live fire or approved simulations. Training requirements can also be met through flexible scheduling as facilitated by the SRM or ReARMM. Facility requirements can be met by using an exception to standard. All the installations will be using an exception to standard for one or more facilities, at least initially.

Table 2-3 shows the facilities that meet the screening criteria and which facilities would require modification or construction at each installation.

Table 2-3. Summary of M-SHORAD Requirements vs Installation Facilities

Requirement	Currently Meets Requirement	Facility or Range Construction May Be Needed
Fort Bliss		
Hosts Maneuver Forces or Provides Training	X	
Maneuver Space	X	
Live-Fire Ranges		X
Airspace	X	
Cantonment Facilities		X
Fort Hood		
Hosts Maneuver Forces or Provides Training	X	
Maneuver Space		X
Live-Fire Ranges		X
Airspace	X	
Cantonment Facilities		X
Fort Riley & Smoky Hill Range		
Hosts Maneuver Forces or Provides Training	X	
Maneuver Space	X	
Live-Fire Ranges		X
Airspace	X	
Cantonment Facilities		X
Fort Stewart		
Hosts Maneuver Forces or Provides Training	X	
Maneuver Space	X	
Live-Fire Ranges		X
Airspace	X	
Cantonment Facilities		X
Fort Carson & Piñon Canyon Maneuver Site		
Hosts Maneuver Forces or Provides Training	X	
Maneuver Space	X	
Live-Fire Ranges		X
Airspace	X	
Cantonment Facilities		X
Fort Sill*		
Hosts Maneuver Forces or Provides Training	X	
Maneuver Space	X	
Live-Fire Ranges	X	
Airspace	X	
Cantonment Facilities		X

*Because Fort Sill will serve as the M-SHORAD institutional training site, its requirements for maneuver space, live-fire ranges, airspace, and facilities are less than the other installations.

The current unit training strategy is the Sustainable Readiness Model (SRM). The SRM places each unit, such as an M-SHORAD battalion or ABCT, into a unit model. Unit models are comprised of a series of modules that specify the training cycle that a unit follows to achieve and maintain a readiness level (RL) prescribed by Army senior leaders. RL denotes a unit's ability to deploy, complete their assigned mission, and support U.S. military objectives. The modules are grouped along a timeline of multiple years that end at the Unit Readiness Objective (URO), a specific future date when the unit is required to be at the prescribed RL.

The two primary unit models are the Unit Readiness Cycle (URC) and Unit Deployment Cycle (UDC). The URC modules follow a progressive path that builds to and maintains the prescribed RL or a sustained path where a unit is required to maintain the prescribed RL. The UDC is comprised of modules that take a unit from a dwell phase when they have just returned from a deployment to be ready to deploy again in the next deployment phase. Units in the dwell phase will undergo personnel changes and equipment maintenance and upgrades. As these changes occur, the UDC unit begins a training cycle where the unit capabilities are improved to reach the prescribed RL.

The Army has developed a new unit training strategy to replace the SRM. The Regionally Aligned Readiness and Modernization Model (ReARMM) will align Army units to a region such as Europe or the Indo-Pacific region. This will aid units in developing expertise in the parts of the world to which they could likely deploy during a conflict. Units would also acquire new and theater-specific equipment for potential operations. The model is also intended to provide soldiers more predictability so units would have time to refine doctrine, and reorganize units if necessary based on theater-specific requirements. ReARMM will allow the Army to deploy troops overseas to meet currently assigned missions while preparing the force for the future.

While active-duty units will cycle through eight-month phases of modernization, training, and mission, National Guard and Reserve units will have extended phases to match total requirements to personnel. In the modernization phase, units may conduct a variety of activities including divestiture of older equipment; new equipment fielding and training; lateral transfers; soldier touchpoints and acclimation with new systems; specialized training for soldiers to build advanced capabilities; and block leave. While in the training phase, units will sharpen their skills employing both new equipment received for modernization and retained equipment. The training missions and exercises will aid the unit in developing the teamwork and unit cohesiveness required to excel during deployment in the mission phase.

Units will transition from the SRM to ReARMM beginning October 1, 2021. It must be noted that the assessment of maneuver space and live-fire ranges in this PEA is based solely on Army training doctrine that does not account for the SRM or ReARMM. Army senior leaders, unit commanders, and installation commanders have flexibility to alter training by increasing, decreasing, or changing the timing of the training events within the installation's training limits. These changes cannot be known as they are subject to the assessment of a unit's readiness and

progression toward their URO in the SRM or their current phase in ReARMM. Units in the sustained URC or nearing their URO in the SRM or nearing the mission phase in ReARMM will have a higher priority to complete their required training. Unit commanders and installation staff will prioritize them for training time with lower priority units completing training later.

Table 2-4 provides more detailed information regarding installation facilities available and how the M-SHORAD can be incorporated into the installation cantonment and range facilities. More detailed information regarding each installation follows Table 2-4.

Table 2-4. Summary of the Alternatives at Each Installation

Installation	**Preferred Alternative** ✓Live fire or approved simulations for all weapons ✓Adequate maneuver space at the installation ✓Permanent or temporary infrastructure in the cantonment	No Action
Fort Bliss	Assessment of Screening Criteria: • ABCTs are present • Maneuver space[8] – excess or deficit if M-SHORAD is stationed: → Light Maneuver Land (LML) – excess → Heavy Maneuver Land (HML) – excess • Live-fire range shortages[9]: deficit of one type of range → Percentage of total range acreage deficient - (N/A),[10] • Existing restricted airspace[11] → max altitude: Unlimited; 4,136 km^2 • Cantonment facilities: 10 facilities of 17.3 acres exist, and one facility of 2.3 acres may require construction.	Fort Bliss will not receive the M-SHORAD capability; no impacts on resources associated with the increase in personnel, maneuver area, airspace, live fire, and existing facilities due to the M-SHORAD stationing and fielding at this installation. Current training remain status quo.
	Biological Resource Constraints: → No digging or collection of any plants, even for camouflage. → All excavations must be approved and backfilled. → Hunting prohibited by personnel during training exercises. → Destruction of nests or disturbance of bats and birds prohibited. → Illegal to collect or harm animals w/o state and Department of Public Works – Env Div (DPW-E) permit. Leave all wildlife alone, even snakes. Cultural Resource Constraints: None indicated Mitigation Requirements for Wetlands/Flood Plains: → 676 acres wetlands (5 acres delineated) exist; → No net loss of wetland and floodplain acreage. → Arroyo riparian buffers along waterways [activities limited].	

[8] Requirement for maneuver training is based on Army training doctrine. Training on weekends is not normally accounted for in training schedules, but was included in this analysis when determining the excess or (deficit) in maneuver training land.

[9] M-SHORAD training is based on Army training doctrine and will occur on 15 primary range types. The shortage of range types and acreage is based on an analysis using ARRM and takes into account extra training days available on weekends and alternate range types that can substitute for the primary range type.

[10] Certain ranges are terrain dependent and have no size specified; therefore, an acreage cannot be determined.

[11] Airspace must overlay the ground footprint of ranges where the training will occur and extend vertically to 25,000-to-30,000-feet altitude.

Installation	**Preferred Alternative** ✓Live fire or approved simulations for all weapons ✓Adequate maneuver space at the installation ✓Permanent or temporary infrastructure in the cantonment	No Action
Fort Hood	Assessment of Screening Criteria: • ABCTs and a SBCT are present • Maneuver space – excess or deficit if M-SHORAD is stationed: → LML– excess → HML – deficit • Live-fire range shortages: deficit of two types of ranges → Percentage of total range acreage deficient – (N/A) • Existing restricted airspace: → max altitude: 45,000 feet.; 705 km^2 • Cantonment facilities: three facilities of 11.3 acres exist, and eight facilities of 8.3 acres may require construction.	Fort Hood will not receive the M-SHORAD capability; no impacts on resources associated with the increase in personnel, maneuver area, airspace, live fire, and existing facilities due to the M-SHORAD stationing and fielding at this installation. Current training remain status quo.
	Biological Resource Constraints: → 60-foot radius buffer around migratory bird nests when found at ground level → 30-foot radius buffer around migratory bird nests when found at low tree height → For two or more nests: 100-foot buffer for ground level; 60-foot buffer for low trees → Bald & Golden Eagle: off-limit buffers during nesting season Cultural Resources Constraints: → 30 m buffer for all historic properties and documented in "no digging" and "no staking/ grounding rod" maps. → Access to Leon River Medicine Wheel restricted to Native Americans for traditional observances Mitigation Requirements for Wetlands/Flood Plains: → 750 acres wetlands (60 delineated) exist. → Buffers required for riparian areas (size of buffer not provided).	
Fort Riley & Smoky Hill Range	Assessment of Screening Criteria: • ABCTs are present • Maneuver space – excess or deficit if M-SHORAD is stationed: → LML – deficit → HML – excess • Live-fire range shortages: deficit of two types of ranges → Percentage of total range acreage deficient – 16% • Existing restricted airspace: → max altitude: 29,000 feet.; 361 km^2 at Fort Riley → max altitude: 23,000 feet.; 240 km^2 at Smoky Hill Range • Cantonment Facilities: three facilities of 13.0 acres exist, and eight facilities of 6.6 acres may require construction.	Fort Riley will not receive the M-SHORAD capability; no impacts on resources associated with the increase in personnel, maneuver area, airspace, live fire, and existing facilities due to the M-SHORAD stationing and fielding at this installation.

Installation	**Preferred Alternative** ✓Live fire or approved simulations for all weapons ✓Adequate maneuver space at the installation ✓Permanent or temporary infrastructure in the cantonment	No Action
	Biological Resource Constraints: → Piping Plovers: no disturbance buffers. → Whooping Cranes: no fly buffers at 2,000 above ground level (AGL) and 0.5-1.5 nautical miles → Bald Eagles – 200-m flight altitude buffer & buffer of roosts and nests. → No tree removal 100 m of nests; buffer at 200 m during breeding season Cultural Resources Constraints: → Archaeological sites for which disturbance must be avoided, minimized or mitigated; → Facilities that require evaluation to determine application of preservation measures. Mitigation Requirements for Wetlands/Flood Plains: → 1,536 acres wetlands (0 delineated) exist; riparian buffers.	Current training remain status quo.
Fort Stewart	Assessment of Screening Criteria: • ABCTs are present • Maneuver space – excess or deficit if M-SHORAD is stationed: → LML – deficit → HML – excess • Live-fire range shortages: deficit of two types of ranges → Percentage of total range acreage deficient – 1.9% • Existing restricted airspace: → max altitude: 29,000 feet.; 1,060 km^2 → Altitude Reservation up to 45,000 ft. is available upon request from Jacksonville FAA • Cantonment facilities: three facilities of 13.0 acres exist, and eight facilities of 6.6 acres may require construction.	Fort Stewart will not receive the M-SHORAD capability; no impacts on resources associated with the increase in personnel, maneuver area, airspace, live fire, and existing facilities due to the M-SHORAD stationing and fielding at this installation. Current training remain status quo.
	Biological Resource Constraints: → Flatwoods Salamander: 100-foot buffer around breeding sites → Bald Eagle: 750 foot radius buffer; no logging, mechanism maneuver/live fire within 1,500 feet, low altitude (500 feet), & no use of toxic chemicals Cultural Resources Constraints: → Applicable SOP's within the ICRMP for avoidance of marked historic sites and cemeteries; → Review of IJOs that affect facilities and training exercises planned outside of "Free Dig" areas. Mitigation Requirements for Wetlands/Flood Plains: → 85,796 acres wetlands (0 delineated) and one conservation bank exist → approx. 1,000 acres exist in training area A-11 maintained as a conservation bank. → Streamside Management Zone buffers: 20 feet for slopes <20%; 35 feet for slopes 21-40%; and 50 feet for slopes >40%	

Installation	**Preferred Alternative** ✓Live fire or approved simulations for all weapons ✓Adequate maneuver space at the installation ✓Permanent or temporary infrastructure in the cantonment	No Action
Fort Carson & Piñon Canyon Maneuver Site (PCMS)	Assessment of Screening Criteria: • ABCT and SBCTs are present • Maneuver space – excess or deficit if M-SHORAD is stationed: → LML – excess → HML – excess • Live-fire range shortages: deficit of four types of ranges → Percentage total range acreage deficient– 69% • Existing restricted airspace: → max altitude: 60,000 foot; 414 km^2 at Fort Carson → max altitude: 10,000 foot; 718 km^2 at PCMS • Cantonment facilities: four facilities of 13.0 acres exist, and seven facilities of 6.6 acres may require construction.	Fort Carson will not receive the M-SHORAD capability; no impacts on resources associated with the increase in personnel, maneuver area, airspace, live fire, and existing facilities due to the M-SHORAD stationing and fielding at this installation. Current training remain status quo.
	Biological Resource Constraints: • Mexican Spotted Owl roost tree buffer of 200 m or 656 feet. • In accordance with the April 2017 Incidental Take Permit, when a Golden Eagle nest is known to be occupied at Fort Carson, a no surface disturbance buffer zone of 0.5 mile is established, except for approved Teller Dam work. • The aircraft buffer zone for Bald and Golden Eagles is 500 feet or 1000 feet, depending upon the location of the nest. • Golden Eagle nest buffer of 200 m until young have fledged. • 60-foot radius buffer around migratory bird nests when found at ground level • 30-foot radius buffer around migratory bird nests when found at low tree height • Eagle nests: 0.5-mile off-limit buffers during nesting season • Seasonal 200-m buffer around known Mexican Spotted Owl roost trees (no bivouac, bird-watching, or off-road vehicle use during winter) Cultural Resources Constraints: • Follow Standard Operating Procedures in the Integrated Cultural Resource Management Plan (includes 30-m buffer and reporting when new discovery is made). • 30-m buffer for all protected resources, which are documented in the Resource Protection Map. Mitigation Requirements for Wetlands/Flood Plains: • 750 acres of wetlands on Fort Carson; 361 acres of wetlands on PCMS • Ensure no-net-loss of wetland acreage on Fort Carson and PCMS (1:1 mitigation for disturbance or loss)	

Installation	Preferred Alternative ✓Live fire or approved simulations for all weapons ✓Adequate maneuver space at the installation ✓Permanent or temporary infrastructure in the cantonment	No Action
Fort Sill	Assessment of Screening Criteria: • Institutional training site. A full battalion will not field to Fort Sill. Expected student load is approximately 260 soldiers per year. • Maneuver space – Full maneuver space not required, only minimum standards of driver training will be met • Live fire ranges – Full complement of ranges is not required, primary live-fire training will be individual weapons with crew served weapons training through simulations. • Existing restricted airspace: → max altitude: 60,000 feet.; 1,298 km^2 • Cantonment facilities: one facility of 0.1 acres exists, and two facilities of 3.3 acres may require construction	Fort Sill will not receive the M-SHORAD capability; no impacts on resources associated with the increase in personnel, maneuver area, airspace, live fire, and existing facilities due to the M-SHORAD stationing and fielding at this installation. Current training remain status quo.
	Biological Resource Constraints: None indicated Cultural Resources Constraints: None indicated Mitigation Requirements for Wetlands/Flood Plains: → 1,174 acres wetlands (0 delineated) exist → 200-m buffer for ponds and lakes.	

2.2.1.1 Fort Bliss

Fort Bliss hosts three ABCTs of the 1st Armored Division. An abundance of maneuver land exists at Fort Bliss so both the light and heavy maneuver training of the M-SHORAD battalion can be accommodated.

After taking into account additional days that may be available on weekends and the use of alternate range types listed in TC 25-8, the required M-SHORAD live-fire training can be accommodated on 14 of the 15 range types listed in Table 2-1 or one or more alternate range types. The need to accommodate the additional training on the listed ranges will require close attention to scheduling and prioritization of units based on the SRM or ReARMM or additional range space.

The sole facility type that Fort Bliss lacks is the TEMF with a total footprint of approximately 2.3 acres.

Fort Bliss has protection measures including restricting vehicle movement around arroyos, sinkholes, and steep slopes, as well as protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse arroyo riparian zones. The Standard Operating Procedures (SOP) for Weapons Firing and Training Area Use on Fort Bliss describe several protection measures instituted to protect wildlife and vegetation on Fort Bliss (U.S. Army 2012d). These measures are placed by range operations and DPW-E and are emphasized during the area access and activity approval process. In addition to the constraints listed in Table 2-4 for biological resources the following protective measures are also included in the SOP:

- Pack out all trash and dispose of it in dumpsters at designated sites.
- Burning or burying trash prohibited.
- No excavations dug on Otero Mesa.
- Commanders will ensure that smoke grenades, trip flares, or any other fire-causing devices are used in areas approved in the Fort Bliss Integrated Wildland Fire Management Plan. Live devices will not be abandoned or discarded anywhere on Fort Bliss.
- Range operations clearance is required prior to using tracers or pyrotechnics.
- Units must check in with range operations prior to occupation of training areas.
- Remove all wire and tactical obstacles after training is completed.
- Remove all ammunition, simulators, explosives, and pyrotechnics after training is completed.
- Contact range operations and conduct a clearance inspection before leaving the range.

Other measures protecting biological resources at Fort Bliss include:

- Maintain vegetative buffers on waterways/riparian corridors by inclusion within limited use areas (LUAs).
- Sustain healthy arroyo riparian buffers along waterways by limiting activities in these areas.
- The Fort Bliss Mitigation and Monitoring Plan provides program-level guidance for implementing mitigation measures based on scientific information and proven methods, principles, and standards.
- Fort Bliss has developed 1,116,595 acres of ecological management units as a tool for maintaining ecological connectivity between Fort Bliss and the surrounding lands and to help with developing goals for ecosystem management.

2.2.1.2 Fort Hood

Fort Hood hosts three ABCTs of the 1st Cavalry Division and one SBCT of the 3rd Cavalry Regiment. The maneuver land at Fort Hood is constrained. There is an excess of light maneuver land but a deficit of heavy maneuver land even if training on weekends is included. Scheduling maneuver training would require prioritization of units based on the SRM or ReARMM or additional maneuver areas.

After considering additional days that may be available on weekends and the use of alternate range types listed in TC 25-8, the required M-SHORAD live-fire training can be accommodated on 13 of the 15 range types listed in Table 2-1 or one or more alternate range types. The need to accommodate the additional RDs on the listed ranges will require close attention to scheduling and prioritization of units based on the SRM or ReARMM or additional range space.

The facility types Fort Hood lacks the available capacity to support are:

- One battalion HQ, 1.1 acres
- One company HQ, 0.8acres
- Four battery HQ, 2.4 acres total for all four

- One TEMF, 2.3 acres
- Soldier housing, 1.7 acres.

Fort Hood has many protective measures in place for biological and cultural resources. Expanding on the entries in Table 2-4:

- Maintain vegetated watersheds and riparian buffers to protect water quality, aquatic habitat, and biological communities, including fisheries. Maintain riparian vegetative zones to reduce erosion along drainages as well as filter and/or catch sediment before it enters the drainage system.
- Limit activities within the buffer zone to those causing little or no impact on water quality and aquatic habitats.
- If a nest is discovered within the work site at ground level (0 to 10 feet above grade), the site containing the nest is flagged or marked, a 60-foot radius buffer around the site delineated, and the area avoided.
- If a nest is discovered at low tree height (10 to 20 feet above grade), it is marked, a 30-foot radius buffer is established around the area of the nest, and the area is avoided.
- If two or more nests are observed at one site location, the buffer increases to a 100-foot radius for ground and a 60-foot radius for low tree height nesting locations.
- If three or more nests are observed at one site location, the buffer is a 100-foot radius for both ground and low tree nesting sites.
- In cantonment areas, an initial site visit is conducted either: (1) prior to Migratory Bird Treaty Act (MBTA) nesting season (15 March); or (2) no fewer than 14 working days before the start of construction activities. Buffering distances start at the same level as range and non-cantonment project sites above but may be reduced based on both the initial and follow-up site visits.
- Motor pool actions are not considered a military readiness activity, as such active nests that occur within motor pools are not eligible for take authorization under the existing Memorandum of Understanding with the U.S. Fish and Wildlife Service (USFWS). All active nests in motor pools must be reported to the Natural and Cultural Resources Management Branch for species identification, nesting stage determination, and conservation management implementation.
- For bald and golden eagles, establish an “off-limits” buffer around the nest site during the nesting season.
- Mitigation for biological resources includes limiting the construction of the proposed action to land maintenance, repairs, restoration, and reconfiguration, during the endangered species and migratory bird nesting seasons when feasible. These measures would minimize adverse effects to these species as a result of vegetation thinning and clearing projects.

- Cultural resource minimization measures include adding a 30-meter buffer to all historic properties and incorporated into Integrated Training Area Management (ITAM) “no digging” and “no staking/grounding rod” maps.
- Leon River Medicine Wheel access is restricted to Native Americans for traditional observances.
- Three sites are identified as being culturally important to the Comanche people: Sugarloaf Mountain (National Registry of Historic Properties (NRHP) eligible), Comanche Trail, and the site designated as “41BL0146.”

2.2.1.3 Fort Riley and Smoky Hill Range[12]

Fort Riley hosts two ABCTs of the 1st Infantry Division. Smoky Hill Range does not host any active Army units but is a training area predominately for the Kansas National Guard and Air National Guard. Units from Fort Riley can access the training areas at Smoky Hill and those lands are included in this analysis. The combination of maneuver land at both locations with the addition of weekend training will accommodate the M-SHORAD maneuver training with the deficit in light maneuver training land being made up by an excess of heavy maneuver land.

After considering additional days that may be available on weekends and the use of alternate range types listed in TC 25-8, the required M-SHORAD live-fire training can be accommodated on 13 of the 15 range types listed in Table 2-1 or one or more alternate range types. The need to accommodate the additional training on the listed ranges will require close attention to scheduling and prioritization of units based on the SRM or ReARMM or additional range space.

The facility types Fort Riley lacks the available capacity to support are:

- One battalion HQ, 1.1 acres
- One company HQ, 0.8 acres
- Four battery HQ, 2.4 acres total for all four
- One TEMF, 2.3 acres
- One hazardous material storage facility, 480 GSF, 0.0 acres.[13]

Fort Riley has many protective measures in place for biological and cultural resources. Expanding on the entries in Table 2-4:

- Establish a "no disturbance" buffer zone to protect nesting piping plovers, if found.
- A "no fly" buffer zone will be established and maintained around the area being used by one or more Whooping Cranes. An altitude restriction of 2,000 above ground level (AGL) will be in effect for the “no fly” zone, with the width ranging from 0.5 to 1.5 NM (nautical miles).

[12] Smoky Hill Range does not list constraints or protective measures.
[13] The hazardous material storage facility is constructed on the tactical vehicle parking apron near the TEMF.

- A 200-meter minimum flight altitude buffer will be established over the "minimum disturbance" buffer zones when bald eagles are in the Fort Riley area. "No disturbance" buffer zones will be maintained around communal bald eagle roosts and nests.
- Avoid clear cutting or removal of overstory trees within 100 meters of a bald eagle nest at any time.
- Timber harvesting operations, including road construction and chain saw operations, will be avoided within 200 meters of a bald eagle nest during the breeding season.
- Fort Riley has multiple protective measures for cultural resources, to include physical barriers, buffer zones, signage, off-limits map indicators and awareness training.

2.2.1.4 Fort Stewart

Fort Stewart hosts two ABCTs of the 3rd Infantry Division. Maneuver lands at Fort Stewart, including the addition of weekend training, will allow accommodation of the M-SHORAD maneuver training with the deficit in light maneuver training land being made up by an excess of heavy maneuver land.

After considering additional days that may be available on weekends and the use of alternate range types listed in TC 25-8, the required M-SHORAD live-fire training can be accommodated on 13 of the 15 range types listed in Table 2-1 or one or more alternate range types. The need to accommodate the additional training on the listed ranges will require close attention to scheduling and prioritization of units based on the SRM or ReARMM or additional range space.

The facility types Fort Stewart lacks the available capacity to support are:

- One battalion HQ, 1.1 acres
- One company HQ, 0.8acres
- Four battery HQ, 2.4 acres total for all four
- One TEMF, 2.3 acres
- One hazardous material storage facility, 0.0 acres.[14]

Fort Stewart has many protective measures in place for biological and cultural resources and wetlands. Expanding on the entries in Table 2-4:

- Bald Eagle nests include a 750-foot radius buffer. The following activities are prohibited within 1500 feet of the nest during the nesting season: logging; mechanized maneuver or live fire; low altitude flight (less than 500 feet); use of chemicals toxic to wildlife.
- Delineate cypress ponds and other potential frosted flatwoods salamander breeding sites located within timber harvest areas by signs at the borders of these wetlands, to include a 100-foot (30.5-meter) buffer.
- Monitor archaeological sites susceptible to vandalism and looting.

[14] The hazardous material storage facility is constructed on the tactical vehicle parking apron near the TEMF.

- Prohibit use of metal detecting devices to recover artifacts without an ARPA permit.
- Location of archaeological resources are not graphically depicted in public documents.
- Training area A-4 (1,236 acres) has been designated as a wetland mitigation bank.
- Streamside management zones are buffer strips: 20 feet for slopes < 20 percent; 35 feet for slopes 21–40 percent; and 50 feet for slopes > 40 percent.

2.2.1.5 Fort Carson and Piñon Canyon Maneuver Site

Fort Carson hosts one ABCT and two SBCTs of the 4th Infantry Division. Maneuver lands at Fort Carson—including the addition of weekend training—will allow accommodation of the M-SHORAD maneuver training. The maneuver areas at PCMS are included as a training asset of Fort Carson in the ARRM database and therefore included in the acreage listed. There is a small excess of light maneuver training land and an excess of heavy maneuver land.

After considering additional days that may be available on weekends and the use of alternate range types listed in TC 25-8, the required M-SHORAD live-fire training can be accommodated on 11 of the 15 range types listed in Table 2-1 or one or more alternate range types. This includes any live fire ranges at PCMS. The need to accommodate the additional training on the listed ranges will require close attention to scheduling and prioritization of units based on the SRM or ReARMM or additional range space.

The facility types Fort Carson lacks the available capacity to support are:

- One battalion HQ, 1.1 acres
- One company HQ, 0.8acres
- Four battery HQ, 2.4 acres total for all four
- One TEMF, 2.3 acres.

Fort Carson and PCMS have protective measures in place for biological, cultural, and wetlands resources as indicated in Table 2-4.

2.2.1.6 Fort Sill

Fort Sill is the institutional training site and does not have ABCT or SBCT units stationed there. Fort Sill is the Fires Center of Excellence and will provide training for soldiers on the employment and maintenance of all M-SHORAD systems. A full M-SHORAD battalion will not be stationed at Fort Sill; the expected annual training load is about 260 students. It is assumed that one-half of those students will be at Fort Sill at any given time throughout the year. The maneuver space at Fort Sill is adequate; only basic driving skills for the M-SHORAD will be taught, not the full maneuver curriculum.

Similarly, a full complement of ranges is not required and much of the initial live-fire training will be completed through appropriate simulations.

The facility types Fort Sill lacks the available capacity to support are:

- One GIB, 2.0 acres
- Student soldier housing, 1.3 acres.

There are initial plans to construct a GIB that is expected to be a shared facility with other air defense systems, thus larger than an M-SHORAD specific facility. In addition to POV parking, the GIB will have secure organizational parking for all training vehicles. The expected total area of the multi-system GIB is 6.5 acres.

Fort Sill has protective measures in place for biological and cultural resources. Expanding on the entries in Table 2-4:

- Prescribed burns are used to control the extent of red cedar and provide improved habitat for migratory birds.
- Cowbird trapping is done to enhance the nesting success of migratory birds.
- Fort Sill has surveyed the entire trainable area and screens training mission actions via RFMSS (Range Control Database) in coordination with Range Control within training areas. Described actions take place on existing ranges, established roads and training areas with existing missions. There are no known constraints for these actions.

2.2.2 No Action Alternative

The M-SHORAD will not be fielded or stationed at any installation; the Army would continue training per current requirements. This would not meet the objectives of the AMS and leave Army ABCT and SBCT maneuver units without the desired air defense capability.

2.3 ALTERNATIVES NOT CARRIED FORWARD FOR FURTHER ANALYSIS

Fielding, stationing, training, and maintaining the M-SHORAD capability at U.S. Army Garrison Hawaii was not carried forward for further analysis because the installation does not currently have an ABCT, SBCT, or a specific training mission for the M-SHORAD capability.

Also not carried forward was an alternative to field the M-SHORAD capability to installations at which the unit could be accommodated within existing infrastructure and training could be accomplished with minimal constraints on activity, time, and space:

- **Activity** – An installation can accommodate 75 percent (three out of four) of the required live-fire training events of the M-SHORAD mounted weapons on the primary range type designated in TC 25-8. This means that one out of four (25 percent) of M-SHORAD weapons systems would require simulation, completion on an alternate range type as designated in TC 25-8, or deployment to another installation to complete required live-fire training.

- **Time** – Non-availability, delays, or interruptions of maneuver space or live-fire ranges of no more than 2 weeks per year.
- **Space** – Training done in a contiguous area with only existing buffer zones to avoid protected resources.[15]

Regarding the alternative of fielding the M-SHORAD capability to installations at which the unit could be accommodated within existing infrastructure and training could be accomplished with minimal constraints on activity, time, and space; a review of the installations listed in Table 2-2 determined that none could meet the criteria without new construction. All installations required more flexibility to accommodate fielding the M-SHORAD capability.

[15] Protected resources include cultural, wetland, migratory birds, and threatened and endangered species.

SECTION 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section begins with an explanation of the analytical approach of this PEA and introduces the general considerations for each resource element. The remainder of the section is organized by installation, including information specific to its affected environment and analysis of effects.

3.1 APPROACH FOR ANALYZING IMPACTS

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

- **None** – There is no impact to the resource due to either the resource or the impact not being present or through full avoidance.
- **Negligible** – No measurable impacts are expected to occur. A negligible impact may locally alter the resource, but would not measurably change its function or character.
- **Minor** – Primarily short-term but measurable adverse impacts are expected. Impacts on the resource may be slight.
- **Moderate/less than significant** – Noticeable adverse impacts that would have a measurable effect on a wide scale (e.g., outside the footprint of disturbance or on a landscape level). If moderate impacts were adverse, they would not exceed the limits of applicable local, state, or federal regulations.
- **Significant** – A significant impact may exceed limits of applicable local, state, or federal regulations or would untenably alter the function or character of the resource. These impacts would be considered significant unless managed by mitigation efforts to a less than significant level.
- **Adverse** – The impacts would have a negative impact on the resource/issue.
- **Beneficial** – The impacts would benefit the resource/issue.

Section 3 provides a summary of environmental impacts. Each alternative subsection within this section 3 includes a table of anticipated impacts associated with the respective installation.

The resource areas have been categorized into 12 resource elements, as identified in Table 3-1, to enable a managed and systematic analysis. To maintain consistent evaluation of impacts in this

PEA, the Army established thresholds of significance for each resource area and included them in Table 3-1. The Army developed these thresholds to take into account substantive environmental regulations and ensure an objective analysis of anticipated impacts. Although some thresholds have been so designated based on legal or regulatory limits or requirements, others reflect some discretionary judgment on the part of the Army. Quantitative and qualitative analyses have been used, as appropriate, in determining whether and the extent to which a threshold is exceeded.

However, it must be remembered that significance is a matter of context and intensity. Loss of a small number of trees in an arid area with few trees could be significant, while the loss of the same number of trees in a forested area might not. Any variation in the significance criteria is set out in the discussion of impacts for specific locations. Additionally, an impact may trigger one of these thresholds, but mitigation could reduce the impact to “less-than-significant.” Also, note that regions of influence (ROI) may vary at installations because of specific circumstances. The context of the affected environment at a given installation may mean that a site-unique threshold is applicable.

Based on the selected alternative, additional installation site-specific analyses will be conducted, if required, to address actions described in section 3 necessary for the installation to support M-SHORAD fielding and operation (e.g., military construction (MILCON), range/facility upgrades). Implementation of the selected alternative may require site-specific follow-on NEPA analysis to evaluate local siting considerations and other environmental issues.

Table 3-1 presents each resource element and corresponding ROI and thresholds of significance. The table also identifies which resource elements are analyzed in this PEA and which resource elements are dismissed from further analysis; each includes an accompanying rationale. In conducting this analysis, a qualified subject matter expert (SME) reviewed the potential direct and indirect effects of the No Action Alternative and the Proposed Action Alternatives relative to each resource element. The SME carefully analyzed and considered the existing conditions of each resource element within the Proposed Action's ROI.

Table 3-1. Summary of ROIs and Significance Thresholds by Resource

Resource Element	ROI	Threshold of Significance	Analyzed or Dismissed	Rationale for Analyzing or Dismissing
Air Quality	Air Quality Control Region(s) that contain the installation.	An impact on air quality would be considered significant if the Proposed Action were to generate emissions which: • Did not meet CAA conformity determination requirements to conform with the State Implementation Plan (SIP)/Tribal Implementation Plan, or • Contribute to a violation of any federal, state, or local air regulation.	Air Quality Analyzed GHG Dismissed	The addition of an M-SHORAD BN would result in increased stationary source and vehicle emissions and potentially an increase in fugitive dust emissions at the selected installations. This resource area is further discussed in each installation section. The impacts of GHGs are limited to potentially minor effects on CO_2, N_2O, and CH_4 emissions. They are not calculated or reported here. The *Final Rule: Mandatory Reporting of Greenhouse Gases* (74 FR 56260) requires reporting from engine and vehicle manufacturers, not fleet operators. In addition, US Army tactical vehicles are not certified under or subject to 40 CFR Parts 89, 1039, or 1065 as required for reporting by 74 FR 56260.
Airspace	Restricted Area SUA above and nearby the installation and under the installations' control.	An impact on airspace would be considered significant if the Proposed Action violates FAA safety regulations or causes a substantial infringement of general aviation or commercial flight.	Analyzed	The addition of an M-SHORAD BN would potentially result in the firing of small arms and missiles that will require exclusive-use airspace at the selected installations. All analyzed installations have a restricted area complex of exclusive-use airspace. Analysis at each installation will determine if the airspace is of adequate lateral and vertical extent and adequate schedule time is available.

Resource Element	ROI	Threshold of Significance	Analyzed or Dismissed	Rationale for Analyzing or Dismissing
Biological Resources	Biological Resources within the installation.	Impacts to biological resources would be considered significant if Army actions were to result in: • Substantial permanent conversion or the net loss of habitat • Long-term loss or impairment of a substantial portion of local habitat (species-dependent), • Loss of populations of species, or • Unpermitted or unlawful "take" of ESA protected threatened or endangered species or species protected under the BGEPA or MBTA.	Analyzed	The Proposed Action and related construction and training activities could adversely impact natural resources at the installation from increased ground disturbance and the potential for related vegetation loss, habitat degradation, and potential spread of invasive species. As a result, this resource area is further discussed in each installation section.
Cultural Resources	Cultural Resources within the installation.	Impacts to cultural resources would be considered significant if they cause alteration of the characteristics that qualify a property for inclusion on the NRHP (may include physical destruction, damage, alteration, removal, change in use or character within the setting, and negligence causing deterioration, transfer, lease, or sale). Alteration of properties, or access to properties, of religious or cultural significance to Indian tribes would also be significant.	Analyzed	The Proposed Action and related construction and training activities could adversely impact cultural resources.

Resource Element	ROI	Threshold of Significance	Analyzed or Dismissed	Rationale for Analyzing or Dismissing
Geology and Soils	Geology and Soils within the installation.	Impacts on geology, topography, and soils would be considered significant if: • The landscape could not be sustained for military training over a wide area, or • Substantial soil losses were to impair plant growth or result in detrimental increases in stream sedimentation.	Soils analyzed, geology dismissed	Training would be similar to existing BN training at the installations and completed in designated training and maneuver areas. Both construction and training activities would have the potential for surficial (soil) impacts, but impacts to geological resources are not anticipated. As a result, no further analysis is required for geology. Soil resources are further discussed in each installation section.
Hazardous Materials and Solid Waste	All areas within the installation.	Impacts to hazardous materials and hazardous waste would be considered significant if a substantial additional risk to human health or safety would be attributable to Army actions, including direct human exposure or a substantial increase in environmental contamination.	Dismissed	The increase in hazardous materials and hazardous and solid waste resulting from fielding an M-SHORAD BN at the analyzed installations will not be appreciable. All of these materials are managed under strict requirements of federal, state, Army, and installation regulations. Proper transport, storage, use, and disposal are mandated within the regulations. Also, construction-related debris associated with facility construction or improvements would be non-substantial and re-used or recycled per applicable best management practices or disposed of per applicable regulations in approved landfills. Therefore, no further analysis of hazardous materials and hazardous and solid waste is required.

Resource Element	ROI	Threshold of Significance	Analyzed or Dismissed	Rationale for Analyzing or Dismissing
Land Use and Compati-bility	Land use within the installation and on adjacent properties.	Impacts to land use would be considered significant if the land use were incompatible with existing military land uses and designations (including recreation). These impacts may conflict with Army land-use plans, policies or regulations, or conflict with land use off-post.	Analyzed	The Proposed Action would not pose conflicts with off-post land uses. Required garrison construction to support the M-SHORAD BN would occur within existing cantonment areas. Live-fire and maneuver training activities would be similar to the types of training already occurring at the installations and occur within existing range and training lands but may require expansion of areas around protected resources.[16] Sustainability of training lands would continue to be managed and monitored according to the Army's Sustainable Range Program and through the ITAM Program (see Section 3.1.2).
Socio-economic and Environ-mental Justice	Socioeconomic and Environmental Justice factors within the installation and immediate surrounding communities and counties.	Impacts to socioeconomics and environmental justice would be considered significant if they were to cause: • Substantial change to the sales volume, income, employment, or population of the surrounding ROI; • Disproportionate adverse economic, social, or health impacts on minority or low-income populations; or Substantial disproportionate health or safety risk to children.	Socioeconomics analyzed, Environmental Justice dismissed	The Proposed Action could potentially affect socioeconomic conditions within the ROI by the addition of an M-SHORAD BN and associated soldiers and families. As a result, socioeconomics is further discussed in each installation section. Within the ROI, the economic effect would be distributed among community members regardless of race, ethnic origin, or economic status, and therefore is not disproportionate.

[16] Protected resources include cultural, wetland, migratory birds, and threatened and endangered species

Noise	Areas adjacent to and within the installation.	Impacts would be considered significant if noise from Army actions were to cause harm or injury to on- or off-post communities, or exceed applicable environmental noise limit guidelines.	Dismissed	Installations in the analysis currently host equipment with expansive noise profiles. Live-fire and maneuver training associated with the Proposed Action would occur on range and training lands already used for similar activities and peak noise levels would not change. The addition of an M-SHORAD battalion would introduce firing of 30mm small arms rounds and the ground-based launch of the Hellfire missile. Approximately 87 percent of the rounds fired are expected to be 9mm, 5.56mm, 7.62mm, and .50 caliber which are much quieter than 30mm rounds. The increased frequency of range use for all small arms rounds varies from 0.15 up to 41.7 additional range days and is less than 10% on most ranges. Increased use greater than 10% only occurs on ranges of 800 acres or more where soldiers and equipment maneuver continuously to engage many targets from many different firing points. These actions will distribute the noise impacts over a large area and minimize the impacts at any one location. The small increases in use at most ranges and the distributed impacts on larger ranges are expected to result in negligible impacts from firing 30mm rounds. The Stinger and Hellfire missiles have been in the Army inventory for many years and are accounted for in installation noise profiles. Missile training will require 52.5 range days which will be an increase of 45 percent or more on all installations. However, the majority of missile training will not result in an actual missile launch and detonation but will be accomplished through

Resource Element	ROI	Threshold of Significance	Analyzed or Dismissed	Rationale for Analyzing or Dismissing
				simulations. Missile detonations that do occur will be against aerial targets above the ground. Detonations against aerial targets increase the distance from the ground and greatly diminish the intensity of the noise. As the distance from a noise source doubles the noise spreads over four times the area and the intensity decreases to only 25 percent of the original intensity. Since most missile training will be simulated and missile detonations will be against aerial targets above the ground the impacts are expected to be negligible. Construction activities would be temporary, and both construction and training activities would abide by the installation's Noise Management Plan. The addition of an M-SHORAD battalion would not change existing noise zones within on-post communities or communities adjacent to the installation.
Traffic and Transpor-tation	Public roadways and key access points within and near the installation; roadways within installation boundaries.	Impacts to traffic and transportation would be considered significant if Army actions: • Cause a reduction by more than two LOSs at roads and intersections within the ROI • Substantially degrades traffic flow during peak hours, or • Substantially exceed road capacity and design.	Analyzed	The addition of an M-SHORAD BN and associated soldiers and families could adversely affect traffic conditions and the integrity of local roadways. As a result, this resource area is further discussed in each installation section.

Resource Element	ROI	Threshold of Significance	Analyzed or Dismissed	Rationale for Analyzing or Dismissing
Utilities, Facilities, and Energy Systems	Utilities and energy systems within the installation and immediate surrounding communities. Facilities within the installation.	Impacts to utilities, facilities, and energy systems would be considered significant if the Proposed Action were to cause an impairment of service to the installation and local communities, homes, or businesses.	Facilities analyzed, Utilities and Energy dismissed	The Proposed Action may require the construction of new facilities within the cantonment area and are further discussed in each installation section. Utilities and energy systems will only require short, insignificant extensions to connect the new facilities to the existing network and are not analyzed.
Water Resources	Watersheds, state-designated stream segments, and groundwater aquifers associated with the installation; USACE jurisdictional WOUS and wetland resources within the installation FEMA-designated floodplains	Impacts to water resources would be considered significant if Army actions: • Result in an excess sediment load in installation waters, affecting impaired resources, • Substantially affect surface water drainage or stormwater runoff, including floodwater flows, • Substantially affect groundwater quantity or quality.	Surface water, ground water, water quality, wetlands, and floodplains analyzed	The Proposed Action could adversely impact surface water, wetlands, and floodplain resources within the installation from training and construction activities generating ground disturbance. Surface water quality could be directly impacted by the Proposed Action and indirectly by sedimentation/erosion. As a result, these resource areas are further discussed in each installation section. The addition of up to 550 soldiers and their Families living on the installation may affect drinking water supply sourced from surface water or groundwater. Incidental spills from any equipment would be managed through the installation's Spill Prevention Control and Countermeasures Plan.

BGEPA = Bald and Golden Eagle Protection Act. BN = battalion. CAA = Clean Air Act. CO_2 = carbon dioxide. ESA = Endangered Species Act. FAA = Federal Aviation Administration. FEMA = Federal Emergency Management Agency. GHG = greenhouse gases. M-SHORAD = Maneuver Short-Range Air Defense. ITAM = Integrated Training Area Management. LOS = levels of service. NRHP = National Register of Historic Places. ROI = regions of influence. SUA = Special-Use Airspace. USACE = U.S. Army Corps of Engineers. WOUS = waters of the United States.

For the purposes of the PEA, analysis of effects are discussed in general terms for each resource element where the impacts from implementing the Proposed Action would be the same for all installations in Section 3.2. Impacts unique to a particular installation are discussed in Sections 3.2-3.7.

There are four impact sources from implementing the Proposed Action, which include: maneuver training, live-fire training, construction of new training areas and facilities, and the increase of up to 550 new soldiers and up to 790 spouses and children at an installation. The actual number of soldiers moved to an installation as part of the Proposed Action is unknown. Data from the Department of Defense Selected Military Compensation Tables of 1 January 2019 show 33 percent of all military personnel live on base and receive quarters in kind, i.e., they are living in a barracks-type facility. The remaining military personnel receive a cash allowance for housing and live off post or in privatized housing on post. This PEA assumes one-third of 550 soldiers would live in barracks, and the remaining two-thirds of soldiers (and their families) would live in privatized housing on post or off post in the local area.

A systematic approach to the analysis of impacts has been developed for this assessment. This approach consists of a description of the components of each alternative; identification of each resource element; development of methods to analyze impacts; identification of significance criteria to determine the intensity of direct, indirect, and cumulative impacts; and development of mitigation measures that may be applied to reduce or eliminate impacts. Each of these components is described in the sections that follow.

Text supporting these conclusions is presented, and mitigations are listed for all adverse impacts, where mitigation is available. There may be both adverse and beneficial impacts within a single resource category; for instance, a project could interfere with a pre-existing land use such as recreation (an adverse impact) while expanding public access to different recreational resources (a beneficial impact). Where there are both adverse and beneficial impacts, both are listed on the tables and in the text. DESCRIPTION OF RESOURCE ELEMENTS

3.1.1 Air Quality

3.1.1.1 Affected Environment

Air resources are affected by gases and particulates from stationary and mobile sources and are influenced by meteorological conditions such as prevailing wind, sunlight, and temperature inversions. The Clean Air Act (CAA), the primary federal statute regulating air emissions, applies fully to the Army and all its activities except for tactical vehicle emissions, which are exempt from CAA requirements.

Air quality data can include emission amounts from point, area, and mobile sources. *Point sources* are stationary sources that can be identified by name and location. *Area sources* are point sources from which emissions are too low to track individually (e.g., from a home or small office building) or a diffuse stationary source (e.g., wildfires or agricultural tilling). *Mobile sources* are

any kind of vehicle or equipment with gasoline or diesel engine, including airplanes and boats. On-road and non-road are the two types of mobile sources that are considered. On-road sources consist of vehicles such as cars, light and heavy trucks, buses, and motorcycles. Non-road sources are aircraft, locomotives, diesel and gasoline boats, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (EPA 2017b).

Depending on the installation's location and whether or not it is considered a "major source" of air pollutants, the CAA may require permitting before construction, demolition, or stationing commences. The specific requirements will depend on whether the installation is located in a "nonattainment" or "maintenance" area.[17] If the installation is located in an "attainment" or "unclassifiable" area, it may have to assess the project's contribution to the local air shed to ensure the Prevention of Significant Deterioration (PSD). Unclassifiable areas are those areas that have not had ambient air monitoring and are assumed to be in attainment with NAAQS. The PSD regulations provide special protection from air quality impacts for certain areas, primarily national parks and wilderness areas that have been designated as "Class I" areas—where air quality (especially visibility and acid deposition) has been given special emphasis.

Under the CAA, the Environmental Protection Agency (EPA) has established NAAQS (40 CFR 50) for the six "criteria" pollutants listed in Table 3-2. The NAAQS represents the maximum levels of background pollution that are considered safe to protect public health and welfare, including an adequate margin of safety. Short-term standards (1-, 3-, 8-, and 24-hour periods) are established for pollutants contributing to chronic health effects.

In addition to the NAAQS for criteria pollutants, national standards exist for 187 toxic substances classified as hazardous air pollutants (HAPs) that are regulated under Section 112(b) of the 1990 CAA Amendments. The National Emission Standards for Hazardous Air Pollutants (NESHAP) regulate Hazardous Air Pollutants (HAP) emissions from stationary sources (40 CFR 61 & 63). M-SHORAD is a mobile system, therefore HAP emissions are exempt.

Table 3-2. National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	Primary and secondary	Maximum arithmetic 3-month mean concentration for a 3-year period	$0.15 \mu g/m^{3(1)}$	Not to be exceeded

[17] This status is based on six criteria air pollutants for which there are NAAQS.

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Nitrogen Dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour maximum daily concentrations, the average over 3 years.
		Primary and secondary	1 year	53 ppb(2)	Annual mean
Ozone (O_3)		Primary and secondary	8 hours	0.070 ppm(3)	Annual fourth-highest daily maximum 8-hour concentration averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	Primary	1 year	12.0 μg/m^3	Annual mean averaged over 3 years
		Secondary	1 year	15.0 μg/m^3	Annual mean averaged over 3 years
		Primary and secondary	24 hours	35 μg/m^3	98th percentile averaged over 3 years
	PM_{10}	Primary and secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1 hour	75 ppb (4)	99th percentile of 1-hour maximum daily concentrations averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards before the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for a clearer comparison to the 1-hour standard level.
(3) The final rule signed on October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for the attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a State Implementation Plan (SIP) call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is a U.S. Environmental Protection Agency action requiring a state to resubmit all or part of its SIP to demonstrate the attainment of the required NAAQS.

Source: EPA 2016a

Conformity. The CAA (Section 176(c)) prohibits federal activities from taking various actions in nonattainment or maintenance areas unless they first demonstrate conformance with the applicable State Implementation Plan (SIP). Regardless of compliance with other environmental regulations, failure to satisfy the requirements of the conformity rule can, by itself, preclude an installation from moving forward with the project. A conformity review is a multi-step process used to determine and document whether a Proposed Action meets the conformity rule. The conformity review would require the installation to:

- Evaluate the nature of the Proposed Action and associated air pollutant emissions;
- Determine whether the rule exempts the action;
- Calculate air pollutant emissions and impacts associated with the Proposed Action;
- Mitigate emissions if regulatory thresholds are exceeded;
- Prepare formal documentation of the findings; and
- Publish findings to the public and regulatory community.

Some Army installations are located in nonattainment areas or maintenance areas. At these locations, air conformity reviews would be conducted, if deemed appropriate. This analysis cannot be done until the number of soldiers and civilians, equipment, facilities requirements, and stationing dates are known. At many installations, formal conformity determinations will not be required because the action will be exempt or meet *de minimis* levels—that is, the minimum threshold for which that determination must be performed per the EPA regulations.

Prevention of Significant Deterioration (PSD). Installations that are classified as "major sources" or located in areas classified as "attainment" or "unclassifiable" must obtain approval to construct a new emissions source or to modify existing emissions sources if the modification project would result in a significant emission increase. It should be noted that "project" includes operational changes that affect emissions, not only equipment construction or modification. The purpose of the PSD program is to prevent areas that meet the CAA standards from becoming nonattainment areas. A PSD permit must be obtained to:

- Construct a new major stationary source of criteria pollutants, or
- Modify an existing major stationary source such that emissions from the source would increase significantly[18].

New Source Review. The Nonattainment New Source Review (NNSR) Permit Program (also known as Nonattainment Area New Source Review [NSR] or Major NSR) applies in nonattainment areas only. Its purpose is to ensure that emissions in these areas are not increased and preferably decreased as a result of new construction or modification projects. This program applies to operational changes as well as equipment changes. It is important to emphasize that NNSR only applies to the pollutants for which the area is in nonattainment.

[18] The significance thresholds vary from 0.0004 to 100 tons per year (tpy) depending on the pollutant.

An NNSR permit must be obtained to:

- Construct a new major stationary source of criteria pollutants, or
- Modify an existing major stationary source such that emissions from the source would increase significantly.

Minor Source Pre-Construction Permitting. To be sure all emissions sources are reviewed for CAA regulations and to prevent source owners from deliberately incrementing their emission increases to avoid PSD/NNSR, the EPA and the states developed minor NSRs. This program has many different names—Notice of Construction, Approval to Operate, Permit to Operate, etc. Each regulatory agency develops regulations to implement minor NSR, typically through a pre-construction permit program. Typically, the regulations will include a list of exempt sources such as temporary sources to be on-site less than 90 days (this often includes construction equipment), small boilers or furnaces (residential size), and ventilation systems. This list may have 100 exempt source types. Most regulators also exempt sources that have the potential to emit below a specific threshold. These thresholds should not be confused with any of the other thresholds previously discussed. For example, some states exempt emissions of any pollutant less than 1 tpy from a single emission source from minor NSR permitting, if no other regulations apply.

Generally, an air quality impact would be considered significant if it led to a violation of a Title V operating permit or synthetic minor permit.

Greenhouse gases (GHGs) are gas emissions that trap heat in the atmosphere. There are six gases tracked for GHGs and include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The main sources of these gases due to human activity are as follows:

- Carbon Dioxide (CO_2): burning of fossil fuels and deforestation;
- Methane (CH_4): livestock enteric fermentation (i.e., cows) and manure management, paddy rice farming, land use and wetland changes, pipeline losses, and covered vented landfill emissions;
- Hydrofluorocarbons (HFCs): these are used in refrigerating units as replacements for chlorofluorocarbons and hydrochlorofluorocarbons, and these items are of concern from the standpoint of global warming and the Kyoto Protocol;
- Perfluorocarbons (PFCs): these are being used in refrigerating units as replacements for chlorofluorocarbons, in aluminum production, and semiconductor production;
- Nitrous Oxide (N_2O): this is used for its anesthetic and analgesic effects as well as being used as an oxidizer in rocketry and in motor racing to increase the power output of engines;
- Sulfur Hexafluoride (SF_6): used in the electrical industry as a gaseous dielectric medium for high-voltage (35 kV and above) circuit breakers, switchgear, and other electrical equipment, often referred to as SF_6. SF_6 is also employed as a contrast agent for ultrasound imaging.

The Proposed Action is expected to have no or unmeasurable effects on CH_4, HFCs, PFCs, N_2O, and SF_6. Negligible effects on CO_2 emissions may occur in the ROI from vehicle emissions during training and personal vehicle use from the additional residents on the installation dedicated to the Proposed Action. Also, this PEA does not attempt to measure the actual incremental impacts of GHG emissions as there is a lack of consensus on how to measure incremental impacts. Existing models have substantial variation in output and do not measure the actual incremental impacts of a project on the environment. Therefore, GHG will not be discussed at the individual installation level.

Executive Order (EO) 13834, Efficient Federal Operations, was signed by President Trump on 17 May 2018.[19] Section 8 of this EO revokes EO 13693. EO 13834 sets forth energy and environmental performance goals based on statutory requirements for agencies concerning the management of facilities, vehicles, and operations. Agencies are instructed to track and report Scope 1 and 2 GHG emissions (e.g., CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) per the Council on Environmental Quality's Federal Greenhouse Gas Accounting Guidance.

- Scope 1 emissions: Direct emissions from sources that are owned or controlled by the federal agency such as vehicles and equipment, stationary sources, on-site landfills, wastewater treatment facilities, and fugitive emissions.
- Scope 2 emissions: Indirect emissions resulting from the generation of electricity, heat, or steam purchased by a federal agency.

The Army will continue its goal to reduce Scope 1 and 2 GHG emissions by 34 percent by 2020, as compared to fiscal year (FY) 2008 GHG emissions (U.S. Army 2016a).

An impact on air quality would be considered significant if the Proposed Action were to generate emissions which:

- Did not meet CAA conformity determination requirements to conform with the SIP/Tactical Implementation Plan (TIP), or
- Contribute to a violation of any federal, state, or local air regulation.

3.1.1.2 Common Environmental Consequences as a Result of the Proposed Action

Air quality impacts from the Proposed Action are expected to be less than significant due to stationing a relatively small number of additional tactical vehicles, approximately 2.6 percent to 5.8 percent of the total tactical vehicles,[20] at any selected installation. The additional vehicles are the primary driver of direct and indirect air quality impacts. Direct impacts would be from the

[19] Federal Center. 2020. Greenhouse Gases. https://www.fedcenter.gov/programs/greenhouse/. Accessed on April 30, 2020.

[20] The approximate total of tactical vehicles at each installation was determined by accessing the Army Force Management System Web (FMSWeb) application on 26Aug20 at https://fmsweb.fms.army.mil/protected/reports/Frame_Reports.asp?RPT=STD. The Reports - Equipment - Detailed Lines for each installation were downloaded and filtered for vehicle types and then summed to compute the total.

emissions of HAPs during maintenance processes. Dust generated by driving vehicles on unpaved surfaces would be an indirect impact.

The computed emissions of dust are approximately 87 percent particulate matter $(PM)_{10}$ and 13 percent $PM_{2.5}$. A substantial portion of the PM_{10} emissions will settle out of the air rapidly and not leave the installation boundary, lessening the air quality impact from dust.

The emission of HAPs from maintenance processes using cleaners, solvents, and paints is expected to be less than significant. The increase in the number of vehicles is small, resulting in only minimal increases in the use of such chemicals. The distribution and inventory of the chemicals used are closely controlled and disposal or recycling is completed under applicable federal and state statutes and regulations.

Impacts from Construction

Construction of M-SHORAD facilities could negatively impact air quality. Construction could consist of buildings and infrastructure to support the unit within the cantonment area and expansion of existing ranges or construction of new ranges in the training areas. Emissions from construction vehicles and equipment and the generation of fugitive dust are the direct impacts. Still, the construction emissions would be short term, generally lasting less than one year, and only occur during actual construction activity, approximately eight hours per day. Indirect impacts from construction would include the lingering pollutants generated by construction activities, although they are also expected to have short-term impacts. Such impacts would not be significant within the air quality ROI.

Impacts from Live-Fire Training

Emissions from ordnance. The ordnance used by the M-SHORAD battalion would consist of 5.56mm, 7.62mm, and 30mm small arms ammunition, grenades, and the Stinger and Longbow Hellfire missiles. Fielding the M-SHORAD would result in an overall increase in the number of RDs on all 15 range types from 3.2 percent to 6.6 percent for all but Fort Sill. At Fort Sill, a full battalion would not field, and firing would be more limited.

Increases in the usage of the 15 individual range types are used as a surrogate for ordnance expended. It is generally less than 10 percent based on the additional RDs required to meet M-SHORAD training compared to the installation’s range requirements to meet all other training needs. About 4 percent of the additional range usage is non-firing and would have no impact on air quality. About 73 percent of the increased range usage would be small arms and the small arms rounds emit a comparatively small propellant charge. Stinger and Longbow Hellfire missile usage would be more limited, about 14 percent of the increased range usage, and result in the detonation of explosives and the burning of propellants. Grenade usage would be even more limited, about nine percent of the increased range usage, and result in the detonation of explosives. The emissions associated with ordnance use at all installations pose very little risk of

creating adverse air quality effects. This association is based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations (U.S. Army 2008). Consequently, air quality effects from munitions use are expected to be less than significant.

Wildland Fire emissions. The additional training and possibly newly constructed ranges would cause a slight increase in wildfire danger. Overall, training up to 550 M-SHORAD battalion soldiers at the 15 specified ranges would increase the total number of rounds fired thus potentially increasing the frequency of wildfires. Implementing the mitigation measures detailed in the respective installations' Wildland Fire Management Plans, including rapid wildfire response and containment strategies would support minimizing emissions from wildfires and thereby mitigate them to less than significant.

Emissions from prescribed fires. Prescribed fires are sometimes used to manage vegetation on range areas or to prepare areas for unexploded ordnance (UXO) clearance. The use of prescribed fire would be planned annually and installation foresters will incorporate this requirements into the installation annual burn plan. Installations will comply with any state permitting requirements for prescribed fires. Prescribed fires are not frequent events, and so the resulting emissions have not been estimated. These emissions would be considered in the prescribed burn plans before the actual burns.

Impacts from Maneuver Training

Military vehicle use and emissions. Vehicle use would be distributed among different maneuver areas, but all vehicles would be stored and serviced at the cantonment area when not in use. The movement of vehicles on unpaved roads and off road for training activities would generate dust emissions that fall within the PM_{10} and $PM_{2.5}$ category. The amount of dust generated is highly dependent on the specific soil and weather parameters and the use of dust prevention at each installation. Therefore, the anticipated amounts of PM_{10} and $PM_{2.5}$ attributable to dust are listed in each installation section. Currently, all assessed installation air quality ROIs are in attainment for PM. Therefore, impacts to air quality are expected to be less than significant.

The Army would monitor the effects of training activities to ensure that emissions stay within the acceptable ranges as predicted, and environmental problems do not result from excessive soil erosion or compaction.

Impacts from aircraft operation. Under the Proposed Action, no substantial change to flight operations would occur. There may be a minimal increase in flights required to present targets for M-SHORAD training in the detection, tracking, and engagement but much of this training can be accomplished using flights not specifically scheduled for M-SHORAD training. Based on the small number of additional flights that may be required, impacts to air quality are expected to be less than significant.

Impacts from Increase in the Number of Soldiers

Minor adverse short- and long-term impacts are anticipated on air quality within the installation and surrounding communities due to the influx of approximately 550 additional soldiers and their families. The anticipated impacts are based on assumed increases in POV-use and increases in normal household activities such as lawn mowing, pest management, and cleaning within the ROI.

3.1.2 Airspace

3.1.2.1 Affected Environment

The Federal Aviation Administration (FAA) manages all airspace within the United States and its territories. The FAA recognizes the military's need to conduct certain flight operations and training within airspace that is separated from that used by commercial and general aviation. *Airspace* is defined in vertical and horizontal dimensions and by time. Airspace is a finite resource that must be managed to achieve equitable allocation among commercial, general aviation, and military needs. The FAA has established various airspace designations to protect aircraft while operating near and between airports and while operating in airspace identified for defense-related purposes. Flight rules and air traffic control procedures govern safe operations in each type of designated airspace. Most military operations are conducted within designated special-use airspace (SUA) and follow specific procedures to maximize flight safety for both military and civil aircraft.

Special-Use Airspace. This airspace permits activities that either must be confined because of their nature or require limitations on aircraft that are not a part of those activities. Prohibited and restricted areas are regulatory SUAs. They are established in Federal Aviation Regulation Part 73 through the rulemaking process of the Administrative Procedures Act (5 U.S. Code (USC) 551-702). Warning areas, military operations areas (MOAs), alert areas, and controlled firing areas are non-regulatory SUAs. The FAA may designate these types of SUAs without resort to the procedures demanded of the Administrative Procedures Act.

Military operations in the United States that pose a significant danger to non-participating aircraft are conducted in the SUA category of restricted areas. Each restricted area has specified minimum and maximum altitudes. Restricted areas contain airspace identified by an area on the surface of the Earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. The penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants.[21]

[21] FAA Aeronautical Information Manual, https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap_3.html accessed 14Apr20.

Restricted areas may have specific operating hours or may be in effect 24 hours per day. Air Traffic Control (ATC) facilities are designated for each restricted area and control entry into the area. Appropriate contact information for the ATC facility is provided in aeronautical publications such as charts or electronic databases.

Other military operations and training over and near Army installations are normally executed in the SUA categories of MOAs and military training routes (MTRs). These types of airspace are not exclusive use by the military, and the pilots of both military and non-military aircraft are responsible for safe flight and collision avoidance

Generally, a significant impact on airspace would be one that led to a violation of FAA regulations that undermines aviation safety, an exceedance of SUA dimensions, or a substantial infringement of general aviation or commercial flight activity.

3.1.2.2 Common Environmental Consequences as a Result of the Proposed Action

Airspace impacts from M-SHORAD training and the construction of M-SHORAD facilities are expected to be less than significant. The Proposed Action would not require permanent changes to SUA, require no new aircraft types, and only require minimal changes to the type of flight operations and flight schedules.

Impacts from Construction

Construction activities at all installations would temporarily increase human presence and activity at construction sites. This construction would not require permanent modifications to existing controlled or SUA, and no new SUA would be needed. There could be a potential for temporary flight restrictions or Notices to Airmen within the SUA to provide a buffer between flight operations and range construction activities but these would be short term, generally lasting less than one year, and only occur during actual construction activity.

Impacts from Live-Fire Training

The Proposed Action would not require modifications to existing controlled or SUA, and no new SUA would be needed. No new aircraft are required to support M-SHORAD training. There may be a minimal increase in flights required to present targets for M-SHORAD training in the detection, tracking, and engagement but much of this training can be accomplished by using flights not specifically scheduled for M-SHORAD training. Actual firing is not required to accomplish the vast majority of missile training. It would be accomplished through simulation using aids such as captive trainers that duplicate all steps required to fire a missile except actual missile launch. If missile firing is required, it would be accomplished within the confines of currently restricted Airspace or completed at a different installation that has sufficient Airspace. While missile firing is being conducted no non-participating flight activities will be permitted within the restricted airspace.

Impacts from Maneuver Training

During maneuver training, there may be activities to detect, track, and engage aerial targets with no intent to fire any ordnance. The impacts of those actions would be the same as described for live-fire training.

Impacts from Increase in the Number of Soldiers

No impacts other than those already addressed are expected from the increase of approximately 550 soldiers. No impacts are expected from the soldiers and families using the cantonment area.

3.1.3 Biological Resources

3.1.3.1 Affected Environment

Biological resources refer to the living landscape and include vegetation and wildlife, both of which have species classified as threatened and endangered. The purpose of biological resources management within installation lands is to maintain high-quality lands for training, biodiversity, and recreation. The Army makes management decisions based on the best available science and attempts, where practical, to mimic the natural, historical disturbance regimes for the installation ecoregion (ecosystem management). Monitoring programs performed by natural resources managers indicate the effectiveness of measures and strategies in achieving intended objectives. The Army's adaptive management approach preserves natural resources while providing the optimum environmental conditions required to sustain the military mission and realistic training conditions.

The Endangered Species Act (ESA) was passed in 1973 to address concerns about the decline in populations of many species. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. The ESA offers two classes of protection for rare species in decline: endangered or threatened. *Endangered* means a species is in danger of extinction throughout all or a significant portion of its range. *Threatened* status indicates a species is likely to become endangered within the foreseeable future. Every newly listed threatened species must have a species-specific rule in accordance with section 4(d) of the ESA that defines prohibited actions and protections on a case-by-case basis (84 FR 44753).

Under the ESA, it is illegal to "take" threatened and endangered species. As defined in the ESA, "the term take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." The Secretary of the Interior has defined the term "harm" as "an act which actually kills or injures wildlife." Such an act may include significant habitat modification or degradation where it kills or injures wildlife, or by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Because most threatened and endangered species are not often hunted or collected, habitat degradation is the primary reason for population declines of ESA-listed species.

The ESA contains provisions for the designation of "critical habitat" for listed species when deemed essential for the conservation and recovery of a species. The ESA defines critical habitat to include geographic areas "on which [threatened or endangered species] are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection." Areas not occupied by the species at the time of listing but are considered essential to the conservation of the species can be designated as critical habitat. Critical habitat designations are limited to federal agency actions or federally funded or permitted activities. However, under section 4(a)(3)(B)(i) of ESA, 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 the Department of Defense (DoD)—or designated for its use—that are subject to an Integrated Natural Resources Management Plan (INRMP) prepared according to 16 USC §670a (Sikes Act). This restriction applies if either secretary determines in writing that a given INRMP provides a benefit to the species for which critical habitat is proposed for designation.

The USFWS and the National Marine Fisheries Service (NMFS) are jointly responsible for administering the ESA. As of March 12, 2020, 2,638[22] federally listed species (over 1,800 plants and over 700 animals)[23] were listed under the ESA.

All federal agencies (including the Army) are required to protect threatened and endangered species while projects are carried out and to preserve threatened and endangered species habitats on federal land. Federal agencies whose actions may affect listed species must consult with the USFWS or NMFS under Section 7 of the ESA. Under the Sikes Act, installations must also develop, maintain, and implement an INRMP, which includes provisions for the conservation of these species and their habitats.

Figure 3.1-1 shows the number of federally listed species, by garrison, discussed in this PEA. Installations manage and monitor federally protected species and other priority species within their boundaries in compliance with the ESA. Management practices for federally protected species are often prescribed in biological opinions or agreements with the USFWS. Minimization measures to reduce the potential for the take (e.g., mortality or harm) of federally protected species often include coordinating with military units, implementing land-use controls and habitat improvement projects, conducting surveys, and avoiding impacts to federally listed species sites.

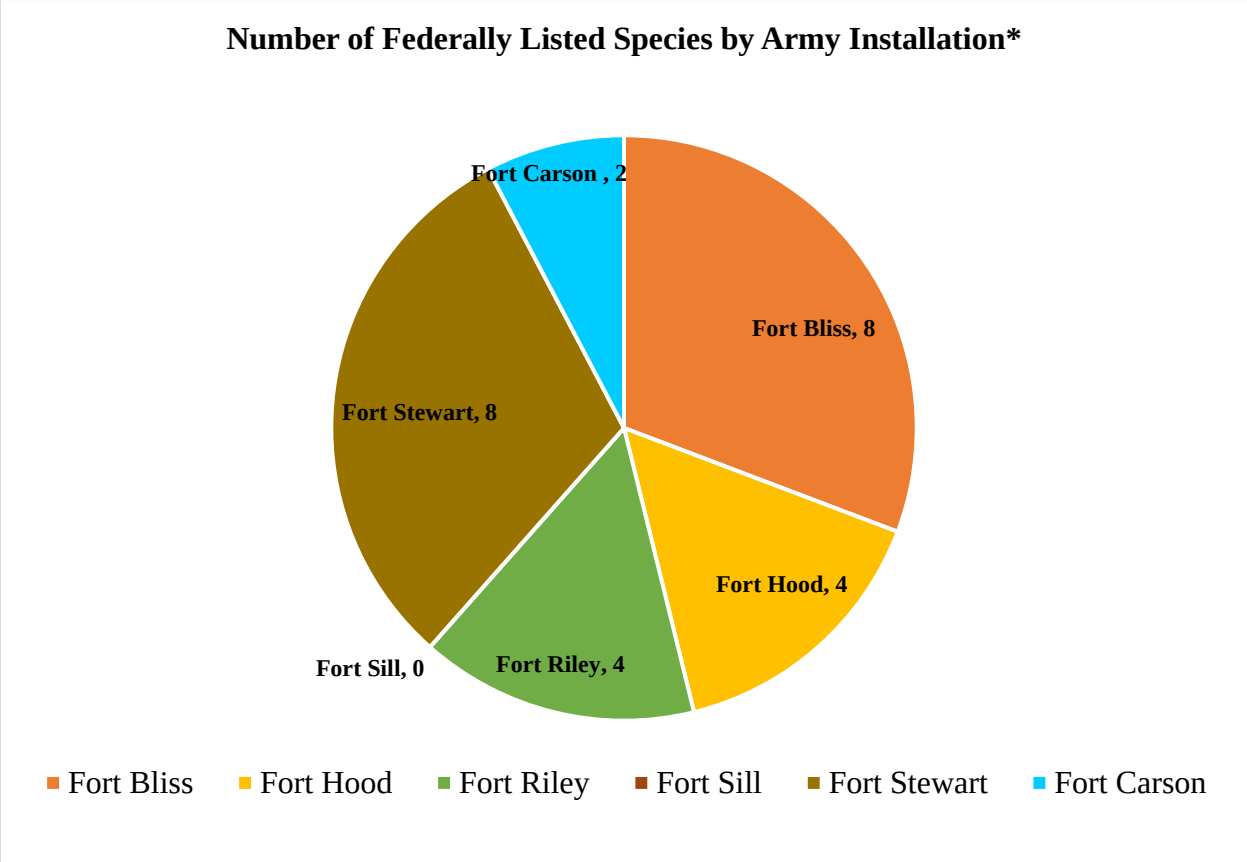
The PEA includes the following designations of wildlife and plants with special protected status:

- Federally Listed Threatened and Endangered Species, as defined above.
- Designated Critical Habitat, as defined above.

[22] Source: USFWS, https://ecos.fws.gov/ecp0/reports/species-listed-by-state-totals-report?status=listed&statusCategory=Listed. Accessed on March 12, 2020
[23] Sources: FWS, https://ecos.fws.gov/ecp/listedSpecies/speciesListingsByTaxGroupTotalsPage. Accessed on March 12, 2020.

- Migratory Bird Species. Including migratory birds and their nesting locations protected under the MBTA. A Deputy Assistant Secretary of the Army Memo dated February 6, 2018, clarifies that take prohibitions are limited to intentional actions on migratory birds, their nests and eggs. Incidental take is not prohibited for military actions. However, the military is required to follow current DoD guidance designed to minimize incidental take.
- Bald and Golden Eagles and their nests are protected under the Bald and Golden Eagle Protection Act (BGEPA).

*Figure 3.1-1. Number of Listed Species by Installation as of 2020**



*Excludes candidate and rare species, species under review, and state-listed species.

Significant impacts to biological resources would include:

- Substantial permanent conversion or a net loss of habitat;
- Long-term loss or impairment of a substantial portion of the local habitat (species dependent); or
- Loss of populations of species, or
- Unpermitted “take” of threatened and endangered species, migratory birds, or bald and golden eagles.

3.1.3.2 Common Environmental Consequences as a Result of the Proposed Action

Impacts from range construction, live-fire training, and maneuver training would occur primarily in areas that have been previously disturbed. Most impacted areas contain common native plants or nonnative vegetation, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. General wildlife and habitats would be affected by range construction and training activities. Limited intact, native habitats may be affected. Overall, impacts to general wildlife and habitats are expected to be less than significant.

Construction and training activities would increase the potential to introduce or spread noxious weeds and increase the possibility of accidental ignition of a wildfire. Impacts from all activity groups would be expected to affect the introduction and spread of invasive species through the movement of troops and equipment, construction, and fires. Impacts from noxious weeds is expected to be less than significant.

Construction and training may impact threatened and endangered species and their habitats. Given training levels would not dramatically increase (approximately 3-6 percent)[24], would be widely distributed across the installations, and most impacts would be in disturbed or existing training areas, impacts are expected to be less than significant for all areas.

Impacts from Construction

Cantonment construction. Construction of M-SHORAD facilities could negatively impact Biological Resources. Construction in the cantonment could consist of buildings and infrastructure to support the unit. Direct impacts could include displacement of wildlife, removal of vegetation, and habitat fragmentation. Indirect impacts from construction could include avoidance of built-up areas because of the construction activity, human presence during and after construction, and a potential increased loss of wildlife caused by collisions with vehicles. Such impacts are not expected to be significant because the cantonment area is not an important source of Biological Resources due to previous disturbance and higher human density.

Impacts to vegetation. Range construction at all installations could occur. Vegetation within the proposed footprints of these projects, which primarily includes grasses, trees, and shrubs, would be removed. Impacts to these areas would include trampling and disturbance from vehicles and military personnel. Indirect impacts could include habitat fragmentation and increased erosion. Following the construction of the proposed ranges, the Army would seed disturbed areas with native or non-invasive vegetation. Impacts to vegetation from range construction are expected to be less than significant.

Impacts to general wildlife and habitats. Human presence and elevated noise levels would displace various wildlife species during construction; however, impacts from range construction

[24] Based on an analysis of Army training doctrine, the M-SHORAD training requirements increase maneuver impacts by 3-6 percent.

to wildlife would not differ from the impacts from normal operations and activities occurring in the anticipated construction footprints. Increased noise resulting from construction is not expected to affect native wildlife because field surveys have shown that it is not a significant factor in behavior and does not affect reproductive success (U.S. Army Engineering District Honolulu 2000). Impacts to general wildlife and habitats from range construction are expected to be less than significant.

Impacts to Threatened and Endangered Species. The Proposed Action could result in short- and long-term impacts to listed species within the installation's ROI due to construction activities, human presence, and noise. If adverse effects are known or anticipated, the installation will consult with the USFWS or the National Oceanic and Atmospheric Administration (NOAA) fisheries to minimize species impacts.

Introduction and spread of invasive plants and noxious weeds. Construction can introduce invasive species and other weeds through the use of sand and gravel that contains nonnative plant seeds. The use of roads and trails would also affect the introduction and spread of invasive species. The introduction of more invasive species to the area would have short- and long-term impacts to sensitive plants and wildlife. Increases in invasive species can have adverse effects on native plants and wildlife by competing for resources. Invasive species often benefit from fires due to their ability to colonize areas following a burn. Also, the presence of invasive species often provides fuel for wildfires, makes fires larger, and facilitates the spread of fire.

Impacts from Live-Fire Training

Impacts to vegetation. Direct adverse effects on vegetation would occur from trampling, either on foot or in vehicles, and live-fire hitting and damaging any remaining trees or larger bushes. Indirect effects from live-fire training could be the occasional wildfire outbreak from munitions discharge and the deposition of undesirable chemicals and compounds in the soil. An increased incidence of wildland fire may require improving or additions to the existing firebreak system. More and more frequent prescribed burns in the range areas or adjacent areas may be required to prevent increased wildland fire intensity and increase chances of containment. Each of the assessed sites have in-place Integrated Wildland Fire Management Plans (IWFMPs) that will be applied to address risk management/mitigation and fire management considerations. Each of these sites has active wildland fire management programs available to address any resulting wildland fires or use of prescribed fire needed for vegetation control/fuel reduction to maintain maneuver training areas. The use of prescribed fire would be planned annually and installation foresters will incorporate this requirements into the installation annual burn plan.

Impacts to general wildlife and habitats. Wildlife will generally avoid live-fire areas that are frequently used. For wildlife that remains, they may be flushed by the presence of humans and the sounds of weapons discharged. Those that are not flushed may risk being injured or killed by trampling or weapons discharge. Wildlife within the impact area and associated surface danger

zones could be directly affected by being struck by ordnance or other munitions. Ordnance fired by the M-SHORAD battalion is not likely to cause below ground disturbance. The likelihood of impacts occurring is low because species will depart the area or burrow below ground. In addition, M-SHORAD training will only increase live-fire range use by approximately 3-6 percent at the assessed installations. Species covered under the MBTA are exempt from the incidental take provision of the Act associated with military training (Department of the Interior Memorandum December 22, 2017, and Deputy Assistant Secretary of Defense Memorandum 2018). Therefore, impacts are expected to be less than significant.

Impacts to Threatened and Endangered Species. The types of impacts would be similar to what is described under general wildlife and habitat impacts. If adverse effects are known or anticipated, the installation will consult with the USFWS or the NOAA fisheries to minimize species impacts.

Introduction and spread of invasive plants and noxious weeds. In general, invasive plant species pose a threat to ecosystems. The potential impacts of live-fire training could increase the introduction and spread of invasive species through the increased risk of wildfire.

Impacts from Maneuver Training

Impacts to vegetation. Vegetation communities within the ranges utilized would be disturbed by maneuver training. Maneuver training may cause crushing or trampling of vegetation and increased erosion. Most training would occur on established roads or trails, with lesser amounts in off-road areas designated for maneuver training throughout the installations. Vegetation resources would not be expected to be affected by maneuvers on existing roads and trails.

In addition, all proposed M-SHORAD fielding locations have existing Integrated Training Area Management (ITAM) programs that manage, repair, and mitigate the land disturbance that results from maneuver training. ITAM activities include, but are not limited to, repairing and revegetating maneuver damage, repair ground hardening, erosion control measures, and establishing temporary off-limits areas to allow ground re-stabilization. ITAM efforts ensure maneuver training ground disturbance impacts will be minimal and temporary.

Impacts to general wildlife and habitats. The operation of ranges has the potential to displace various wildlife species. Displacement would be caused by increased vehicle and human presence in the area and elevated noise levels. Wildlife species in or around these ranges are more tolerant of human activity, and it is assumed that more sensitive species have previously left the area. Higher training levels at existing ranges could increase incidental mortality or injury to wildlife. However, such mortality would not cause measurable impacts to wildlife populations. M-SHORAD training on the new and existing ranges would have a less than significant impact to wildlife and habitats.

Impacts to Threatened and Endangered Species. The types of impacts would be similar to what is described under general wildlife and habitat impacts. If adverse effects are known or anticipated, the installation will consult with the USFWS or the NOAA fisheries to minimize species impacts.

Introduction and spread of invasive plants and noxious weeds. Maneuver training increases the threat of spreading invasive plants and noxious weeds through increased use of roads and trails. Movement of troops and equipment across the landscape would increase the likelihood of nonnative plant introductions. Disturbance of native vegetation creates an open ecological niche that nonnative plants can invade. Fires could put native plant species at a competitive disadvantage.

Impacts from Increase in the Number of Soldiers

Increases in the number of soldiers increase the risk of human-wildlife interactions that may result in less than significant adverse effects. The population increase would be between 1 percent and 2.5 percent of the current installation population. The small population increase is not expected to have a significant impact on Biological Resources.

3.1.4 Cultural Resources

3.1.4.1 Affected Environment

Cultural resources encompass archaeological, paleontological and architectural resources, including historic properties, cultural items, historic and prehistoric archeological resources, and archeological collections. Army Regulation 200-1 *Environmental Protection and Enhancement* (AR 200-1) guides the management of cultural resources on Army installations. AR 200-1 has a section specific to the Army's cultural resources programs. Cultural resources include:

- Historic properties, as defined by the National Historic Preservation Act (NHPA);
- Cultural items as defined by the Native American Graves Protection and Reparation Act (NAGPRA);
- Archeological resources as defined by Archaeological Resources Protection Act (ARPA);
- Sacred sites as defined in EO 13007, to which access is afforded under the American Indian Religious Freedom Act (AIRFA); and
- Archeological collections as defined in 36 CFR 79.

The NHPA of 1966, as amended, states that historic resources are "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such property or resource."

Applicable Statutes, Executive Orders, and Regulations

Under AR 200-1, the Garrison Commander is responsible for managing the cultural resources on the installation in compliance with federal laws, regulations, and standards. The Garrison Commander typically delegates this authority to a Cultural Resource Manager. The laws, executive orders, and regulations that prescribe how the installation identifies the potential impacts to cultural resources that may occur from the Proposed Action (described in Section 2 above) are summarized here. Other legal historic preservation requirements for each installation are contained in the Installation Cultural Resources Management Plan (ICRMP) and are not repeated here.

National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 et seq.)

The NHPA establishes a national program for historic preservation. The overarching policy of the act is to find "conditions under which our modern society and our prehistoric and historic resources can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations" (Section 2, NHPA). Specifically, it:

- Allows for the expansion and maintenance of a NRHP (Section 101);
- Requires all federal agencies to consider the effects of their actions on the nation's historic properties (Section 106);
- Directs federal agencies, such as an Army garrison, to assume responsibility for the management of historic properties that they own or control (Section 110).

The NHPA requires that the federal agency make these decisions in cooperation with state and local governments, federally recognized tribes, and the public. The NHPA acknowledges that not all cultural resources are significant. Only cultural resources significant to American history, architecture, archaeology, engineering, and culture can be listed on or determined eligible for listing on the NRHP. A cultural resource must meet one or more of the following criteria (from 36 CFR 60.4 [*Parks, Forests, and Public Property—National Register of Historic Places Criteria for Evaluation*]) to be eligible for listing in the NRHP:

- A property associated with events that have made a significant contribution to the broad patterns of our history;
- A property associated with the life of a person significant in our [nation's] past;
- A property that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction;
- A property that has yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting this significance test, the property must also possess integrity. *Integrity* means that the property contains the physical characteristics that existed during the resource's historic or prehistoric occupation or use.

Cultural resources that meet this significance test are called "historic properties" or "historic districts"—when multiple historic properties lie nearby and relate to each other. Under Section 106 of the NHPA, a federal agency is obligated to consider the effects of its undertakings on historic properties. Cultural resources that are not eligible for the NRHP are not "historic properties" and not considered further under Section 106.

Protection of Historic Properties, 36 CFR 800

Protection of Historic Properties regulations, 36 CFR 800, outlines how federal agencies meet their responsibilities under Section 106 of the NHPA. They define the roles of the agency, the Advisory Council on Historic Preservation (ACHP), the State Historic Preservation Officer (SHPO), the Tribal Historic Preservation Officer (THPO), and interested parties or the public. The process for compliance with Section 106 consists of the steps below, all of which are made by the installation Historic Preservation Officer (HPO) in consultation with the SHPO, THPO, and interested members of the public. At times, the ACHP may also be a consulting party to a proposed undertaking.

- *Identification of the Area of Potential Effects of the undertaking*. The Area of Potential Effects (APE) is the geographic area within which an undertaking may affect a historic property. For example, the construction of a forward operating base (FOB) during an exercise on the location of an archaeological site that has been determined eligible for the National Register would be an effect that could cause dramatic changes to that historic property if portions of the FOB need to be leveled. The APE for the Proposed Action would be the areas directly impacted by each undertaking within each alternative of the three categories. This APE includes the footprints for the new ranges or training facilities, FOB sites, new buildings in the cantonment, off-road vehicle training in areas where this has not been allowed, and other proposed undertakings that were not analyzed in previous environmental documents. In most cases, these footprints are not known at this time. As each footprint is identified, its APE will be defined by the installation HPO. It also includes training areas (TAs) where the type of training or the intensity of training will change.
- *Identification of historic properties within the APE*. Each cultural resource identified on the installation is evaluated against the NRHP criteria. If an undertaking does not affect any properties determined to be eligible for the NRHP, it is not subject to further review under Section 106. If no historic properties are found in the APE, the federal agency documents that no historic properties are present get concurrence from SHPO/THPO and then has completed its compliance under Section 106. If the undertaking affects properties eligible for the NRHP that are within the APE, the installation will review them under the next step.

- Determination of effect. The installation will determine if the proposed undertaking will have an adverse effect on historic properties in the APE. An undertaking has an "effect" on a historic property when the undertaking may alter the characteristics that may qualify the property for listing on the NRHP. An undertaking is considered to have an "adverse" effect when the effect may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. One of the following effect findings will be made: adverse effect or no adverse effect. If the proposed undertaking will have no adverse effect, the installation documents this determination, gets concurrence from the SHPO/THPO, and has completed its responsibilities under Section 106.
- *Resolution of adverse effect/mitigation*. When the effects are found to be adverse, the installation examines the proposed undertaking to determine if it can be modified to avoid adverse effects. If the proposed undertaking cannot be modified to avoid adverse effects, the installation will consult about developing mitigation measures to resolve the adverse effects.

The Army or DoD have Program Comments (PC) negotiated with the ACHP in consultation with SHPO/THPO, Indian tribes and Native Hawaiian organizations. A PC streamlines the repetitive management actions for a large inventory of similar historic properties or for agencies that have programs that generate a large number of similar undertakings. The PC can help an agency achieve a broader perspective in planning for similar historic properties it manages on a nationwide basis (36 CFR § 800.14(e)). There are currently PCs covering: Capehart Wherry military housing (1949-1962), Cold War-era (1946–1974) unaccompanied personnel housing, World War II and Cold War-era (1939–1974) Army ammunition production facilities, World War II and Cold War Era (1939-1974) ammunition storage facilities, and Inter-War era historic housing (1919-1940).

The Army also has Prototype Programmatic Agreements (PPA) negotiated with the ACHP in consultation with SHPO/THPO, Indian tribes and Native Hawaiian organizations. A PPA (36 CFR § 800.14(b)(4)) may be used for the same type of program or undertaking in more than one case or area and typically establish efficiencies and protocols for implementing these undertakings. Current Army PPAs cover the privatization of Army lodging and address the interiors of NRHP contributing buildings and individually eligible buildings.

Native American Graves Protection and Repatriation Act of 1990

NAGPRA requires federal agencies to consult with tribes about the discovery and disposition of Native American human remains found on federal land. It also provides a process for repatriation to tribes of burial objects not associated with human remains, objects considered sacred to a tribe, and objects considered of great importance to tribal traditions or customs.

American Indian Religious Freedom Act

AIRFA affirms American Indians' right of freedom to believe, express, and exercise their traditional religions. It also provides their right to access sites on federal land, use and possess sacred objects, and the freedom to worship through ceremonies. It requires federal agencies to consult with tribes about whether agency undertakings will affect tribal religious activities.

Executive Order 13007—Indian Sacred Sites

The EO 13007 regarding Indian Sacred Sites requires federal agencies responsible for federal land management to accommodate access and ceremonial use of Indian Sacred Sites. It also requires that the federal agency avoid adversely affecting the physical integrity of sacred sites "to the extent practicable, permitted by law and not clearly inconsistent with the essential agency functions" and provide notice to the tribe of any action that may affect the site or access to the site." Where appropriate, the agency will also maintain the confidentiality of such sites. Sacred sites are identified by a tribe, within their religious tradition, as places of religious significance or ceremonial use. It is important to note that while all cultural resources on an installation are evaluated against the National Register criteria, some properties determined not eligible under that process may be identified as a sacred site by a tribe. In such a case, the site will be managed as a sacred site by the installation.

Executive Order 13084—Consultation and Coordination with Indian Tribal Governments

The EO 13084 states that there exists a unique legal relationship between the United States and Indian tribal governments. It stresses that federal agencies must collaborate with Indian tribal governments when formulating policies that would uniquely affect such governments, their treaty rights, or other rights.

Significant cultural resource impacts would occur with any adverse effect to an eligible property (may include physical destruction, damage, alteration, removal, change in use or character within the setting, neglect causing deterioration, transfer, lease, or sale) without appropriate mitigation. This includes concerns raised by Indian Tribes or Native Hawaiian Organizations regarding adverse effects to eligible properties of religious and cultural significance to those tribes or organizations without appropriate mitigation.

3.1.4.2 Common Environmental Consequences as a Result of the Proposed Action

The Proposed Action could result in inadvertent impacts to cultural[25] resources or restrict access to known Tribal resources.

[25] Cultural resources as defined in Section 3.1.4.1.

Impacts from Construction

Cantonment and range construction involve clearing vegetation, grading site surfaces, subsurface excavations, and moving heavy construction equipment. All of these activities, particularly excavation, could result in direct damage to or destruction of Cultural Resources. Destruction, damage, or restricted access to previously unknown properties of traditional Native American importance could occur. Surveys would be conducted to identify Cultural Resources within the area of potential effect, thereby reducing unintended impacts to unknown resources during earth-disturbing activities. Installations may have alternative means to avoid impacts as established through existing procedures or Programmatic Agreements for compliance with Section 106 of NHPA. During construction, if the disturbance of any potential cultural resource is noted, the construction activities would cease, and a qualified staff member would be called in to assess the potential cultural resource and determine a course of action to minimize impacts.

There remains a potential for impact to documented sites. These impacts are expected to be mitigated to less than significant by the implementation of appropriate treatment plans. Mitigation in the project area would include avoidance of known sites during construction design to minimize impacts. There would be regular monitoring of known sites by cultural resource personnel during construction to ensure that the site protection measures are working and adjusted if needed. Per the Installation's Programmatic Agreement or through consultation with their state's SHPO and consultation with associated tribes or THPO, if sites cannot be avoided during design and construction, appropriate mitigation measures would be implemented. Mitigation measures could include protection through buffers or avoidance, documentation, or artifact and data recovery.

Impacts from Live-Fire Training

All live ordnance would be expended on existing or newly constructed range areas. Known cultural resource sites within the footprint of ranges have been mitigated during construction; therefore, less than significant effects are anticipated. For ranges that were constructed prior to the existence of an Army Cultural Resources Program (typically before 1990), cultural resources may not have been surveyed. If it is safe and feasible, these areas may be surveyed in the future and appropriate mitigations would apply.

Impacts from Maneuver Training

Maneuver training would take place on existing or newly designated maneuver areas. Any known cultural resource sites within the footprint of a training area are protected, clearly marked (on maps or on the range), and are off-limits to training activities. Soldiers receive training in recognizing and avoiding cultural resource sites. There would be regular monitoring of known sites by cultural resource personnel after training activities to ensure that the site protection measures are working and adjusted if needed. Previously unknown cultural sites may be discovered during training. If this occurs, soldiers are trained to avoid the area and report it to

cultural resource personnel to be properly assessed and preserved if necessary. Therefore, impacts to Cultural Resources from maneuver training are expected to be less than significant.

Impacts from Increase in the Number of Soldiers

Increases of between 1 percent and 2.5 percent of the current installation population would increase the chance that a cultural resource site may be disturbed. Cultural resource sites within the cantonment area are normally known, marked, and protected. Cultural resource sites within the training areas are much less likely to be disturbed due to the substantially larger acreage, the lower density of human occupation that is primarily soldiers, and the training soldiers receive in recognizing and avoiding cultural resource sites. It is worth noting that the procedures in place for preservation of cultural resources would remain applicable and the installations are prepared to conduct additional coordination to ensure implementation. Therefore, impacts to Cultural Resources from the increase in population are expected to be less than significant.

3.1.5 Soils

3.1.5.1 Affected Environment

Erosion is the gradual wearing away of land by water, wind, and other general weather conditions. Erosion can be influenced by many military and human activities within a given landscape. Erosion impacts can be influenced by the types of soils, vegetative cover, topography, weather, and climate, and may be amplified by the frequency and types of training. Soil erosion can be an important concern on military lands where maneuver training involving large vehicles (tracked and wheeled) and large- and small-arms fire occurs. It can undermine the ability of the natural environment to support the Army mission, and once the erosion process has started, the direct effects are difficult to reverse.

The Army has numerous programs and management initiatives to reduce environmental damage to training lands. The principal mechanism for this management is the ITAM Program, discussed in section 3.1.2.1. The ITAM Program provides a comprehensive means to address the cumulative effects of soil erosion on Army training lands.

Significant impacts to soils would occur if the landscape could not be sustained for military training over a wide area, substantial soil losses were to impair plant growth over two growing seasons, or result in detrimental increases in stream sedimentation.

3.1.5.2 Common Environmental Consequences as a Result of the Proposed Action

Impacts to soils resulting from fielding an M-SHORAD battalion are driven by construction and training. These impacts are expected to be less than significant due to the small increases in training, use of existing facilities, and the control measures employed by the Army.

Impacts from Construction

Construction within the cantonment area would involve clearing vegetation, grading site surfaces, subsurface excavations, and moving heavy construction equipment. This construction may occur in

previously disturbed or undisturbed areas. These activities can result in soil compaction or soil erosion. Indirect impacts could be increased stream sedimentation and dust production. Converting natural soil to paved or solid surfaces increases stormwater runoff and may impact groundwater recharge. Design and construction adherence to the required stormwater management plan and best management practices would minimize soil erosion, stormwater runoff, and sediment production. After construction is complete, the site would be landscaped with native plants and seeds. Therefore, impacts are expected to be less than significant.

Newly designated or expanded maneuver areas could increase the exposure of vegetated soils to vehicle and foot traffic. This may include new unpaved roads or trails, berms to protect high-value targets, and hardened concrete turning points on unpaved trails. This could cause loss of vegetation, soil compaction, and alterations to drainage patterns that would increase soil erosion from both wind and water. Best management practices (BMPs) and required erosion control measures are expected to reduce adverse impacts to soil to less than significant levels.

Construction at live-fire ranges would consist of firing points, training aids such as buildings and bunkers, trench lines, stationary and moving targets, and other typical range features and the associated range support facilities such as control buildings[26], bleachers, and latrines. Construction could occur in undisturbed or previously disturbed areas but the use of standard construction BMPs and required erosion control measures are expected to reduce impacts to less than significant levels.

Construction is expected to result in short- and long-term adverse impacts to soil resources. Short-term impacts may include soil compaction from construction equipment activities and temporary displacement of soil to facilitate construction activities. Long-term impacts could include soil removal to provide proper site grading and soil loss due to erosion. The Army would construct stormwater runoff control structures as part of required erosion control measures and standard BMPs, which would divert water from the construction sites. Other standard range maintenance BMPs implemented under the Proposed Action include road grading, target repair, and berm re-contouring would also reduce erosion. Compared to existing conditions, increased soil erosion resulting from range construction activities is expected to be localized and less than significant.

Impacts from Live-Fire Training

Weapons training would increase under the implementation of the Proposed Action. Live-fire training would increase at all installations from 3.20 to 6.56 percent. Although weapons training events would be periodic, minor long-term impacts are expected due to the deposition of munitions constituents resulting in soil contamination. Implementation of the soil erosion control measures and standard BMPs are expected to result in less than significant impacts.

[26] Control buildings allow the Range Control Officer to oversee the range activities to ensure safe and effective training.

Training-related activities can initiate wildfires. Wildfire could remove large areas of vegetation that normally protect soil from erosion by slowing surface runoff, intercepting raindrops before they reach the soil surface, and anchoring the soil with roots. Vegetation removal resulting from wildfires could result in increased soil erosion by water and wind, indirectly causing removal and re-deposition of soils, gullying, or unstable slopes in areas of steep slopes and rapid runoff. The impact would be directly proportional to the size of the fire. Fire and loss of soil could reduce native plant species and encourage fast-growing nonnative species that recover quickly after fires. Removing grassland vegetation by fire would temporarily expose soils to increased water erosion, but perhaps even more so to wind erosion. Areas with flowing streams and wind erosion could transport soil further from its original location. Based on the type of ordnance fired by the M-SHORAD, the risk of wildfire outbreaks is relatively low. Also, the installation's Integrated Wildland Fire Management Plans would help reduce adverse effects. Therefore, impacts are expected to be less than significant.

Munitions are fired from firing points downrange and into the range impact areas. The Army restricts access to these areas by soldiers or members of the public because of the explosive risk to safety they represent. It is unlikely, therefore, that military personnel or off-post residents would come into contact with the constituents of these munitions in the downrange impact area soils. The risk to military personnel who use the ranges would be low because contact with downrange impacted soils is unlikely and there are relatively few areas with high chemical constituent concentrations. There would be no risk to the general public from munitions constituents related to range use because there would be no public access to these areas. Exposure to soil contaminants during live-fire training activities is considered a less than significant impact.

Impacts from Maneuver Training

Mounted maneuver training for the M-SHORAD battalion would increase maneuver area training by 3.07 percent to 5.76 percent at the assessed installations. This is expected to damage or remove vegetation and disturb soils to the extent that would increase soil erosion rates and alter drainage patterns in the training areas, which could lead to gullying, and indirectly to downstream sedimentation, particularly when the vehicles travel off-road.

While most of the off-road maneuvering would occur on existing maneuver areas, there may be areas used for maneuvering that have not been previously used. M-SHORAD vehicles tend to use trails much more than off-road travel because their wheeled chassis favors maneuver on roads and trails. Because of their weight and wheel size, the off-road maneuvering that they would conduct could disturb soils and vegetation, increasing the potential for soil erosion.

Soils in the training areas, particularly soils that have not previously been used for military vehicle maneuver training, could become compacted using the M-SHORAD vehicles. This could alter the permeability and water-holding capacity of the soils and harden silty clays. Reduced

water-holding capacity and permeability adversely impact the ability of the soils to support recovered vegetation. Because vegetation cover is a primary means of preventing soil erosion, widespread compaction could indirectly lead to increased erosion and downstream sedimentation. The compacted linear tracks or ruts left by off-road vehicles could create preferential pathways for surface runoff, which could also indirectly result in increased erosion along the tracks and subsequent downstream sedimentation. The small increase in maneuver training and Army land assessment, rehabilitation, and maintenance practices are expected to reduce these impacts to less than significant.

Impacts from Increase in the Number of Soldiers

Increases of between 1 percent and 2.5 percent of the current installation population are not expected to impact soils. All soil impacts are related to construction and training activities.

3.1.6 Land Use and Compatibility

3.1.6.1 Affected Environment

Land use refers to the planned development of property to achieve its highest and best use and to ensure compatibility among adjacent uses. In the Army, land-use planning is the mapping and planned allocation of the use of all installation lands based on established land-use categories and criteria.

The land-use planning process is iterative because it needs feedback and ideas from the installation unit, tenant organizations, and residents. Land-use planning is used continuously as a component of real property master planning.

An installation's Real Property Master Plan, which typically covers a 20-year planning horizon, is focused on the management and development of real property resources. This plan should contain information that is vital for addressing cumulative effects on land use. The Real Property Master Plan analyzes and integrates the plans prepared by the Director of Public Works and other garrison staff, mission commanders, and other tenant activities, higher headquarters, and those of neighboring communities to provide for orderly development, or in some cases, realignment and closure of real property resources (DA, AR 210-20, May 2005).

Change to land use under the Proposed Action could occur if additional land has to be converted to use for training or land currently used for buildings is converted to another use when the buildings are eliminated or when buildings are constructed on training land. Such changes would be reflected through changes to the master plan.

Significant impacts would occur if the Proposed Action caused a land use to be incompatible with existing military land uses and designations (including recreation). These impacts may conflict with Army land-use plans, policies or regulations, or conflict with land-use off-post.

3.1.6.2 Common Environmental Consequences as a Result of the Proposed Action

Impacts to land use and compatibility resulting from fielding an M-SHORAD battalion are driven by construction, training, and the additional soldiers and families. These impacts are expected to be less than significant due to the limited need to change land use type and there would not be a notable increase in the intensity of existing land uses.

Impacts from Construction

The exact locations where the facilities required to field an M-SHORAD battalion at the assessed installations may not be known yet. However, for this analysis, it is assumed that land uses related to fielding an M-SHORAD battalion would remain consistent with the installation's Real Property Master Plans (RPMP).

If a land designated for training has not supported mounted maneuver training in the past, some construction may be required such as creating trails, reinforcing turn points, or creating bivouacs[27] or forward operating bases. This may generate small amounts of dust, may require removal of vegetation, and increase compaction of soils and erosion potential. Such changes are expected to be minimal and therefore less than significant.

During any range construction, if the presence of munitions and explosives of concern (MEC) is known or suspected, appropriate steps to ensure any MEC is detected and safely removed would be taken. Also, ordnance health and safety monitoring would occur during construction to reduce potential exposure and impacts of this project. If MEC is detected during construction, nearby occupants within the danger zone would be notified and evacuated. If needed, road closures and coordination with local law enforcement agencies, fire departments, and transportation agencies would occur. The Army would continue to educate soldiers on identifying MEC and the proper safety procedures for handling MEC. With continued implementation of standard Army regulatory and administrative requirements, this impact is expected to be less than significant.

Construction of ranges at the installations could indirectly affect nearby land uses due to increased noise, dust, odors, human presence and activity in the construction sites. These impacts would be localized, temporary, and are expected to be less than significant.

Impacts from Live-Fire Training

Access to adjacent training lands and the associated surface danger zones could be restricted during range use. Land use and compatibility impacts would be associated with short- or long-term changes in ambient conditions, such as increased noise, dust, or odors and may result in indirect effects to land uses or quality of recreation in the vicinity of the training area.

Under the implementation of the Proposed Action, additional live-fire training would occur due to an increased number of soldiers training at both the existing and possible new ranges. The

[27] Bivouacs are a temporary camp without tents or cover, used especially by soldiers.

potential requirement for new ranges could result in a loss of prime farmland, wetlands, maneuver areas, or recreational lands. If this is required, it would be addressed in the installation-specific analyses for land use and compatibility.

In addition, weapons new to a particular training range may be used, but these weapons are very similar to those currently in use. The cumulative amount of munitions fired could increase. Increased noise, dust, or other indirect effects associated with this alternative are not expected to affect off-post land uses since these weapons are similar to what is currently in use. Prior to the use of any new weapon on a specific range, surface danger zones are reviewed to ensure compatibility with adjacent ranges and nearby non-range lands. The presence of MEC would only occur within the impact areas, which are posted as restricted to public access. With continued implementation of current Army SOPs to minimize potential noise and safety impacts, impacts are expected to be less than significant.

Impacts from Maneuver Training

The addition of an M-SHORAD battalion would increase the number of vehicles completing maneuver training. The increase in vehicles could require a larger area compared to current training, potentially extending training into areas that have not been used as frequently or requiring new training areas. Impacts from additional maneuver training are expected to be less than significant because training would occur on areas already designated for this use and the intensity would only increase from 3.07 percent to 5.76 percent, a minimal amount. The potential requirement for new maneuver training areas could result in a loss of prime farmland, wetlands, or recreational lands. If this is required, it would be addressed in the installation-specific analyses for land use and compatibility.

Impacts from Increase in the Number of Soldiers

The increase in the number of soldiers is not expected to change the type of land use, but the degree of use is expected to increase slightly. The soldier population is expected to increase by 1 percent to 3.5 percent, not a significant amount.

3.1.7 Socioeconomics

3.1.7.1 Affected Environment

Socioeconomics are the basic attributes and resources associated with the human environment, particularly population and economic activity. Population levels are affected by regional birth and death rates, as well as immigration and emigration, which are often related to regional employment availability. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators may be accompanied by changes in other components, such as housing availability and the provision of public services. Socioeconomic data at the county, state, and national levels permit the characterization of baseline conditions in the context of regional, state, and national trends.

The principal factors affecting socioeconomics at Army installations are construction project expenditures; salaries (soldier, civilian, and contractor); procurement of goods and services locally and regionally by soldiers, civilians, and their family members; and employment changes. As the Army increases or decreases either expenditures or employment (soldier or civilian) at an Army installation, these impacts are felt within the economic ROI by businesses, local governments, and individuals. Impacts from stationing actions can manifest themselves as a loss or gain in jobs; change in real estate values; change in educational, social, and medical services; or change in state or local tax revenue. Installation changes in soldier or civilian employee populations could result in varying degrees of economic impact depending on the economic diversity and size of the regional economy. Socioeconomic impacts are linked through cause-and-effect relationships. With the Proposed Action, there would be direct impacts from proposed military employee (soldier and civilian employee) changes. Impacts on jobs, income, business volume, and personal spending in the ROI would all be anticipated.

These changes in soldier and government civilian employee populations would also be associated with some change in the need for contract support and lead to indirect impacts through either an increase or reduction in the overall demand for goods and business services within the region. Increases or decreases in demand for goods and services, in turn, can result in indirect increases or reductions of other miscellaneous jobs to support demand.

Impacts on the local economy could depend on the fluctuations in the population within the installation. For example, installation population loss would negatively impact regional economies. Cities, towns, and counties in the ROI, whose economies are supported by military employment, contribute to local and regional employment and economic activity and could be adversely affected. Installation personnel reductions would be expected to result in adverse economic impacts due to the loss of jobs, income, and sales in an affected region. In addition, adverse impacts on regional community services and schools could occur because they receive funding, support, time, donations, and tax revenue directly related to the installation's military authorizations and their dependents. Population loss could put downward pressure on housing demand and the local housing market, as well as decrease the need for varying public services such as police, fire, emergency, or medical services.

Installation population gains, for example, would generally represent beneficial long-term economic impact within the ROI due to increased jobs, income, sales, resources, and associated increases in tax revenues. Gains also can have variable impacts to school districts concerning the student population. It would be anticipated that most soldiers would be accompanied by their families and that there would be an increase in schools' student population growth. This increase could also result in more impact aid[28] for the schools. Increases in the number of Army personnel

[28] Impact Aid is paid to local education agencies (LEAs, i.e., school districts) to compensate for lost local tax base to LEAs imposed upon by federal property.

could also decrease housing availability and put upward pressure on housing prices, as well as increase the need for public services.

Increases in construction spending to support population gains would have similar beneficial economic impacts as population gains; however, impacts would generally be short-term and temporary. Increased construction could result in temporary increases in jobs, income, and sales due to increased spending in a given region. It could lead to temporary increases in the population if relocation were necessary.

Impacts on socioeconomics would be considered significant if they were to cause substantial change to the sales volume, income, employment, or population of the surrounding ROI.

The Environmental Justice (EO 12898) analysis requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal agency programs, policies, and activities on minority and low-income populations. Minority populations are identified as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, Hispanic, of two or more races, and other. The Proposed Action may have disproportionate health impacts on low-income or minority populations in that it may involve economic impacts to communities with higher minority populations than the state as a whole. Within the ROI, however, the economic effect would be distributed among community members regardless of race, ethnic origin, or economic status, and therefore is not disproportionate and will not be discussed further.

In addition, the EO 13045 requires federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children. Such risks to health and safety are attributable to products or substances that a child would be likely to come in contact with or ingest. The impacts of the alternatives are not projected to have adverse impacts on children, because no aspects of the action would be anticipated to increase the risks described in the EO. Therefore, there is no further discussion on the effects of the Proposed Action on children.

3.1.7.2 Common Environmental Consequences as a Result of the Proposed Action

Impacts from Construction

If an installation requires new or refurbished facilities in the cantonment area or within the training areas, construction would be required. Such construction would normally be contracted to private firms and provide a positive economic impact within the ROI. A direct benefit would be increased employment related to construction and indirect benefits, including increased sales volume and income. There could also be increases in the population if workers, solo or with families, move into the ROI for construction jobs. These impacts would initially be temporary but could lead to permanent increases if workers and families remain in the ROI long term. Increases in employment, sales volume, income, and population would all be beneficial but less than significant compared to the totals in each category within the ROI.

Impacts from Live-Fire Training

Live-fire training would have no impacts to employment, sales volume, income, and population.

Impacts from Maneuver Training

Maneuver training would have no impacts to employment, sales volume, income, and population.

Impacts from Increase in the Number of Soldiers

An increase of 550 soldiers would result in increases ranging only from 1.1 percent to 2.5 percent of the installation population. Based on statistics gathered from the Defense Manpower Data Center,29 it is estimated that 52.9 percent of the soldiers will be married resulting in 291 spouses. Also, each soldier will have 0.9 children on average, totaling 495 children, resulting in a total population increase of 1,336 persons within the ROI. Across the installations assessed, the ROI population increase would range from 0.1 percent to 2.2 percent. Within the ROI, where the soldiers and their families would reside, the population changes are expected to result in a less than significant beneficial impact on employment, sales volume, income, and population numbers.

At the time of analysis, the employment situation across the country was in a great state of flux due to the impacts of COVID-19. There is no way to determine how long COVID-19 impacts to employment will persist. The addition of 550 soldier positions with an assured salary would be a positive impact on employment in the ROI. Conversely, many soldiers will have spouses who may have left employment to move to the ROI. Spouses may have a difficult time finding new employment in the ROI. There will be approximately 290 spouses accompanying the soldiers but not all may seek employment in the ROI. Therefore, the addition of the M-SHORAD battalion will consistently result in a net gain of employment though it may be insignificant.

In terms of race and origin, the Army population generally reflects the diversity across our nation. It would not be expected to significantly affect the diversity of race and origin within each respective ROI. There would also be a negligible increase in the use of local services such as schools, hospitals, police, and fire.

The average annual per capita income of the soldier population arriving due to stationing an M-SHORAD battalion is $23,518.[30] Depending on the cost of living at each installation's ROI, soldier income may vary based on supplemental payments to account for variations in living

[29] June 2020 data accessed from the Defense Manpower Data Center at https://dmdcrs-pki.dmdc.osd.mil/dmdcrs/vp.html#!/reports/16?filter=A,N,M,F&filter=202006 and https://dmdcrs-pki.dmdc.osd.mil/dmdcrs/vp.html#!/reports/17?filter=A&filter=S,MJ,MC&filter=202006 on 29 July 2020.

[30] Calculation of the average annual per capita income is based on the Disposable Income from the Detailed Regular Military Compensation (RMC) Tables For All Personnel, Assume All Cash Pay 1 January 2019 table of the Department of Defense Selected Military Compensation Tables dated 1 January 2019. The calculation was done by adding the disposable income for the expected number of Soldiers of each rank and dividing by the total number of Soldiers, spouses, and children expected to arrive with the battalion. This income does not include any wages that spouses or children may receive since this information is not available.

expenses. This average annual per capita income is similar to the average annual per capita income within each installation's respective ROI, except Fort Riley and Fort Carson which will be addressed in sections 3.5.7 and 3.7.7. Therefore, impacts to the local economy are expected to be less than significant.

The overall estimated contribution of the M-SHORAD battalion disposable income is $31,420,177 to each installations' ROI. The contribution ranges from 0.11 percent to 2.39 percent of the total estimated income within the ROI.[31]

3.1.8 Traffic and Transportation

3.1.8.1 Affected Environment

Traffic and transportation systems refer to organized means of moving people and commodities. Principal transportation systems include highways and automobiles, commercial air carriers, waterway and maritime shipping, railroads, and trucking. Movement of people by privately owned vehicles (POVs) on a local or regional scale is related to traffic and circulation. In many instances, the location and availability of transportation system hubs and their capacities can affect or be affected by installation activities. The smooth flow of traffic and the adequacy of on post and off post road networks to move people efficiently contribute materially to the quality of the human environment in the vicinity of the installation.

Traffic impacts could include congestion and delays on public roadways and key access points within and near the installation. If an installation is selected to receive additional soldiers, site-specific traffic studies may be required.

Significant impacts would generally occur when a reduction by more than two levels of service (LOSs) at roads and intersections within the ROI occurs.

3.1.8.2 Common Environmental Consequences as a Result of the Proposed Action

As described below, impacts to traffic and transportation resulting from fielding an M-SHORAD battalion are driven by construction, training, and the additional soldiers and families. These impacts are expected to be less than significant because construction activities would be short term and designed to minimize traffic disruptions. Training activities would take place on the installation range and maneuver lands, not within the cantonment area. Population changes would be limited to increases ranging from 1.1 percent to 2.5 percent within the installation and from 0.1 percent to 2.2 percent within the ROI.

Impacts from Construction

Construction activities associated with the Proposed Action would generate additional traffic from worker vehicles and trucks. Still, construction traffic would be temporary and is expected to result in less than significant impacts. The project-related construction traffic would not

[31] The total income within the ROI is calculated by multiplying each county's average annual per capita income times the population of the county and adding the resulting sums together.

significantly affect road use in the training areas and is not expected to significantly adversely affect operations at the intersections and street segments in the cantonment areas. Installation access is not expected to be adversely impacted by construction traffic. Construction and commercial traffic are required to enter the installation through designated entry control points that have parking and inspection areas set aside to prevent traffic delays.

Impacts from Live-Fire Training

Under the implementation of the Proposed Action, M-SHORAD training would result in increased numbers of soldiers training at certain ranges that are designed to accommodate M-SHORAD weapons. Traffic would increase because a slightly larger number of soldiers would use the existing and newly constructed live-fire ranges. However, traffic impacts associated with intersection operations, roadway segments, and parking are expected to be less than significant because Range Control manages range use to prevent overlapping range assignments and excessive usage at any range.

Impacts from Maneuver Training

Under the Proposed Action, M-SHORAD vehicles may need to transit on installation roadways within the cantonment to reach maneuver training areas. Impacts from these transits are expected to be less than significant because they would be infrequent and occur over a matter of minutes.

Vehicle convoys may be used to move personnel and equipment to satellite training areas at Forts Carson, Riley, and Stewart for maneuver training. Impacts from convoys are expected to be less than significant and are further described in the specific installation sections.

Impacts from Increase in the Number of Soldiers

The increase in soldier population ranges from 1.1 percent to 2.5 percent at the assessed installations. Based on the 2019 DoD Selected Military Compensation Tables,[32] it is assumed that of the increase, 33 percent of battalion soldiers would reside on post, in barracks-type facilities. The other 67 percent would reside off post or in privatized housing on post. This may have minor adverse effects on traffic in the nearby community because of the increase in vehicles on roadways and entry control points since some soldiers and family members would be accessing the installation. The increase in traffic flow within the cantonment area is also expected to be minor and less than significant.

3.1.9 Facilities

3.1.9.1 Affected Environment

Facilities encompass all aspects of Army real property management. Army real property includes lands, facilities, and infrastructure. The ROI for facilities includes the Army installations in

[32] The DoD Selected Military Compensation Tables of 1 January 2019 show 33 percent of military personnel live on base receiving quarters in kind.

which the proposed activities would be located. In addition, the ROI includes the regional infrastructure and utilities serving the installations.

Lands include Army-owned land (real estate), leaseholds, and other interests in land. Military real property master plans provide the framework for facilities management, including design and construction activities for land development on military installations. Land is discussed in the Land Use and Compatibility section.

Facilities are buildings, structures, and other improvements to support the Army's mission, such as cantonment areas, training ranges, housing, schools, and recreational facilities.

Infrastructure is the combination of supporting systems that enable the use of Army land and facilities. Infrastructure includes roadways and infrastructure for utilities. Roadways and other transportation infrastructure serving the Army installations are described in Section 3.1.8, Traffic and Transportation. Utilities and energy systems will only require short, insignificant extensions to connect the new facilities to the existing network and are not analyzed.

Impacts to facilities would be considered significant if the Proposed Action were to cause an impairment of service to the installation and local communities, homes, or businesses.

3.1.9.2 Common Environmental Consequences as a Result of the Proposed Action

Facilities at the installations assessed include buildings and improvements, such as housing, community support facilities, unit support facilities, installation support facilities, and training and range facilities. The facilities potentially impacted by the Proposed Action include housing, unit support facilities,[33] and training and range facilities[34].

Impacts from Construction

Table 3-3 below summarizes the facilities required for fielding an M-SHORAD battalion and whether or not a given installation might need to undertake modification or construction of the designated facilities to meet the requirement. Impacts from the construction of facilities could include land clearing, grading, re-contouring, paving areas, installation of utilities, and erecting buildings. Impacts from constructing the required facilities in Table 3-3 are expected to be less than significant since most are below the 5-acre threshold or are in previously disturbed areas. Any construction greater than 5 acres of undisturbed terrain that has not been analyzed in sufficient detail in this document would require a separate analysis tiering from or supplementing this PEA. There is no anticipated need to construct family housing to support the M-SHORAD at any of the assessed installations because a review of the family housing website for each assessed installation showed vacancies in family housing, and it is not addressed in this PEA.

[33] Unit support facilities include buildings such as battalion headquarters, equipment maintenance and storage facilities, and their associated parking.
[34] Training and range facilities include structures such as range control buildings, bleachers, latrines, parking areas, targets, and bunkers.

Since Fort Sill would support the M-SHORAD institutional training requirement but not host a full battalion, the facility requirements are different. Where required, the total square feet and total acres include any needed personally owned vehicle parking. More details of the specific facilities are addressed in each installation section.

Table 3-3. M-SHORAD Expected Facility Requirements FY 2021 Data

Y = Required facilities exist				X = Facility construction possibly required					
Facility name	**Number required**	**Total sq ft**	**Total acres**	**Ft Bliss**	**Ft Hood**	**Ft Riley**	**Ft Stewart**	**Ft Carson**	**Ft Sill**
Battalion HQ Building	1	48,520	1.1	Y	X	X	X	X	N/A
Company HQ Building	1	33,646	0.8	Y	X	X	X	X	N/A
Company HQ Building	4	103,104	2.4	Y	X	X	X	X	N/A
Vehicle Maintenance Shop	1	100,800	2.3	X	X	X	X	X	N/A
Oil Storage Building	1	480	0.0[1]	Y	Y	X	X	X	N/A
Organizational Vehicle Parking	1	450,000	10.3	Y	Y	Y	Y	Y	N/A
Dining Facility	1	41,116	0.9	Y	Y	Y	Y	Y	Y
Barracks Permanent Party	1	76,140	1.7	Y	X	Y	Y	Y	N/A
Barracks Trainee (Fort Sill only)	1	54,730	1.3	N/A	N/A	N/A	N/A	N/A	X
General Instruction Building (Fort Sill only)	1	86,20	2.0	N/A	N/A	N/A	N/A	N/A	X

Note: The oil storage building is located on the Organizational Vehicle Parking area.
N/A indicates the Facility Type does not apply to the installation indicated.

Impacts from the construction of live-fire ranges and maneuver areas could include land clearing, grading, re-contouring, and construction of range equipment, including targets, buildings, obstacles, and bunkers at live-fire ranges and roads, trails, bridges, hardened stream crossings, and

erosion control features for maneuver areas. Impacts from the construction of live-fire ranges and maneuver areas are expected to be less than significant because a substantial portion would be constructed on previously disturbed areas. Also, the proportion of land disturbed compared to the total area of ranges and maneuver areas within the installation is very small. Finally, the actual construction activities would usually occur on a small subset of any range or maneuver area.

Table 3-4 below summarizes the live-fire ranges required for fielding an M-SHORAD battalion and whether or not a given installation would need to undertake modification or construction of the designated ranges to meet the requirement. More details of the specific ranges are addressed in each installation section.

Table 3-4. Live-fire Range Facility Requirements

Y = Required facilities exist	X = Facility construction possibly required				
	Fort Bliss	**Fort Hood**	**Fort Riley**	**Fort Carson**	**Fort Stewart**
Convoy live-fire range/entry control point (CLF/ECP)	Y	X	X	Y	Y
Basic 10m–25m firing range (Zero)	Y	Y	Y	Y	Y
Automated record fire (ARF) range	Y	Y	Y	Y	Y
Automated multipurpose machine gun (MPMG) range	Y	Y	Y	Y	Y
Scout/RECCE gunnery complex	Y	Y	Y	Y	X
Digital multipurpose training range (DMPTR)	Y	Y	Y	Y	Y
Digital multipurpose range complex (DMPRC)	Y	Y	Y	Y	Y
Automated multipurpose training range (AMPTR)	Y	Y	Y	Y	Y
Multipurpose range complex-heavy (MPRC-H), automated	Y	Y	X	X	Y
Battle area complex (BAX)	Y	Y	Y	X	Y
Air defense missile firing range	Y	Y	Y	Y	Y
Hand grenade qualification course (non-firing)	X	X	Y	X	Y
Hand grenade familiarization range (live)	Y	Y	Y	Y	Y
Grenade launcher range	Y	Y	Y	Y	X
Combined arms collective training facility (CACTF)	Y	Y	Y	X	Y

Since Fort Sill would support the M-SHORAD institutional training requirement but not host a full battalion, the number of M-SHORAD soldiers there at any given time would be much less. A full complement of ranges is not required and much of the initial live-fire training would be completed through appropriate simulations. Therefore, the range requirements are substantially less and are addressed in the Fort Sill section.

Impacts from Live-Fire Training

Impacts from the use of the live-fire ranges could include accumulation of contaminants associated with ammunition and ordnance, impacts to vegetation and topographic features, and erosion of impact locations within the range. Impacts are expected to be less than significant because the Army performs routine monitoring of range conditions and implements maintenance and rehabilitation when required.

Impacts from Maneuver Training

Impacts from the use of maneuver training areas could include soil compaction, increased erosion, and rutting on designated trails. Off-trail maneuvering could also add damage to vegetation. Impacts are expected to be less than significant because the Army performs routine monitoring of maneuver area conditions and implements maintenance and rehabilitation when required.

Impacts from Increase in the Number of Soldiers

The fielding of an M-SHORAD battalion to any of the assessed installations would lead to increased use of existing shopping, dining, medical, family support, morale, welfare, and recreation facilities, both on the installation and in the nearby communities. Utility and water use would also increase. Impacts from the increased soldier population are expected to be less than significant because the population at any of the assessed installations is only increasing by 1.1 percent to 2.5 percent.

3.1.10 Water Resources

3.1.10.1 Affected Environment

Water resources include surface water, groundwater, and floodplains, as well as other conservable resources such as estuaries and watersheds. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Stormwater flows, which may be exacerbated by high proportions of impervious surfaces (e.g., buildings, roads, and parking lots), are important to the management of surface water. Stormwater is also important to surface water quality because of its potential to introduce sediments and other contaminants into lakes, rivers, and streams. Groundwater consists of the subsurface hydrologic resources. It is an essential resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically may be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate. Significant impacts to groundwater would

occur if demand outpaced recharge rates leading to an unsustainable drawdown on the quantity of water available or if there were substantial adverse effects to water quality.

Floodplain is defined in EO 11988 as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year." The 100-year floodplain represents those areas that could be inundated in the event of high flood water levels expected to occur once every 100 years from the combination of heavy rainfall, high tides, and storm surges. Based on existing Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) and an engineering-level analysis, the Army would determine if the Proposed Action is within the 100-year floodplain.

Federal, state, and local regulations generally limit development in floodplains to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety.

The Clean Water Act (CWA) gives the EPA the authority to regulate the discharge of pollutants into the waters of the United States. It set the ground rules for implementing pollution control programs as well as continuing the requirement to set water quality standards for all surface water contaminants. The EPA establishes thresholds for pollution and contaminants to water bodies that are referred to as total maximum daily load (TMDL). A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. If these thresholds are exceeded, the water body is classified as impaired.

Army activities subject to CWA regulation include activities involving the collection and discharge of effluents (e.g., discharging pollutants from a point source into waters of the U.S.) or construction activities near waterways or wetlands. Several compliance responsibilities under the CWA result from the types of facilities used by the Army and the range of activities at Army installations.

Significant impacts would include the exceedance of TMDLs for sediments that causes a change in surface water impairment status or cause an unpermitted direct impact on a U.S. body of water.

For regulatory purposes under the CWA, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" [40 CFR 232.2(r)]. There are many different kinds of wetlands to include swamps, marshes, bogs, and similar areas. Wetlands definitions can vary by agency, regulations, and policy. Wetlands are of value to the sustainable management of military lands because of the ecological functions they provide in addition to training realism. Three wetland functions applicable to sustainable management are flood attenuation, groundwater recharge, and improvement of water quality by filtering sediment, nutrients, and toxics.

The National Wetlands Inventory (NWI) of the USFWS has identified and mapped most of the known wetlands in the conterminous United States, including those on military installations. DoD Instruction 4715.3 states that installations will manage for "no net loss" of wetlands. In order to manage wetlands properly, installations have used the NWI and have conducted planning level surveys to determine the extent and location of wetlands across their installation. By identifying wetlands early in the NEPA process, and utilizing a "Go/No-Go" approach where avoidance is preferred to direct or indirect impacts, installations have the ability to avoid costly mitigation and potential delays in implementation of the Proposed Action.

Significant impacts would include unpermitted loss or destruction of more than one acre of jurisdictional wetlands

3.1.10.2 Common Environmental Consequences as a Result of the Proposed Action

3.1.10.2.1 Surface water

Impacts from Construction

Construction at the assessed installations could impact surface water quality from nonpoint source runoff from disturbed areas or spills and leaks from construction equipment. During ground preparation for new construction sites, grading, excavating, and trenching may expose erodible soils to stormwater runoff and increase the potential for sediments to contaminate surface waters. Similarly, accidental spills, or broken or leaking fluid lines on heavy equipment could release chemicals, solvents, and paints. The resulting stormwater runoff could carry sediments or contaminants to adjacent waterways. These impacts are expected to be less than significant because Army installations must follow the Stormwater Management Plan (SWMP) guidelines to minimize runoff and impacts to surface water. Also, the Army would incorporate BMPs that would reduce runoff and sedimentation to aquatic environments per the CWA regulations for stormwater runoff at construction sites. Spills would be addressed effectively through required procedures including reporting, containment, and cleanup as soon as possible under the installation Spill Prevention, Control, and Countermeasures (SPCC) Plan.

Dust control measures such as wetting graded areas are routinely used during construction to ensure minimal impacts to the sediment loads of nearby surface waters. Dust control measures are expected to have a minor short-term impact to water quality.

The new facilities and improvements to existing facilities would require increases in impervious surfaces. The increase in impervious surfaces may result in increased stormwater runoff and non-point source pollution. These impacts are expected to be less than significant because control measures for stormwater runoff must be incorporated in design plans. The Army requires Low Impact Development principles to be used in facility designs to reduce runoff.

Impacts from Live-Fire Training

Live-fire training could result in impacts to surface water quality from the introduction of munitions chemical residues present in soils from ordnance use. Other chemical pollutants, such as fuels, lubricants, or solvents, may be inadvertently spilled or released as an indirect result of military activities. The potential increase in the intensity of range use may cause slight increases in the erosion of soils to surface waters from the unpaved roads within the range. Accidental wildland fires may increase the amount of debris and soils accumulating in surface waters. The risk of wildland fires is not expected to change as a result of the Proposed Action. However, if a fire breaks out on a live-fire range, it is extinguished in areas where it can be safely accomplished or controlled to minimize damage in areas containing dangerous ordnance. Impacts to surface water quality from live-fire training are expected to be less than significant. The Army routinely monitors the accumulation of munitions chemical residues and when required and takes steps to prevent leaching or erosion to surface water. Range areas are regularly maintained to minimize soil erosion that could impact surface waters. Also, all soldiers must immediately respond to known spills to prevent or minimize the impact to the environment.

Impacts from Maneuver Training

Maneuver training could result in impacts to surface water quality from nonpoint source sediment loading and pollutant discharges and inadvertent spills of fuels, lubricants, or solvents. Training activities are expected to include increased mounted maneuver training ranging from 3.1 percent to 5.8 percent at the assessed installations compared to existing conditions.[35] The resultant increase in soil erosion results in a minor increase in suspended sediment in adjacent streams. These impacts are expected to be less than significant. Erosion control measures are routinely employed through regular land condition assessments, rehabilitation, and maintenance actions. Spills would be addressed effectively through required procedures, including reporting, containment, and cleanup as soon as possible under the installation SPCC Plan.

Calcium chloride, magnesium chloride, calcium lignosulfonates, or other environmentally friendly materials may be applied to unpaved roads in maneuver areas to control dust. These actions are expected to have less than significant effects on surface water quality because the chemicals would be applied according to industry standards (Parametrix 2001).[36] Also, the amount of runoff is expected to be low in most of the areas where dust suppression would be needed.

[35] Data calculated through the Army Range Requirements Model Data Version 14.0.2 and 14.0.3 accessed May 15 and 17 and June 10, 2020.

[36] Parametrix. 2001. BMPs for Dust Abatement Practices on Unpaved County Roads in Oregon. Prepared for Oregon Association of County Engineers and Surveyors [Web page]. Located at http://www.aocweb.org/em/uploads/Dust%20Abatement%20BMPs_5_01.pdf. Accessed: February 26, 2004.

Impacts from Increase in the Number of Soldiers

The addition of an M-SHORAD battalion could require additional facilities such as headquarters buildings or vehicle maintenance shops and increases in the routine use of potential contaminants. These facilities would be provided with storm drainage systems. At vehicle maintenance shops, the drainage system would incorporate modern oil-water separators; repair activities would be performed indoors to avoid stormwater exposure; petroleum, oil, and lubricants and hazardous waste storage facilities would be designed to preclude pollutant runoff. Increased industrial activity under the Proposed Action could result in a greater probability of accidental spills. Increases in personnel could result in increases in trash and debris that could wind up in local waterways. These impacts are expected to be less than significant because the proper design of drainage control measures would minimize the accumulation of pollutants and debris in nearby waterways.

3.1.10.2.2 Groundwater

Impacts from Construction

Construction at the assessed installations could impact groundwater quality caused by contamination from accidental spills and leaks from construction equipment. Accidental spills or broken or leaking fluid lines on heavy equipment could release chemicals, solvents, and paints. The resulting contaminants could infiltrate into groundwater. These impacts are expected to be less than significant because the Army would quickly contain and address the contaminants under the SPCC Plan at all construction sites under the Proposed Action.

During ground preparation for construction sites, grading, excavating, and trenching may decrease surface water infiltration to the groundwater. Also, any new facilities and improvements to existing facilities may require increases in impervious surfaces. The increase in impervious surfaces may result in decreases in infiltration rates. These impacts are expected to be less than significant because the Army employs BMPs including Low Impact Development and the use of materials that allow infiltration through paved surfaces. Also, site designs should retain precipitation on site so that it can infiltrate to groundwater or evaporate to the air and not increase stormwater runoff.

Impacts from Live-Fire Training

Live-fire training could result in impacts to groundwater quality caused by the leaching of munitions chemical residues present in soils to the groundwater. Other chemical pollutants, such as fuels, lubricants, or solvents, may be inadvertently spilled or released as an indirect result of military activities. Impacts to groundwater quality from live-fire training are expected to be less than significant. The Army routinely monitors the accumulation of munitions chemical residues and when required, takes steps to prevent leaching to groundwater. Also, all soldiers must immediately respond to known spills to prevent or minimize the impact on the environment.

Impacts from Maneuver Training

Maneuver training could result in impacts to groundwater quality from inadvertent spills of fuels, lubricants, or solvents remaining in place and eventually leaching to groundwater. These impacts are expected to be less than significant because spills would be addressed effectively through required procedures, including reporting, containment, and cleanup as soon as possible under the installation SPCC Plan.

Calcium chloride, magnesium chloride, calcium lignosulfonates, or other environmentally friendly materials may be applied to unpaved roads in maneuver areas to control dust. These actions are expected to have less than significant effects on groundwater quality because the chemicals would be applied according to industry standards (Parametrix 2001).[37] Also, by design, these materials bind to the soil particles which greatly reduces the chance of leaching to groundwater. In addition, dust suppression is required in arid areas with lower annual precipitation. The lower precipitation amounts make it unlikely that the dust suppressants would leach to groundwater.

Increased maneuver training could result in increased soil erosion and compaction, which could change the rate of infiltration of water from the surface to groundwater. The rate of infiltration could increase if a layer of soil is exposed that is more permeable or decrease through compaction. Training activities are expected to include increased mounted maneuver training ranging from 3.1 percent to 5.8 percent at the assessed installations compared to existing conditions.[38] These impacts are expected to be less than significant. Regular land condition assessments, rehabilitation, and maintenance actions are undertaken by the Army to maintain the quality of maneuver areas.

Impacts from Increase in the Number of Soldiers

An additional M-SHORAD battalion at any of the assessed installations could require additional facilities such as headquarters buildings or vehicle maintenance shops and increases in the routine use of potential contaminants. Increased industrial activity under the Proposed Action could result in a greater probability of accidental spills, which, if not addressed, could leach into the groundwater. These impacts are expected to be less than significant because most activities involving potential contaminants would occur over impervious surfaces and all soldiers are required to immediately respond to known spills to prevent or minimize the impact to the environment.

[37] Parametrix. 2001. BMPs for Dust Abatement Practices on Unpaved County Roads in Oregon. Prepared for Oregon Association of County Engineers and Surveyors [Web page]. Located at http://www.aocweb.org/em/uploads/Dust%20Abatement%20BMPs_5_01.pdf. Accessed: February 26, 2004.
[38] Data calculated through the Army Range Requirements Model Data Version 14.0.2 and 14.0.3 accessed May 15 and 17 and June 10, 2020.

3.1.10.2.3 Water Quality

Impacts from Construction

The impacts to water quality resulting from construction activities are addressed in Section 3.1.10.2.1 for surface water and Section 3.1.10.2.2 for groundwater.

Impacts from Live-Fire Training

The impacts to water quality resulting from live-fire training activities are addressed in Section 3.1.10.2.1 for surface water and Section 3.1.10.2.2 for groundwater.

Impacts from Maneuver Training

The impacts to water quality resulting from maneuver training activities are addressed in Section 3.1.10.2.1 for surface water and Section 3.1.10.2.2 for groundwater.

Impacts from Increase in the Number of Soldiers

The impacts to water quality resulting from the increase in the number of soldiers are addressed in Section 3.1.10.2.1 for surface water and Section 3.1.10.2.2 for groundwater.

3.1.10.2.4 Wetlands and Floodplains

Impacts from Construction

Wetlands

Construction at the assessed installations could result in impacts to wetlands. Facilities for M-SHORAD command, operations, maintenance, and training or housing soldiers may need to be constructed at one or more installations. Potential impacts to wetlands from construction include excavation, placement of fill within a wetland, and changes in the volume, temperature, and quality of water flowing into the wetland. The wetland impacts from construction projects are based on delineated wetland areas within the project footprint. Within a project footprint, if it has not already occurred, an assessment and delineation of wetlands would be completed before site design and construction. If filling of wetlands is required during construction, appropriate permits would be secured and necessary mitigations would be completed.

The Army seeks to avoid construction in wetland areas. Still, if avoidance is not possible, a Finding of No Practicable Alternative would be completed per EO 11990, Protection of Wetlands. In addition, the Army would comply with the Section 404 permitting process of the CWA. Depending on the type(s) of impact, CWA regulations require mitigation of wetland losses. Mitigation can be accomplished in four ways: (1) construct a new wetland for no net loss of wetlands; (2) restore a degraded wetland for no net loss of wetlands; (3) deduct credits from an existing installation managed wetland mitigation bank; and (4) purchase credits from a

privately owned wetlands mitigation bank. The type of mitigation selected will vary by installation based on the type of resources and opportunities available.

On-site wetland protection efforts also focus on erosion prevention and stormwater control, including the establishment of filter strips adjacent to bodies of water, terracing, seeding and mulching bare soil, and planting cover vegetation, among others. Erosion and sedimentation impacts to wetlands during construction, operation, and maintenance are minimized through compliance with the requirements of the National Pollutant Discharge Elimination System (NPDES) permit, an activity-specific Stormwater Pollution Prevention Plan, and an Erosion Sediment and Control Plan.

Based on the previously stated requirements and practices, impacts to wetlands from construction are expected to be less than significant.

Floodplains

Construction at the assessed installations could occur within a floodplain. The Army would determine if the proposed construction is within a floodplain based on existing federal Emergency Management Agency Flood Insurance Rate Maps and an engineering-level analysis. Construction within a floodplain could make flooding worse, pose a greater risk to soldier safety, increase the risk of inundation and facility damage, and result in contaminants entering floodwaters.

The Army seeks to avoid construction within floodplains. If this is not possible, a Finding of No Practicable Alternative would be completed per EO 11988, Floodplain Management. In addition, the Army complies with Section 438 of the Energy Independence and Security Act of 2007. This requires projects involving a federal facility with footprints exceeding 5,000 square feet to use site planning, design, construction, operation, maintenance, and maintenance strategies for the property to maintain or restore—to the maximum extent technically feasible—the predevelopment hydrology of the property concerning the temperature, rate, volume, and duration of flow. During the design stage for each action, more precise studies would be conducted to analyze the capacity of the existing stormwater conveyance systems and what additional measures should be implemented as a result of new construction.

Impacts to floodplains are expected to be less than significant. The Army would avoid floodplains if possible, and use site design and construction standards and BMPs to minimize impacts at any site constructed within the floodplain.

Impacts from Live-Fire Training

Live-fire training could impact wetlands from the firing of munitions into or near wetland areas and the deposition of munitions debris and the leaching of chemical residues into the wetland. Other chemical pollutants, such as fuels, lubricants, or solvents, may be inadvertently spilled or released as an indirect result of military activities. Impacts to wetlands from live-fire training are expected to be

less than significant. The Army routinely monitors the accumulation of munitions debris and chemical residues and when required, takes steps to address the problem. Also, all soldiers must immediately respond to known spills to prevent or minimize the impact on the environment.

No impacts to floodplains as a result of live-fire training are expected. Live-fire training does not involve construction, vehicle maneuvering, or any alteration of floodplain topography.

Impacts from Maneuver Training

Maneuver training could result in impacts to wetlands and floodplains from inadvertent spills of fuels, lubricants, or solvents remaining in place and causing contamination. Also, vehicle maneuvers may occur within wetlands and floodplains. Maneuver training could cause changes to the land surface through increased erosion, rutting, and damage or removal of vegetation. These impacts are expected to be less than significant because spills would be addressed effectively through required procedures, including reporting, containment, and cleanup as soon as possible under the installation SPCC Plan. Also, impacts from maneuver training would be corrected through land rehabilitation and maintenance programs to maintain the original topography and drainage patterns.

Impacts from Increase in the Number of Soldiers

An additional M-SHORAD battalion at any of the assessed installations could require additional facilities such as headquarters buildings or vehicle maintenance shops and increases in the routine use of potential contaminants. Increased industrial activity under the Proposed Action could result in a greater probability of accidental spills, which, if not addressed, could degrade wetlands or floodplains. These impacts are expected to be less than significant because most activities involving potential contaminants would occur over impervious surfaces and all soldiers must immediately respond to known spills to prevent or minimize the impact to the environment. Also, the additional facilities could require additional impervious surfaces which could affect the temperature, rate, volume, and duration of flow into wetlands or floodplains. These impacts are expected to be less than significant because the Army employs BMPs including low impact development and the use of materials that allow infiltration through paved surfaces. Further, site designs should retain precipitation on site so that it can infiltrate to groundwater or evaporate to the air and not increase stormwater runoff. Finally, the increased number of soldiers could increase the frequency and intensity of training events on live-fire ranges and maneuver areas. These impacts are expected to be less than significant because the land condition is assessed and impacts would be corrected through land rehabilitation and maintenance programs to maintain the original topography and drainage patterns.

3.1.11 Common Environmental Consequences to Assessed Resource Elements from the No Action Alternative

Implementing the No Action Alternative would result in minimal effects to the assessed resource elements at each installation. The M-SHORAD battalion would not be fielded. No construction

would be required and no additional maneuver or live-fire training would occur. Further, no additional soldiers and family members would work and reside on the installation. Table 3-5 provides information regarding the impacts of the No Action Alternative to each resource element. The impacts of the No Action Alternative to these resource elements are fully addressed here and will not be discussed in the installation-specific sections.

Table 3-5. Common Environmental Consequences to Assessed Resource Elements from the No Action Alternative

Resource Element	Level of impact	Impact description
Air Quality	Negligible	Stationary sources would continue to operate following existing permits. Mobile source emissions would be generated consistent with current operations. Maintenance processes generating HAPs would continue at the current rate. All assessed installations are in attainment for criteria pollutants and would remain in attainment for ongoing operations and training.
Airspace	Negligible	No additional activities would occur in the SUA, and no new aircraft types, flight patterns, or flight schedules would be required.
Biological Resources	Negligible	Installations would continue to adhere to its existing resource management plans to minimize and monitor any potential effects. Units are briefed before each training event regarding sensitive areas on the installation, such as protected species habitat. Soldiers are briefed regarding activities that are prohibited within certain areas to protect listed species, migratory birds, and bald and golden eagles.
Cultural Resources	Negligible	Before initiating ground disturbing activities, installation Cultural Resources Managers would evaluate all activities to identify resources that might be affected, determine effects, and initiate the consultation processes as mandated by regulations and agreements. Activities with the potential to affect Cultural Resources are monitored and regulated through various preventative and minimization measures.
Soils	Negligible	Installations would continue to adhere to existing resource management plans to monitor and minimize any potential effects. Units are briefed before each training

Resource Element	Level of impact	Impact description
		event regarding sensitive areas on the installation, such as highly erodible soils, and allowed activities or prohibitions within specific areas. Training lands would continue to be assessed, maintained, and rehabilitated as current protocols require under the No Action Alternative.
Land Use and Compatibility	No Effect	Current land uses would continue and no compatibility issues would arise.
Socioeconomics	No Effect	The quality of the socioeconomic environment would remain unchanged.
Traffic and Transportation	No Effect	Traffic and transportation would remain unchanged at the assessed installations. The use of the roadways or other transportation modes would continue as the status quo due to the No Action Alternative.
Facilities	Less Than Significant	No new facilities would be required, and the number of soldiers and families would not change due to the No Action Alternative. Any ongoing facility shortages, excesses, or required repair and refurbishment would continue as the status quo.
Water Resources	Negligible	Current Army responses to going issues related to surface waters, groundwater, water quality, wetlands, and floodplains would continue to be addressed under the No Action Alternative.

3.1.12 Approach for Cumulative Effects Analysis

Cumulative effects analysis is required to assess the effects of the Proposed Action when combined with the effects of other past, present, and reasonably foreseeable future projects that would affect the same resource element(s), regardless of what entity is implementing the other project(s). The Army is undertaking a modernization effort as described in Section 1 that would result in numerous changes to personnel, weapons, and capabilities at the installations assessed in this PEA.

The Army modernization projects planned for FY2021 through FY2026 are listed below with a short description:

1. Indirect Fires Protection Capability (IFPC) is a mobile, ground-based weapon system designed to defeat unmanned aircraft systems (UAS) and cruise missiles. The system will

use an existing interceptor and sensor and will develop a launcher on an existing vehicle platform to support the Counter-UAS (C-UAS) and Cruise Missile Defense (CMD) missions. The system will use the Army Integrated Air and Missile Defense (AIAMD) open systems architecture, and will use the AIAMD Integrated Battle Command System as its mission command component. The IFPC is transported on wheeled vehicles. There are expected to be an additional 90 soldiers when a unit receives the IFPC system.

2. Optionally Manned Fighting Vehicle (OMFV) is a tracked vehicle and is the planned replacement for the Bradley Fighting Vehicle. It can operate as a crewed vehicle but will also have the ability to conduct remotely controlled operations while the crew is off platform. Since OMFV is replacing an existing system no changes in manning levels are expected.
3. Future Tactical Unmanned Aerial System (FTUAS) is a new drone to replace the Army's medium size drones such as the RQ-7 Shadow. It will enable multi-domain capabilities for brigade air-ground operations via significant improvements in operational capability, survivability, reliability, availability, maintainability and mobility. Since FTUAS is replacing an existing system no changes in manning levels are expected.
4. Army Integrated Air and Missile Defense System (AIAMD) will develop a unified air defense, by providing the ability for Soldiers to connect various air defense weapons and systems to a single command and control network, allowing the air defense Soldier to control all the various weapons and sensors that form an air defense network through a single battle command system. AIAMD is predominately a computer and networking system housed in an Engagement Operations Center facility that is transported on wheeled vehicles. Fielding of AIAMD is expected to be to existing units and no change in manning levels is expected.
5. The Armored Multi-Purpose Vehicle (AMPV) is the replacement for the M113 Family of Vehicles (FoV) within the Armored Brigade Combat Team. The AMPV provides significant capability improvement over the M113 FoV in force protection, survivability, mobility and power generation to incorporate the Army's inbound network and other future technologies. The AMPV is a tracked vehicle based on the Bradley Fighting Vehicle chassis that is larger, heavier than the M113. The equipment replacement ratio is expected to be one for one and no changes in manning levels are expected.
6. Iron Dome Defense System-Army (IDDS-A) will be truck-towed, multi-mission mobile air defense system developed to counter very short-range rockets, artillery and mortar threats. The IDDS-A is expected to field as a battery with approximately 60 additional soldiers joining an existing unit.
7. Extended Range Cannon Artillery 1 and 2 (ERCA 1 and ERCA 2) will deliver integrated cannon artillery technology solutions to increase lethality for U.S. Army 155 mm indirect fire systems. It will increase the systems range to over 60 km, minimize weight growth over current armaments, increase the rate of fire and reduce crew burden through automation. The ERCA 1 & 2 is expected to field to existing artillery batteries and no

change in manning levels is expected. It is assumed that ERCA 1 & 2 training can be accomplished with simulated firing, firing munitions with a shorter range that will not exceed installation range boundaries, or firing at a range on a different installation that can accommodate the munition.

8. Precision Strike Missile (PrSM) will be a surface-to-surface, all weather, precision-strike guided missile fired from the M270A1 Multiple Launch Rocket System (MLRS) tracked vehicle and the M142 High Mobility Artillery Rocket System (HIMARS) wheeled vehicle. The baseline missile will be developed and fielded to engage a wide variety of targets at ranges up to 499 km. The PrSM is expected to field to existing units and no change in manning levels is expected. It is assumed that PrSM training can be accomplished with simulated firing, firing munitions with a shorter range that will not exceed installation range boundaries, or firing at a range on a different installation that can accommodate the munition.
9. Directed Energy M-SHORAD (DE M-SHORAD) will use the same chassis as the M-SHORAD and replace select weapons with a directed energy system to accomplish the same mission. The DE M-SHORAD is expected to field to existing units and replace equipment on a one for one basis, no change in manning levels is expected. It is assumed that the DE-M-SHORAD training can be accomplished with simulated firing, firing at targets with an appropriate backstop to intercept the directed energy beam before it leaves the firing range, or if the required airspace is available at the installation the directed system may be fired for training without constraints.
10. Long Range Hypersonic Weapon (LRHW) will consist of a maneuverable hypersonic warhead launched by missile from a truck transported launcher. The LRHW is expected to field as a battery of an existing unit and will add approximately 50 soldiers. It is assumed that LRHW training can be accomplished with simulated firing, firing munitions with a shorter range that will not exceed installation range boundaries, or firing at a range on a different installation that can accommodate the munition.
11. Strategic Long Range Cannon (SLRC) is a cannon that will fire rocket assisted projectiles for extended range. It will be movable and transported by the M1070 Heavy Equipment Transport (HET) and a system specific wheeled trailer. The SLRC is expected to field as a battery of an existing unit and will add approximately 75 soldiers. It is assumed that SLRC training can be accomplished with simulated firing, firing munitions with a shorter range that will not exceed installation range boundaries, or firing at a range on a different installation that can accommodate the munition.
12. Lower Tier Air and Missile Defense Sensor (LTAMDS) is an advanced radar sensor array about the same size as the Patriot Air and Missile Defense System, but with enhanced capabilities. It is planned to be incorporated into the AIAMD system once developed and fielded. It will be transported on a trailer towed by truck. Fielding of LTAMDS is expected to be to existing units and no change in manning levels is expected.

The first four systems are being assessed for fielding to all six installations to allow Army senior leader's flexibility in their fielding decisions. The remaining systems will be discussed in the relevant installation discussions of the PEA.

Table 3-6 lists Army modernization projects that may be fielded between 2021 and 2026 at the installations assessed in this PEA.

Table 3-6 Army Modernization Projects 2021-2026

X = The indicated project may be fielded to the installation						
Project	**Fort Bliss**	**Fort Hood**	**Fort Riley**	**Fort Stewart**	**Fort Carson**	**Fort Sill**
IFPC	X	X	X	X	X	X
OMFV	X	X	X	X	X	X
FTUAS	X	X	X	X	X	X
AIAMD	X	X	X	X	X	X
AMPV	X	X	X	X	X	X
IDDS-A	X	X	X	X		X
ERCA 1	X					
ERCA 2		X	X	X	X	X
PrSM	X	X				X
DE-M-SHORAD[1]	X	X	X	X	X	X
LRHW						X
SLRC						X
LTAMDS	X	X				X
Note 1: DE-M-SHORAD would not be fielded to any of the installations if the M-SHORAD battalion is not fielded under the Proposed Action.						

Table 3-7 lists the cumulative effects of the Proposed Action and the Proposed Action plus the five systems slated to be fielded to all six installations.

Table 3-7. Cumulative Effects of the Proposed Action and the Five Common Systems

	Effects of Proposed Action	Cumulative Effects: AMPV + IFPC + OMFV + FTUAS + AIAMD	Total Cumulative Effects of the Proposed Action and the five systems
Air Quality	Less than significant adverse effects	Minor adverse effect	Less than significant adverse effects
Airspace	Minor, short term, adverse effects	Minor adverse effect	Minor adverse effect
Biological Resources	Less than significant adverse effects	Minor adverse effect	Less than significant adverse effects
Cultural Resources	Less than significant adverse effects	No change	Less than significant adverse effects
Soils	Less than significant adverse effects	Minor adverse effect	Less than significant adverse effects
Land Use and Compatibility	Less than significant adverse effects	Minor increase in intensity of use	Less than significant adverse effects
Socioeconomics	Less than significant beneficial effects	Minor beneficial effect	Less than significant beneficial effects
Traffic and Transportation	Less than significant adverse effects	Minor adverse effect	Less than significant adverse effects
Facilities	Less than significant adverse effects	Minor adverse effect	Less than significant adverse effects
Water Resources	Less than significant adverse effects	Minor adverse effect	Less than significant adverse effects

3.1.13 Cumulative Effects of the Proposed Action and the Five Common Systems

Air Quality

The effects to air quality caused by the addition of the five systems addressed in Table 3-6 consist of minor increases in emissions of dust and National Ambient Air Quality Standards (NAAQS) criteria pollutants. These changes are due to slight increases in the number of vehicles and replacement vehicles being larger and heavier than the original vehicles used. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects on air quality.

Airspace

The effects to Airspace caused by the addition of the five systems addressed in Table 3-6 consist of minor adverse effects due to the potential to require Airspace changes to accommodate the flight parameters of new missiles that could be fielded with the IFPC system. Changes to Airspace require lengthy reviews and could reduce the Airspace available for non-military use.

The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to Airspace.

Biological Resources

The effects to Biological Resources caused by the addition of the five systems addressed in Table 3-6 consist of minor increases in damage to vegetation during construction and training activities. These changes are due to slight increases in the number of vehicles and replacement vehicles being larger and heavier than the original vehicles used. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects on Biological Resources.

Cultural Resources

There are no anticipated changes to effects to Cultural Resources caused by the addition of the five systems addressed in Table 3-6. The new systems are expected to be one-for-one replacements of existing systems or the addition of new systems. All systems addressed would likely use already designated training areas and facilities. Known Cultural Resources will be avoided to the maximum extent practicable. The impacts of these new systems, when added to the Proposed Action, are expected to result in less than significant cumulative adverse effects to Cultural Resources.

Soils

The effects to soils caused by the addition of the five systems addressed in Table 3-6 consist of minor increases in compaction and erosion during construction and training activities. These changes are due to slight increases in the number of vehicles and replacement vehicles being larger and heavier than the original vehicles used. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to soils.

Land Use and Compatibility

The effects to land use and compatibility caused by the addition of the five systems addressed in Table 3-6 consist of minor increases in the intensity of land use caused by slight increases in the number of vehicles and replacement vehicles being larger and heavier than the original vehicles used. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to land use and compatibility.

Socioeconomics

The effects to socioeconomics caused by the addition of the five systems addressed in Table 3-6 consist of minor beneficial impacts to the local economy due to small increases in the number of soldiers assigned to the installation. The effects of the additional actions, when combined with

those of the Proposed Action, are expected to result in minor beneficial impacts to socioeconomics.

Traffic and Transportation

The effects to traffic and transportation caused by the addition of the five systems addressed in Table 3-6 consist of minor increases in the level of traffic due to a slight increase in the number of soldiers assigned to the installation. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to traffic and transportation.

Facilities

The effects to facilities caused by the addition of the five systems addressed in Table 3-6 consist of a slight increase in required housing to accommodate a slight increase in soldiers and families at the installations. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative effects to facilities.

Water Resources

The effects to water resources caused by the addition of the five systems addressed in Table 3-6 consist of minor increases in sediments and runoff. These changes are due to slight increases in the number of vehicles and replacement vehicles being larger and heavier than the original vehicles used. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to water resources

3.2 FORT BLISS, TEXAS[39]

3.2.1 Background

Fort Bliss is a U.S. Army post located in the states of New Mexico and Texas, with its headquarters located in El Paso, Texas (see Figure 3.2-1). The installation has an area of about 1,120,000 acres (453,247 hectares or ha). Fort Bliss is used as a TA by all branches of the military.

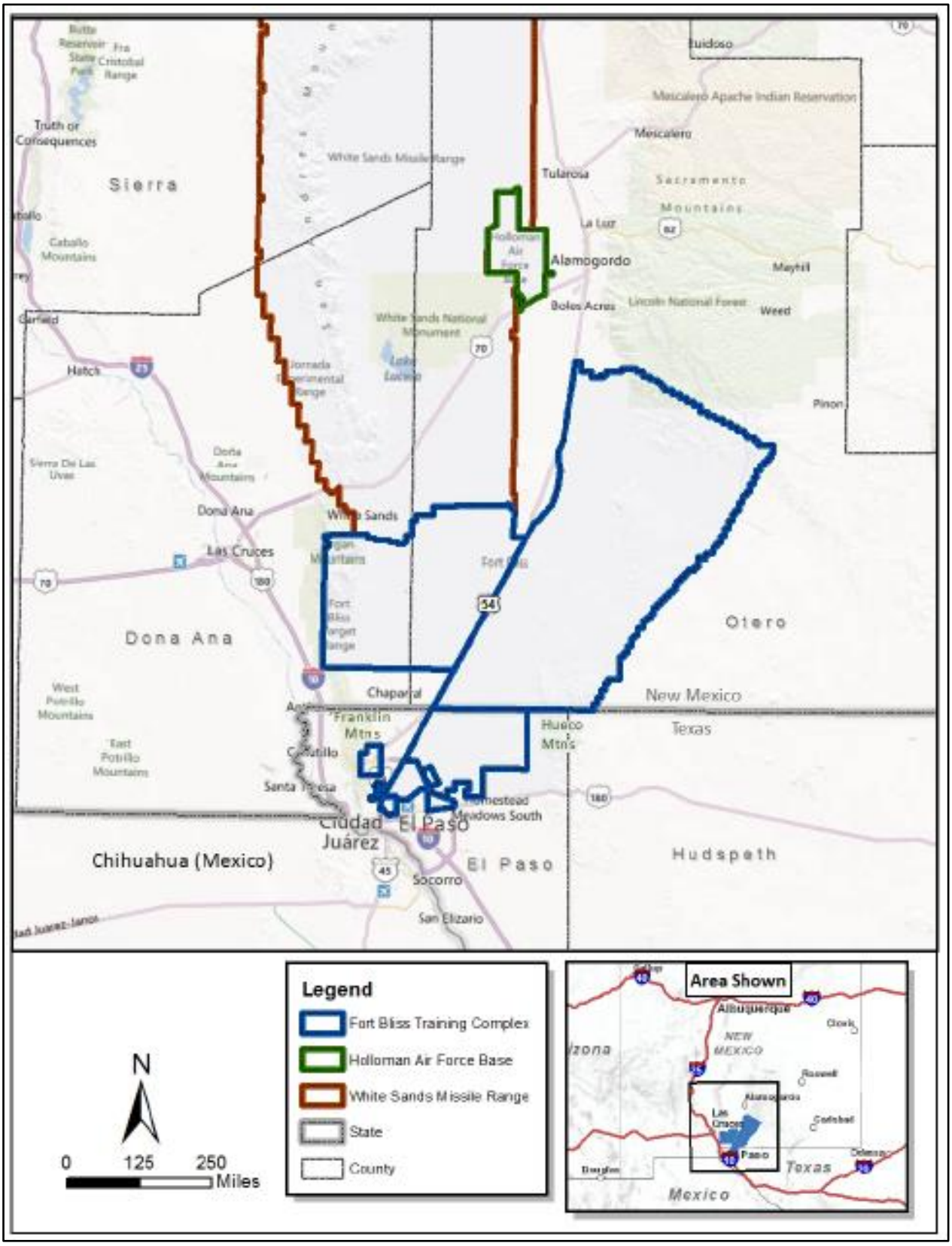
Fort Bliss provides the largest contiguous tract (1,500 square miles or mi^2, or 3,900 square kilometers or km^2) of restricted airspace in the continental United States, used for missile and artillery training and testing, and at 992,000 acres (401,448 ha), has one of the largest maneuver areas. The following units are associated with Fort Bliss and have permanent facilities in the cantonment area:

- U.S. Army 1st Armored Division (1st AD)
- 1st Brigade Combat Team (BCT), 1st AD
- 2nd BCT, 1st AD
- 3rd BCT, 1st AD
- Combat Aviation Brigades (CAB)
  - 3-6 Cavalry
  - 1AD CAB 2-501st
- 1st AD Sustainment Brigade (BDE)
- 31st Combat Support Hospital
- 32nd Army Air and Missile Defense Command
- 93 Military Police Battalion
- 5th Armor BDE

The TAs are collectively known as the Fort Bliss Training Center (FBTC). The mission of the FBTC includes providing a training environment for a wide variety of equipment enabling training, sustaining, and deploying members of the joint team.

[39] Information on the Affected Environment for Fort Bliss is taken directly from the Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement (FEIS) March 2010.

Figure 3.2-1. Location of Fort Bliss



3.2.2 Air Quality

3.2.2.1 Affected Environment

The ROI for Fort Bliss' air quality includes El Paso County, Texas, Doña Ana County, New Mexico, and Otero County, New Mexico.

Except for PM_{10}, the City of El Paso is currently meeting NAAQS for all criteria pollutants except for 8-hour ozone (O_3)-levels (see Table 3-8). Doña Ana County is in nonattainment for PM_{10} at significant levels[40] and O_3 (8-hour) at marginal levels, based on the EPA's Air Quality Statistics Report[41] (Table 3-9). Information is not available for Otero County, New Mexico. EPA only provides regional trend data for $PM_{2.5}$ and SO_2. Texas and New Mexico are below the national average for $PM_{2.5}$. Texas is below the national average for SO_2, whereas New Mexico meets the national average.

Table 3-7~~8~~. El Paso Attainment Status, by Pollutant, as of 2019

Pollutant	Primary NAAQS	Averaging Period	Designation
Ozone (O_3)*	0.09 ppm 0.075 ppm	1-hour 8-hour	Attainment/Unclassifiable Above air quality standard
Lead (Pb)	0.01 µg/m^3	Rolling 3-month average	Attainment/Unclassifiable
Carbon Monoxide (CO)	3.7 ppm 2.4 ppm	1-hour 8-hour	Attainment/Unclassifiable Attainment (Maintenance)
Nitrogen Dioxide (NO_2)	-- 0.14 ppm	1-hour Annual	Information not available Attainment/Unclassifiable
Particulate Matter (PM_{10})	79 µg/m^3	24-hour	Moderate Nonattainment

*The EPA revoked the 1-hour O_3 standard and the 1997 8-hour O_3 standard in all areas, although some areas have continuing obligations under these standards

**The standard is scheduled to be revoked one year after the effective date of final designations for the 75 ppb standard.

NAAQS = National Ambient Air Quality Standards.

Source: EPA 2020. Website: https://www.epa.gov/outdoor-air-quality-data/air-quality-statistics-report, accessed on April 27, 2020.

[40]Anthony, New Mexico in Doña Ana County, is nonattainment for PM_{10}. Sunland Park, New Mexico, also in Doña Ana County, is marginal nonattainment for 8-hour O_3.

[41] EPA: https://www.epa.gov/outdoor-air-quality-data/air-quality-statistics-report, accessed on April 24, 2019.

Table 3-89. Doña Ana County, New Mexico Attainment Status, by Pollutant, as of 2019

Pollutant	Primary NAAQS	Averaging Period	Designation
Ozone (O_3)*	0.09 ppm 0.077 ppm	1-hour 8-hour	Attainment/Unclassifiable Nonattainment (minor)
Lead (Pb)	0.15 µg/m^3	Rolling 3-month average	Attainment/Unclassifiable
Carbon Monoxide (CO)	-- --	1-hour 8-hour	Information not available
Nitrogen Dioxide (NO_2)	-- 7 ppm	1-hour Annual	Information not available Unclassifiable/Attainment
Particulate Matter (PM_{10})	488 µg/m^3	24-hour	Nonattainment

Table 3-10 provides an actual annual emission estimate of pollutants at Fort Bliss during the calendar year 2019. The installation is in the attainment of these pollutants.

Table 3-910. Summary of Calendar Year Actual Annual Emission Estimates for Fort Bliss [42]

Annual Emissions	Emission Estimates (tpy)							
	CO	NO_x	PM_{total}	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs
Actual	37.73	51.46	27.13	8.46	4.18	0.61	38.47	5.59

CO= carbon monoxide HAPs = hazardous air pollutants NO_x = nitrogen oxides
PM = particulate matter-total PM_{10} = PM less than 10 microns in diameter
$PM_{2.5}$ = PM less than 2.5 microns in diameter SO_2 = sulfur dioxide tpy = tons per year
VOC = volatile organic compounds

Permitting Requirements

Fort Bliss holds a Title V Federal Operating Permit that covers emissions of both criteria pollutants (including NO_2) and HAPs installation-wide. The permit, No. O-2865, covers sources located in Texas only and is currently undergoing renewal.

3.2.2.2 Environmental Consequences

Air quality at Fort Bliss is in attainment for all criteria pollutants. Three nearby locations are not in attainment status:

- Sunland Park, New Mexico, is marginal nonattainment under the 2015 8-hour ozone standard;
- Anthony, New Mexico, is moderate nonattainment for PM_{10};
- The city of El Paso, Texas, is moderate nonattainment for PM_{10}.

[42] Fort Bliss. 2019. Summary of data for the Commission on Environmental Quality, 2019 Emissions Inventory.

While these locations are near Fort Bliss, their status does not impact the Fort Bliss status and no conformity analysis is required.

As noted in Section 3.1.1.2, dust will contribute to the emissions of PM_{10} and $PM_{2.5}$ at Fort Bliss. The total increase is anticipated to be 1,023.5 tons per year with approximately 890.5 tons as PM_{10} and 133 tons as $PM_{2.5}$. The PM_{10} should settle out of the air rapidly and not impact air quality away from the activities generating the dust. Fort Bliss uses dust preventatives extensively which would reduce the anticipated amount substantially but no qualitative data exists to determine the amount of reduction. With the addition of the dust emissions, the impacts are as described in Section 3.1.1.2. Air quality impacts from the Proposed Action are expected to be less than significant due to stationing 235 additional tactical vehicles at Fort Bliss. This is approximately 3.7 percent of the total number of tactical vehicles.

3.2.2.3 Cumulative Effects

Fort Bliss is expected to receive 10 of the 13 systems. It is anticipated that adding all 10 systems and the Proposed Action at Fort Bliss would only cause minimal increases in the emission of pollutants. Many of these systems are replacing existing systems on a one-for-one basis. There would only be a minimal increase of additional vehicles operated during training, and most of the new systems would operate from fixed or semi-fixed positions.

3.2.3 Airspace

3.2.3.1 Affected Environment[43]

The ROI for airspace is the SUA areas above and nearby the installation that is controlled by Fort Bliss. The *airspace* is defined on aeronautical charts and may be exclusive, limiting non-participating (e.g., commercial and general aviation) users or it may simply be advisory. This would be indicating to non-participating users of the airspace that military operations are occurring in certain areas, requiring an extra measure of vigilance. For the Fort Bliss area SUA, the ROI extends a greater distance and would include not only the SUA controlled by Fort Bliss, but also associated SUA in the southeastern New Mexico region. This airspace generally includes the area around White Sands Missile Range (WSMR) and Holloman Air Force Base (AFB) as well as Fort Bliss.

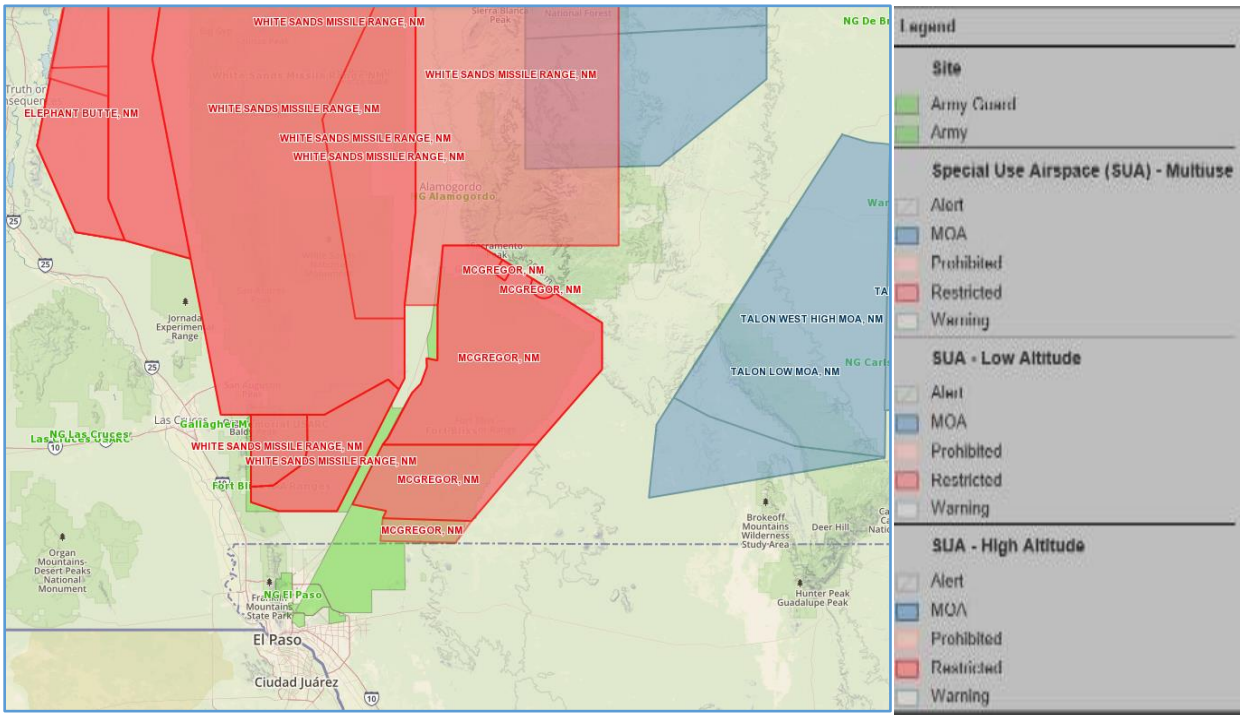
Fort Bliss restricted airspace reaches a maximum altitude of unlimited and an approximate area of 4,135 km^2 (Figure 3.2-2). The major airspace units are subdivided vertically and horizontally, enabling airspace managers and schedulers to activate particular blocks of airspace that are sized appropriately to the activities occurring within them (Figure 3.2-3). Four military units are the use or scheduling agencies: one at Fort Bliss, one at WSMR, New Mexico, and two at Holloman AFB, New Mexico. A wide variety of activities occur within the SUA; however, for the SUA

[43] Information in this section taken from Army 2010.

managed by Fort Bliss, the principal uses and purposes of the SUA supporting the M-SHORAD are:

- To protect non-participating aircraft from range activities occurring on the ground.
- To promote realistic training, allowing scenarios to unfold without training distracters such as suspensions required when civilian aircraft penetrate the restricted areas.

Figure 3.2-2. SUA On and Near Fort Bliss[44]



3.2.3.2 Environmental Consequences

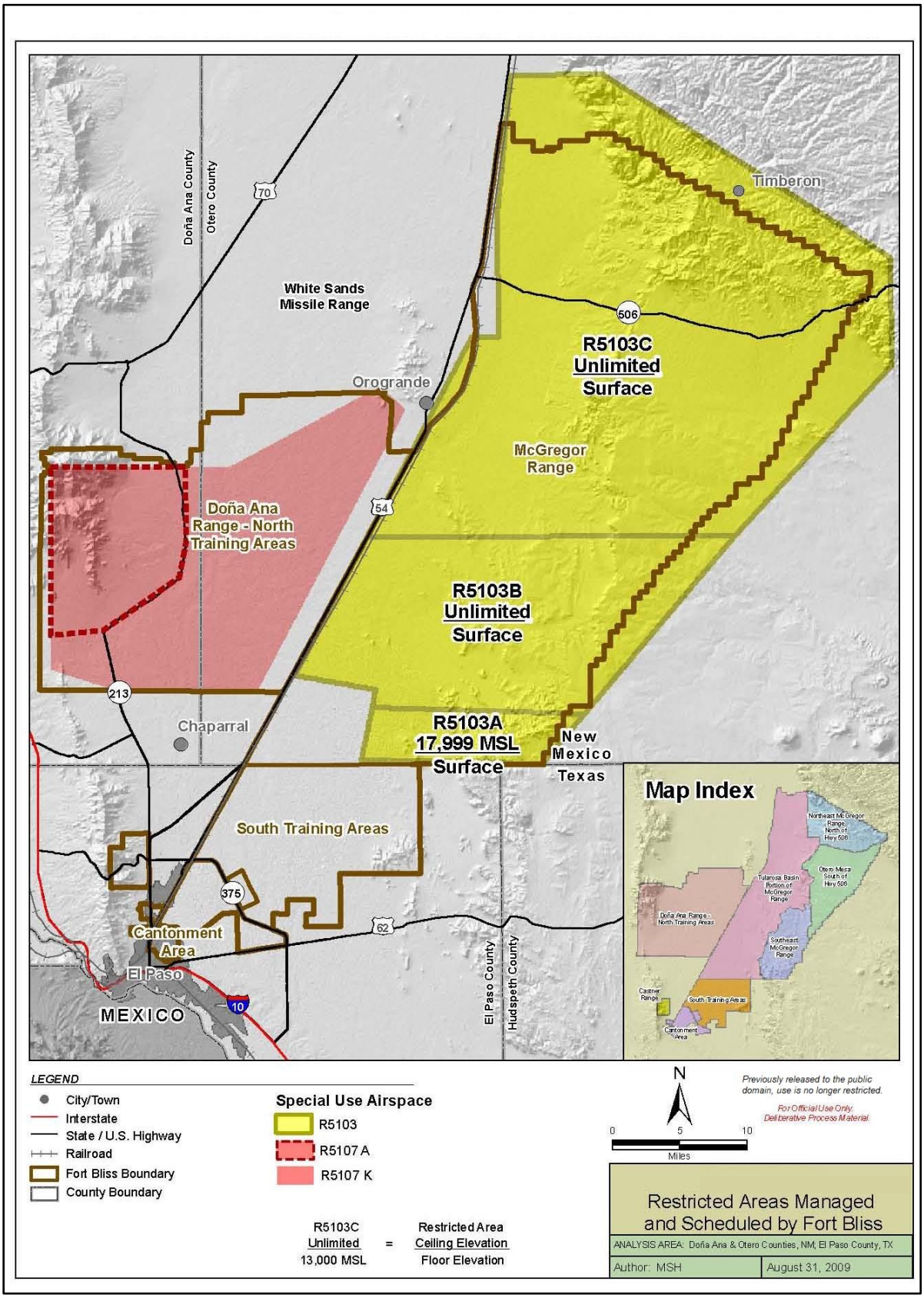
Fielding the M-SHORAD battalion at Fort Bliss may cause a minor, less than significant increase in Airspace use that can be accommodated within the current Airspace available to Fort Bliss.

3.2.3.3 Cumulative Effects

Fort Bliss is expected to receive 10 of the 13 systems. There could be a small increase in Airspace use due to adding all 10 new systems at Fort Bliss. Any required increases in use can be accommodated within the current Airspace available to Fort Bliss. Therefore, cumulative effects to Airspace are expected to be less than significant.

[44] Source: DISDI Atlas. https://rsgisias.crrel.usace.army.mil/disdi_atlas/. Accessed on April 3, 2020.

Figure 3.2-3. Restricted Areas Managed and Scheduled by Fort Bliss



3.2.4 Biological Resources

3.2.4.1 Affected Environment

The ROI for this analysis encompasses Fort Bliss and the surrounding area, including the Franklin and Organ Mountains to the west, the Sacramento Mountains to the northeast, the Hueco Mountains to the southeast, the Otero Mesa to the east, and the Tularosa Basin. Important habitats within the region include grasslands and woodlands that cross ecoregions or watershed boundaries, such as the Chihuahuan Desert, Arizona-New Mexico Mountains, and Southern Shortgrass Prairie Ecoregions. Most of Fort Bliss lies within the Chihuahuan Desert ecoregion, except for the north end that lies within the Arizona-New Mexico Mountains ecoregion. The Chihuahuan Desert Ecoregion covers approximately 174 million acres (70,415,300 ha) from Mexico to southwestern Texas and southern New Mexico. It is one of the most biologically diverse desert ecoregions of the world with a high degree of endemism (i.e., a substantial number of species are unique to the region) (Fort Bliss 2016).

The locally important natural resources (LINRs) are considered to be the grasslands (more specifically mesa grasslands), shinnery oak islands, sand sagebrush communities, and arroyo-riparian drainage areas (inclusive of playas). Other resources, such as water or soil, are described in more detail in other sections of this document.

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3.2.4.1.1 Flora

Plant communities on the installation range from the Chihuahuan Desert in the Tularosa Basin to Rocky Mountain conifer forests in the Organ Mountains (Fort Bliss 2007). Fort Bliss' large size and varied topography (which spans from desert basins to montane peaks) allow for a high degree of biodiversity. There are estimated to be 300 nonvascular and 1,200 vascular plant species that occur on Fort Bliss, with more than 800 species in the Organ Mountains alone. Additional forest and woodland communities of ponderosa pine and piñon-juniper are found in

the Sacramento Mountains and are described and discussed in detail in the 2001 FEIS and 2007 Supplemental Environmental Impact Statement (SEIS) (Fort Bliss 2001, 2007).

Shrubland makes up 67 percent of the land cover, while approximately 31 percent is grassland, and 0.94 percent is montane woodland and riparian. Approximately 0.3 percent of Fort Bliss consists of military facilities (Fort Bliss 2007). Each general vegetation category is composed of a diverse list of plant species. Generally, alluvial fan, piedmont, desert shrub, and grassland plant communities dominate the Tularosa Basin. In the Organ and Sacramento Mountains, forest and woodland communities of ponderosa pine, mixed conifer, and piñon-juniper are the predominant vegetative categories. Grassland communities dominate the Otero Mesa.

A complete list of the plants making up the vegetative categories found on Fort Bliss can be found in the Fort Bliss INRMP (Fort Bliss 2016).

3.2.4.1.2 Fauna

Fort Bliss supports a relatively high faunal diversity with 334 species of birds, 58 species of mammals, 39 species of reptiles, and eight species of amphibians. Many of the birds and mammals and a good proportion of the reptiles and amphibians found on Fort Bliss are those generally found in the Intermountain West, with a substantial Great Plains influence (Fort Bliss 2016). Detailed lists of species are available in previous Fort Bliss environmental documentation (Fort Bliss 2000; U.S. Army 2005a), SOPs for Weapons Firing and Training Area Use at Fort Bliss Training Complex (FBTC 2001), and in a Resource Management Plan Amendment (RMPA) prepared by the Bureau of Land Management (BLM) (2005).

Birds

As of 2016, Fort Bliss has had 334 species of birds recorded on the installation (Fort Bliss 2016). Eighty bird species are year-round residents of Fort Bliss and much of the ROI, 129 species are seen only during the spring and fall migration, 42 species are spring and summer residents, and the remaining 83 species occur principally during the winter (Programmatic Environmental Impact Statement [PEIS]; U.S. Army 2000; Fort Bliss 2001). One-hundred and forty-one species are rare to very rare, 72 are uncommon, 89 are fairly common, and 32 species are common. Many species of water birds have been observed on playa lakes and stock tanks in the South Training Areas, the Doña Ana Range – North Training Areas, and McGregor Range as well as the El Paso Oxidation Ponds near the cantonment. Most of the birds on Fort Bliss are migratory and are protected primarily by the MBTA (USFWS 2008).[45] The Director of the Army Staff Policy Memo, dated February 6, 2018, clarifies that the prohibition on “taking” or “killing” of migratory birds only applies to deliberate actions intending to take migratory birds, their nests, or their eggs. Further, it requires military departments to minimize, to the extent practicable,

[45] www.fws.gov/migratorybirds/intrnltr/treatlaw.html.

incidental take of migratory birds without diminishing military readiness activities. Threatened and endangered species are addressed in the Protected Species section.

Mammals

A total of 58 species of mammals have been documented on Fort Bliss and an additional 20 species have the potential to occur thereon, including 17 species of bats (Fort Bliss 2016). Within the ROI, predators and prey species occur across Fort Bliss. Predators include black bears, coyotes, foxes, badgers, bobcats, and cougars. Prey species include grazers like elk, deer, pronghorn, the introduced oryx, and numerous species of rodents and rabbits. Specifically, the mesa grasslands are an important pronghorn habitat. Therefore, the pronghorn are primarily found on the Otero Mesa, south of Highway 506, the southeast McGregor Range, and the southern boundary of the northeast McGregor Range, north of Highway 506 (part of the Otero Mesa Ecological Management Unit [EMU]). Rodent surveys completed in 1997 and 1998 in the McGregor Range show the largest number of individuals and species in the swale and the acacia scrub habitat, and the lowest number was in the mesquite dunes. The montane habitats of the Huecos, Organs, and the Sacramento Foothills are significant as they provide different rodent species than are found in the grasslands and basin, including the Organ Mountains and gray footed chipmunks.

3.2.4.1.3 Protected Species

The Fort Bliss INRMP contains a list of the 53 sensitive species of flora and fauna of protected status known to occur or have the potential to occur on Fort Bliss (Fort Bliss 2016). Because of the diversity of habitats on Fort Bliss, there is the potential that species may occur that have not been identified or confirmed on post. Continued monitoring and improved documentation of Fort Bliss' natural environment ensures that sensitive species receive adequate protection if a new population is discovered. Protected species occurring on Fort Bliss property are managed by guidance contained within the Endangered Species Management Plan (ESMP) component of the INRMP.

Of the 53 sensitive plant and animal species, seven have federal protection status (Table 3-11). Three of these seven species are federally listed as endangered, and four species are federally listed as threatened; the Sprague's pipit (*Anthus spragueii*) is a candidate for federal listing. Only the federally endangered Sneed's pincushion cactus and yellow-billed cuckoo have been documented to occur on Fort Bliss. The other four federally-protected species may occur on Fort Bliss, however, they have not been identified or confirmed on post. The survey and monitoring of existing populations of Sneed's pincushion cactus have occurred continuously since 1980—on South Hill, North Hill, and Webb Gap on Fort Bliss (Fort Bliss 2016).

Table 3-1011. Federally Listed Species That May Occur on Fort Bliss

Common Name	Scientific Name	Federal Status
Northern Aplomado falcon	*Falco femoralis*	E
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Yellow-billed cuckoo	*Coccyzus americanus*	T
Piping plover	*Charadrius melodus*	T
Sneed pincushion cactus	*Coryphantha sneedii var. sneedii*	E
Kuenzler hedgehog cactus	*Echinocereus fendleri var. kuenzleri*	T
Sprague's pipit	*Anthus spragueii*	C

Northern Aplomado Falcon

The northern Aplomado falcon has a significant local interest. The species status was designated as 10(j) in 2006, resulting in experimental releases of captive-reared birds within the states of New Mexico and Arizona. Currently, the northern Aplomado falcon is a transient species on Fort Bliss (U.S. Army 2000; Young et al. 2002); however, potential Aplomado habitat does occur on Fort Bliss (Figure 3.2-4).

Southwestern Willow Flycatcher

No confirmed observations and an appropriate nesting habitat does not exist on Fort Bliss.

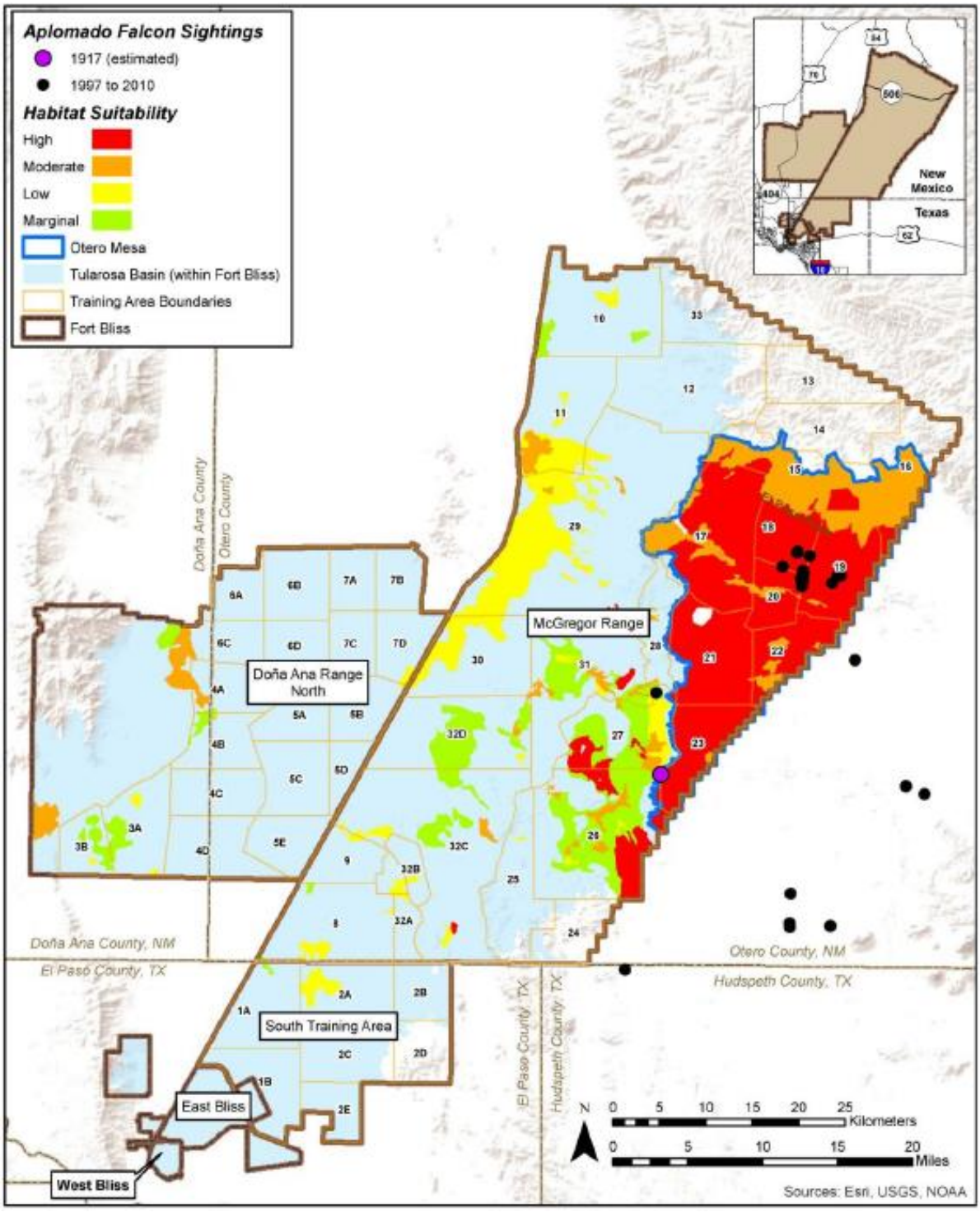
Mexican Spotted Owl

An appropriate breeding habitat may exist in the mountains near Fort Bliss. Uncommon, only two sightings were reported near Fort Bliss.

Yellow-Billed Cuckoo

This species was observed in a survey in Soledad Canyon in the Organ Mountains and on the Otero Mesa (Fort Bliss 2016).

Figure 3.2-4. Aplomado Falcon Sightings on Fort Bliss



Piping Plover

The species was observed in 1997 at the Fort Bliss sewage ponds.

Sneed Pincushion Cactus

This species is both a federal and states of New Mexico and Texas endangered species. The Sneed pincushion cactus populations are located on specific limestone habitats in the Doña Ana Range – North Training Area. The areas are off-limits to all entry and military use.

Kuenzler Cactus

The Kuenzler cactus is listed as both a federal and state of New Mexico endangered species. A large survey within Fort Bliss is underway but no cacti have been found. The Northeast McGregor Range appears to be the most suitable habitat.

Bald Eagles

Bald eagles are no longer listed under the ESA but are still protected by the BGEPA. Observations indicate that bald eagles using the northern portion of McGregor Range roost at a known roost site within the Lincoln National Forest, about 5 miles north of the FBTC boundary (Fort Bliss 2001). Bald eagles will forage in winter within the Sacramento Mountains and occasionally occur on Fort Bliss.

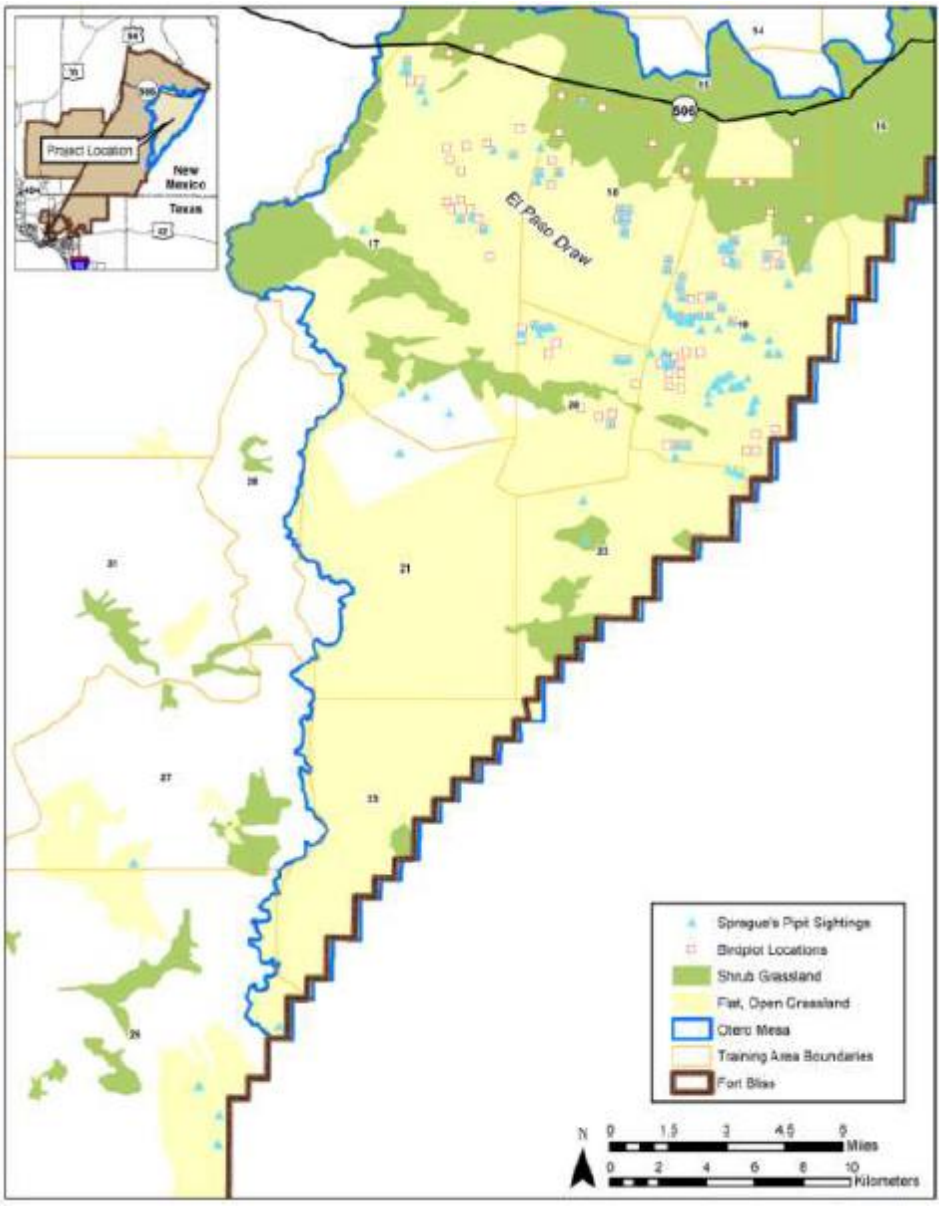
Desert Night-Blooming Cereus

The desert night-blooming cereus is a federal species of concern (SOC) and a state of New Mexico sensitive species. There have been more than 80 individuals documented within shrubland communities on Fort Bliss. It generally occurs in Chihuahuan Desert shrubland communities. Populations on Fort Bliss are documented on Doña Ana Range but are not documented in the Doña Ana Range – North Training Area. Fort Bliss has developed a threatened and endangered species management plan for the desert night-blooming cereus (Corral and Bill 2000; Corral et al. 2000b-e). Areas with known populations of this species are restricted from Fort Bliss maneuver activities. Additional populations may occur outside of firing ranges and buffers, but that is unlikely due to lack of suitable habitat.

Sprague's Pipit

Sprague's pipit is associated with prairie habitat and breeds in the north-central United States. Texas is within its wintering range (Figure 3.2-5).

Figure 3.2-5. Sprague's Pipit Sightings on Fort Bliss



Fort Bliss Special Protection Species

Fort Bliss has designated three species of invertebrates as deserving special attention (U.S. Army Data 2008). They are the Boulder woodland snail, Maple Canyon woodland snail, and the Organ Mountains woodland snail. These snails are known to occur in the Organ Mountains and Doña Ana Range in the Doña Ana Range – North Training Area of Fort Bliss (NM Cooperative Fish and Wildlife Research Unit 2001). Recent studies have refined the understanding of the species' distribution, but several questions regarding their taxonomy remain.

3.2.4.2 Environmental Consequences

Impacts from Construction

Construction of a battalion complex may be required. The battalion area complex would encompass about 40 acres near the intersection of the Purple Heart Memorial Highway (TX 375) and Torch Street. Actual ground disturbance for each building would be substantially less. The battalion area would consist of a battalion HQ, battery HQs, a company HQ, a vehicle maintenance shop, an oil storage building, and an organizational vehicle parking area. The HQ buildings may be combined into a single HQ complex. The vehicle maintenance shop and oil storage building would be constructed within the confines of the organizational vehicle parking area. The area around the possible location of the complex is shrubland and is adjacent to substantial areas supporting armor brigades at Fort Bliss. There has not been a recent disturbance of the soils in the planned construction area. Impacts would include removal of vegetation, grading, and filling which would alter wildlife habitats. Based on the proposed location, there is no suitable habitat nor any reported sightings of protected species. Impacts to flora, fauna, and protected species are expected to be less than significant.

Impacts from Live Fire Training and Maneuver Training

Live-fire and maneuver training takes place within the designated range complex at Fort Bliss. The range complex is nearly 1 million acres and consists of forests, woodlands, grasslands, shrublands, and pockets of riparian habitat.

Protected avian species may occur on Fort Bliss. The northern Aplomado falcon is a transient species on the installation. Highly suitable habitat occurs in the northeast and north-central McGregor Range and moderately suitable habitat occurs in the western Doña Ana Ranges. Other areas of Fort Bliss are judged to have poor or no suitable habitat. Impacts to the species in the McGregor and Doña Ana Ranges are expected to be less than significant because the species would likely avoid any areas while training is occurring. The Mexican spotted owl may occur in the mountains at the north end of Fort Bliss training areas. The M-SHORAD training would not normally be conducted in forested mountain terrain that is the preferred habitat of the Mexican spotted owl. Therefore, impacts to the Mexican spotted owl are expected to be less than significant. The yellow-billed cuckoo has been sighted in Soledad Canyon, the Organ Mountains, and Otero Mesa in the Doña Ana range. The species prefers woodlands with dense undergrowth which is not the type of terrain for M-SHORAD training. Sprague's pipit wintering range includes Fort Bliss. Suitable habitat exists in the Otero Mesa shrubland communities of the McGregor Range. Training on McGregor Range may impact the species. Still, the impacts are expected to be less than significant because the species would likely leave the area during training and return when training is complete.

The piping plover has been sighted in the vicinity of the Fort Bliss sewage ponds. The impacts of these species are expected to be less than significant because the ponds are not near the ranges or

the proposed construction site. The southwestern willow flycatcher has not had any confirmed observations and there is not suitable nest habitat present; therefore, impacts are expected to be negligible or not occur.

The bald eagle is known to roost in the Lincoln National Forest about 5 miles north of the McGregor Range and has been observed foraging within the installation boundary. Impacts are expected to be less than significant because the bald eagle would likely forage elsewhere while M-SHORAD training occurs. Impacts to species protected under the MBTA are expected to be less than significant because take that is incidental to military training is exempt (Department of the Interior Memorandum December 22, 2017, and Deputy Assistant Secretary of Defense Memorandum 2018).

Three protected plant species may occur within the training areas. The Sneed pincushion cactus has specific habitat in the Doña Ana Range marked as off-limits to the military, and no impact is anticipated. Currently, no data is available regarding the presence of the Kuenzler cactus on Fort Bliss. The most suitable habitat is believed to occur in the northeast McGregor Range and there are possible impacts when training those areas. Impacts from M-SHORAD training are expected to be less than significant because the majority of maneuvers by M-SHORAD battalion vehicles would occur on designated roads and trails where the cactus would not occur. The desert night-blooming cereus is a federal species of concern and a New Mexico sensitive species. It is found in the Chihuahua Desert of Doña Ana Range. All documented areas are off-limits with buffer areas around them to preclude damage. The species is unlikely to occur in other areas as there is no suitable habitat. Therefore, impacts are expected to be less than significant.

Fort Bliss has three garrison species of concern. The boulder woodland snail, maple canyon woodland snail, and the Organ Mountains woodland snail. These species occur in the Organ Mountains and Doña Ana Ranges. Training in these areas may impact the species, but Fort Bliss would attempt to minimize adverse effects to the maximum extent practicable.

Use of the live-fire ranges may result in increased deposition and leaching of munitions contaminants, erosion, soil compaction, and the potential for range fires within the range complex. These impacts are expected to be less than significant because Fort Bliss conducts range assessments and land rehabilitation and maintenance actions to mitigate these effects.

Maneuver training may result in injury or mortality of fauna, temporary flushing of fauna from their preferred habitat, vegetation loss, soil compaction, rutting, and generation of dust. This could alter habitat and increase erosion. Fort Bliss maintains its maneuver areas through regular assessments, maintenance, and rehabilitation. Off-limits areas and buffers are established around areas known to support sensitive species. Therefore, impacts to biological resources are expected to be less than significant

Impacts from Increase in the Number of Soldiers

The impacts of increasing soldier population are adequately addressed in Section 3.1.3.

3.2.4.3 Cumulative Effects

Fielding of 10 new systems is not expected to result in new facility construction but may require expansion or renovation of existing facilities. An expected increase of approximately 1.2 percent more soldiers would be using the maneuver and live-fire ranges resulting in minor increases in the intensity and frequency of use of the training areas that are expected to be less than significant. Adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Bliss is expected to have a less than significant cumulative impacts to biological resources because it represents a small population increase of less than 0.1 percent within the ROI.

3.2.5 Cultural Resources

3.2.5.1 Affected Environment

3.2.5.1.1 Cultural Resources Present

Fort Bliss contains over 20,600 identified archaeological sites and approximately 4,340 structures. Of those, 3,567 archaeological sites and 507 buildings and structures are listed or eligible for listing on the NRHP (Fort Bliss 2017). Fort Bliss has three archaeological sites that are listed on the NRHP: Hot Well Pueblo, the Sgt. Doyle Site (pueblo), and Fusselman Canyon (rock art). The installation also contains one historic district, the Fort Bliss Main Post Historic District, listed into the National Register of Historic Places. Five additional historic districts separate and distinct from the Main Post are also eligible for listing; Army Field Forces Board No. 4 Historic District, 1st Guided Missile Group Training Facilities Historic District, Early Cold War Guided Missile Instruction Historic District (Areas A-F), 7000 Area Residential Community Historic District, and the Firebee/Towbee Drone Launch Complex Historic District..

Fort Bliss implements several measures to protect cultural resources against adverse effects from training, construction, and other ground-disturbing activities. Training requests are vetted through expert staff on archaeology and historic preservation. Staff re-route training requests to avoid off-limit areas and outline authorized activities in LUAs. When necessary, staff will personally consult with the requesting unit to assist.

3.2.5.1.2 Consultation and Coordination with Tribal Governments

Fort Bliss, the New Mexico and Texas SHPOs, and the ACHP operate under a Programmatic Agreement (PA) (2015–2025) which details how Fort Bliss meets cultural resources requirements under Sections 106 and 110 of the NHPA. The PA streamlines compliance under Section 106, outlining undertakings that do not require project-by-project review by SHPOs; however, 36 CFR 800 is followed when addressing Section 106 with federally recognized tribes. The PA includes standard operating procedures that provide for consistent, day-to-day management of mission undertakings carried out on the installation that may affect historic properties, including those resulting from training activities (Fort Bliss 2017).

Fort Bliss maintains an ICRMP to protect and manage the installation's cultural resources in compliance with various federal laws and regulations. It integrates those management responsibilities with the installation's military training, construction, maintenance, and other mission-related activities. The ICRMP also includes an action plan whose goals include integrating preservation compliance requirements with planning and conducting military training and surveying for and evaluating sites on McGregor Range and other areas where the change in military training will have the greatest impact. The goals also include minimizing and mitigating adverse effects on all eligible properties in concert with the execution of military training and support activities (Fort Bliss 2017).

3.2.5.2 Environmental Consequences

No activities related to the Proposed Action would occur within the Fort Bliss NRHP listed archaeological sites or historic districts. Fort Bliss will take the necessary steps to protect cultural resources during the implementation of the Proposed Action. Fort Bliss will avoid construction or permanent changes that would alter their established viewsheds and historic landscapes. If required, Fort Bliss will rely on the procedures in their PA to meet the cultural resources requirements under Sections 106 and 110 of the NHPA.

Impacts from Construction

Construction would be as described in Section 3.3.4.2. The area around the possible location of the complex is shrubland and is adjacent to substantial areas supporting armor brigades at Fort Bliss. There has not been a recent disturbance of the soils in the planned construction area. Impacts would include the removal of vegetation, grading, and filling. No known cultural resources would be impacted at the proposed site. All areas disturbed by construction within the cantonment area would be surveyed for cultural resources unless a survey has been previously completed. If cultural resources are found required consultations would be completed and appropriate mitigations would be implemented to meet federal, state, and tribal requirements. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Live-Fire Training

During the planning for the construction of live-fire training ranges the presence of cultural resources is taken into account and appropriate mitigations implemented to avoid or minimize adverse impacts to those resources and meet federal, state, and tribal requirements. The nature of the ordnance fired by the M-SHORAD would not cause effects below the ground surface and disturb unknown, buried cultural resources. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Maneuver Training

In the maneuver training areas, any known cultural resources are appropriately documented and marked as off-limits to prevent damage. Soldiers are trained to recognize the off-limits markings

and are required to avoid such areas. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Increase in the Number of Soldiers

The increase in soldiers and families resulting from the Proposed Action could increase human presence and traffic near cultural resources. As a result, the resources could be damaged by increases in access and general wear and tear, vibrations caused by traffic, or vandalism. These impacts are expected to be negligible because Fort Bliss has established appropriate protective measures per their ICRMP.

3.2.5.3 Cumulative Effects

Fielding of the 10 new systems is not expected to result in new facility construction but may require expansion or renovation of existing facilities. An expected increase of approximately 1.2 percent more Soldiers would be using the maneuver and live-fire ranges resulting in minor increases in the intensity and frequency of use of the training areas that are expected to be less than significant. Adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Bliss is expected to have a less than significant cumulative impacts to cultural resources because it represents a small population increase of less than 0.1 percent within the ROI.

3.2.6 Soils

3.2.6.1 Affected Environment

The ROI for soil impacts of the project is defined as all areas in which project-related activities may occur, including the footprint of each training and construction area and the corridors of the military vehicle roads. It would also include adjacent areas that may be affected by actions in the project area. For example, if a project area road cut or embankment experiences slope failure, adjacent affected downslope areas become part of the ROI. The ROI for soils is the area that may be affected by proposed changes from facility construction and changes in training or intensity. It includes all Fort Bliss land other than the area within Lincoln National Forest and Castner Range.

The Earth Resources section in the PEIS (Fort Bliss 2007) includes extensive descriptions of physiography, geology (including stratigraphy, structure, and mineral and energy resources), seismicity, and soils. The existing descriptions for these resources are descriptive of the entire Fort Bliss project area and are not specific to facilities or TAs within the project area. Resource data specific to facilities or TAs are presented for the cantonment area and the FBTC under each general resource type of physiography, geology, and soils, as appropriate. There have not been any substantive changes in the condition of the physiography, geology, and seismicity of the project area. They are not expected to be affected by the Proposed Action and alternatives considered in this document; therefore, this document will not address the physiography, geology, and seismicity in the project area. Soils have the greatest potential to be affected by the Proposed Action and the alternatives and are therefore addressed in detail. The description for

each soil type emphasizes soil characteristics that would affect and be affected by construction and ground-disturbing training activities, especially off-road vehicle maneuvers in the FBTC.

In general, soils on Fort Bliss are well-drained to excessively drained with depth to bedrock ranging from shallow to very deep. Most soils on the North and South Training Areas are highly susceptible to wind erosion, while McGregor Range contains soils that are highly susceptible to both water and wind erosion. The Fort Bliss Soil Survey (USDA 2003) provides descriptions of general soil map units, grouped by landscape position, that are suitable for characterizing soils over a large area. The eight general soil map units are displayed in Figure 3.2-6. The basic characteristics of each of these general soil map units are shown in Table 3-12. Each soil map unit on Fort Bliss is a soil association, which is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps.

In arid and semi-arid lands throughout the world, vegetation cover is often sparse or absent. Nevertheless, in open spaces between the higher plants, the soil surface is generally not bare but covered by biological soil crusts, a complex mosaic of living organisms—algae, cyanobacteria (blue-green algae), bacteria, lichens, mosses, liverworts, and fungi—that grow on or just below the soil surface. Biological soil crusts function as living mulch by retaining soil moisture and discouraging annual weed growth. They reduce wind and water erosion, fix atmospheric nitrogen, and contribute to soil organic matter (BLM 2001). These areas are susceptible to becoming either coppice dunes surrounding vegetation or bare ground resulting in accelerated wind erosion if the time for recovery is not allowed after surface disturbance.

The wind erosion hazard on Fort Bliss is high, as shown by the dominance of highly erodible soils in Figure 3.2-6. The soil surface is dry, sandy, and sparsely vegetated, particularly in areas that have been denuded by military vehicle traffic. These soils are susceptible to dust generation and dune formation. Wind speeds in the El Paso area are relatively moderate but can raise considerable dust and sand. The annual average wind speed in the El Paso area is 9.0 miles per hour (mph). Sandstorms occur most frequently during March and April, which have the highest average wind speeds—11.3 mph. Slight, moderate, and severe probabilities for erosion correlate to the Not Highly Erodible, Potentially Highly Erodible, and Highly Erodible.

Figure 3.2-6. General Soils Map Units on Fort Bliss

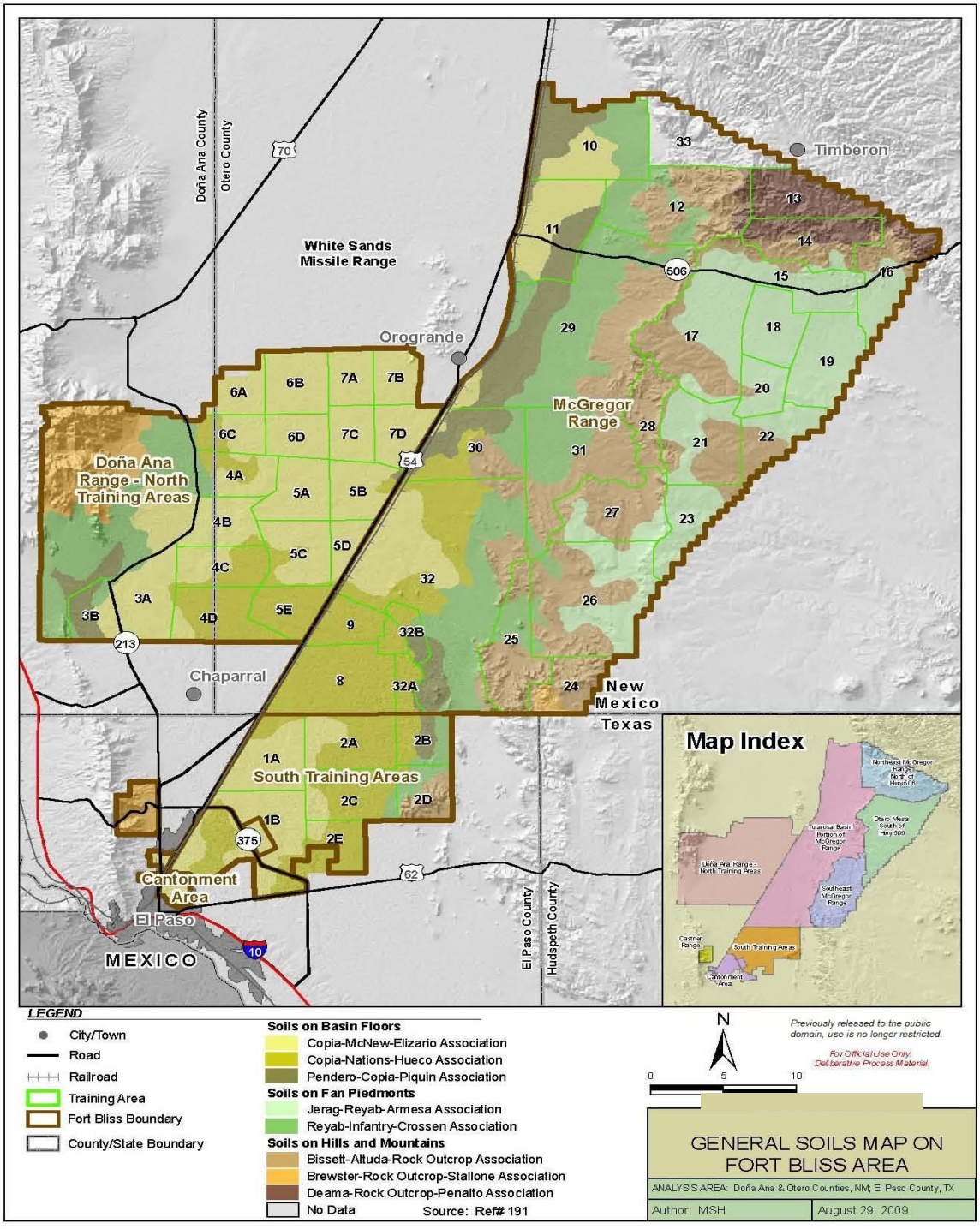


Table 3-1112. Soil Characteristics on Fort Bliss

Landscape Position	Soil Association Map Name	Percent of Fort Bliss*	Physical Properties
Basin Floors	Copia-Mcnew-Elizario Association	22	2–5% slopes, very deep, well drained to excessively drained, a high proportion of sand on surface
	Copia-Nations-Hueco Association	15	0–5% slopes, very deep to moderately deep, loamy fine sand surface texture
	Pendero-Copia-Piquin Association	6	2–15% slopes, very deep, excessively drained, loamy fine sand to very gravelly sandy loam surface texture
Subtotal	Basin Floors	43	
Fan Piedmonts	Jerag-Reyab-Armesa Association	14	0–5% slopes, well drained, very deep to shallow, very fine sandy loam and silt loam surface texture
	Reyab-Infantry-Crossen Association	20	0-10% slopes, well drained, very deep to very shallow, surface texture mixed (silt loam, very gravelly loam, gravelly fine sandy loam)
Subtotal	Fan Piedmonts	34	
Hills and Mountains	Bissett-Altuda-Rock Outcrop Association	16	5–65% slopes, well drained, shallow and very shallow, very gravelly or very cobbly loam surface texture
	Brewster-Rock Outcrop-Stallone Association	4	5–90% slopes, well drained, very deep to very shallow, very gravelly loam to extremely bouldery sandy loam surface texture and rock outcrop
	Deama-Rock Outcrop-Penalto Association	3	5–65% slopes, well drained, shallow and very shallow, very cobbly or gravelly loam surface texture
Subtotal	Hills and Mountains	23	

* Excluding Castner Range and Training Area 33 (Grapevine).

Source: USDA 2003

Fort Bliss Soil Survey

The Fort Bliss Soil Survey (USDA 2003, 2004) provides interpretations for specific military land uses. These include suitability ratings for construction and maintenance of buildings and roads, erosion hazards, and soil trafficability using a range of vehicles under wet and dry conditions. Table 3-13 summarizes the wind and water erosion and trafficability limitations, based on the vehicle classifications of light (L), medium (M), and heavy (H), of the soils on Fort Bliss.

Table 3-1213. Wind and Water Erosion and Trafficability Ratings of Soils on Fort Bliss

Soil Erosion and Trafficability		Wind and Water Erosion and Trafficability Ratings of Soils[3]				
		Excellent/ Slight Limitations	Good[1]	Fair/ Moderate Limitations	Poor/ Severe Limitations	Not Rated[2]
Wind Erosion		1 %	N/A	0 %	99 %	0 %
Water Erosion		61 %	N/A	22 %	17 %	0 %
Trafficability, L-Classification	wet	0 %	65 %	0 %	11 %	24 %
	dry	58 %	0 %	9 %	11 %	22 %
Trafficability, M-Classification	wet	0 %	57 %	9 %	11 %	23 %
	dry	57 %	0 %	9 %	11 %	23 %
Trafficability, H-Classification	wet	22 %	58 %	1 %	15 %	1 %
	dry	70 %	10 %	1 %	15 %	1 %

[1] Applies only to vehicle trafficability ratings.
[2] Includes miscellaneous map units such as rock outcrops, pits, and dumps.
[3] Trafficability ratings are based on 50 vehicle drive-overs.
Source: USDA 2004

Trafficability refers to the capacity of soils to support military vehicles. Trafficability is affected by soil strength, slope, stickiness, slipperiness, vegetation, and natural obstacles. The degree of trafficability is determined by vehicle type, which is dependent on the contact pressure of tires or tracks and vehicle weight and the effect to the surface soil layer under wet or dry conditions. The ratings listed in Table 3-13 are for 50 vehicle drive-overs. An excellent rating means that soil features are very favorable for the vehicle to pass. A good rating indicates moderately favorable soil conditions. A fair rating indicates soil limitations that are likely to require adjustments to vehicle spacing or route. A poor rating indicates soil features that cannot be overcome. Areas with fair to poor trafficability may result in more vehicle wear and tear and thus requires greater vehicle maintenance (USDA 2003).

The Fort Bliss Soil Survey also describes ecological sites (ecosites), which are a classification unit that represents an area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. The ecosites can be correlated with soil map units. Each ecosite describes a typical plant community and uses a threshold concept to characterize changes in the system. The standard indicators used to determine thresholds are described in the 2007 SEIS and

are not repeated in this analysis. These indicators primarily include measures of erosion by water and wind, plant community composition and production, and land cover (landscaping, pavement, buildings, gravel).

Soil Resources Management

An erosion and sediment control plan must be implemented as required by AR 200-1, AR 210-20 (*Real Property Master Planning for Army Installations)*, the INRMP, the New Mexico Administrative Code (NMAC) Title 20.1 Environmental Protection, General; and the Doña Ana County Erosion Control Regulations (Doña Ana County 2001). New Mexico has enacted the Watershed District Act (New Mexico Statute 73-20-1) (State of New Mexico 2008), which authorizes the state conservation agency and the districts to develop and execute soil erosion and sediment control plans or programs. Texas Commission on Environmental Quality authorizes the General Permit to Discharge Wastes, which includes provision for erosion control from construction activities.

Soil management is coordinated through the Fort Bliss Directorate of Public Works – Environmental Division (DPW-E) and ITAM – Directorate of Plans, Training, Mobilization, and Security. Plans to control or mitigate water or wind erosion must consider effects on the vegetative community, grazing, cultural resources, and natural resources, especially threatened and endangered species. Land Rehabilitation and Maintenance (LRAM) is one of the four components of the ITAM program. The purpose of LRAM is to repair damaged lands to facilitate military activities and to prevent further degradation of resources, including soil, in areas designated for military activities. The primary focus of LRAM is maneuver areas to include trails. Areas that need to be rehabilitated have been and will continue to be identified and restoration methods assessed.

Soil erosion and sediment control are managed in part through the LRAM program projects, which consist of strategies and resource allocations for resting and repairing training lands on a rotational basis as well as repairing damaged TAs as the need arises. LRAM seeks to stabilize soils and provide long-term vegetative cover to support military land use. The program involves using cost-effective technologies, such as revegetation, erosion control structures, site hardening, blockades, and dust palliatives to prevent training site degradation, soil erosion, and excessive trail damage.

Fort Bliss resource management objectives for ecosystems include the comprehensive goal to prevent deterioration of highly erodible soil resources (U.S. Army Data 2008).

3.2.6.2 Environmental Consequences

Impacts from Construction

Construction would be as described in Section 3.3.4.2. Soils in this area are predominately sandy loams with a moderately high erodibility. There has not been a recent disturbance of the soils in the planned construction area. As described in Section 3.1.5.2, the measures employed by the Army

would control soil erosion resulting from construction activities. Therefore, impacts are expected to be localized and less than significant.

Impacts from Live-Fire Training and Maneuver Training

The soils within the training ranges and areas at Fort Bliss vary substantially based on whether the range or area is located in a basin floor, a fan piedmont, or hills and mountains. The basin floor soils are predominately fine sands that are highly erodible and loamy fine sands that are moderately erodible. The fan piedmont soils are predominately very fine sandy loam and loam with low erodibility. The hill and mountain soils are gravelly loams and stony loams with low erodibility. The potential for erosion varies across the Fort Bliss training areas due to both soil type described above and whether the location is flatter or more steeply sloped. The flatter terrain in the basin regions is more susceptible to wind erosion while the steeper slope regions are more susceptible to water erosion. The land area of Fort Bliss is more extensive than other Army installations conducting training, which allows Fort Bliss to spread out their training impacts and reduce the potential for increased erosion. The potential for erosion is reduced by the land assessment, rehabilitation, and maintenance practices combined with a relatively low average annual rainfall of the desert landscape. Also, Fort Bliss routinely applies treatments to their maneuver trails to reduce the dust generated by maneuvering forces. Although no quantitative data is available, the dust reductions are substantial. Therefore, the impacts to soils are expected to be less than significant. Other effects to soils are adequately addressed in Section 3.1.5.2.

Impacts from Increase in the Number of Soldiers

The effects to soils from the increase in the number of soldiers are adequately addressed in Section 3.1.5.2.

3.2.6.3 Cumulative Effects

Fielding of the 10 new systems is not expected to require facility construction and would add less than 150 additional soldiers to Fort Bliss. The additional systems would cause slight increases in the intensity of use within the live-fire range and maneuver complexes. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to soils.

3.2.7 Land Use and Compatibility

3.2.7.1 Affected Environment

Land use encompasses the general land-use patterns, land ownership, land management plans, and special use areas on Fort Bliss. The land use ROI includes the installation and areas adjacent to Fort Bliss boundaries in El Paso County, Texas, and Doña Ana and Otero Counties, New Mexico.

The installation presents two major settings: the developed cantonment adjacent to the urban and suburban areas of the city and county of El Paso, Texas, and the FBTC, with extensive open

TAs, surrounded primarily by undeveloped, publicly owned lands. The FBTC encompasses approximately 98 percent of the installation's areal extent (Table 3-14).

Table 3-13~~14~~. Fort Bliss Installation Components

Component	Square Kilometers (km^2)	Percent of Total
Cantonment Area including Biggs Army Airfield	96	>2
Caster Range	27	<1
South Training Areas	373	8
Doña Ana Range – North Training Areas	1,196	27
McGregor Range	2,814	62
Total	4,506	100

Source: Fort Bliss 2009

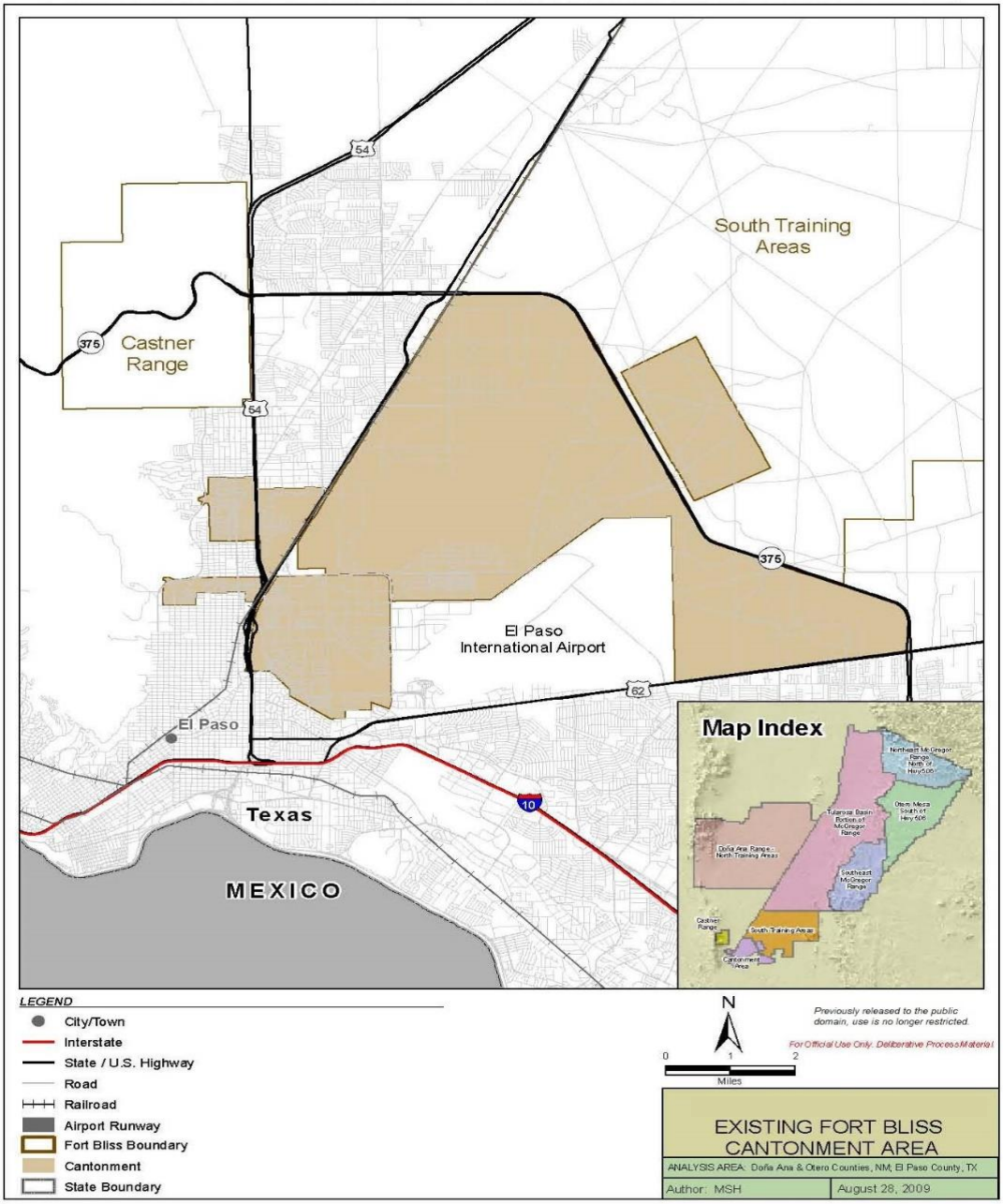
Non-military land uses on Fort Bliss include livestock grazing and public recreation. Livestock grazing is permitted on McGregor Range. The FBTC issues recreation access permits and allows limited public access. Public access must be compatible with the military activities onsite at the time. Examples of recreational activities include hunting, hiking, and bird watching. There are approximately 300 recreational passes issued annually, approximately 25 percent of which are for recreational activities other than hunting. The most frequented areas for recreation are the South Training Areas, in particular, TAs 1A and 1B (Locke 2009). Recreational vehicular traffic is limited to designated roads and trails. When military activities are incompatible with public use, the entire TA is closed to public access.

3.2.7.1.1 Cantonment

The cantonment, presented in Figure 3.2-7, contains the heaviest concentration of facilities and mission support activities on Fort Bliss. It covers one percent of the total acreage of Fort Bliss and includes all of the installation south and west of Loop 375, and a portion east of Loop 375. Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical and community facilities and Biggs Army Airfield (AAF).

The cantonment is designated for a single mixed-use land-use designation, as opposed to having specific areas designated for individual land-use categories. Facilities siting and development will continue to follow Army land-use compatibility criteria. In the cantonment, single-use "tactical campuses" accommodate the BCTs. As presented in the 2007 SEIS, a single mixed-use land designation supports the Army's transformation to a modular force by enabling BCT facilities to be planned as integrated enclaves, and also provides greater flexibility in responding to the evolving mission and facility requirements. Furthermore, the proximity of the BCT campuses to the South Training Areas reduces travel distances for training and minimizes the intrusion of BCT vehicular activity into the remaining cantonment area.

Figure 3.2-7. Existing Fort Bliss Cantonment Area



3.2.7.1.2 Range Complex

South Training Areas

The South Training Areas consists of seven TAs (TAs 1A-1B; 2A-2E).

Military Land Use. The South Training Areas are used primarily for on- and off-road vehicle maneuvers and close-in military training ranges.

Non-Military Land Uses. The South Training Areas contain public utility infrastructure, including water treatment facilities, deep-well injection sites, water wells, and gas and water pipelines. The Fred Hervey Water Reclamation Plant, Kay Bailey Hutchinson Desalination Plant, and the Fort Bliss Rod and Gun Club are located in the South Training Areas.

Doña Ana Range – North Training Areas

The Doña Ana Range – North Training Areas consists of 19 TAs (TAs 3A-3B, 4A-D, 5A-E, 6A-D, and 7A-D). War Highway (New Mexico Route 213) divides the Doña Ana Range complex from the North Training Areas. The majority of the Doña Ana – North Training Area is land withdrawn under Public Land Order 833 (circa 1952), and all management of the surface acreage is under the jurisdiction of the Army.

Military Land Use. A complex of weapons firing ranges is located to the west of War Highway, with their impact areas located in the foothills of the Organ Mountains. The North Training Areas are used primarily for on- and off-road vehicle maneuvering. Aerial drop zones and artillery firing areas are located in the western part of the North Training Areas. Two range camps, the Orogrande and the Doña Ana Range Camps, provide mission support facilities.

Non-Military Land Uses. War Highway (New Mexico Highway 213 and Ranch Road 3255 in Texas), a public access road, serves as the primary link between the city of El Paso and the WSMR. Utility easements crossing portions of the Doña Ana Range – North Training Areas include above ground electric lines and underground gas pipelines. There is limited recreation in the Doña Ana – North Training Areas. The public's recent level of use of the Doña Ana – North Training Areas is low and can only be permitted when military activities are not using the training areas.

McGregor Range

McGregor Range is approximately 62 percent of the total Fort Bliss land area and contains 26 TAs occupying roughly 2,833 km^2 (700,000 acres). Approximately 87 percent of McGregor Range (more than 2,428 km^2 or 600,000 acres) is public land administered by the BLM and co-managed by Fort Bliss and the BLM under a Memorandum of Agreement, per congressional withdrawal of public lands for military use (Public Law [PL] 106-65). Per the Memorandum of Agreement between BLM and Fort Bliss, Fort Bliss controls the construction and maintenance of improvements in hazardous and Army fee-owned areas, to include the boundary fence for McGregor Range. Approximately 10 percent (287 km^2 or 71,000 acres) is land owned-in-fee by the Department of Army. The remainder of McGregor Range, approximately three percent (73 km^2 or 18,000 acres), is part of the Lincoln National Forest, which is public land managed by the U.S. Forest Service (USFS).

Military Land Use. McGregor Range is used for a variety of missile testing and training programs, individual and collective training ranges, and unit field maneuvers. Two complexes of

ranges exist: Orogrande Range Complex, east of the town of Orogrande, and Meyer Range Complex adjacent to the McGregor Range Camp, north of the Texas/New Mexico border. Wilde Benton, a 2-mile long dirt airstrip, exists slightly north and east of the Orogrande Range Complex. Approximately half of McGregor Range, 1,425 km^2 (352,000 acres), permits heavy off-road vehicle maneuvers (i.e., tracked vehicles or large units). Controlled field training exercise (FTX) activities (allowing concentrations of personnel and vehicles at fixed sites, and digging) are designated in areas where off-road vehicle maneuver is not permitted, except TA 33. Under a MOU between the USFS and the Army, military uses are permitted on TA 33 with the concurrence of the USFS (Fort Bliss 1999). Per the USFS Travel Management Policy, military activities are limited to dismounted maneuvers throughout TA-33 and off-road vehicle use is prohibited off designated routes except for traveling up to 300 feet (90m) from designated routes to access dispersed campsites (USFS 2009).

Holloman AFB uses the Centennial Bombing Range, consisting of approximately 21 km^2 (5,200 acres) on Otero Mesa south of Highway 506 (occupying portions of TAs 17 and 21), for air-to-ground target training.

Non-Military Land Uses. Non-military uses are allowed on McGregor Range, provided they do not conflict with military uses or pose safety risks to the public. The BLM's Record of Decision (ROD) and RMPA for McGregor Range, May 2006, details the most recent management plan for the 2,453 km^2 (606,233 acres) of public land now withdrawn from the public domain for military use (BLM 2006). The RMPA details the co-management responsibilities of BLM and Fort Bliss on withdrawn lands and Army-fee owned lands with regard to lands, rangeland management, and recreation, as well as habitat management and special species management, cultural resources, and fire management. In May 2006, Fort Bliss signed a MOU with the BLM regarding the RMPA for McGregor Range. This document includes BMPs that, when applied properly, minimize adverse impacts on the McGregor Range ecosystem, and retains the reclamation potential of the disturbed area while accommodating land-user objectives.

Below is a summary of some key BLM/Fort Bliss responsibilities concerning land use on McGregor Range, inclusive of the RMPA MOU:

- *Public Road Access and Utility Easements.* The BLM authorizes rights-of-way (ROWs) on a case-by-case basis with the concurrence of Fort Bliss (BLM 2006). Fort Bliss is responsible for authorizing right-of-way and short-term leases and permits on the Army fee-owned lands. Highway 506 provides access to the southeastern portion of Otero County and to Dell City, Texas, as well as to communities in the southern part of the Sacramento Mountains. For certain training activities, Fort Bliss closes Highway 506. Smaller range roads provide the only ingress to some grazing allotments in the northern part of McGregor Range on USFS land and in the Culp Canyon Wilderness Study Area (WSA). The RMPA designates two linear corridors to accommodate future utilities (e.g., power line, pipeline,

fiber optics) and identifies 171,948 acres to be excluded from consideration for any type of ROW unless otherwise mandated by law (ROW exclusion areas).

- *Public Recreation.* Fort Bliss and the BLM share responsibilities for access permits on both the withdrawn lands and the Army fee-owned lands. The BLM does not allow recreational off-road vehicle use on McGregor Range. (Per EO 11644, amended by EO 11989, this prohibition does not apply to combat or combat support vehicles when used for national defense purposes.) The New Mexico Department of Game and Fish (NMDGF), Fort Bliss, and the BLM share responsibilities for hunting on McGregor Range. The NMDGF authorizes hunts for deer, antelope, and other big game on McGregor Range in the joint-use areas.
- *Livestock Grazing.* The BLM is responsible for livestock grazing, including permitting/leasing and overall management on both the withdrawn lands and the Army fee-owned lands. The BLM and Fort Bliss share responsibilities for livestock water maintenance. The maintenance and construction of livestock control fences and water pipelines are the responsibility of the BLM for areas on McGregor Range outside impact areas. Fort Bliss is responsible for the maintenance and construction of livestock control fences inside impact areas on McGregor Range.

Per PL 106-65, the BLM manages livestock grazing on approximately 1,093 km^2 (270,000 acres). The BLM grazing is limited to 14 grazing units. The USFS manages livestock grazing on TA 33, also known as Grapevine Canyon. The actual number of units available each year for grazing, their season of use, and the livestock use of each grazing unit vary, depending upon ecological conditions. The ROD/RMPA for McGregor Range provides a detailed discussion of livestock grazing activities and responsibilities on Fort Bliss and is incorporated herein by reference.

- *Wilderness Study Areas.* The BLM and Fort Bliss share responsibilities regarding WSA management and compliance on the withdrawn lands. Pursuant to the Federal Land Policy and Management Act and the Wilderness Act of 1964, WSAs are roadless areas that the BLM manages so as not to impair their suitability for preservation as wilderness until Congress acts to either permanently protect them as Wilderness Areas or release them from WSA status to non-wilderness areas. Culp Canyon WSA consists of approximately 45 km^2 (11,000 acres) in TA 12. While Fort Bliss uses the WSA for military training, activity within the Culp Canyon WSA is limited to dismounted maneuver.
- *Area of Critical Environmental Concern (ACEC).* The 15 km^2 (3,718-acre) Black Grama Grassland ACEC is situated on four sites in the northeastern portion of McGregor Range. The BLM, Fort Bliss, and New Mexico State University share responsibility for the management of the Black Grama Grassland ACEC through a cooperative agreement among the three entities. The Black Grama Grassland ACEC is closed to motorized vehicle use.

- Future Watershed and Habitat Plans. The RMPA includes the future development of six watershed management plans and two habitat management plans (HMPs) for a total of 830 km2 (205,109 acres) in the Sacramento Mountains foothills on grasslands on Otero Mesa.

3.2.7.2 Environmental Consequences

Impacts from Construction

As a result of the Proposed Action, Fort Bliss would plan on constructing the M-SHORAD battalion facilities near the intersection of TX 375 and Torch Street. The area around the possible location of the complex is adjacent to substantial areas supporting armor brigades at Fort Bliss. No changes to land use are required and the land use is compatible with the surrounding area. Therefore, impacts are expected to be less than significant.

Impacts from Live-Fire Training, Maneuver Training and the Increase in the Number of Soldiers

As a result of the Proposed Action, Fort Bliss would not plan on constructing new ranges to support the M-SHORAD battalion. The use of the training areas may increase slightly but would be managed through scheduling per the SRM or ReARMM. Impacts to land use and compatibility are adequately addressed in Section 3.1.6.2.

3.2.7.3 Cumulative Effects

Fielding of the 10 new systems is expected to have less than significant effects because they would be fielded to existing units with no changes to land use or compatibility.

3.2.8 Socioeconomics

3.2.8.1 Affected Environment

3.2.8.1.1 Population

The ROI for Fort Bliss includes three counties adjacent to Fort Bliss, consisting of El Paso County in Texas, and Doña Ana and Otero Counties in New Mexico.

The total estimated employed population at Fort Bliss is 46,317 for 2020. This includes 34,714 total military and 11,603 total civilians (Army Stationing and Installation Plan (ASIP) 2020).

The population size in El Paso County, Texas, is approximately 840,758 as of July 2018.[46] The population sizes in Doña Ana[47] and Otero Counties[48] in New Mexico are 217,522 and 18,432, respectively, as of July 2018. Thus, the total population estimated for the ROI in 2018 was

[46] Census. 2020. QuickFacts El Paso County, Texas. https://www.census.gov/quickfacts/elpasocountytexas Accessed on 11 March 2020.
[47] Census. 2020. QuickFacts Doña Ana County, New Mexico. https://www.census.gov/quickfacts/fact/table/donaanacountynewmexico/AGE295218#AGE295218 Accessed on 11 March 2020.
[48] Census 2020. QuickFacts Otero County, New Mexico. https://www.census.gov/quickfacts/fact/table/oterocountycolorado,donaanacountynewmexico/AGE295218 Accessed on 11 March 2020.

1,076,712. As shown in Table 3-15, the population growth rates in El Paso, Doña Ana, and Otero Counties from 2010 are 5.3 percent, 3.9 percent, and -2 percent, respectively.

Table 3-1415. Growth Rate over an 8-Year Period by County

	El Paso County, Texas	Doña Ana County, New Mexico	Otero County, New Mexico
2018	840,758	217,522	18,432
2010	800,647	209,233	18,831
% Growth	5.3%	3.9%	-2%

There are currently 2,395 permanent military family housing units under the control of Fort Bliss. These are all located in the cantonment of several neighborhoods. Family housing on Fort Bliss has been privatized under the Residential Communities Initiative, and the contractor responsible for Fort Bliss Military Housing indicates that the construction of 1,708 additional homes is well underway (Belfour Beatty Communities 2008). Unaccompanied housing is primarily located on the cantonment (4,748 units), with some (2,320 units) located in the three range camps for temporary use during training exercises (U.S. Army 2007). Fort Bliss also maintains about 1,124 units for temporary use including temporary duty travel personnel and active duty families relocating to Fort Bliss.

3.2.8.1.2 Race/Origin Demographics

This PEA gives particular attention to the distribution of race and poverty in areas potentially impacted by the implementation of the Proposed Action. Table 3-16 summarizes race and origin demographics for the ROI.

Table 3-1516. Demographic Statistics for Doña Ana, Otero, and El Paso Counties (in Percent of Population) in 2019[49]

Race/ Origin	Doña Ana County	Otero County	El Paso County
White only	91.9	82.7	92.0
Black or African American only	2.4	4.0	3.9
Native American and Alaskan only	2.4	8.5	1.0
Asian only	1.3	1.5	1.3
Native Hawaiian or Other Pacific Islander	0.2	0.3	0.2
Hispanic or Latino*	68.6	38.7	83.0
Two or more races	1.9	3.0	1.5
*Hispanic or Latino is not a race but an origin. To get the total percent for race, subtract this origin.			

[49] Census. 2019. Quick Facts: https://www.census.gov/quickfacts/fact/table/elpasocountytexas,oterocountynewmexico,donaanacountynewmexico/PST045219. Accessed on April 3, 2020.

3.2.8.1.3 Income and Employment

The per capita income in 2018 for Doña Ana County was $21,300, for Otero County was $22,477, and for El Paso County was $20,763.[16] The estimated total annual income for the ROI in 2018 was $22,504,173,018 based on the summation of the total incomes for Doña Ana, Otero, and El Paso Counties ($4,633,218,600; $414,296,064; and $17,456,658,354, respectively).

Table 3-17 and Figure 3.2-8 show comparisons in unemployment as well as prominent employment sectors across Doña Ana, Otero, and El Paso Counties. Education, health care and social assistance was the most prominent category across all three counties. Otero County has the highest unemployment rate at 9.2 percent, followed by Doña Ana County at 8.2 percent and El Paso at 6.2 percent.

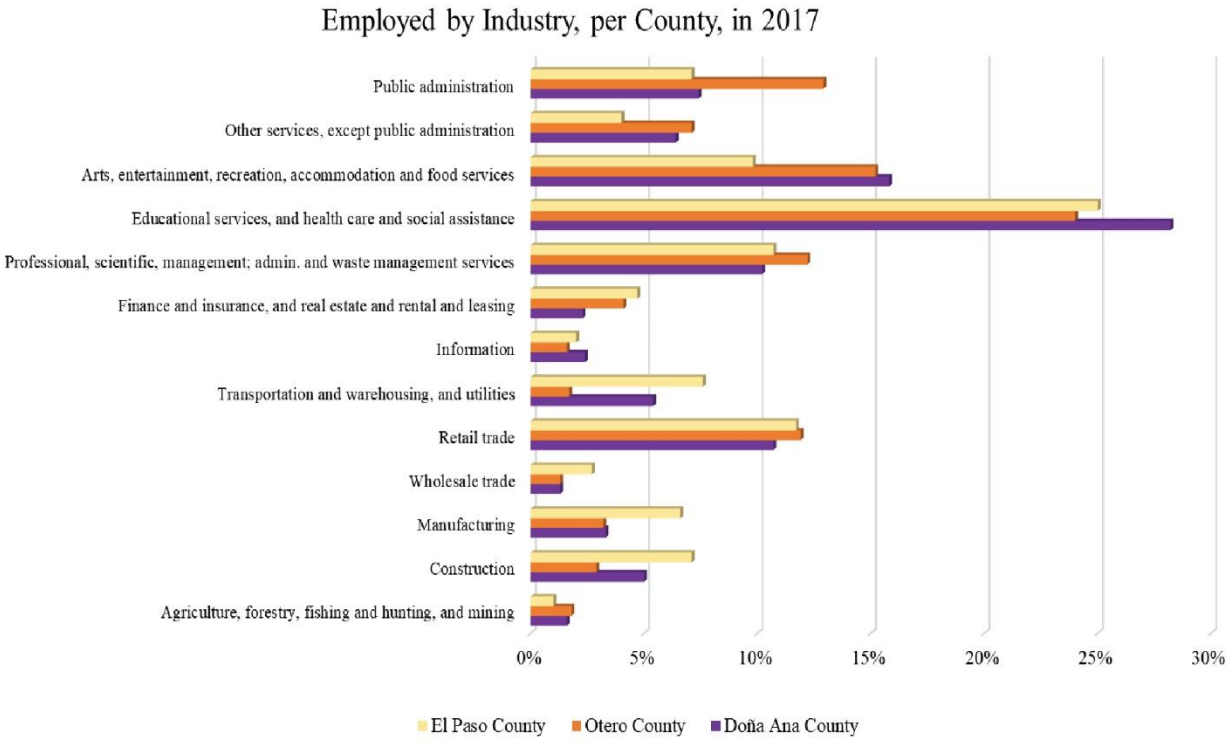
Table 3-1617. Unemployment and Poverty Status Statistics for the ROI in 2017

Race and Hispanic or Latino Origin	Doña Ana County, New Mexico	Otero County, New Mexico	El Paso County, Texas
White alone	8.20%	7.80%	6.20%
Black or African American alone	N	N	9.20%
American Indian and Alaska Native alone	N	N	N
Asian alone	N	N	N
Native Hawaiian and Other Pacific Islander alone	N	N	N
Some other race alone	13.60%	N	6.40%
Two or more races	N	N	3.20%
Hispanic or Latino origin (of any race)	9.90%	12.10%	6.10%
White alone, not Hispanic or Latino	5.00%	6.00%	6.70%
Poverty Status in Past 12 Months			
Below poverty level	19.70%	25.90%	15.90%
At or above the poverty level	5.50%	7.30%	4.50%

N = number of sample cases is too small. ROI = regions of influence

Source: U.S. Census Bureau, 2017 American Community Survey 1-Year Estimates. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_1YR_S2301&prodType=table. Accessed on 11 March 2020.

Figure 3.2-8. Comparison of Employment by Industry for Doña Ana, Otero, and El Paso Counties



The industry category with the highest numbers employed in 2017 was education, health care, and social assistance services.

3.2.8.2 Environmental Consequences

Impacts to socioeconomics at Fort Bliss are expected to be negligible and are fully addressed in Section 3.1.7.2. The increase of 550 soldiers and 786 family members on average represents a 0.1 percent-increase in population within the ROI. The contribution of the M-SHORAD battalion wages of $31.4 million represents only 0.14 percent of the total estimated ROI income of $22.5 billion.

3.2.8.3 Cumulative Effects

Fielding of the 10 new systems is expected to add less than 150 additional soldiers to Fort Bliss. The cumulative effects of adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Bliss are expected to be less than significant because it represents a population increase of less than 0.1 percent within the ROI.

3.2.9 Traffic and Transportation

3.2.9.1 Affected Environment

The ROI for the ground transportation systems within the cantonment is El Paso County, Texas. The ROI for the ground transportation systems within the FBTC consists of the South Training Areas, Doña Ana Range – North Training Areas, and McGregor Range.

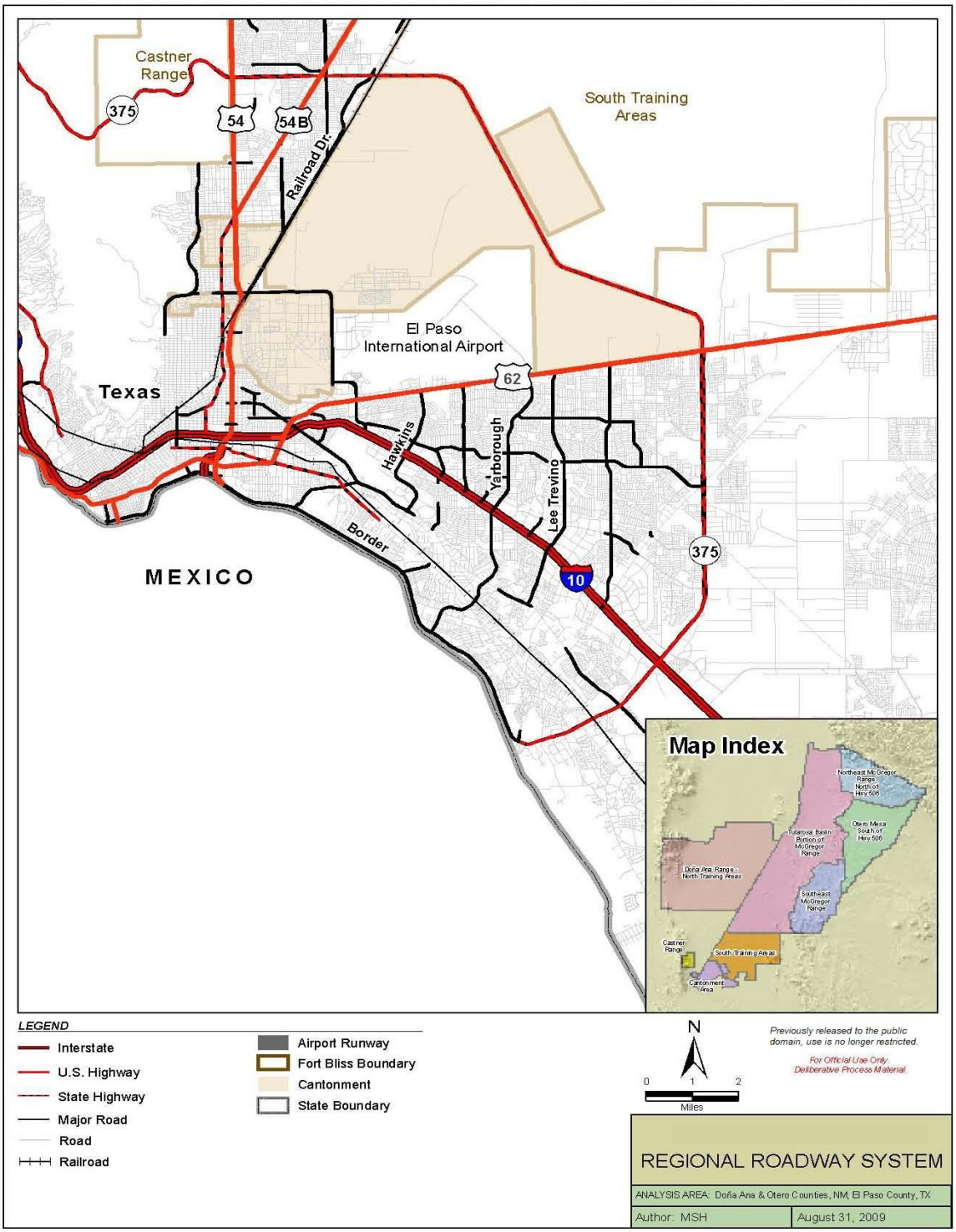
Several highways provide regional access to El Paso and Fort Bliss (Figure 3.2-9). The major east-west access is provided by Interstate 10 (I-10), which runs through downtown El Paso and passes just south of the cantonment. I-10 is the most heavily traveled roadway in El Paso and connects the region to western and central Texas to the east, and southern New Mexico and Arizona to the west. I-25 is the major northern access route to the El Paso region and is available by following I-10 approximately 44 miles northwest to Las Cruces, New Mexico. U.S. Highway 54 (US-54, locally referred to as the Patriot Freeway), a major non-interstate freeway, also provides northern access to Alamogordo, New Mexico. Another key interregional roadway is Montana Avenue (US-62/180), which is located immediately south of Fort Bliss and provides access to locations east of El Paso.

Loop 375, also an important regional traffic corridor, connects the northeast and eastern portions of the city and helps to reduce traffic congestion along US-54. Loop 375 crosses the Fort Bliss installation between Montana Avenue and US-54. Overpasses have been constructed to allow military vehicles and equipment to pass under the roadway, preventing through-traffic interference with military operations. West of US-54, Loop 375 becomes Woodrow Bean Trans Mountain Drive, which connects to I-10 northwest of El Paso and has the advantage of few cross streets allowing traffic to be carried at high speeds. To meet the corresponding demand of significant projected background traffic growth throughout El Paso, Spur 601 provides a 7.4-mile mobility connection between US-54 on the west and Loop 375 on the east. The alignment follows the existing Fred Wilson Avenue from US-54 to the Airport Road/Sergeant Major Boulevard intersection, progresses eastward through an undeveloped area north of and along Founders/Walter Jones Boulevards, traverses the property lines between El Paso International Airport (EPIA), Biggs AAF, and Fort Bliss Military Reservation and terminates at Loop 375.

The Fort Bliss cantonment is surrounded by major arterial city streets (Figure 3.2-9). The north boundary is Fred Wilson Avenue, and the east boundary is Airport Road. Patriot Freeway, US-54, forms the west boundary and Montana Avenue serves as the south boundary. Other major roadways in the area of the installation are Railroad Drive and Dyer Street. Current traffic conditions and roadway capacities are further discussed in the 2007 SEIS (U.S. Army 2007).

Twelve access control points provide access to the cantonment. Eight of the gates provide access to the main post: Cassidy Gate, Chaffee Gate, Jeb Stuart Gate, Marshall Gate, Pershing Gate, Remagen Gate, Robert E. Lee Gate, and Sheridan Gate. There are two gates on Biggs AAF—Biggs Gate and Global Reach Gate—and two gates on William Beaumont Army Medical Center—Fred Wilson Gate and Alabama Gate. Depending on the post's construction activities or operational needs, some of these gates are closed from time to time. All vehicles that enter Fort Bliss are required to have an individual and government identification card, display an installation decal, or be issued a vehicle pass. For those persons without a government identification card or decals, vehicle passes are issued at the Cassidy Gate, Robert E. Lee Gate, Chaffee Gate, Biggs Gate, and Fred Wilson Gate.

Figure 3.2-9. Regional Roadway System for Fort Bliss



The FBTC is comprised of three main segments: the South Training Areas (TAs 1 and 2), Doña Ana Range – North Training Areas (TAs 3–7), and McGregor Range (TAs 8–33). The South Training Areas are northeast of Fort Bliss's cantonment and are bordered on the north by the

New Mexico state line. TA 1B is adjacent to the cantonment, EPIA, and Biggs AAF. US-54 runs along the northwest boundary, and the southernmost boundary is US-62/180 (Montana Avenue). TA 2A through TA 2E adjoin TAs 1A and B on the east and do not border any major roadways, but TA 2E comes close to Montana Avenue just east of Loop 375.

Doña Ana Range is located west of US-54 and is provided access from Fort Bliss by Martin Luther King Highway (Ranch Road 3255) in Texas and War Highway 11 (NM 213) in New Mexico, which runs along the Franklin and Organ Mountains on the eastern boundary of the range. War Highway 11 (NM 213) is closed occasionally for safety reasons during certain military operations. US-54 connects El Paso, Texas, with Alamogordo, New Mexico, and is on the western border of the McGregor Range. New Mexico Highway 506, an east-west arterial, is the major road on McGregor Range and crosses the northern portion of the range. This road provides access to McGregor Range on the west at US-54 and travels east, where it intersects County Road FO52, and then continues northeast until it exits the range. New Mexico Highway 506 is a gravel road maintained by Otero County and provides access to several communities in the area. BLM maintains the road network on grazing units 1 through 15. The Army maintains the remainder of the road network on the McGregor Range. These intra-range roads primarily consist of dirt roads that provide access to different parts of the range and are discussed in other sections.

Military convoy traffic between the Fort Bliss cantonment and the FBTC on US-54 is limited to wheeled vehicles. Tracked vehicles are generally transported to and from the FBTC by heavy equipment tactical trucks (HETT) or transit through the TA on tank trails.

The evaluation of roadway conditions is based on traffic flow. The capacity of a roadway depends on the number of lanes, lateral obstructions, percentage of large trucks in the traffic stream, intersection control, and other physical factors.

3.2.9.2 Environmental Consequences

The addition of an M-SHORAD battalion at Fort Bliss would add 550 new soldiers representing an increase of approximately 1.2 percent. Including the anticipated number of spouses and children, the ROI population would increase by approximately 0.1 percent. Therefore, the impacts to traffic and transportation within the ROI and the installation are expected to be negligible.

3.2.9.3 Cumulative Effects

Fielding of the 10 new systems is expected to add less than 150 additional soldiers to Fort Bliss. The cumulative effects of adding approximately 700 soldiers and 370 spouses at Fort Bliss are expected to have less than significant effects to traffic and transportation. It is assumed that most children would be below driving age and therefore not included in the effects on traffic and transportation.

3.2.10 Facilities

3.2.10.1 Affected Environment

The family housing on Fort Bliss is under the management of the Residential Communities Initiative (RCI) partner Fort Bliss Family Homes (FBFH). FBFH is comprised of 17 distinct neighborhoods and serves the on-base housing community of active-duty Army families assigned to Fort Bliss and also welcomes qualified military retirees, DoD civilians, and general public applicants in select neighborhoods.[50]

The cantonment, also addressed briefly in the Land Use and Compatibility section, contains the heaviest concentration of facilities and mission support activities on Fort Bliss. Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical and community facilities, and Biggs AAF.

The cantonment has undergone major development and redevelopment to accommodate infrastructure and facility needs associated with changes in the Army structure and units, as per the 2007 ROD for the SEIS. The cantonment projects were identified from FY 2009 through FY 2015 on this programmed future development plan, dated December 11, 2008. Many of these projects renovated and upgraded existing facilities on the Main Post for reuse. Approximately 16 km^2 (4,000 acres) were developed within the cantonment and an additional 6 km^2 (1,500 acres) on the east side of Biggs AAF and along the existing ramp areas were developed. This acreage included approximately 5 km^2 (1,300 acres) of additional impervious surface area and 2 km^2 (21.9 million $feet^2$) of new building construction. The new development in the cantonment occurred to the north and east, up to and extending east of Loop 375.

Army facilities are built to meet the standards of the uniform facilities criteria using standard designs of MILCON requirements, standardization, and integration or similar documents. Exceptions to the standard are available and if granted for a facility, it would be considered adequate.

3.2.10.2 Environmental Consequences

The excess or deficit of facilities available to support the M-SHORAD battalion at Fort Bliss was assessed based on the Army Real Property Planning and Analysis System (RPLANS) records. The results are shown in Table 3-18 with deficits shown in parentheses.

Table 3-~~17~~18. M-SHORAD Expected Facility Requirements FY 2021 Data

Facility name	Number required	Total sq ft	Total acres	Ft Bliss
Battalion HQ Building	1	48,520	1.1	24,940
Company HQ Building	1	33,646	0.8	210,948

[50] https://www.fortblissfamilyhomes.com/. Accessed 1 June 2020.

Facility name	Number required	Total sq ft	Total acres	Ft Bliss
Company HQ Building	4	103,104	2.4	210,948
Vehicle Maintenance Shop	1	100,800	2.3	(47,130)
Oil Storage Building	1	480	0.0	8,166
Organizational Vehicle Parking	1	450,000	10.3	932,506
Dining Facility	1	41,116	0.9	62,631
Barracks Permanent Party	1	76,140	1.7	496,477

Impacts from Construction, Live-Fire Training, and Maneuver Training

Construction would be as described in Section 3.3.4.2. Fort Bliss would not construct a new range or maneuver facilities to support the M-SHORAD battalion.

Impacts from Increase in the Number of Soldiers

Impacts caused by the increase in soldiers are addressed in Section 3.1.9.2 and are expected to be less than significant.

3.2.10.3 Cumulative Effects

Fielding of the 10 new systems is expected to have less than significant effects because these new systems would be fielded to existing units with no additional facility requirements anticipated.

3.2.11 Water Resources

3.2.11.1 Affected Environment

3.2.11.1.1 Surface Water[51]

Surface water is rare and mostly ephemeral on Fort Bliss. There are a few perennial springs located within the Organ Mountains. These springs include Fillmore Spring, Globe Spring, Rock House Spring, Pine Spring, Dripping Spring, and Beasley Spring. Indian Spring is located on Castner Range in the Franklin Mountains. The only other semi-permanent surface water near Fort Bliss is the Rio Grande River, which is west and south of Fort Bliss. Surface water flows in the Rio Grande River vary greatly due to the upstream control of river water for irrigation and farming purposes. FBTC lands drain into closed basin systems (U.S. Army 2000). Precipitation events in the surrounding mountains can lead to runoff water that collects in these basins. The result is trapped surface water in small, shallow lakes called playas.

The Doña Ana Range – North Training Areas and McGregor Range are located within two closed basin systems, the Tularosa Basin and the Salt Basin. The Salt Basin includes the eastern part of Otero Mesa and the southern slopes of the Sacramento Mountains foothills. The Tularosa

[51] Based on pg 2–36 of Fort Bliss 2016 INRMP.

Basin lies between the Sacramento Mountains to the east and the Organ and San Andres Mountains to the west. Both basins are characterized by small ephemeral streams that discharge toward the central areas of the basin.

3.2.11.1.2 Groundwater[52]

Most of the water used by Fort Bliss comes from underground aquifers drawn to the surface by wells. The El Paso area obtained an average of 24 percent of its potable water supply from the Rio Grande between 1967 and 2002 and the remaining 76 percent of its potable water supply from wells located in the intermontane-basin aquifers in the Hueco and Mesilla Bolsons (U.S. Army 2000).

Fort Bliss is located primarily in the Tularosa-Hueco Basin of the Basin and Range Physiographic Province with small portions in the Mesilla Basin and the Salt Basin. The principal aquifers in the Tularosa-Hueco Basin are the Hueco Bolson, which provides groundwater to the city of El Paso, the Fort Bliss Main Cantonment Area, and Ciudad Juárez, Mexico; and the Tularosa Basin, which underlies parts of Doña Ana, Otero, Lincoln, and Sierra Counties and portions of the Doña Ana Range – North Training Areas and McGregor Range.

The population and water use of El Paso and surrounding areas continue to expand and limited water supplies in the Hueco Bolson are drawing down. Water use will become more expensive and may result in indefinite deliveries to customers. Contingency plans are in place for future water shortages. At present, water conservation policies are beneficial and necessary. Fort Bliss currently has a residential water conservation policy in effect that limits outdoor watering[53].

The Kay Bailey Hutchinson Desalination Plant has recently come online and is supporting the potable water requirements of Fort Bliss and El Paso by treating brackish groundwater that is too salty for consumption at a rate of up to 27.5 million gallons per day.

3.2.11.1.3 Water Quality[54]

Drinking water on Fort Bliss is obtained from groundwater sources. The Hueco Mesilla Bolson Aquifer is located east and west of the Franklin Mountains in far west Texas and is recognized as a major aquifer in Texas. Fort Bliss Water Services Company (FBWSC) currently owns and operates three community-based Public Water Systems (PWSs) within Fort Bliss.

Water distribution systems for Fort Bliss Main Post Area and Biggs Army Airfield are self-sustaining systems, operating independently of one another. The primary water supply for these

[52] Based on pg 2–39 of Fort Bliss 2016 INRMP.
[53] Source: Fort Bliss Master Plan 2000.
[54] Fort Bliss Water Services Company, Inc. 2019. Water Quality Report - Fort Bliss PWS ID#: TX0710020, TX0710078, TX0710187. Fort Bliss Water Services Company, Inc. American States Utility Services, Inc.

systems derives from wells located within the Fort Bliss Army Base property. Zero percent of this water is purchased from El Paso Water (EPW). East Biggs Water System is supplied by water that is purchased from EPW. In the event that the FBWSC water systems are incapable of providing sufficient supply, EPW water can be accessed via emergency interconnections to the FBWSC water distribution system.

3.2.11.1.4 Wetlands and Floodplains

All of the wetland habitats on Fort Bliss are regarded as important habitats for wildlife and protected accordingly.

Very few of the arroyo-riparian drainages and none of the playa lakes on Fort Bliss are regulated as jurisdictional wetlands as defined by the Army Corps of Engineers (USACE). The only known waters of the United States (WOUS) are on the west side of the Organ Mountains (part of the Rio Grande drainage), and some arroyos on McGregor Range that originate in New Mexico and cross into Texas and the Rio Grande drainage. One stormwater retention pond in the cantonment has been identified as a jurisdictional wetland by USACE (Fort Bliss 2016). Whether federally regulated or not, Fort Bliss recognizes all arroyo-riparian drainages and playa lakes as important habitats for wildlife.

Fort Bliss studies have identified 291 km^2 of arroyo-riparian drainage areas on the facility (U.S. Army 2000, 2007). They were designated as LUAs in the ROD for the 2007 SEIS. These drainages are characterized by shrub, tree, and forb cover that is more diverse and dense than in the surrounding area. The highest species density and variety of shrubs, trees, grasses, and forbs is in the main channel rather than in adjacent areas. Montane riparian plant communities have a distinct mix of species, while the ephemeral drainages or dry arroyos that cross each of the other communities are less distinct. Canyons support diverse woodland and grassland riparian plant communities (U.S. Army 1996). These areas were mapped (USGS 1997) and tend to be inhabited more extensively by wildlife, particularly avian species (Kozma and Mathews 1997), than adjacent upland areas (Kozma and Mathews 1997).

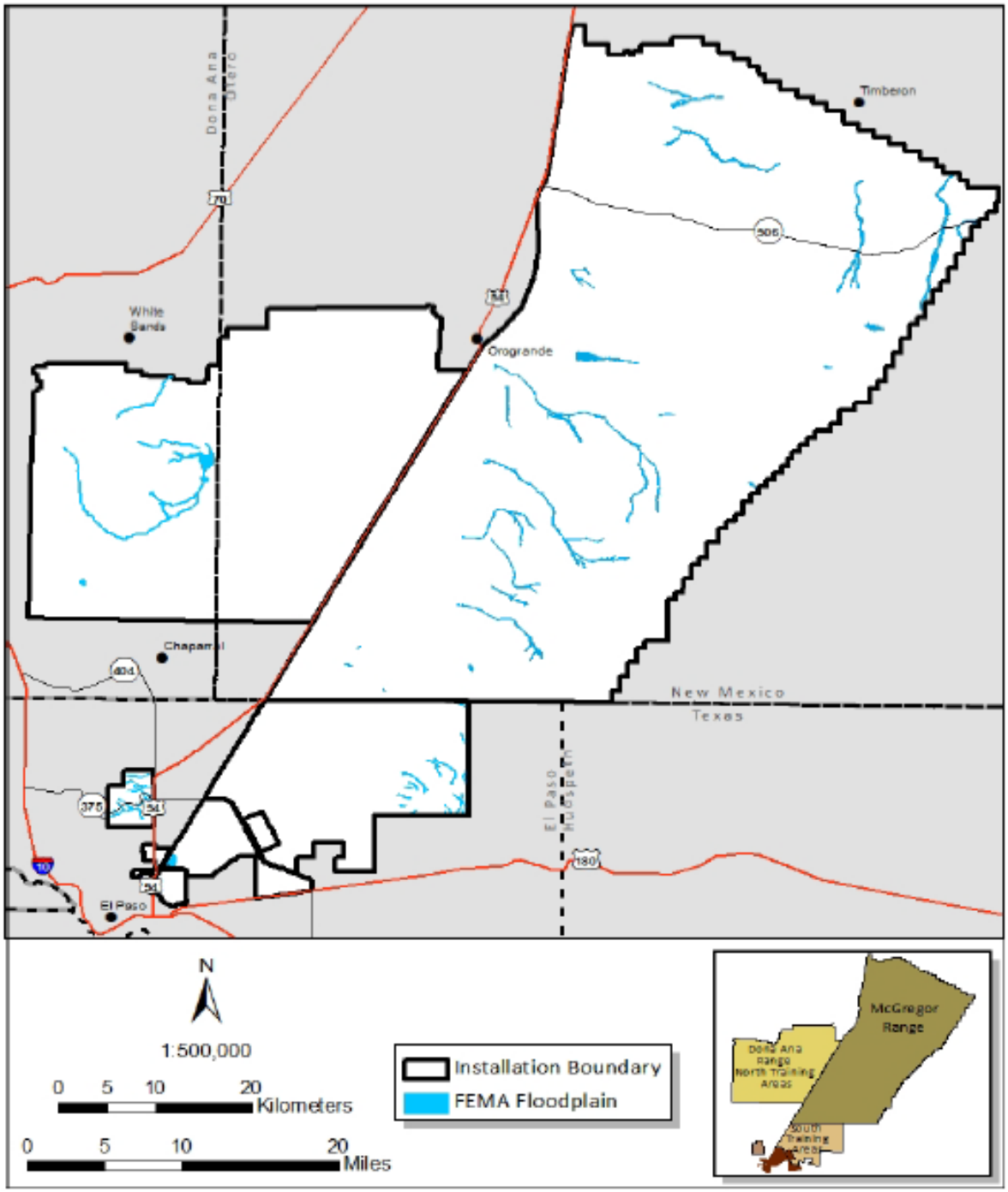
Playa Lakes

A locally important natural resource, playa lakes are natural depressions that are ephemeral (seasonally flooded) and are typically wet in the summer and fall. These wetlands are usually ringed with vegetation and may be completely vegetated in the bottoms, or not vegetated at all. As with other wetland types, playa wetlands provide unique flora and fauna assemblages, important to the overall diversity and uniqueness of wildlife on the installation. The majority of the wetlands within Fort Bliss are playas, and occur mostly in the Basin Aeolian and Basin Alluvial areas of the Tularosa Basin of McGregor Range. A few widely distributed playas exist in the Foothill-Bajada and Otero Mesa EMUs. Playas are designated as LUAs, where concentrations of vehicles or personnel, fixed sites, and digging are not permitted.

There are a few springs in the Organ Mountains EMU and at least one in the Foothill-Bajada EMU on McGregor Range. The springs are in locations where off-road maneuvers do not occur.

The vast majority of these wetland habitats are in the watershed of the Tularosa Basin of McGregor Range, a closed basin with no connection to jurisdictional waters of the United States.

Figure 3.2-10. 100-Year Floodplains on Fort Bliss



Floodplains, by EO 11988 *Floodplain Management*, are "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the area subject to a 1 percent or greater chance of flooding in any given year."

Figure 3.2-10 depicts the 100-year floodplains on Fort Bliss as defined by the FEMA. The majority of floodplain areas on Fort Bliss are in the FBTC. Only the far southwest corner of the cantonment area has a floodplain of approximately 310 acres that is not developed.

3.2.11.2 Environmental Consequences

Surface Water

Impacts from Construction

There are no impacts to surface waters from construction as no surface water bodies are near the planned construction site.

Impacts from Live-Fire and Maneuver Training, and Impacts from Increase in the Number of Soldiers

Impacts to surface waters from live-fire training, maneuver training, and the increase in the number of soldiers are fully addressed in Section 3.1.10.2.1.

Groundwater

Impacts from Construction, Live-Fire Training, and Maneuver Training

Impacts to groundwater from construction, live-fire training, and maneuver training are fully addressed in Section 3.1.10.2.2.

Impacts from Increase in the Number of Soldiers

Most impacts to groundwater from the increase in soldiers are addressed in Section 3.1.10.2.2. In addition, adding 550 soldiers and their 786 family members to Fort Bliss is approximately 1.2 percent of the soldier population and a 0.1 percent population increase within the ROI. The majority of potable water for the El Paso region comes from groundwater. While these supplies are limited these small increases in population and the comprehensive Fort Bliss water conservation program would reduce adverse effects to the groundwater supply. Therefore, effects to groundwater are expected to be less than significant.

Water Quality

Section 3.1.10.2.3 addresses the impacts to water quality as a result of the Proposed Action.

Wetlands and Floodplains

Impacts from Construction

There are no impacts to wetlands or floodplains from construction as the planned construction site is not near these resources.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Section 3.1.10.2.4 fully addresses the impacts to wetlands and floodplains from impacts from live-fire training, maneuver training, and the increase in the number of soldiers.

3.2.11.3 Cumulative Effects

Fielding of the 10 new systems is expected to have less than significant effects to all water resources because these new systems would be fielded to existing units with no additional facility, live-fire range, or maneuver area requirements are anticipated. Only a nominal additional increase in the population of 150 soldiers and their 214 family members would occur. There would also be a slight increase in the intensity of training area use.

3.3 FORT HOOD, TEXAS[55]

3.3.1 Background

Fort Hood is an Army installation located in Bell and Coryell Counties, Texas, 60 miles (96.6 km) northwest of Austin and 50 miles (80.5 km) southwest of Waco (Figure 3.3-1). It covers more than 218,823 acres (88,555 ha), including 132,525 acres (53,631 ha) used for maneuver, 64,272 acres (26,010 ha) as a Live-fire Impact area, and 22,026 acres (8914 ha) for the installation's cantonment areas. There are three cantonment areas: the main cantonment, West Fort Hood (WFH), and North Fort Hood (NFH).

Units located at Fort Hood include:

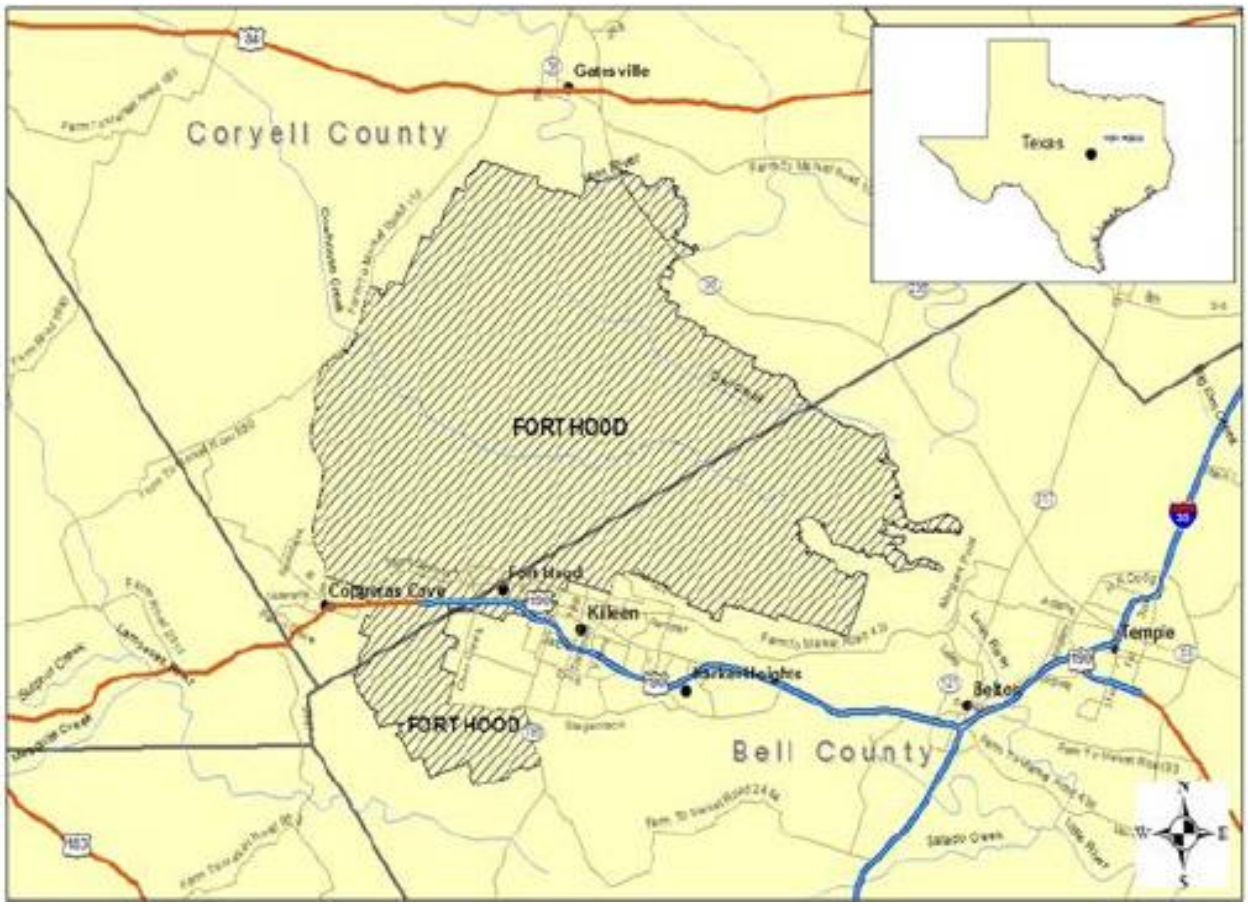
- The III Corps,
- 1st Cavalry Division,
- Division West – First Army,
- 13th Sustainment Command (Expeditionary),
- 3rd Air Support Operations Group (Air Force),
- 3rd Cavalry Regiment,
- 36th Engineer BDE,
- 48th Chemical BDE,
- 69th Air Defense Artillery,
- 89th Military Police BDE,
- 407th Army Field Support BDE,
- 504th Battlefield Surveillance BDE,
- U.S. Army Operational Test Command,
- Carl R. Darnall Medical Center,
- Warrior Transition BDE,
- 47th Explosive Ordnance Detachment (EOD),

[55] Affected environment descriptions for Fort Hood were taken from the Environmental Assessment for The Stationing Actions to Support the Grow the Army Initiative Fort Hood, Texas, dated 2009, prepared by the U.S. Army Environmental Command.

- Criminal Investigation Command (CID), and the
- Network Enterprise Center.

Fort Hood exists to train its assigned units, as a mobilization station for Army Reserve and National Guard units, and as a strategic power projection platform.

Figure 3.3-1. Location of Fort Hood



3.3.2 Air Quality

3.3.2.1 Affected Environment

Fort Hood is located in Bell and Coryell Counties, which are within the Austin-Waco Intrastate Air Quality Control Region (AQCR) (40 CFR 81.134). Ambient air quality for the Austin-Waco Intrastate AQCR is classified as an unclassifiable/attainment area for all criteria pollutants as of April 2020.[56] Fort Hood is considered a major source for criteria pollutants because of its calculated potential to emit certain criteria pollutants including CO, NO_2, SO_2, VOC, and PM_{10}.

[56] https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=5fcc13818bd8a7472f5b7d923afdf753&mc=true&n=pt40.18.81&r=PART&ty=HTML#se40.20.81_1134 Accessed on 24 April 2020.

It is under the jurisdiction of the EPA Region VI and the Texas Commission on Environmental Quality (TCEQ).

Based on the most recent EPA information available, Bell County is in attainment status with national standards (Table 3-19). No information is available for Coryell County, Texas on the EPA website. Texas is below the national average for $PM_{2.5}$ and SO_2.

Table 3-~~18~~19. Bell County, Texas Attainment Status, by Pollutant, as of 2019

Pollutant	Primary NAAQS	Averaging Period	Designation
Ozone (O_3)*	0.08 ppm 0.067 ppm	1-hour 8-hour	Attainment Attainment
Lead (Pb)	--	Rolling 3-month average	Information Not Available
Carbon Monoxide (CO)	-- --	1-hour 8-hour	Information Not Available
Nitrogen Dioxide (NO_2)	-- 3 ppm	1-hour Annual	Information Not Available Attainment
Particulate Matter (PM_{10})	--	24-hour	Information Not Available

Source: EPA. 2020. Air Quality Statistics Report

3.3.2.2 Environmental Consequences

Air quality at Fort Hood is in attainment for all criteria pollutants. As noted in Section 3.1.1.2, dust will contribute to the emissions of PM_{10} and $PM_{2.5}$ at Fort Hood. The total increase is anticipated to be 715.1 tons per year with approximately 622 tons as PM_{10} and 93 tons as $PM_{2.5}$. The PM_{10} should settle out of the air rapidly and not impact air quality away from the activities generating the dust. With the addition of the dust emissions, the impacts are as described in Section 3.1.1.2. Air quality impacts from the Proposed Action are expected to be less than significant due to stationing 235 additional tactical vehicles at Fort Hood, approximately 2.6 percent of the total number of tactical vehicles.

3.3.2.3 Cumulative Effects

It is anticipated that adding 10 of the 13 systems in addition to the Proposed Action at Fort Hood would only cause minimal increases in the emission of pollutants. Many of these systems are replacing existing systems on a one-for-one basis. There would only be a minimal increase of additional vehicles operated during training, and most of the new systems would operate from fixed or semi-fixed positions.

3.3.3 Airspace

3.3.3.1 Affected Environment

The ROI for airspace is the SUA areas above and nearby the installation that is controlled by Fort Hood. The airspace is defined on aeronautical charts and may be exclusive, limiting non-participating (e.g., commercial and general aviation) users or it may simply be advisory. This would be indicating to non-participating users of the airspace that military operations are occurring in certain areas, requiring an extra measure of vigilance.

The SUA is a complex set of Restricted Areas for exclusive use and Military Operations Areas (MOA) that are advisory. The SUA is designed to ensure the segregation of incompatible, non-participating aircraft from potentially hazardous operations occurring either in flight (e.g. munitions releases, unmanned aerial systems [UAS] operations) or on the ground (e.g., artillery ranges, testing activities). A MOA does not provide the exclusive use required to support M-SHORAD range activities and will not be addressed in this document. Fort Hood restricted air space reaches a maximum altitude of 45,000 feet and an approximate area of 705 km^2 (Figure 3.3-2).

The major airspace units are subdivided vertically and horizontally, enabling airspace managers and schedulers to activate particular blocks of airspace that are sized appropriately to the activities occurring within them. A wide variety of activities occur within the SUA; however, for the SUA managed by Fort Hood, the principal uses and purposes of the SUA supporting the M-SHORAD are:

- To protect non-participating aircraft from range activities occurring on the ground.
- To promote realistic training, allowing scenarios to unfold without training distracters such as suspensions required when civilian aircraft penetrate the restricted areas.

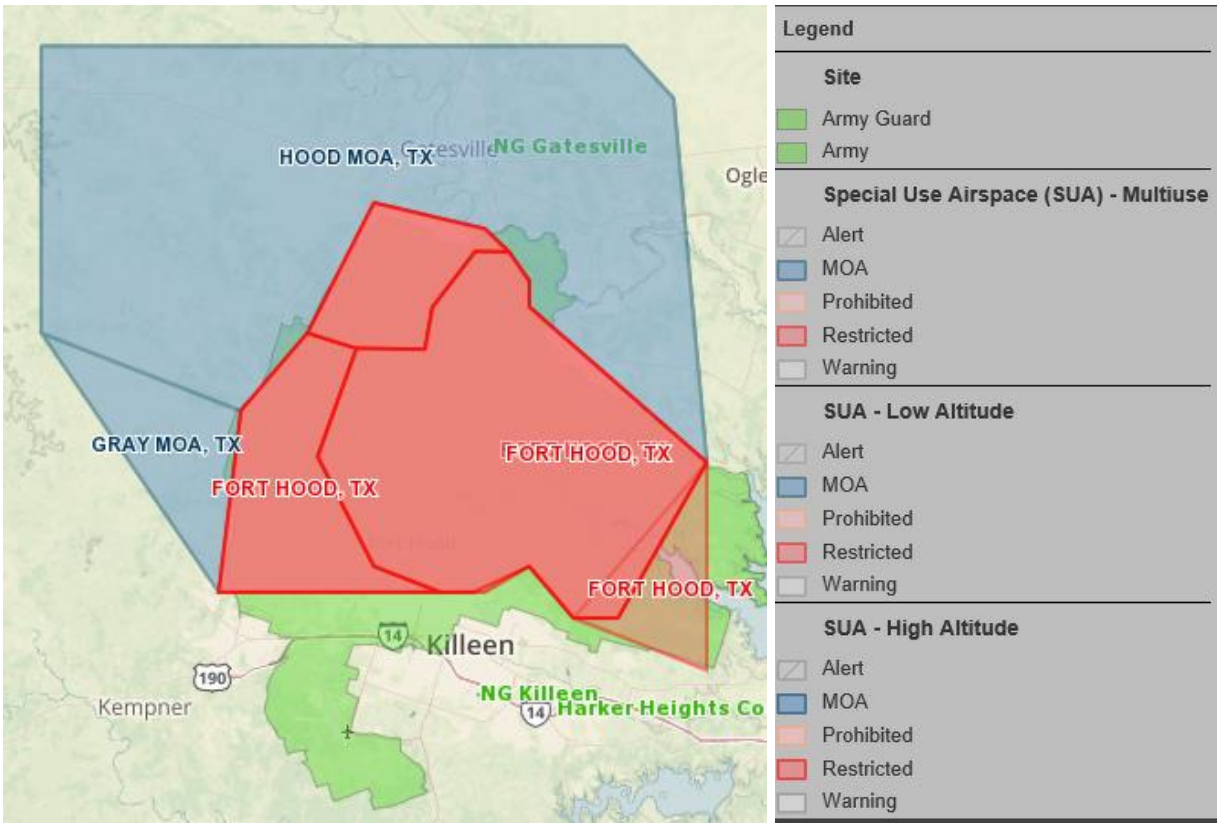
3.3.3.2 Environmental Consequences

Fielding the M-SHORAD battalion at Fort Hood may cause a minor, less than significant increase in Airspace use that can be accommodated within the current Airspace available at Fort Hood.

3.3.3.3 Cumulative Effects

There could be a small increase in Airspace use due to adding 10 new systems at Fort Hood. Any required increases in use can be accommodated within the current Airspace available to Fort Hood. Therefore, cumulative effects to Airspace are expected to be less than significant.

Figure 3.3-2. Location of Fort Hood Restricted Airspace[57]



3.3.4 Biological Resources

3.3.4.1 Affected Environment

The ROI for biological resources is the entirety of Fort Hood.

3.3.4.1.1 Flora

The two dominant types of vegetation at Fort Hood are grasslands and forest and shrub communities (Figure 3.3-3). Historically, grasslands occurred in valleys and lowlands, and in isolated patches on hills where disturbance occurred. When taken as a whole: wooded mesas, hills, and canyons occupy a large land area of Fort Hood. Wildfires, which are a natural component of grasslands, were suppressed to prevent impacts on structures and to minimize the risk to human life. With the suppression of fires and the loss of competitive grasses due to military training and livestock grazing, Ashe juniper and other woody vegetation of the rocky slopes encroached into the grasslands, forming dense thickets in many areas and reducing forage production (Fort Hood 2006).

Grassland communities are found throughout the installation but are most common in the live-fire zone/impact area and the Western Maneuver Area. Wildfires caused by various training activities in these areas likely reduce the woody vegetation and allow grasses to dominate.

[57] Source: DISDI Atlas 2020. https://rsgisias.crrel.usace.army.mil/disdi_atlas/. Accessed on April 2, 2020.

Grassland areas are composed primarily of perennial herbaceous species characteristic of mid-grass habitats. Common grass species include little bluestem (*Schizachyrium scoparium*), hairy grama (*Bouteloua hirsuta*), and sideoats grama (*Bouteloua curtipendula*). Common forbs are broomweeds (*Amphiachyris sp.*), ragweed (*Ambrosia artemisiifolia*), and snow-on-the-prairie (*Euphorbia bicolor*). Remnant patches of tallgrass prairie vegetation are dominated by yellow Indiangrass (*Sorghastrum nutans*) and big bluestem (*Andropogon gerardii*) (USACE 1999).

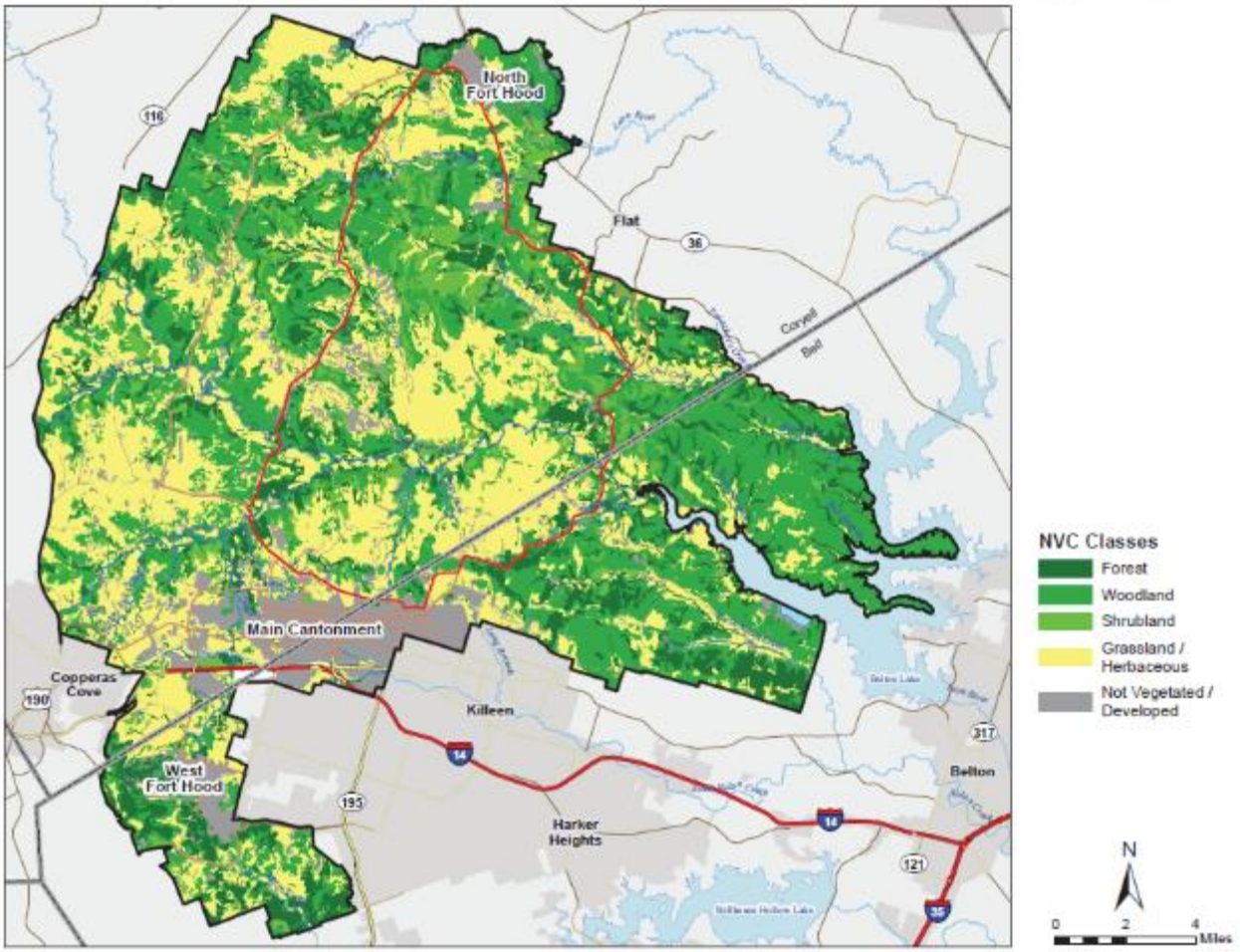
Forest and shrub communities are a major component of the installation. The majority of these habitats are found on the rocky slopes and hillsides or mesas; smaller amounts of woodlands occur in narrow bands along streams. Over time, forest and shrub vegetation has expanded into areas that were once grasslands because of a combination of factors, including fire suppression, training disturbance, and continuous grazing by livestock (USACE 2003).

Three distinct forest and shrub communities have been classified: coniferous forest and shrub, deciduous forest and shrub, and mixed forest and shrub. Small pockets of coniferous forest and shrub communities are found throughout the installation. They are primarily composed of Ashe juniper (*Juniperus ashei*, commonly referred to as "cedar"), a dominant coniferous species in the area (USACE 2003). Another relatively uncommon vegetation association throughout the installation is the deciduous forest and shrub community. This community is composed of broad-leaf trees and shrubs and is found near streams in lowlands and on protected slopes. Tree species representative of this community include plateau live oak (*Quercus fusiformis*), post oak (*Quercus stellata*), pecan (*Carya illinoinensis*), and sycamore (*Platanus occidentalis*) (Fort Hood 2006).

The most common vegetation community on the installation is the mixed forest and shrub community. In some areas, Ashe juniper dominates over either plateau live oak or Texas oak (*Quercus buckleyi*), and in others, the oaks dominate over the Ashe juniper (USACE 1999, 2000). Lack of fire and overuse by livestock are primary factors leading to increases in Ashe juniper and other woody plants in the Edwards Plateau (Smeins et al. 1997).

Ashe juniper is a native plant. However, it was historically confined to steep slopes and ridges where naturally occurring fires did not reach. Following European settlement, fires were slowed or stopped. This plant has since encroached onto prairies and oak savannahs and replaced several woody and grass species. Stands of Ashe junipers can block the line of sight for training aid devices simulator and simulations (TADSS), the Army's primary non-live-fire training systems. Despite the encroachment of the Ashe juniper, it is an essential component of the endangered golden-cheeked warbler habitat.

Figure 3.3-3. Fort Hood Land Cover



Source: Fort Hood 2019

3.3.4.1.2 Fauna

There are approximately 199,000 acres of mission land suitable for fish and wildlife management. There are 692 surface acres of lakes and ponds, 816 miles of rivers and permanent streams, and 43 miles of shoreline access to Belton Lake. Several projects are ongoing and planned to maintain or improve fish and wildlife habitat. Although not intended primarily for the benefit of wildlife, most of the planned elements being installed for other purposes will benefit fish and wildlife. Current fish habitat management includes lake renovation, shoreline improvement, aquatic weed management, and dam and spillway repair. Fort Hood's animal species include most animals indigenous to this part of Texas. The wildlife management program at Fort Hood is targeted toward restoring the ecological health of the mission lands (Fort Hood 2006).

Fort Hood coordinates with the USFWS on issues regarding fish and wildlife management, as well as for regulatory issues concerning the ESA or the MBTA.

3.3.4.1.3 Protected Species[58]

The Table 3-20 lists the federally listed threatened and endangered species that occur or may occur on Fort Hood.

Table 3-1920. Federally Protected and Candidate Species

Common Name	Scientific Name	Status
Whooping Crane	Grus americana	E
Golden-cheeked warbler	Dendroica chrysoparia	E
Salado Salamander	Eurycea chisholmensis	T
Smalleye Shiner	Notropis buccula	E
Sharpnose Shiner	Notropis oxyrhynchus	E
Texas fawnsfoot	Truncilla macrodon	C
Smooth pimpleback	Quadrula houstonensis	C

E= Endangered T=Threatened C=Candidate for listing as threatened or endangered

Whooping Crane

The whooping crane is a rare migrant. Three whooping cranes were sighted in 2017, and this species was previously documented on Fort Hood. They may fly over or near Fort Hood during spring and fall migration. They may stop at Belton Lake during migration and have been observed at other wetland areas on Fort Hood.

Golden-cheeked Warbler

Research and conservation efforts for this species on Fort Hood have been numerous. Research projects have included nest survival rates, forest cover and its impacts on density, and nest predation, to name a few. Current ongoing research includes a breeding range-wide geolocator study to determine migration corridors and overwintering site fidelity; impacts of geolocators on reproductive success, site fidelity, and survival; and source-sink population dynamics. Monitoring and research activities for the warbler on Fort Hood were initiated in 1991 and continue through the present. Figure 3.3-4 shows golden-cheeked warbler habitat.

Past monitoring (1991–2015) efforts include point count surveys to determine detection rate and trends, while current monitoring efforts employ distance sampling to determine population estimates and trends. Current and past research includes demographic monitoring in selected study sites, research in habitat selection, studies to determine the effects of habitat fragmentation and wildfire on warbler demographics, and population viability analyses.

[58] Source: Fort Hood 2019 INRMP and FWS ECOS database access on May 1, 2020.

The USFWS issued a biological opinion (BO) in August 2020. This BO adds additional flexibility through an adaptive management approach which gives the Army the ability to manage project parameters within the guidelines outlined in the Incidental Take Statement.

The area of the proposed and ongoing actions in the 2020 BO is limited to the boundaries of Fort Hood. Training activities conducted at Fort Hood include maneuver exercises for units up to brigade level, live-weapons firing, and aviation training. The Proposed Action consists of ongoing military training and other activities, land management, range improvements, and other associated activities to support the military mission, including endangered species management. Additionally, this opinion includes a section on adaptive management. Incorporating an adaptive management framework is intended to provide additional flexibility to the Army and improve upon management and minimization techniques to endangered species.

The majority of the Proposed Action in the 2020 BO is composed of training range improvements and ongoing military training activities. Other minor actions include endangered species management, recreation, cattle grazing, and monitoring and research. Historically, military training activities have resulted in incidental take of the golden-cheek warbler, which has been well documented. It is anticipated that incidental take would continue to occur on Fort Hood at slightly elevated levels due to the proposed permanent and temporary loss of habitat. Even at this elevated level, the years of monitoring and research conducted at Fort Hood indicate that the long-term population viability of the golden-cheek warbler within the action area would be sustained. Most importantly, Fort Hood has committed to continue to monitor and manage their endangered species populations for long-term conservation.

Salado Salamander

The natural habitat of the Salado salamander is freshwater springs. They were found only from a few springs that feed Salado Creek in Bell County, Texas.

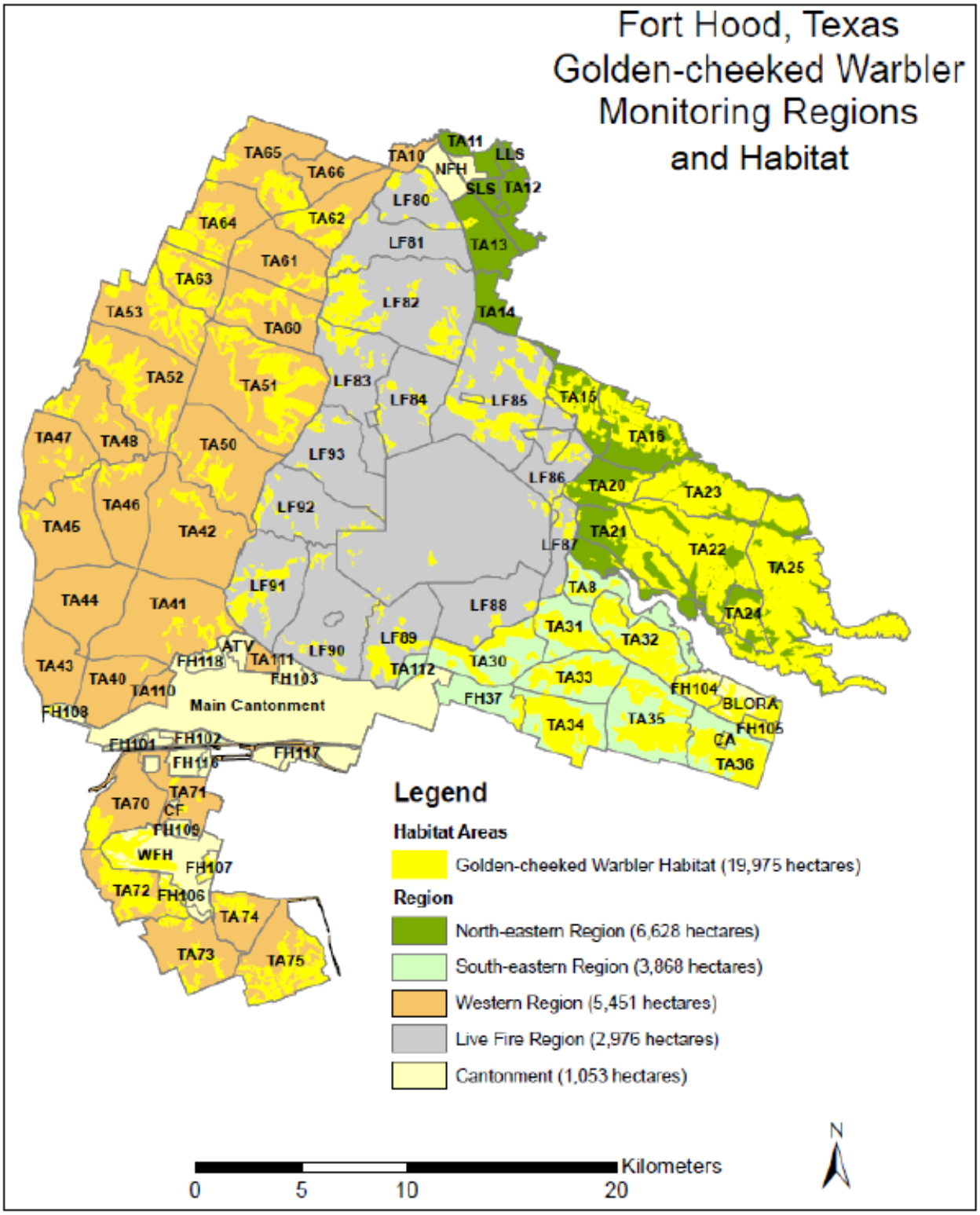
Smalleye Shiner

The smalleye shiner is a species of ray-finned fish. It is found only in the upper Brazos River basin of Texas.

Sharpnose Shiner

The sharpnose shiner has historically occurred on a tributary to the Leon River, which will not be affected by activities on Fort Hood.

Figure 3.3-4. Golden-Cheeked Warbler Habitat



*Source: August 31, 2020 Biological Opinion (02ETAR00-2020-F-0856)

Texas Fawnsfoot

The Texas fawnsfoot has a distribution straddling the Brazos River and the Colorado River in the San Saba, Lampasas, and Mills County regions.[59]

Smooth Pimpleback

The smooth pimpleback is found along the southern halves of the Colorado and Brazos Rivers in Texas. They may occur on Fort Hood in tributaries to the Leon River.

3.3.4.2 Environmental Consequences

Impacts from Construction

As a result of the Proposed Action, Fort Hood would not plan on constructing new facilities or ranges to support the M-SHORAD Battalion. Therefore, there are no impacts to biological resources from construction.

Impacts from Live-Fire Training and Maneuver Training

Live-fire and maneuver training takes place within the designated range complex at Fort Hood. The range complex consists of forests, woodlands, grasslands, and riparian habitat. Use of the live-fire ranges may result in increased deposition and leaching of munitions contaminants, erosion, soil compaction, and the potential for range fires within the range complex. These impacts are expected to be less than significant because Fort Hood conducts range assessments and land rehabilitation and maintenance actions to mitigate these effects. Maneuver training may result in vegetation loss, soil compaction, rutting, and generation of dust—altering habitats and increasing erosion. Fort Hood maintains its maneuver areas through regular assessments, maintenance, and rehabilitation.

Drainage from the range complex flows into tributaries of the Lampasas, Leon, and Brazos Rivers. These tributaries and rivers may hold populations or have suitable habitat for the Salado Springs salamander, sharpnose shiner, smooth pimpleback mussel, and the Texas fawnfoot mussel. The small eye shiner would not be impacted because it is known to occur in the upper Brazos River basin, which is northwest of Fort Hood. The sharpnose shiner has historically occurred on a tributary to the Leon River which will not be affected by activities on Fort Hood. The increased contaminant loading, erosion and sedimentation into the rivers, creeks, and tributaries may have minor adverse impacts to the species. However, the 2015 USFWS BO (BO #02ETAR00-2015-F-0339, June 30, 2015) has assessed the impacts to species resulting from live-fire and maneuver training at Fort Hood. The BO states that the protection and reporting measures for the Salado Springs salamander are sufficient and there would be no effect to the species. The mussels are

[59] USFWS. 2016. https://www.fws.gov/southwest/es/Documents/R2ES/AUES_Mussels_DRAFT_maps_20160915.pdf

candidate species and the BO recommended that Fort Hood establish a monitoring program to address the status and distribution of native mussel species on the installation.

The whooping crane migrates through the region in the spring and fall and has been known to use Belton Lake and other riparian areas on Fort Hood. The 2015 BO has assessed the impacts to species resulting from live-fire and maneuver training at Fort Hood. The BO states that the protection and reporting measures for the whooping crane are sufficient and there would be no effect to the species.

The golden-cheeked warbler and its habitat occur extensively on Fort Hood, but there is no designated critical habitat. Current research suggests that golden-cheeked warbler populations are relatively resilient to direct harassment effects from human activity. Under the 2015 BO, Fort Hood manages the species through habitat management. Incidental take from live-fire and maneuver training is fully addressed in the 2015 BO for the species. The Proposed Action would not change land usage or expand or construct new live-fire ranges and maneuver areas at Fort Hood. Therefore, the effects to the golden-cheeked warbler are expected to be less than significant.

Bald and golden eagles could occur on Fort Hood, but there have been no recent sightings. If either were to occur, the appropriate regulatory agencies would be consulted, off-limits buffers would be established, and an Eagle Restricted Aviation Zone would be implemented during the nesting season if the nest is occupied (Fort Hood 2019).

There is an exemption to the take of migratory birds that is incidental to military training (Department of the Interior Memorandum December 22, 2017, and Deputy Assistant Secretary of Defense Memorandum 2018). All M-SHORAD training would be classified as military training. Therefore, the effects to migratory birds are expected to be less than significant.

Impacts from Increase in the Number of Soldiers

Section 3.1.3 adequately addresses the impacts of the increasing soldier population.

3.3.4.3 Cumulative Effects

Fielding of the 10 new systems is not expected to result in new facility construction but may require expansion or renovation of existing facilities. An expected increase of approximately 1.1 percent more soldiers would be using the maneuver and live-fire ranges resulting in minor increases in the intensity and frequency of use of the training areas that are expected to be less than significant. Adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Hood is expected to have a less than significant cumulative impacts to biological resources because it represents a small population increase of less than 0.4 percent within the ROI.

3.3.5 Cultural Resources

3.3.5.1 Affected Environment

The ICRMP for Fort Hood, Texas, provides a description of the history of the III Corps and Fort Hood (Fort Hood 2015). The ICRMP includes the Historic Properties Component (HPC) for Fort Hood, Texas, (Fort Hood 2015). The HPC contains a detailed description of the prehistoric and historic background for the land encompassed by the installation as well. Both documents are incorporated by reference.

Cultural resources are prehistoric and historic sites, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on the condition and historic use, such resources may provide insight into living conditions in previous civilizations and may retain cultural and religious significance to modern groups. The land occupied by Fort Hood is associated with the history of American Indians, western settlement, and the military history of the United States. Numerous and varied cultural resources within the boundaries of Fort Hood have been documented through extensive and systematic investigations.

3.3.5.1.1 Cultural Resources Present

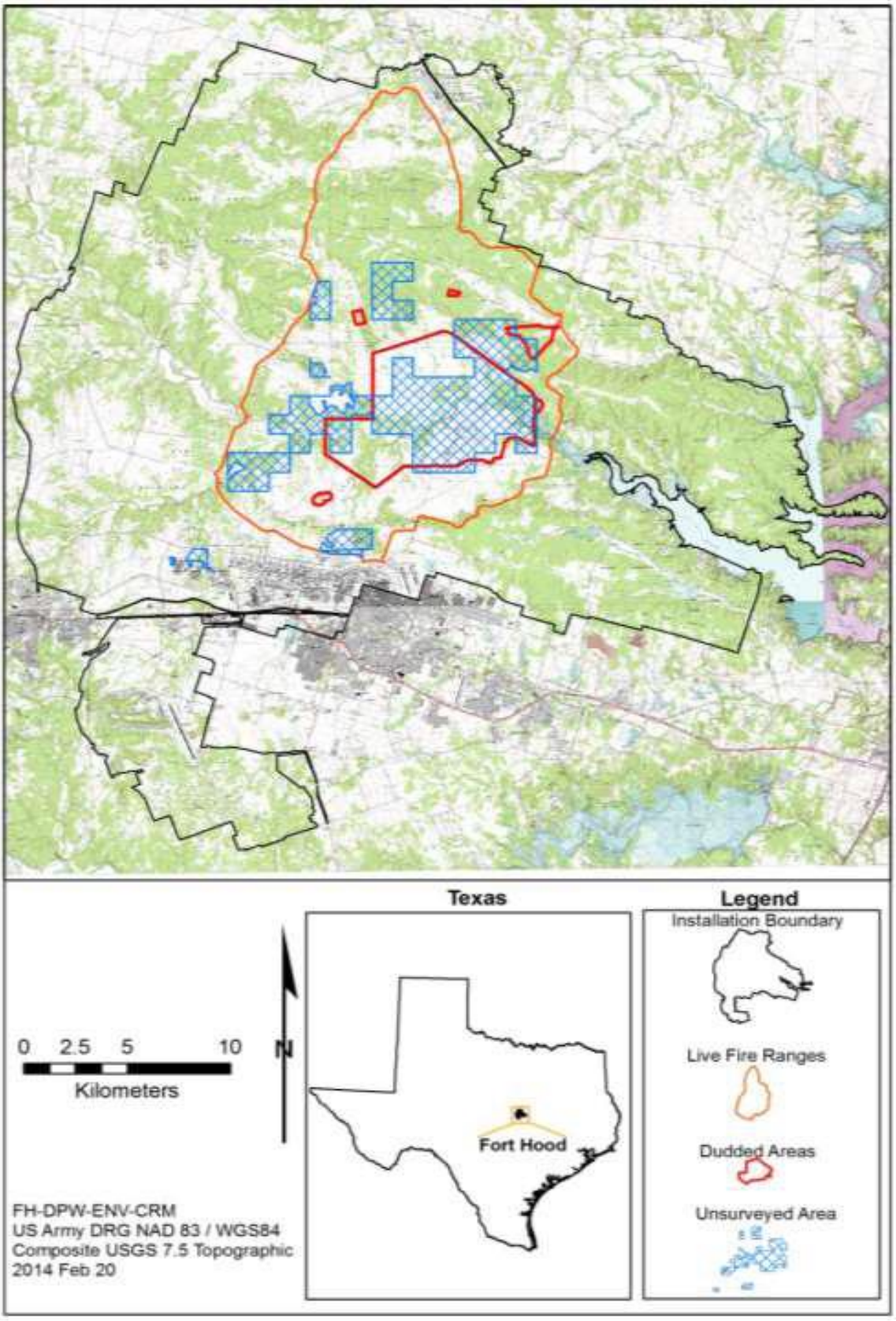
The Fort Hood Cultural Resource Manager currently has oversight responsibility for 218,823 acres of land at Fort Hood, including 196,791 acres designated range and training lands. Included within these training lands is 5,592 acres of USACE property around Belton Lake that Fort Hood currently manages under a land-use permit with the USACE.

All of the training and cantonment areas and the majority of the live-fire area have been systematically surveyed (Figure 3.3-5). The impact areas or surface danger zones account for the greatest portion of the unsurveyed areas of Fort Hood. The archeology sites that have been determined to be historic properties are located throughout the installation and are not indicated in Figure 3.3-5. The total amount of unsurveyed area within the installation is approximately 16,300 acres (Fort Hood 2015).

Historic Sites Inventory

Fort Hood's archaeological inventory contains 2,258 archeological sites, including 1,130 historic and 1,128 prehistoric sites. Features within specific historic sites can include, but are not limited to, concentrations or scatters of specific artifact types, hearths or baking pits, burned rock middens and mounds (earth ovens), post molds, and burial grounds. Historic sites are those related to European settlement and usually have documentation associated with the land use. Prehistoric sites are those related to earlier Native American land use. These sites were identified by archaeologists conducting pedestrian surveys (Fort Hood 2015).

Figure 3.3-5. Installation Map Depicting Surveyed and Unsurveyed Areas



Properties of Traditional Religious and Cultural Importance

Fort Hood has conducted an inventory of traditional cultural properties or sacred sites in FY 2014 for the Comanche Nation. Identified prehistoric archeological resources include one Native American sacred site. This site is actively used for ceremonial purposes regularly (Fort Hood 2015).

Cemeteries

At least 19 cemeteries have been documented within installation boundaries at Fort Hood. In 1943 and 1953, several large cemeteries were disinterred, and the human remains were relocated to previously established cemeteries in local communities. Smaller cemeteries with less than 50 interments were allowed to remain (Fort Hood 2006). Fort Hood Regulation 210-190 describes the Army's role in the upkeep and conditions for the interment of these remaining cemeteries.

Fort Hood manages the Comanche National Indian Cemetery (CNIC) which was established in 1991. The cemetery is located in a protected set-aside area, strictly for Native American use and reburial of NAGPRA-related remains and objects.

3.3.5.1.2 Consultation and Coordination with Tribal Governments

Native American Resources

There are seven federally recognized Native American tribes affiliated with the lands of the installation—the Apache Tribe of Oklahoma, Caddo Nation, Comanche Nation, Kiowa Tribe of Oklahoma, Mescalero Apache Tribe, Tonkawa Tribe of Oklahoma, and Wichita and Affiliated Tribes (Keechi, Waco, and Tawakonie). There is one Native American traditional cultural property (TCP) located at Fort Hood—the Leon River Medicine Wheel—which has been recognized by tribal representatives and is used for ceremonial activities. Access to the location of the Medicine Wheel is restricted to Native Americans and Fort Hood Cultural Resource personnel for condition monitoring. Fort Hood has not conducted a systematic inventory of traditional cultural properties or sacred sites. Another Native American resource at Fort Hood is the CNIC that was established in 1991 for the reburial of remains that had been recovered since the establishment of Fort Hood (Fort Hood 2006).

Buildings, Structures, Districts, Landscapes, and Objects

Fort Hood has inventoried all structures on the installation and is currently in the process of identifying and assessing the buildings and landscapes that are important to local and national heritage and may be eligible for listing in the NRHP. Fort Hood has recently identified seven historic landscapes within the cantonment areas: (1) the Capehart-Wherry Family Housing, (2) the Headquarters/Ceremonial Landscape, (3) the Hood AAF, (4) the Killeen Base, (5) the Motorpool Corridor, (6) the Railroad and Transportation Corridors, and (7) the Unaccompanied Personnel Housing. The original post chapel, Building 53, is a significant contributing element of the headquarters/ceremonial landscape.

3.3.5.2 Environmental Consequences

Impacts from Construction

As a result of the Proposed Action, Fort Hood would not plan on constructing new facilities or ranges to support the M-SHORAD Battalion. Therefore, there are no impacts to cultural resources from construction.

Impacts from Live-Fire Training

During the planning for the construction of live-fire training ranges, the presence of cultural resources is taken into account and appropriate mitigations implemented to avoid or minimize adverse impacts to those resources and meet federal, state, and tribal requirements. However, there is a large area within the dudded impact area that has not been surveyed for cultural resources. Because of the potential to encounter dangerous ordnance this area cannot be surveyed. The nature of the ordnance fired by the M-SHORAD would not cause effects below the ground surface and disturb unknown, buried cultural resources. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Maneuver Training

In the maneuver training areas, any known cultural resources are appropriately documented and marked as off-limits to prevent damage. In addition, Fort Hood places a 30-meter buffer around such properties and prohibits digging or staking activities within the buffer. Soldiers are trained to recognize the off-limits markings and are required to avoid such areas. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Increase in the Number of Soldiers

Impacts to cultural resources at Fort Hood are less than significant and are adequately addressed in Section 3.1.4.2.

3.3.5.3 Cumulative Effects

Fielding of the 10 new systems is not expected to result in new facility construction but may require expansion or renovation of existing facilities. An expected increase of approximately 1.1 percent more soldiers would be using the maneuver and live-fire ranges resulting in minor increases in the intensity and frequency of use of the training areas that are expected to be less than significant. Adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Hood is expected to have a less than significant cumulative impacts to cultural resources because it represents a small population increase of less than 0.4 percent within the ROI.

3.3.6 Soils

3.3.6.1 Affected Environment

Fort Hood is located on a deeply dissected limestone plateau underlain by erosion-resistant limestone on higher ridges with less resistant limestone on rolling hills and mesa. Several deep valleys are present through which streams generally flow southeast in narrow strips of alluvial bottomland. Many steep slopes have little topsoil remaining.

Complete surface series descriptions and locations are available in NRCS-published soil surveys of Bell and Coryell Counties and the 2019 INRMP. There are over 30 unique soil series on Fort Hood (Figure 3.3-6). In general, these soil series are well-drained and moderately permeable, but they can vary widely in other characteristics such as depth, parent material, and slope. Five soils that occur on Fort Hood are partially hydric soils, covering approximately 2.5 percent of the installation and are generally located along the stream banks of Cowhouse, Nolan, and Leon Creeks and their tributaries (NRCS 2017). However, other soils can become hydric, exhibiting anaerobic conditions, as a result of periodic or permanent saturation or inundation. Seventeen soils that occur on Fort Hood are prime farmland soils, covering approximately 19 percent of the installation and are generally located near the main cantonment area, WFH, NFH, and on floodplains (NRCS 2017).

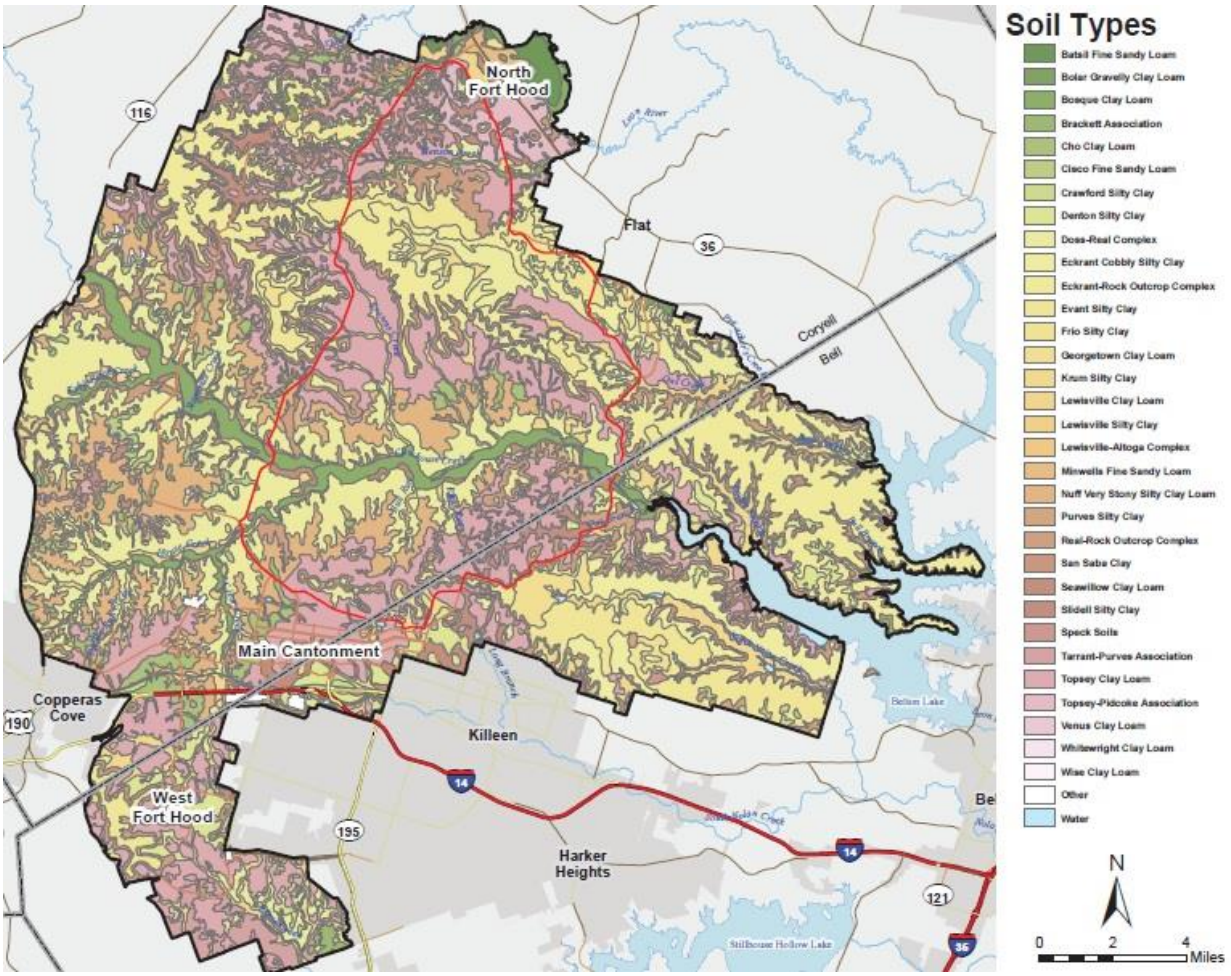
Table 3-21 lists the names of each soil series found on Fort Hood, including the acreage, prime farmland, and erodibility classification, drainage, landscape position, and parent material.

Table 3-20~~21~~. Soils Series on Fort Hood

Soil Series Name Acres Prime	Acres	Prime Farmland	Erodibility	Drainage	Landscape Position	Parent Material
Topsey CL, 3 to 8 % Slopes, Severely Eroded	40,113	No	PHE	Well Drained	gently sloping to moderately sloping sideslopes	surface: CL subsoil: Si (upper) shaley SiCL (lower)
Doss-Real Complex, 1 to 8 % Slopes	33,447	No	PHE	Well Drained	gently sloping to steeply sloping uplands	surface: gravelly SiC subsoil: gravelly C
Eckrant-Rock Outcrop Complex, 1 to 5% Slopes	26,374	No	PHE	Well Drained	Undulating to very steep uplands	surface: very gravelly C subsoil: limestone
Real-Rock Outcrop Complex, 12 to 40 % Slopes	22,294	No	HE	Well Drained	gently sloping to steeply sloping uplands	surface: gravelly CL subsoil: extremely gravelly CL (upper) cemented caliche (lower)
Nuff Very Stony SiCL, 2 to 6 % Slopes	19,359	No	PHE	Well Drained	gently sloping to moderately sloping uplands	surface: SiCL subsoil: SiCL (upper) Marly shaley SiL (lower)
Evant SiC, 1 to 3 % Slopes	12,756	No	PHE	Well Drained	Gently sloping uplands	surface: SiC subsoil: C

Note: HE = Highly Erodible, PHE = Potentially Highly Erodible, C = Clay, L = Loam, Si = Silt, CL = Clay Loam, SiC = Silty Clay, SiCL = Silty Clay Loam, SiL = Silty Loam
Sources: USDA 1977, 1985; USDA-NRCS, 2005.

Figure 3.3-6. Soil Types Found on Fort Hood, Texas

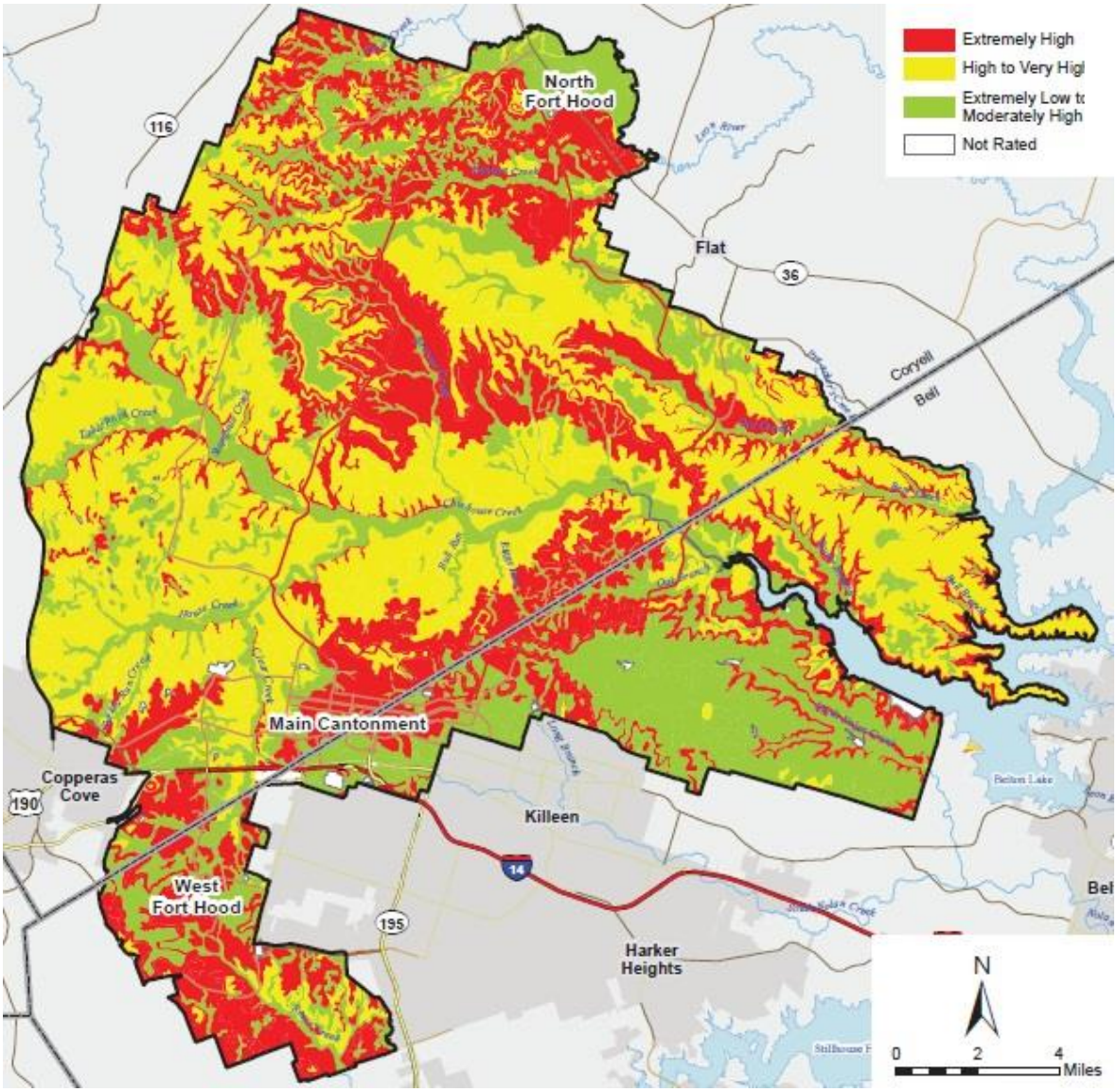


Many of the soils on Fort Hood are naturally susceptible to water erosion (Figure 3.3-7). Five soils are categorized as having very high-water erosion potential, covering approximately 68,128 acres, or 31 percent of the installation. Nine soils are categorized as having a high to moderate water erosion potential, covering approximately 82,504 acres, or 38 percent of the installation. The remainder of the installation has a low to very low water erosion potential (NRCS 2017).

Severe erosion areas are defined as areas with erosion rates exceeding tolerance limits established by the Natural Resources Conservation Service (NRCS) for each soil type according to its capability to maintain vegetative cover. Soil tolerance levels on Fort Hood range from 1 to 5 tons per acre (USACE 2003). Soils with higher tolerance values can hold soil or withstand erosion better than those with lower values. Soil loss exceeding the tolerance levels results in sheet, rill, and gully erosion, potentially limiting land availability for military training maneuvers. Erosion in areas already bare from previous activities, lack of ground cover, lack of woody vegetation, or overgrazing is exacerbated by continued effects from military vehicle tracks or wheels. Several areas of the installation, particularly TAs, have extremely high soil erosion rates due to high use by tracked vehicles and cattle grazing, resulting in high sheet, rill,

and gully erosion. Loss of perennial vegetative cover (herbaceous and woody vegetation) has resulted in these high erosion rates and increased bare soil and annual plants in some areas.

Figure 3.3-7. Water Erosion Potential on Fort Hood



Sedimentation is the most prevalent water quality threat at Fort Hood. Training exercises and land practices (e.g., cattle grazing) have resulted in erosion and sediment deposition in water bodies across the installation. To combat this erosion, Fort Hood has created 33 sediment retention structures to limit soil loss into Belton Lake, the installation's supply for drinking water. Construction and maintenance activities can also contribute to erosion and sedimentation. Stormwater runoff transports eroded soils into nearby water bodies. Erosion and sedimentation adversely affect the water quality of streams and lakes and reduce the capacity of lakes and ponds.

3.3.6.2 Environmental Consequences

Impacts from Construction

As a result of the Proposed Action, Fort Hood would not plan on constructing new facilities or ranges to support the M-SHORAD battalion. Therefore, there are no impacts to soils from construction.

Impacts from Live-Fire Training and Maneuver Training

Most of the soils within the training ranges at Fort Hood are comprised of loams, clays, and clay loams and are prone to water erosion at high to extremely high rates. Although there is a strong potential for erosion, the land assessment, rehabilitation, and maintenance practices combined with a relatively low average annual rainfall amount of 34 inches per year reduces the erosion potential. Therefore, the impacts to soils are expected to be less than significant. Other effects to soils are adequately addressed in Section 3.1.5.2.

Impacts from Increase in the Number of Soldiers

The effects to soils from the increase in the number of soldiers are adequately addressed in Section 3.1.5.2.

3.3.6.3 Cumulative Effects

Fielding of the 10 new systems is not expected to require facility construction and would add less than 150 additional soldiers to Fort Hood. The additional systems would cause slight increases in the intensity of use within the live-fire range and maneuver complexes. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to soils.

3.3.7 Land Use and Compatibility

3.3.7.1 Affected Environment

Fort Hood Military Reservation is located in central Texas within Bell and Coryell Counties adjacent to the City of Killeen. Fort Hood lies between the major cities of Waco, 39 miles to the northeast, and Austin, 60 miles to the south. Fort Hood is bounded on the east by Belton Lake and the south by the cities of Copperas Cove, Killeen, and Harker Heights. The City of Gatesville is located north of the installation. Fort Hood encompasses over 218,000 acres including the three cantonment areas, two instrumented airfields, and maneuver and live-fire training areas (see Figure 3.3-8).

3.3.7.1.1 Cantonment[60]

The cantonment areas are primarily for urban uses. The main cantonment area and Hood AAF (HAAF) are located on the southern edge of the training area and adjacent to Killeen, Texas. West Fort Hood is located south of U.S. Highway 190, near the city of Copperas Cove, Texas, and includes Robert Gray

[60] Source: Environmental Assessment for the Stationing Actions to Support the Grow the Army Initiative at Fort Hood, Texas, July 2009.

AAF (RGAAF). North Fort Hood, located near Gatesville, Texas, is the primary site for Army Reserve and National Guard training, equipment service, and storage (USACE 1999).

While the cantonment areas contain administrative, maintenance, industrial, supply/storage, operations, housing, community support facilities, medical, outdoor recreation, and open space land uses, the maneuver/live-fire training areas provide the locations for combat training activities, which is Fort Hood's primary purpose. A limited amount of cattle grazing is permitted throughout the training and live-fire areas. The airfields are located adjacent to the cantonment areas and house the fixed-wing and rotary-wing assets and support facilities (USACE 1999). Various other land uses on Fort Hood include Belton Lake Outdoor Recreation Area and miscellaneous uses such as roadways and easements.

3.3.7.1.2 Range Complex

Fort Hood's training area consists of 132,525 acres of maneuver training area and 64,272 acres of range live-fire area (LFA). Maneuver training land comprises roughly 61 percent of the installation's total land acreage. Table 3-22 lists the breakdown of current land use on Fort Hood. Figure 3.3-8 shows the land uses on Fort Hood.

The LFA and impact areas do not host much maneuver training, and traffic is limited primarily to vehicles moving to and from the ranges. Access to the impact area is restricted due to danger from direct and indirect fire from active ranges and unexploded ordnance. Figure 3.3-9 shows land contraints related to the LFA.

The LFA has the second-largest acreage of the endangered species habitat of any management unit (MU). Also, the LFA MU has 252 miles of streams, including Cowhouse Creek, which empties into Belton Lake, the drinking water supply for Fort Hood and surrounding municipalities.

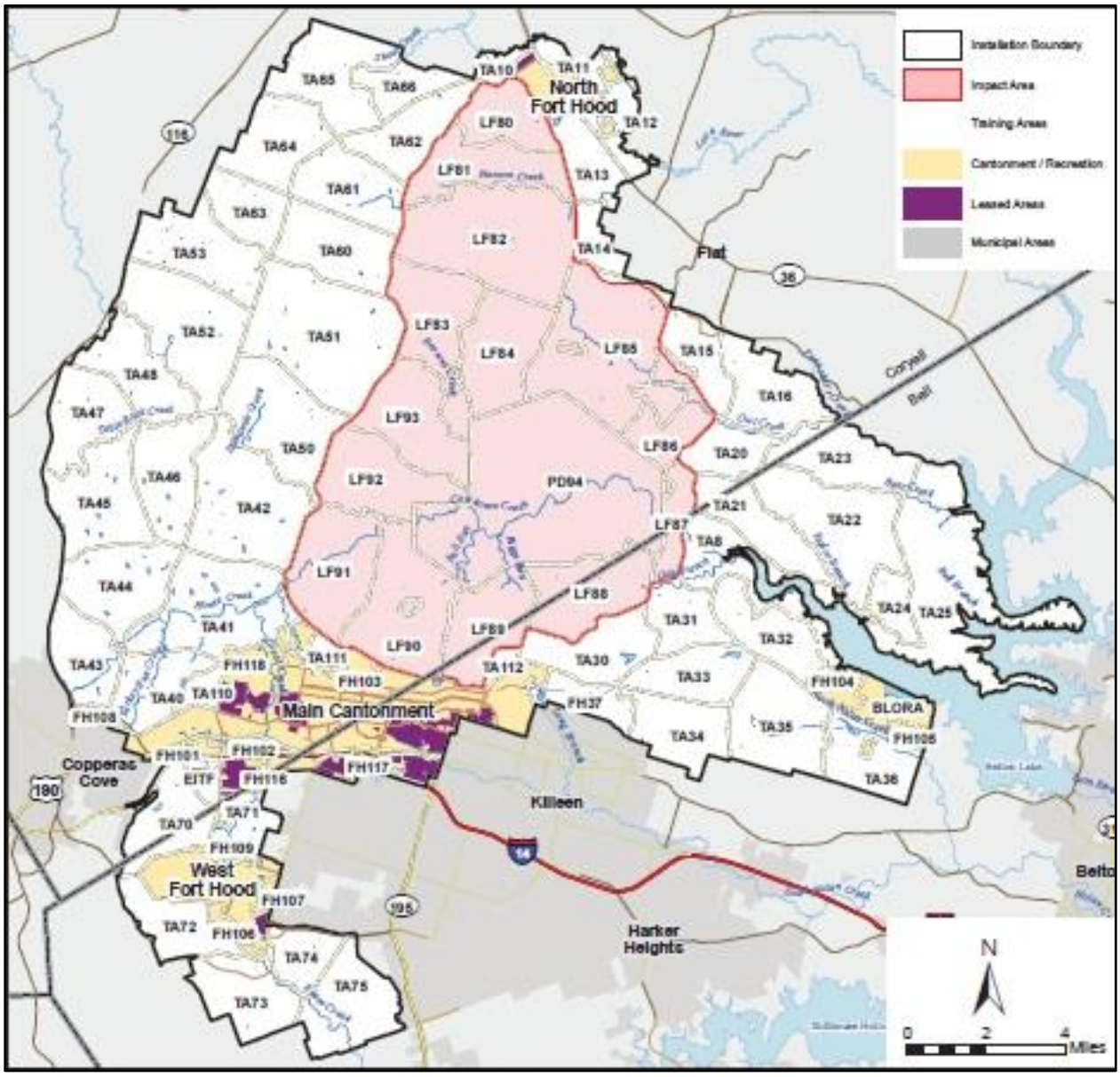
Table 3-2122. Fort Hood Land Use[61]

Primary Land Uses	Acreage	Percent
Training and Live-Fire Areas	**196,797**	**89.9**
Maneuver Land	132,525	60.6
Live-Fire Areas	64,272	29.4
Cantonment Areas and Belton Lake Outdoor Recreation Areas	**22,026**	**10.1**
Total Acreage	**218,823**	**100.00**

Training includes infantry, mechanized infantry, armored units, artillery, and air support with helicopters, fixed-wing tactical aircraft, high-speed interceptors, and large bombers (USACE 1999). The post's training land is divided into two main areas: the Western Maneuver Area and the Eastern Training Area. There are 120 individual ranges on Fort Hood.

[61] Fort Hood. 2019. Fort Hood Final 2019–2023 INRMP. Fort Hood, Texas.

Figure 3.3-8. Fort Hood Land Use Map



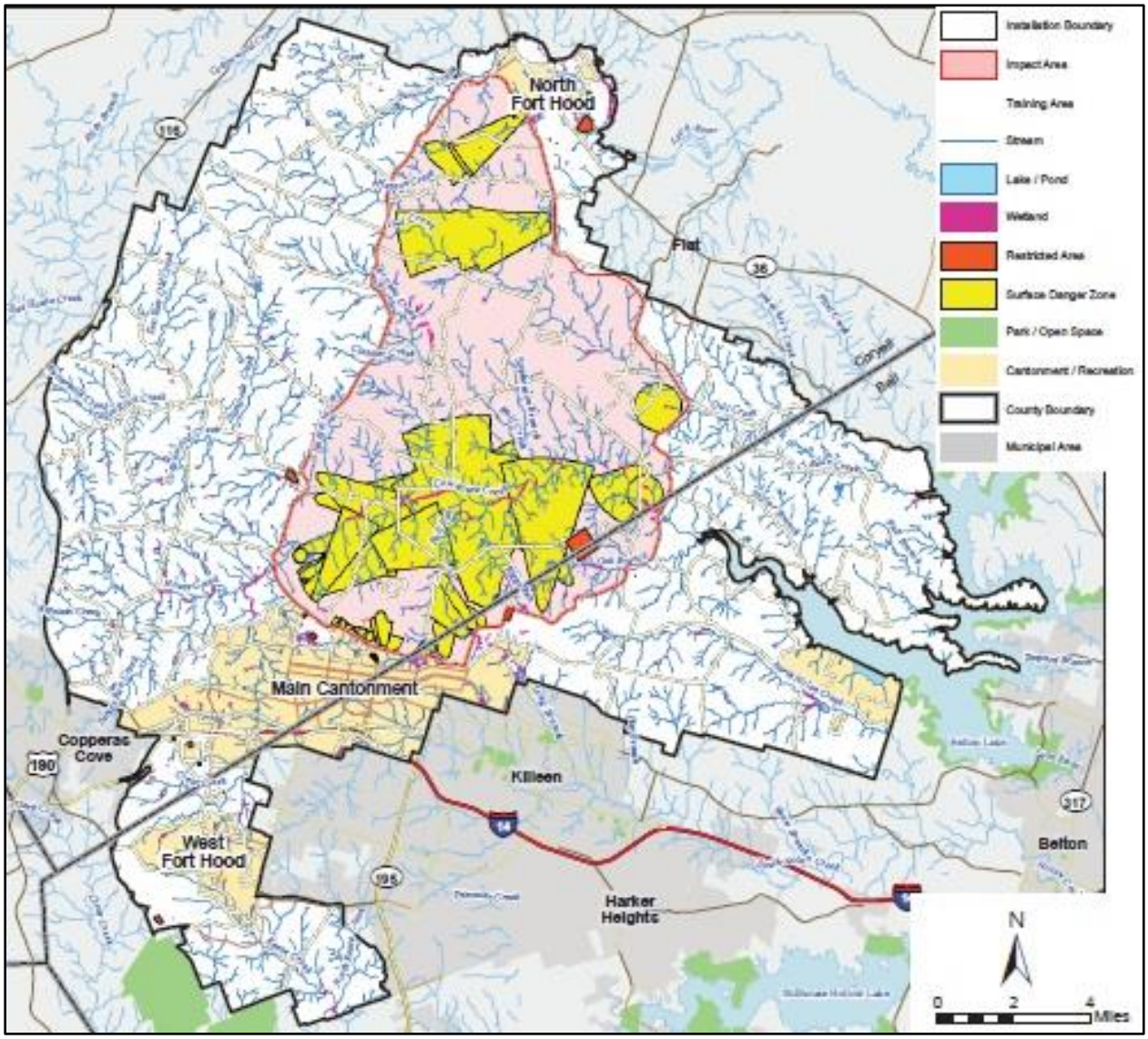
Both urban and rural areas surround Fort Hood. Urban areas include the cities of Killeen, Harker Heights, and Copperas Cove near the southern boundary, and the city of Gatesville north of the installation. Urban land uses are typically residential, business, and industrial. The rural areas surrounding Fort Hood support agricultural land-use practices such as farming and ranching.

Fort Hood is participating in the Army Compatible Use Buffer (ACUB) program to minimize incompatible land-use practices that could conflict with critical military training activities conducted on Fort Hood (Figure 3.3-10).[62] The ACUB program seeks to maintain current compatible uses through the purchase of agricultural conservation easements from willing

[62] Source: US Army Garrison Fort Hood Army Compatible Use Buffer Proposal, March 2017.

landowners. Maintaining the current land use surrounding the installation boundary, primarily rural agricultural lands, will prevent potential conflicts from arising with future training conducted on Fort Hood.

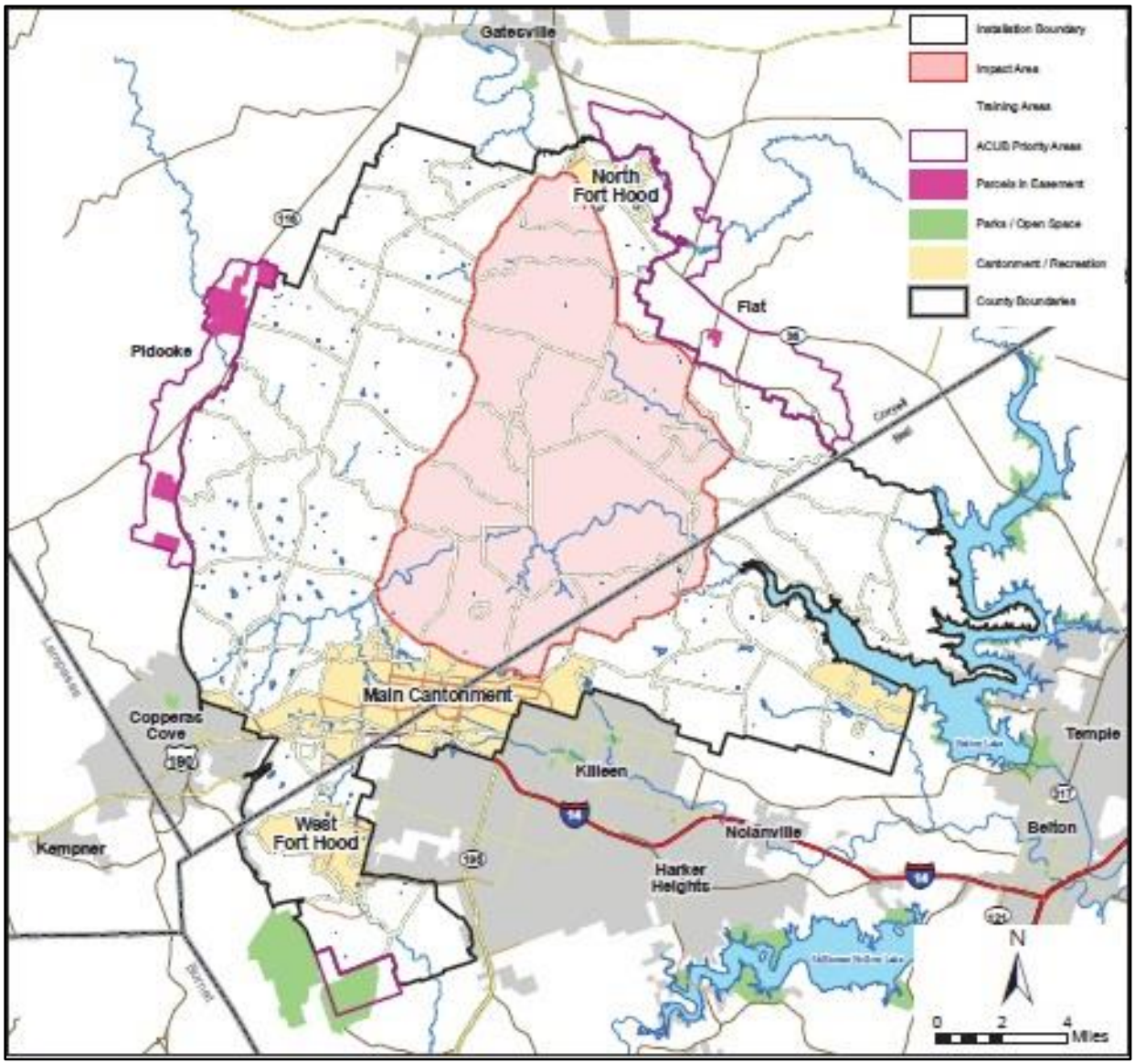
Figure 3.3-9. Fort Hood Constraints Map



The main concerns arising from incompatible land use practices developing adjacent to the installation boundary are the restrictions that could be imposed upon military training activities conducted on Fort Hood. These restrictions could result from noise (from ground maneuver, aviation, and live-fire training), night training, pyrotechnics use, and air quality degradation (from the use of training smoke, pyrotechnics, and maneuver generated dust).

The ACUB program at Fort Hood minimizes the necessity to establish internal buffers needed to conduct required training and ensure residential and commercial development does not encapsulate Fort Hood training land boundaries.

Figure 3.3-10. Fort Hood Region Map



3.3.7.2 Environmental Consequences

Impacts from Construction, Live-Fire Training, Maneuver Training, and Increase in the Number of Soldiers

As a result of the Proposed Action, Fort Hood would not plan on constructing new facilities or ranges to support the M-SHORAD battalion. The use of the training areas may increase slightly but would be managed through scheduling per the SRM or ReARMM. Impacts to land use and compatibility are adequately addressed in Section 3.1.6.2.

3.3.7.3 Cumulative Effects

Fielding of the 10 new systems is expected to have less than significant effects because they would be fielded to existing units with no changes to land use or compatibility.

3.3.8 Socioeconomics

3.3.8.1 Affected Environment

The ROI includes Bell and Coryell Counties. The ROI includes counties that are generally considered the geographic extent to which the majority of the installation's soldiers, Army civilians, and contractor personnel and their families reside. The population and workforce at Fort Hood have long been an essential element of the regional economy.

3.3.8.1.1 Population

The estimated population total of the ROI in 2019 was 438,875, including 75,951 for Coryell County and 362,924 for Bell County. The ROI has seen some changes in population growth between 2010 and 2018. The population in Coryell County declined by 0.9 percent, but the population in Bell County increased by 14.7 percent (U.S. Census Bureau 2020). For the same period, the state of Texas experienced a similar growth rate of Bell County of 14.1 percent.[63] The total estimated employed population at Fort Hood is 50,093 in 2020 (ASIP 2020).

3.3.8.1.2 Race/Origin Demographics

This PEA gives particular attention to the distribution of race and poverty in areas potentially impacted by the implementation of the Proposed Action. The minority population (excluding two or more races) make up 40.6 percent of the percent of the population in Coryell County and 55 percent in Bell County (see Table 3-23) in 2019. In comparison, the non-White population in Texas was approximately 58 percent for the same period.[64] There are pockets of low-income and minority populations within areas adjacent to Fort Hood.

Table 3-2223. Demographic Statistics for Coryell and Bell Counties, Texas, in 2019[65]

Race/ Origin	Percent of the Population In Coryell County	Percent of the Population In Bell County
White only	73.6	65.8
Black or African American only	17.7	24.4
Native American and Alaskan only	1.1	1.1
Asian only	2.1	3.3
Native Hawaiian or Other Pacific Islander	1.0	0.9
Hispanic or Latino	18.7	25.3
Two or more races	4.5	4.6
***Hispanic or Latino is not a race but an origin. To get the total percent for race, subtract this origin.**		

[63] Census: https://www.census.gov/quickfacts/fact/table/TX/SBO010212 Accessed on March 19, 2019.
[64] Census Data for 2018: https://www.census.gov/quickfacts/fact/table/coryellcountytexas,bellcountytexas/PST045219 and https://www.census.gov/quickfacts/fact/table/TX/SBO010212
[65] Census.2019. Quick Facts. https://www.census.gov/quickfacts/fact/table/TX,coryellcountytexas,bellcountytexas/PST045219

3.3.8.1.3 Income and Employment

Fort Hood provides a substantial contribution to the ROI economy, with an estimated 36,974 military personnel assigned to the post, and 12,948 civilian personnel working on the installation (ASIP 2017). Fort Hood's economic impact in 2017 was estimated at $24.56 billion across the state of Texas[66].

The ROI 2017 annual average civilian labor force was 101,980. Education, health care, and social assistance were the highest employed sectors for Bell County in 2018, and agriculture, forestry, and fishing was the most populous sector for Coryell County during the same period (see Figure 3.3-11, U.S Census Bureau 2018). Bell and Coryell Counties' unemployment rate was 4.1 percent as of 2018, a decrease since 2014.[67] However, the ROI unemployment rate was still higher than the state of Texas' 2018 rate of 3.7 percent.[68]

The average per capita income of the ROI was $25,148.85 in 2018.[69] For comparison, the per capita income of Texas was $30,143 (U.S. Census Bureau 2020). The total income estimated for the ROI between 2081-2019 was $11,037,201,921.[70]

3.3.8.2 Environmental Consequences

Impacts to socioeconomics at Fort Hood are expected to be negligible and are fully addressed in Section 3.1.7.2. The increase of 550 soldiers and 786 family members on average represents a 0.3 percent increase in population within the ROI. The contribution of the M-SHORAD battalion wages of $31.4 million represents only 0.28 percent of the total estimated ROI income of $11.0 billion.

3.3.8.3 Cumulative Effects

Fielding of the 10 new systems is expected to add less than 150 additional soldiers to Fort Hood. The cumulative effects of adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Hood are expected to be less than significant because it represents a population increase of less than 0.4 percent within the ROI.

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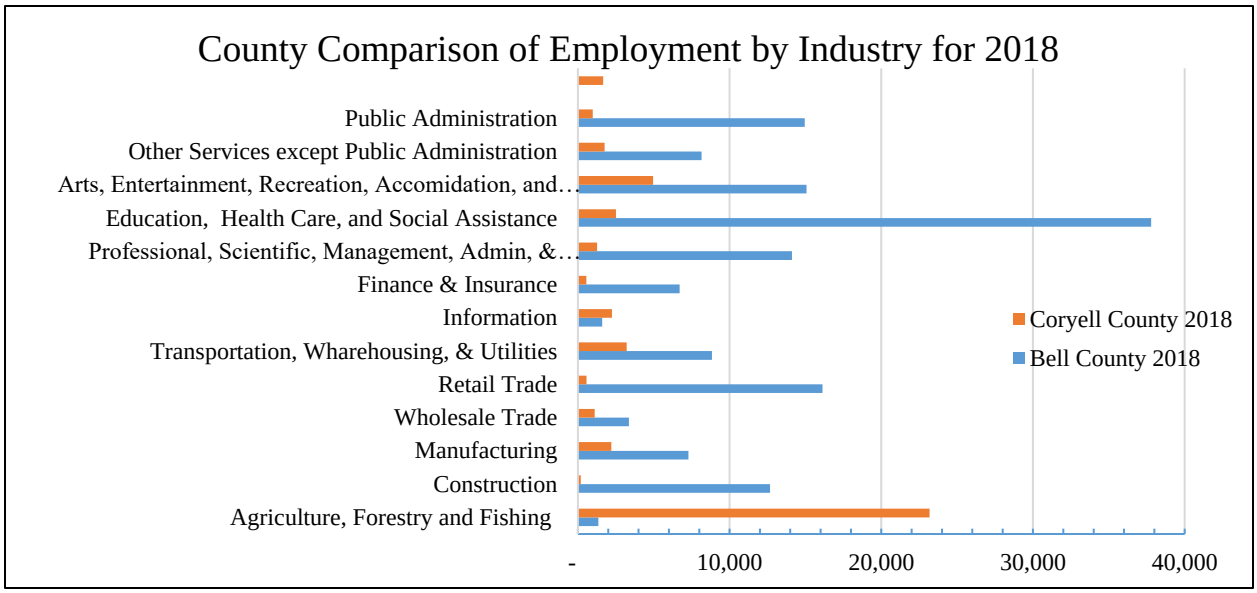
[66] Texas Comptroller. https://comptroller.texas.gov/economy/economic-data/military/fort-hood.php Website accessed on March 19, 2020.
[67] Texas Association of Counties. 2018. https://txcip.org/tac/census/morecountyinfo.php?MORE=1042 Website accessed on March 19, 2020.
[68] Texas Work Force Commission. 2018. https://twc.texas.gov/news/texas-unemployment-rate-hits-historic-low-37-percent Website accessed on March 19, 2020.
[69] Based on per capita income of $21, 507 and $ 25,911 for Coryell and Bell Counties, respectively. Source: Census 2020: https://www.census.gov/quickfacts/fact/table/coryellcountytexas,bellcountytexas/PST045219 Accessed on March 19, 2019.
[70] This value was calculated by first multiplying the total population by the per capita income and adding those values for the ROI.

Figure 3.3-11. Employment by Sector and County for 2018[71]



Source: Census 2018.

3.3.9 Traffic and Transportation

3.3.9.1 Affected Environment

Transportation in and around Fort Hood is achieved via road networks, rail routes, and air systems. Pedestrian walks, bike paths, and trails are also used to a limited extent for travel within the cantonment area. This section describes the installation's transportation resources, their relative use, and their importance to the surrounding communities.

On-Post Highways and Roads

The evaluation of the existing roadway segments focuses on capacity, which reflects the ability of the network to serve the traffic demand and volume. All roadways throughout Fort Hood are classified as primary, secondary, or tertiary according to their relative importance and function as part of the roadway network. Primary roadways include all installation roads and streets that serve as the main distribution arteries for all traffic originating outside and within the installation and that provide access to, through, and between various functional areas. Secondary roadways include all installation roads and streets that supplement the primary roadways by providing access to, between, and within the various functional areas (Fort Hood 2004a).

[71] Source: Census. 2018.
https://data.census.gov/cedsci/table?q=employment%20by%20industry%20bell%20county&g=0500000US48027&hidePreview=false&tid=ACSST1Y2018.S2403&t=Employment%3AIndustry&vintage=2018&layer=county&cid=S2403_C01_001E
and
https://data.census.gov/cedsci/table?q=employment%20by%20industry%20coryell%20county&g=0500000US48099&tid=ACSST1Y2018.S2403&t=Employment%3AIndustry&layer=county
Accessed on March 19, 2020

There are 413 miles of paved roads and 449 miles of unpaved roads on Fort Hood (Fleming 2008). Many primary streets are routed continuously through the southern part of the main cantonment area and function primarily to collect and distribute traffic within Fort Hood. These roads are constructed largely of concrete or asphaltic concrete and are considered to be in good condition: Hood Road and Clear Creek Road, which provide access to U.S. Highway 190 to the south; Tank Destroyer Boulevard, which provides access to the city of Killeen to the east and the city of Copperas Cove to the west. Also, Battalion Avenue, which primarily facilitates east-west movement in the main cantonment area and provides access to the city of Killeen via the Central Drive post entrance; and Warrior Way Road, which transitions into the one-way pair of Old Ironsides Avenue and Hell on Wheels Avenue just west of Martin Drive, both of which terminate at Clear Creek Road to the west. The principal street providing access to west Fort Hood is Clarke Road, which runs in a north-south direction from Turkey Run Road on the north to Grey Drive on the south. All of these roadways are multi-lane for most of their length in the Fort Hood study area.

A 2008 Post-wide Traffic Engineering and Safety Study indicated a variety of traffic infrastructure improvements that would improve the traffic flow on post with Fort Hood's population changes over the next few years. Through FY18, potential improvements to Fort Hood roadways include:

- Development of additional lanes
- Development of new access roads
- Development of new crosswalks
- Development of new signage
- Widening of roadways
- Installation of curb cuts
- Optimization of signal timings
- Intersection realignments

Long-term analyses of the traffic patterns at Fort Hood suggested a new need for the development of a four-lane highway to facilitate traffic flow to the north of the main cantonment area (Gannett Fleming 2008). Currently, Fort Hood's primary roads are restricted by the number of intersections with traffic lights, which causes traffic congestion on the main post.

Off-Post Highways and Roads

I-35, I-14, U.S. Highways 84, 183, 190 and 195, and State Highway 36 serve Fort Hood. These arteries provide excellent means to get to and from the Waco and Dallas/Fort Worth area in the north, the Austin/San Antonio region to the south, western Texas, and other nearby communities and cities, including those in the southeast. Road compositions range from heavy-duty asphaltic concrete to medium-duty asphalt.

Development and improvement of regional transportation routes have accompanied the growth, especially along the I-35 and U.S.-190 corridors. The Texas Department of Transportation (TxDOT) is planning to expand U.S.-190 by creating a north loop and has created a south loop as reliever routes around Copperas Cove. TxDOT has also begun adding lanes to U.S-190 to allow for smoother traffic flow between Temple and Copperas Cove.

The TxDOT also plans to connect SH-195 to Central Avenue and Tank Destroyer Avenue on the northeast side of the cantonment area. A new access control point and intersection reconfiguration would be required for this project. Once the connection is complete, the new access would facilitate traffic flow on the northeast side of the cantonment and to HAAF (Gannett Fleming 2008).

Traffic

Traffic engineering studies indicate that approximately 107,285 vehicles per day (vpd) enter and exit the gates around the main cantonment area. Access points to Fort Hood include the Fort Hood East Gate (fed by Hwy 195) with 18,084 vpd, the Main Gate with 35,439 vpd, Clear Creek Gate with 22,070 vpd, Santa Fe Gate with 12,871 vpd, Warrior Way Gate with 17,073 vpd, and East Range Gate with 1,751 vpd. The North Clarke Road Gate and West Fort Hood Gate are also primary access control points. From the Main Gate, Hood Road serves as the primary arterial corridor on post with a traffic volume of 34,000 vpd (Fleming 2008).

There are 56 signalized intersections in the main cantonment area of Fort Hood. LOS in the signalized intersections is a qualitative measure of operational conditions. It is reported as seconds of stopped delay per vehicle and is directly related to stop vehicle delay. Six categories, letters A through F, are used to describe LOS. LOS A represents a very short delay (less than 5 seconds), and LOS F represents a very long delay (greater than 60 seconds). LOS D (an average delay of 25.1 to 40 seconds) is the limit of acceptable operation in the main cantonment area at Fort Hood. Intersections or approaches on Fort Hood operating LOS E or F result in unstable and congested traffic operations. Capacity analyses of the critical intersection locations on-post indicate that of the intersections evaluated have acceptable levels of service, but several intersections are below the acceptable level. Analyses of future traffic volumes indicate that all but two intersections should maintain acceptable levels of service. However, the intersection of Hell on Wheels Avenue and Hood Road and the intersection of Old Ironsides Avenue and Hood Road would operate at LOS E or F (Fleming 2008).

3.3.9.2 Environmental Consequences

The addition of an M-SHORAD battalion at Fort Hood would add 550 new soldiers representing an increase of approximately 1.1 percent. Including the anticipated number of spouses and children, the ROI population would increase by approximately 0.3 percent. Therefore, the impacts to traffic and transportation within the ROI and the installation are expected to be negligible.

3.3.9.3 Cumulative Effects

Fielding of the 10 new systems is expected to add less than 150 additional soldiers to Fort Hood. The cumulative effects of adding approximately 700 soldiers and 370 spouses at Fort Hood are expected to have less than significant effects to traffic and transportation. It is assumed that most children would be below driving age and, therefore, not included in the effects on traffic and transportation.

3.3.10 Facilities

3.3.10.1 Affected Environment

On-Post Family Housing. The family housing on Fort Hood is under the management of the RCI partner Fort Hood Family Housing (FHFH). At present, the FHFH management welcomes active-duty military families, military and geographic bachelors, DoD employees, gold star families, reservists, National Guard, military retirees, and civilians to make their home in one of 11 distinct neighborhoods.[72]

On-Post Unaccompanied Personnel Housing. Unaccompanied personnel accommodations at Fort Hood include enlisted barracks, guest quarters, and in-transit quarters (Fort Hood 2004a).

Off-Post Housing. There were 169,286 housing units in the ROI in 2018. Most Fort Hood military and civilian personnel who live off post live in the cities of Killeen and Harker Heights within Bell County, and the city of Copperas Cove in Coryell County. The number of vacant units in the ROI in 2018 was 24,607 (U.S. Census Bureau 2020[73]).

The three cantonment areas, also addressed briefly in the Land Use and Compatibility section, contain the heaviest concentration of facilities and mission support activities on Fort Hood. Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical facilities, community facilities, RGAAF, and HAAF.

Army facilities are built to meet the standards of the uniform facilities criteria using standard designs of MILCON requirements, standardization, and integration or similar documents. Exceptions to standard are available and if granted for a facility, it would be considered adequate.

3.3.10.2 Environmental Consequences

The excess or deficit of facilities available to support the M-SHORAD battalion at Fort Hood was assessed based on the Army RPLANS records. The results are shown in Table 3-24 with deficits shown in parentheses.

[72] https://www.forthoodfh.com/ accessed 1 June 2020.
[73] Websites accessed on March 19, 2020: https://data.census.gov/cedsci/all?q=Housing%20statistics%20bell%20county&g=0500000US48027&tid=ACSDP1Y2018.DP04&t=Housing&layer=county&cid=DP04_0001E&vintage=2018 and

Table 3-2324. M-SHORAD Expected Facility Requirements FY 2021 Data

Facility name	Number required	Total sq ft	Total acres	Ft Hood
Battalion HQ Building	1	48,520	1.1	(355,594)
Company HQ Building	1	33,646	0.8	(1,763,152)
Company HQ Building	4	103,104	2.4	(1,763,152)
Vehicle Maintenance Shop	1	100,800	2.3	(145,062)
Oil Storage Building	1	480	0.0	4,697
Organizational Vehicle Parking	1	450,000	10.3	3,768,743
Dining Facility	1	41,116	0.9	75,192
Barracks Permanent Party	1	76,140	1.7	(673,619)

The plan, as provided, assumes Fort Hood would provide facilities for the M-SHORAD battalion on par with what other units stationed at Fort Hood typically receive. New construction is not needed to support this request. Most units on Fort Hood are assigned between 50 percent and 70 percent of the administrative and HQ facility space they require. The M-SHORAD battalion would be provided the required vehicle maintenance, oil storage, and organizational vehicle parking space in a legacy motor pool.

Fort Hood would not construct new ranges or maneuver areas to support the M-SHORAD battalion. Training requirements would be met through appropriate scheduling per the SRM or ReARMM.

Since existing facilities would be used to accommodate the M-SHORAD battalion requirements the effects are expected to be less than significant.

3.3.10.3 Cumulative Effects

Fielding of the 10 new systems is expected to have less than significant effects because these new systems would be fielded to existing units with no additional facility requirements anticipated.

3.3.11 Water Resources

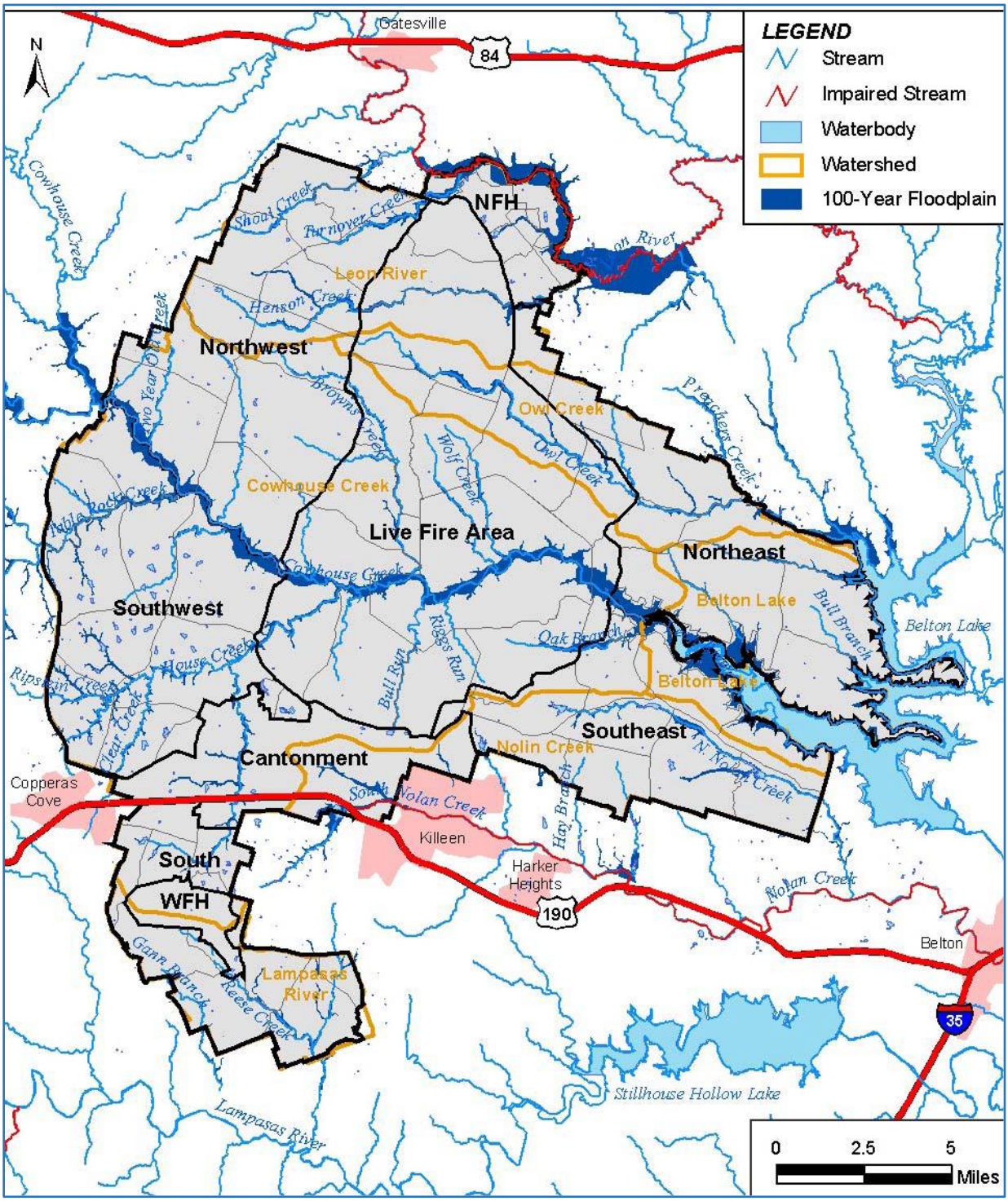
3.3.11.1 Affected Environment

3.3.11.1.1 Surface Water

There are 692 acres of lakes and ponds, 55 miles of rivers and permanent streams, and 43 miles of shoreline access to Belton Lake on Fort Hood. All water impoundments are manmade for purposes such as flood control, sediment retention, recreation, water supply, wildlife and livestock water, and fish habitat. Additional impoundments are being constructed for the primary purpose of storing sediment from the training areas as shown in Figure 3.3-12 (Fort Hood 2006).

Fort Hood is divided into two major watersheds with numerous sub-watersheds. The major watersheds are the Leon River (including Belton Lake) and the Lampasas River. The Leon River drains most of the installation, including all maneuver training lands.

Figure 3.3-12. Fort Hood Watersheds



Source: Fort Hood 2006

Water quality is a major concern due to the sediment loads carried by these streams. Cowhouse Creek and its sub-watersheds drain directly into Belton Lake. North and South Nolan Creeks drain into the Leon River below Belton Lake (Fort Hood 2006).

A small portion of the southern end of Fort Hood, used primarily for dismounted training, drains into the Lampasas River. The river empties into the Stillhouse Hollow reservoir. Only dismounted training, which has a smaller impact on the environment than vehicular training, occurs in this area (Fort Hood 2006).

3.3.11.1.2 Groundwater

The major aquifer that underlies Fort Hood is the Trinity Aquifer. Parts of both the outcrop and the depression are deeply buried below Fort Hood. The Trinity Aquifer extends through parts of 55 counties of central Texas (Fort Hood 2019).

The Travis Peak formation is the deepest and hydrologically most important geologic unit in the Fort Hood region. This formation does not outcrop at the surface in Fort Hood. No major groundwater resources outside the installation are affected by recharge from within Fort Hood, and recharge that occurs within the installation affects only the small, shallow groundwater supplies that remain on the installation (Fort Hood 2019). Potentially sensitive groundwater areas of the Fort Hood region are the outcrop areas of the Paluxy formation and recent alluvial materials within and adjacent to Cowhouse Creek, Henson Creek, and the Leon River, as well as the karst or cave systems found throughout the installation. The aquifers recharged by these areas are relatively shallow, and therefore they could be affected by hazardous material spills and seepage. However, these waters are rarely used (Fort Hood 2019). Surface water, not groundwater, is the primary water supply for Fort Hood (Fort Hood 2019).

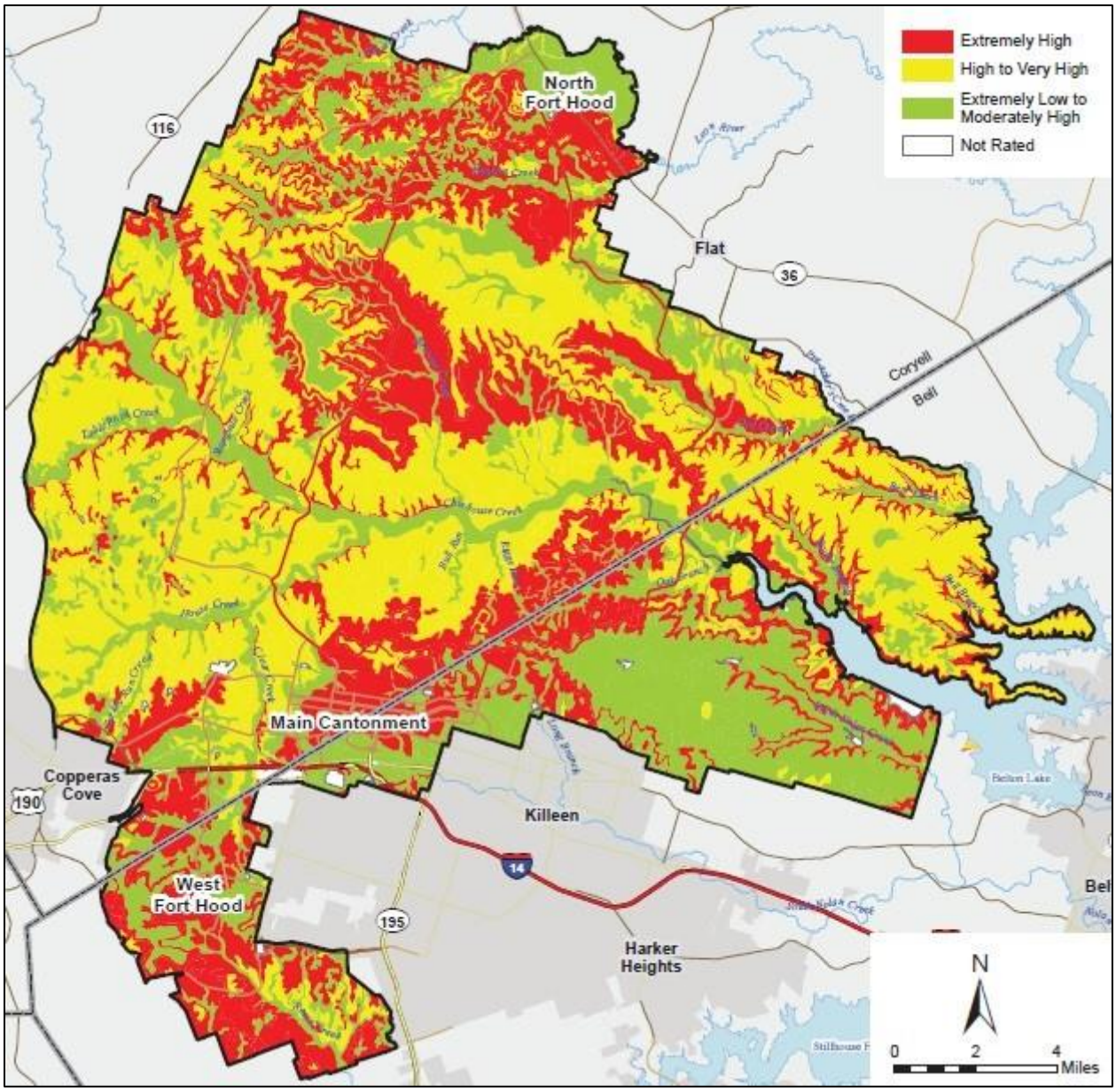
Currently, there is no known usage of groundwater at Fort Hood. Groundwater studies have been conducted at Fort Hood, and the results do not show any critical issues directly attributed to the installation. A detailed discussion of these studies is provided in Section 4.6 of the INRMP (Fort Hood 2019).

3.3.11.1.3 Water Quality

Water quality studies at Fort Hood include sedimentation and erosion studies, stormwater data collection, Texas Pollutant Discharge Elimination System (TPDES) permit monitoring, and studies of sediment, groundwater, and surface water in the Cowhouse Creek drainage basin. Figure 3.3-13 shows the highest potential of water erosion that could affect water quality. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), now the U.S. Army Public Health Center, examined munitions constituents (MC) on Fort Hood range sites and evaluated the effects and risks associated with water quality and other means of MC environmental movement. (USACHPPM 2007) The environmental fate of MC indicates a very low risk to humans and sensitive species. Fort Hood ranges were assessed for MC transport off

range in 2012 and 2018 and the risk continues to be low (U.S. Army 2019). The cumulative effects of organic chemical and metal contamination are minimal.

Figure 3.3-13. Water Erosion Potential on Fort Hood[74]



Stormwater Management

Currently, Fort Hood operates under an industrial stormwater permit (TPDES Permit No. TXR05F998) that comes from the general permit, TXR050000. The EPA has published Phase II Storm Water permitting requirements that include Fort Hood as the owner and operator of a municipal separate storm sewer system (MS4). Therefore, upon adoption of Final TPDES Permit

[74] Source: Fort Hood 2019 INRMP.

TXR040000, the Fort Hood DPW will be required to file its permit application, which must include a stormwater management program (SWMP). The SWMP will direct Fort Hood's compliance efforts for a period of up to 5 years following issuance and will include the following five minimum control measures:

- Public education and outreach on stormwater impacts
- Public involvement/participation
- Illicit discharge detection and elimination
- Pollution prevention/good housekeeping for municipal efforts
- Construction site stormwater runoff control

Post-construction stormwater management in new development and redevelopment DPW has been implementing stormwater management programs under a general industrial permit, and a general construction permit since 1995 and has anticipated the Phase II Storm Water permitting requirements. Therefore, many necessary program management actions are already in place or planned for implementation. Although the program is now in draft format, once implemented, it should ensure that controls that will prevent or minimize water quality impacts are in place (Fort Hood DPW 2005).

Sediment and Erosion

Sedimentation is the most prevalent water quality threat at Fort Hood. Training exercises and land practices (e.g., cattle grazing) have resulted in erosion and sediment deposition in water bodies across the installation. Stormwater runoff transports eroded soils into nearby water bodies. Erosion and sedimentation have adversely affected the water quality of streams and lakes and reduced the capacity of lakes and ponds. Total suspended solids (TSS) data for streams have been collected at several stations during stormwater events as an indicator of sediment input to streams. The physicochemical properties of water bodies, such as turbidity and TSS, can be affected by sedimentation. Across the installation, measurements of sedimentation have been collected in terms of TSS measurements and erosion inventories that were conducted in 1998 and 1999 indicate severe erosion. Most of the TSS values tend to increase with increasing stream level, indicating that high values might be due to storm runoff associated with precipitation. The Blackland Research and Extension Center (BREC) Water Science Laboratory has been monitoring sediment losses at 13 sites on Fort Hood. To monitor restoration and sediment reduction efforts, monitoring included sites in the Shoal Creek watershed. The NRCS installed BMPs in the Shoal Creek watershed, which is in the Leon River drainage, to reduce erosion in this training area to acceptable levels and keep it open for training activities (Fort Hood 2006).

The increases in TSS that correlate with higher streamflow levels have several elements: First, the surface and stream channel erosion increase from raindrop impact and subsequent runoff. Second, the increase of streamflow concentrates and creates gullies. This is supported when the gullies are associated with tank trails and other impacts such as cross-country driving. Increased

runoff also comes from urbanized lands that have parking lots, roads, and building roofs. These runoff increases may not have initial high TSS concentrations, but they add to channel erosion as storm runoff rates increase and the streamflow impacts channel banks or creates other forces on the banks that detach soil.

3.3.11.1.4 Wetlands and Floodplains

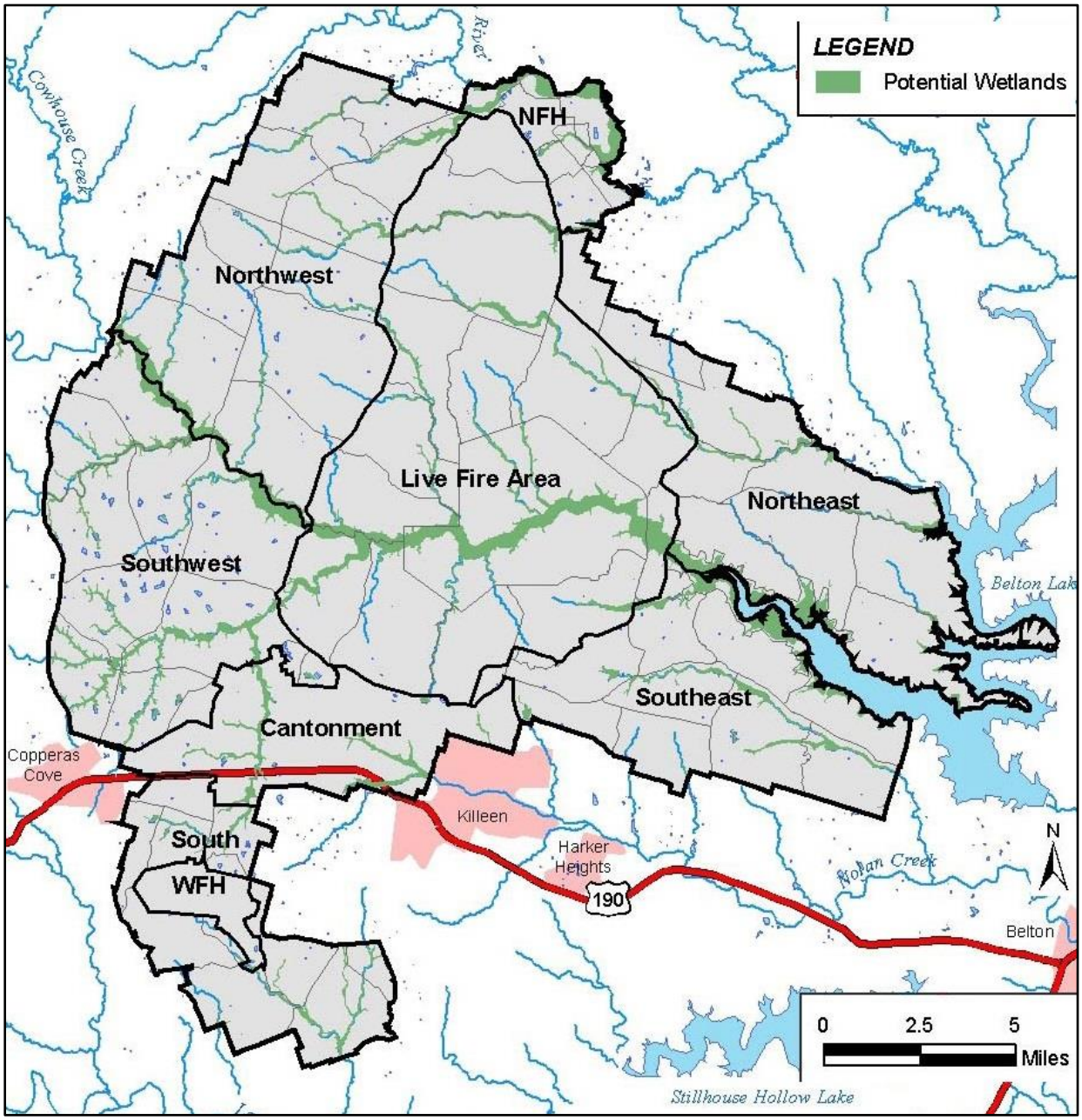
The CWA protects water bodies and stream channels that are under its jurisdiction. WOUS, including wetlands, exist across the installation. WOUS range from small emergent wetlands associated with ephemeral streams to large forested wetland complexes adjacent to perennial channels. Currently, efforts are underway to delineate (map and describe) all water features, both jurisdictional and non-jurisdictional, within potential project areas on the installation

Jurisdictional wetlands in central Texas and at Fort Hood are most common on floodplains along rivers and streams (riparian wetlands), along the margins of lakes and ponds, and in other low-lying areas where the groundwater intercepts the soil (springs). An analysis of existing hydrology, hydric soils, vegetation, and floodplains was conducted to determine areas of high probability for jurisdictional wetlands and waters of the United States. The results of this analysis indicated that potential jurisdictional wetlands within the boundaries of Fort Hood occur along the 692 surface acres of lakes and ponds, as well as tributaries of the WOUS, including all streams (Figure 3.3-14). There are numerous natural springs within the Fort Hood Military Reservation boundaries, but not all of their locations have been mapped. Several well-known springs from the area are Ransomer Springs, 8 kilometers north northwest of Nolanville; Mountain Springs, in the Owl Creek Mountains about 20 kilometers north-northwest of Belton; and Taylor Springs, 2 kilometers south of Mountain Springs (Brune 1981).

It has been the practice of Fort Hood to minimize impacts to potential jurisdictional areas. These areas might be indirectly affected by ongoing installation activities such as military training activities, livestock grazing, hydrologic alterations, and urban and training area stormwater runoff. A survey of project areas has occurred but that effort has not been formally accepted yet as delineation. The 69th ADA campus layout has seven crossings of ephemeral stream channels. This design avoids direct impacts on larger areas of wetlands and stream channels.

The combination of soils, vegetation, and climate affect the current watershed characteristics. The soils are high in clay so the percolation rate within them is quite low. Vegetation provides little ground cover over most of the installation so the watersheds have only a small portion of moderate to heavy rainfall soak into soil. The net effect is that Fort Hood stream channels are ephemeral or intermittent and flow only in direct response to rainfall. The existing cantonment area stream channels are altered to accommodate urban runoff and protect the infrastructure.

Figure 3.3-14. Fort Hood Potential Wetlands



Source: Fort Hood 2006

Floodplains

EO 11988, "Floodplain Management," was enacted on May 24, 1977, to set guidelines to avoid the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. FIRM for Bell and Coryell Counties (Community Panel Numbers 480706 0125 B, 4807680370 B, 4807060080 B, 4807680215 B, and 4807680325 B) were analyzed for proposed construction areas to evaluate any impact to floodplains from the proposed

construction. The locations under consideration for proposed construction and training activities all fall within FIRM map Zone C, which are areas determined to be outside of the regulated 100-year floodplains.

3.3.11.2 Environmental Consequences

Surface Water

Impacts from Construction

As a result of the Proposed Action, Fort Hood would not plan on constructing new facilities or ranges to support the M-SHORAD battalion. Therefore, there are no impacts to surface waters from construction.

Impacts from Live-Fire Training and Maneuver Training

There are two impaired streams on and adjacent to Fort Hood. South Nolan Creek flows through the cantonment area and would not be impacted by the training activities. The Leon River flows along the north boundary of the installation. This area does not support live-fire or mounted maneuver training and would not be impacted by the Proposed Action. Impacts to surface waters from live-fire and maneuver training are less than significant and fully addressed here and in Section 3.1.10.2.1.

Impacts from Increase in the Number of Soldiers

Impacts to surface waters from the increased soldier population are fully addressed in Section 3.1.10.2.1.

Groundwater

Groundwater at Fort Hood is present in shallow, discontinuous lenses and the much deeper Trinity aquifer. The shallow lenses are not usable due to limitations in quantity. The Trinity aquifer is protected from contamination by a thick, impervious confining layer. Fort Hood has no beneficial use of groundwater. The actions that reduce impacts to groundwater described in Section 3.1.10.2.2 combined with the nature of the Fort Hood groundwater result in less than significant impacts.

Water Quality

The impacts to water quality as a result of the Proposed Action are addressed in Section 3.1.10.2.3.

Wetlands and Floodplains

Potential wetlands occur on Fort Hood along the 692 surface acres of lakes and ponds and tributaries of the waters of the United States which includes all streams. There are two main

floodplain areas: one along Cowhouse Creek which bisects the training areas, and another along the Leon River adjacent to the north border of Fort Hood.

Impacts from Construction

No construction is planned to support the M-SHORAD battalion; therefore, there are no impacts.

Impacts from Live-Fire and Maneuver Training

Impacts to wetlands and floodplains from live-fire and maneuver training are fully addressed in Section 3.1.10.2.4.

Impacts from Increase in the Number of Soldiers

Impacts to wetlands and floodplains from the increased soldier population are fully addressed in Section 3.1.10.2.4

3.3.11.3 Cumulative Effects

Fielding of the 10 new systems is expected to have less than significant effects to all water resources because these new systems would be fielded to existing units with no additional facility, live-fire range, or maneuver area requirements are anticipated. Only a nominal increase in population and the intensity of training area use is anticipated.

3.4 FORT RILEY, KANSAS

3.4.1 Background

Fort Riley is a U.S. Army installation located in North Central Kansas, on the Kansas River, between Junction City and Manhattan (Figure 3.4-1). The installation covers 101,733 acres (41,170 ha) in Geary and Riley counties. Fort Riley's population includes 15,009 soldiers (Army), 164 Airmen (Air Force), and 18,028 family members (9,347 on post, 8681 off post). Fort Riley is home to the 1st Infantry Division (1st ID), which includes:

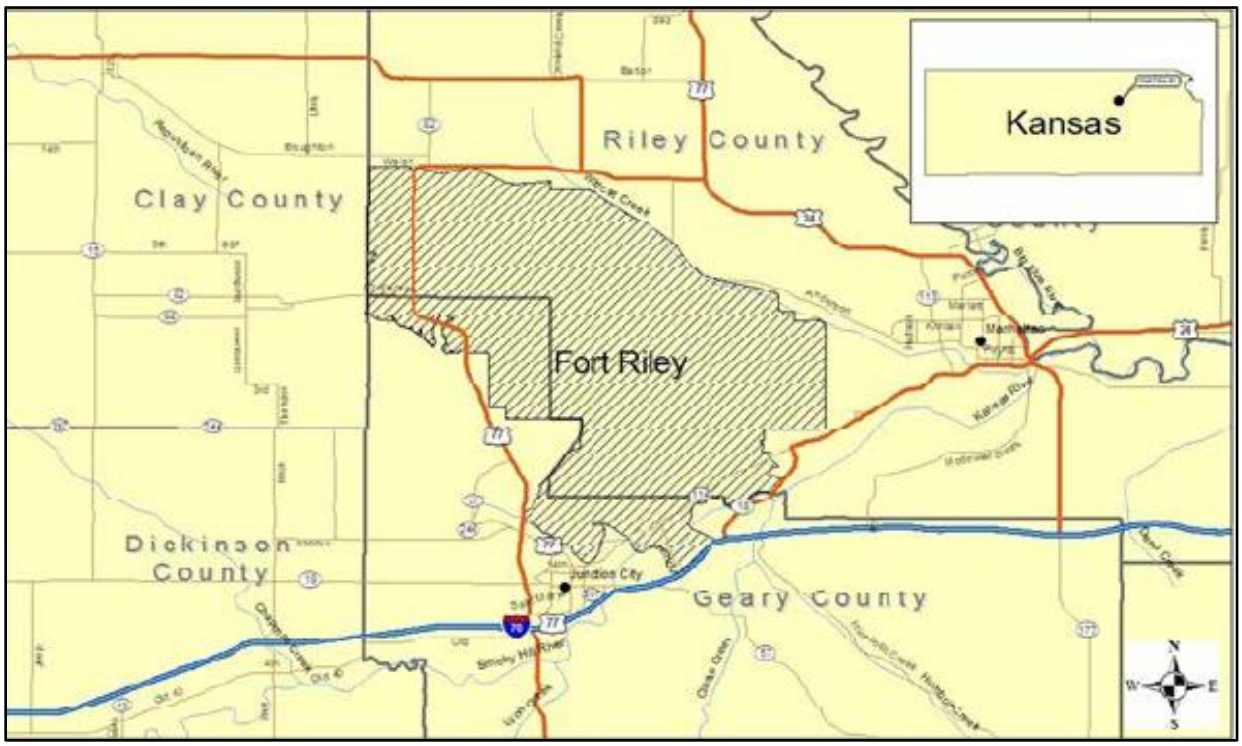
- 1st ABCT
- 2nd ABCT
- 1st CAB
- 1st Sustainment Brigade
- Division Headquarters and Headquarters Battalion
- Division Artillery

Other tenants on Fort Riley include: 407th Army Field Support Battalion, 10th Air Support Operations Squadron, 97th Military Police Battalion, U.S. Army Medical Activity (MEDDAC), Dental Activity, Warrior Transition Battalion, Civilian Human Resources Agency, Civilian Personnel Advisory Center, 902nd Military Intelligence Group, Logistics Readiness Center, Mission and Installation Contracting Command, Special Operations Recruiting Battalion, 3rd

Weather Squadron 2nd Detachment, Army and Air Force Exchange Service, Defense Commissary Agency, Army Benefits Center, and the Network Enterprise Center.

The mission of the 1st ID and Fort Riley is to build and maintain combat ready forces; and on order, deploy these forces in an expeditionary manner to conduct Decisive Action to fight and win in complex environments as members of a Joint, Inter-organizational, and Multinational team. (http://www.riley.army.mil/Units/1st-Infantry-Division/).

Figure 3.4-1. Location of Fort Riley, Kansas



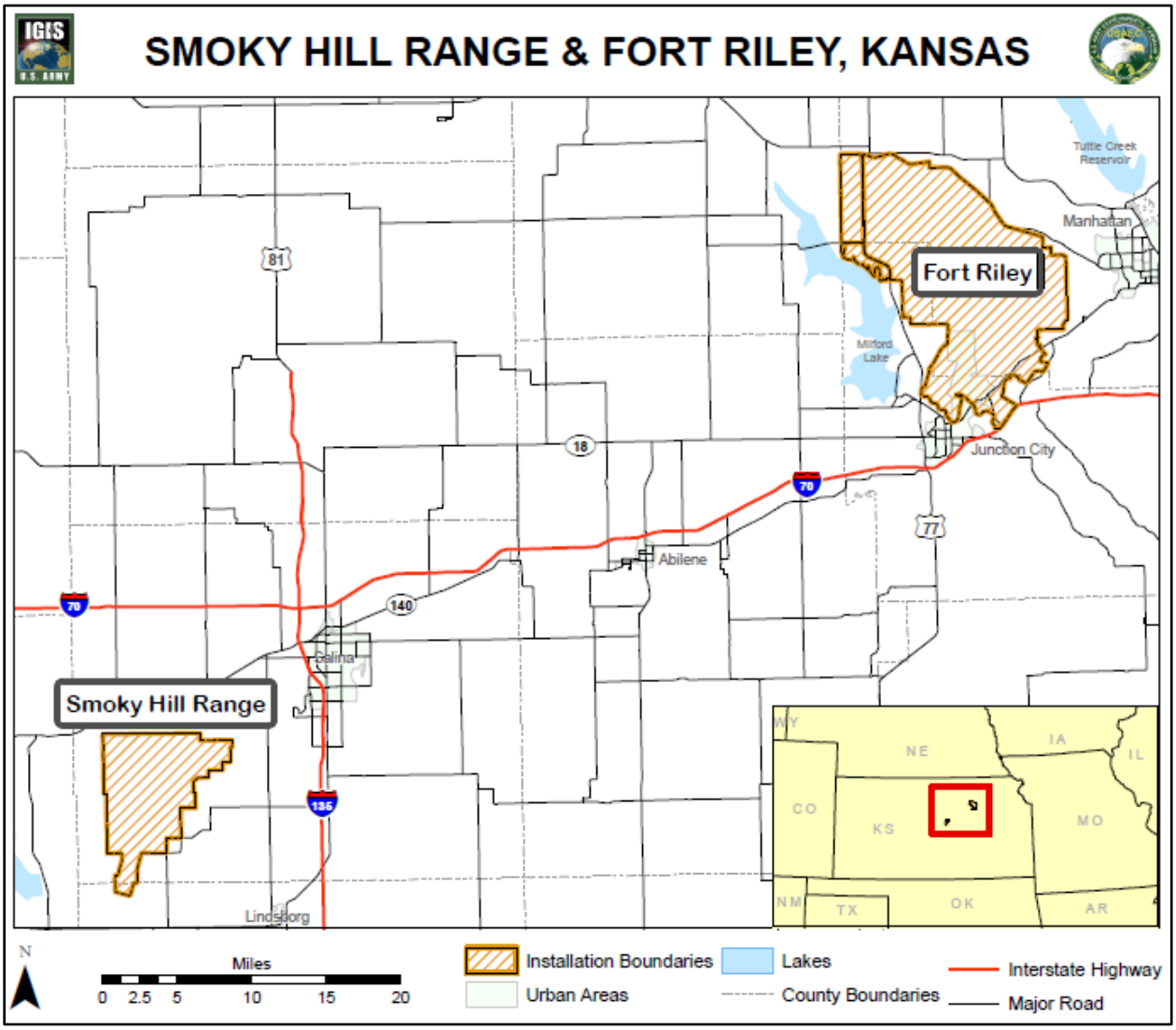
Smoky Hill Range

Smoky Hill Range is an additional training range for Fort Riley, located approximately 60 miles southwest of the installation and 10 miles west of Salina, Kansas (Figure 3.4-2). Smoky Hill Range is located in Saline and McPherson Counties.

The Smoky Hill Air National Guard Range is the largest and busiest Air National Guard (ANG) bombing range in the nation, encompassing 51 square miles, and has more than 100 Tactical targets and an electronic warfare range. The complex provides approximately 36 thousand acres for air-to-ground weapons training, allowing Active and Reserve component military organizations to train jointly in a realistic environment that combines ground and air assets in operational training in a way that is possible at only a few sites throughout the United States. The Smoky Hill Range provides airspace within FAA-sanctioned Military Operations Area, which permits active and reserve units to operate both piloted and unmanned aircraft in training

scenarios.[75] Smoky Hill Range also has a FAA-sanctioned restricted area described in the Airspace section.

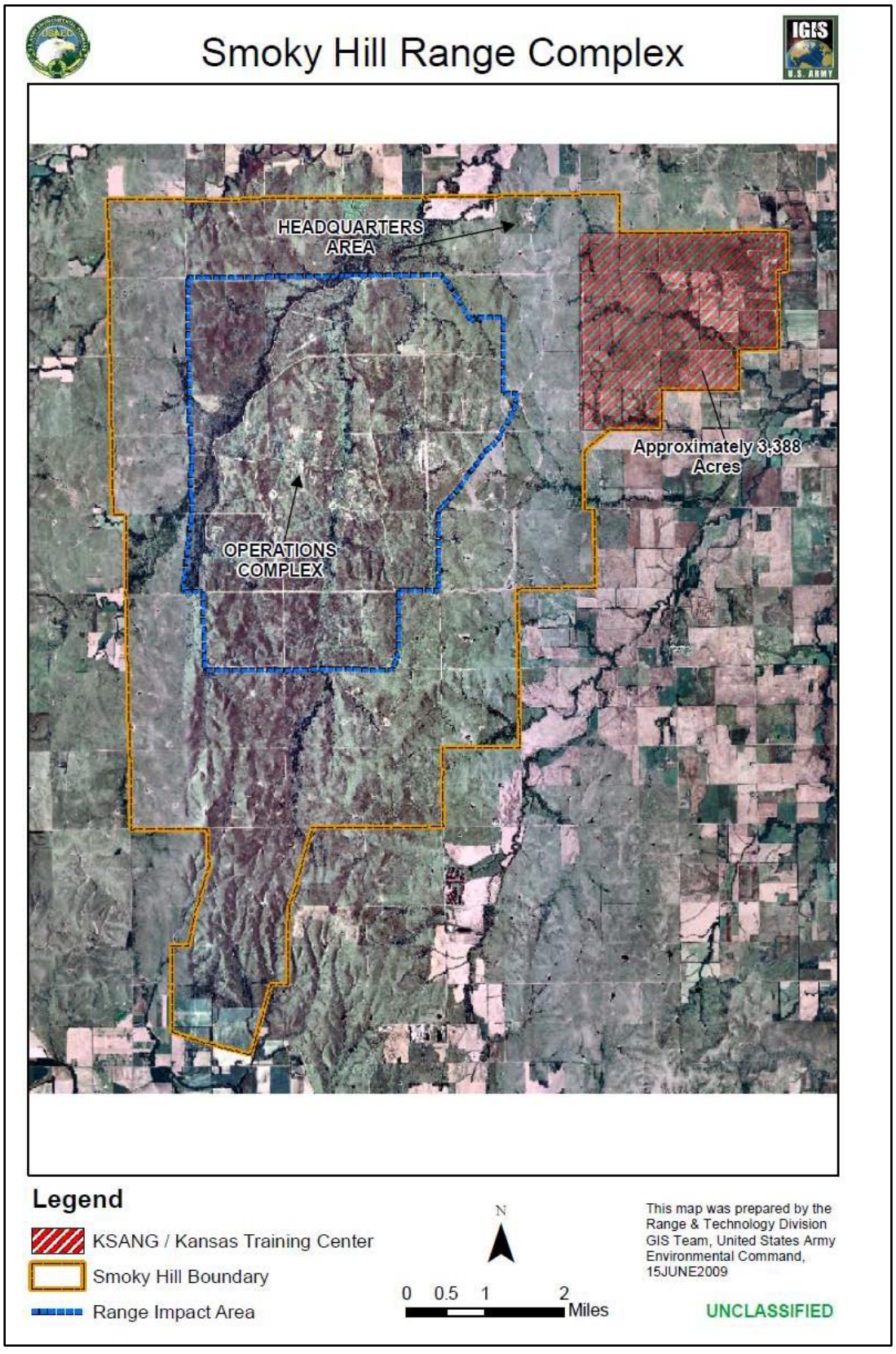
Figure 3.4-2. Location of Smoky Hill Range Relative to Fort Riley



The Kansas Training Center (KSTC) is an area at the northeast corner of Smoky Hill Range that could host Army and ARNG maneuver exercises. It is approximately 3,500 acres (Figure 3.4-3). The KSTC could host up to 10 battalion exercises annually with each training exercise lasting up to two weeks. Up to eight company/battery level exercises could be conducted annually. Each exercise would last five to seven days. Battalion and company/battery training exercises will not be conducted simultaneously. Division level and BCT level command centers could be established on the range up to six times annually each lasting up to 10 days.

[75] Source: http://www.kansastag.gov/gpjtc_default.asp Accessed on May 6, 2020.

Figure 3.4-3. Map of Smoky Hill Range



3.4.2 Air Quality

3.4.2.1 Affected Environment

The ROI for Fort Riley includes Geary and Riley Counties, and the ROI for Smoky Hill Range includes Saline and McPherson Counties. The 2011 Air Emission inventories for both ROIs are shown in Table 3-25.

Table 3-2425. County Air Emissions Inventories (2011) in Tons per Year

Location	NO_X	VOCs	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e[76]
Geary County	2,325	10,705	28,292	253	5,810	2,604	687,249
Riley County	2,548	13,711	35,945	316	9,440	3,427	814,866
McPherson County	5,566	10,783	20,780	174	15,007	3,572	442,638
Saline County	3,970	10,303	23,194	157	10,025	2,629	640,399

NO_x = nitrogen oxides; VOC = volatile organic compounds; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 microns in diameter; CO_2e = carbon dioxide equivalent.
Source: (EPA 2017c)

As of 2018, Fort Riley remains in an attainment area for all criteria pollutants (Army 2018). As of May 31, 2020, all of McPherson County is an attainment area for all criteria pollutants as is Saline County, except for a small area in Salina, Kansas. This area is nonattainment for lead and is about 10 miles east of Smoky Hill Range[77].

3.4.2.2 Environmental Consequences

Air quality at Fort Riley is in attainment for all criteria pollutants. At Smoky Hill Range, Saline County is nonattainment for the lead. The Proposed Action will not contribute measurable amounts of lead to the atmosphere. As noted in Section 3.1.1.2, dust will contribute to the emissions of PM_{10} and $PM_{2.5}$ at Fort Riley and Smoky Hill Range. The total increase is anticipated to be 935.6 tons per year with approximately 814 tons as PM_{10} and 121 tons as $PM_{2.5}$. The PM_{10} should settle out of the air rapidly and not impact air quality away from the activities generating the dust. With the addition of the dust emissions, the impacts are as described in Section 3.1.1.2. Air quality impacts from the Proposed Action are expected to be less than significant due to stationing 235 additional tactical vehicles at Fort Riley. This is approximately 5.8 percent of the total number of tactical vehicles.

3.4.2.3 Cumulative Effects

It is anticipated that adding eight of the 13 systems in addition to the Proposed Action at Fort Riley would only cause minimal increases in the emission of pollutants. Many of these systems are replacing existing systems on a one-for-one basis. There would only be a minimal increase of

[76] CO_2e is calculated by: $CO_2e = CO_2$ + Methane * 25 + N_2O * 298
[77] https://www3.epa.gov/airquality/greenbook/mbp.html#Lead.2008.Salina accessed 1 June 2020.

additional vehicles operated during training, and most of the new systems would operate from fixed or semi-fixed positions.

3.4.3 Airspace[78]

3.4.3.1 Affected Environment

The ROI for airspace is the SUA areas above and nearby the installation that are controlled by Fort Riley. The Smoky Hill Range also has SUA designated for use by military operations. The airspace is defined on aeronautical charts and may be exclusive, limiting non-participating (e.g., commercial and general aviation) users or it may simply be advisory, indicating to non-participating users of the airspace that military operations are occurring in certain areas, requiring an extra measure of vigilance.

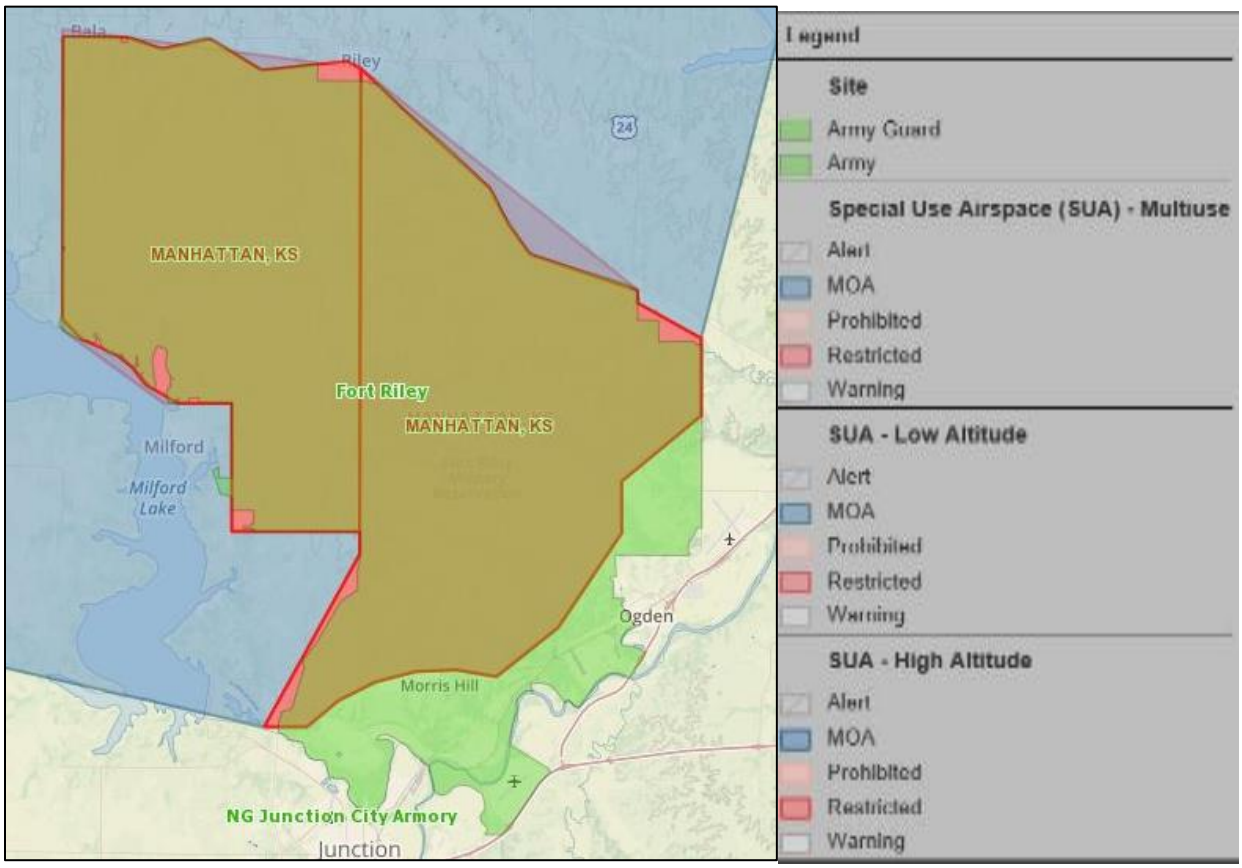
The SUA is a complex set of restricted areas for exclusive use and Military Operations Areas (MOAs) that are advisory. The SUA is designed to ensure the segregation of incompatible, non-participating aircraft from potentially hazardous operations occurring either in flight (e.g., munitions releases, unmanned aerial systems [UAS] operations) or on the ground (e.g., artillery ranges, testing activities). An MOA does not provide the exclusive use required to support M-SHORAD range activities and will not be addressed in this document. Fort Riley has restricted airspace reaching a maximum altitude of 29,000 feet and an approximate area of 360.69 km^2. Figure 3.4-4 shows the location of Fort Riley's Airspace. Smoky Hill Range also has restricted airspace reaching a maximum altitude of 23,000 feet and an approximate area of 241 km^2. Figure 3.4-5 shows the location of the Smoky Hill Range Airspace. The geographic relationship of Fort Riley and Smoky Hill Range is shown in Figure 3.4-6.

The major airspace units are subdivided vertically and horizontally, enabling airspace managers and schedulers to activate particular blocks of airspace that are sized appropriately to the activities occurring within them. A wide variety of activities occur within the SUA; however, for the SUA managed by Fort Riley and Smoky Hill Range, the principal uses and purposes of the SUA supporting the M-SHORAD are:

- To protect non-participating aircraft from range activities occurring on the ground.
- To promote realistic training, allowing scenarios to unfold without training distracters such as suspensions required when civilian aircraft penetrate the restricted areas.

[78] Information based on IMCOM data 2020 and Defense Installation Spatial Data Infrastructure (DISDI).

Figure 3.4-4. SUA for Fort Riley, Kansas[79]



3.4.3.2 Environmental Consequences

Fielding the M-SHORAD battalion at Fort Riley may cause a minor, less than significant increase in Airspace use that can be accommodated within the current Airspace available to Fort Riley.

3.4.3.3 Cumulative Effects

There could be a small increase in Airspace use due to adding eight new systems at Fort Riley. Any required increases in use can be accommodated within the current Airspace available to Fort Riley. Therefore, cumulative effects to Airspace are expected to be less than significant.

[79] DISDI Atlas. https://rsgisias.crrel.usace.army.mil/disdi_atlas/ Accessed on April 28, 2020.

Figure 3.4-5. SUA for Smoky Hill Range, Kansas[80]

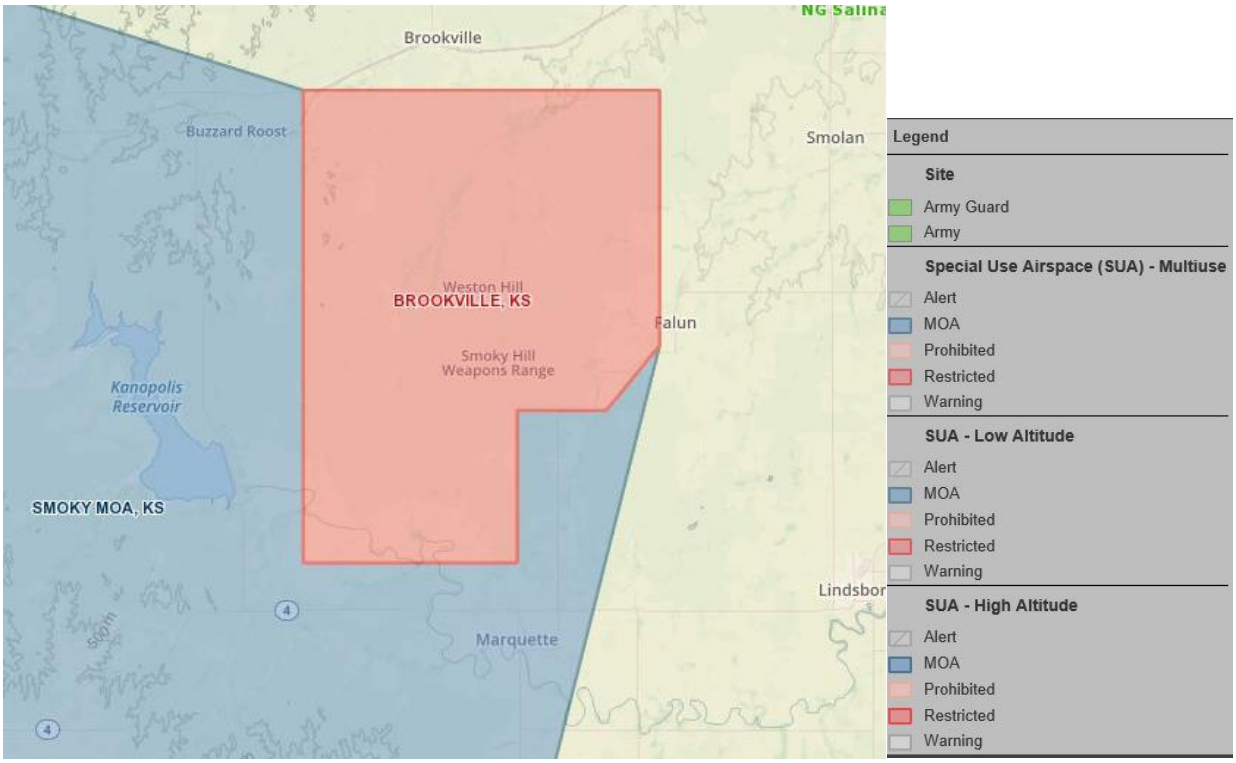
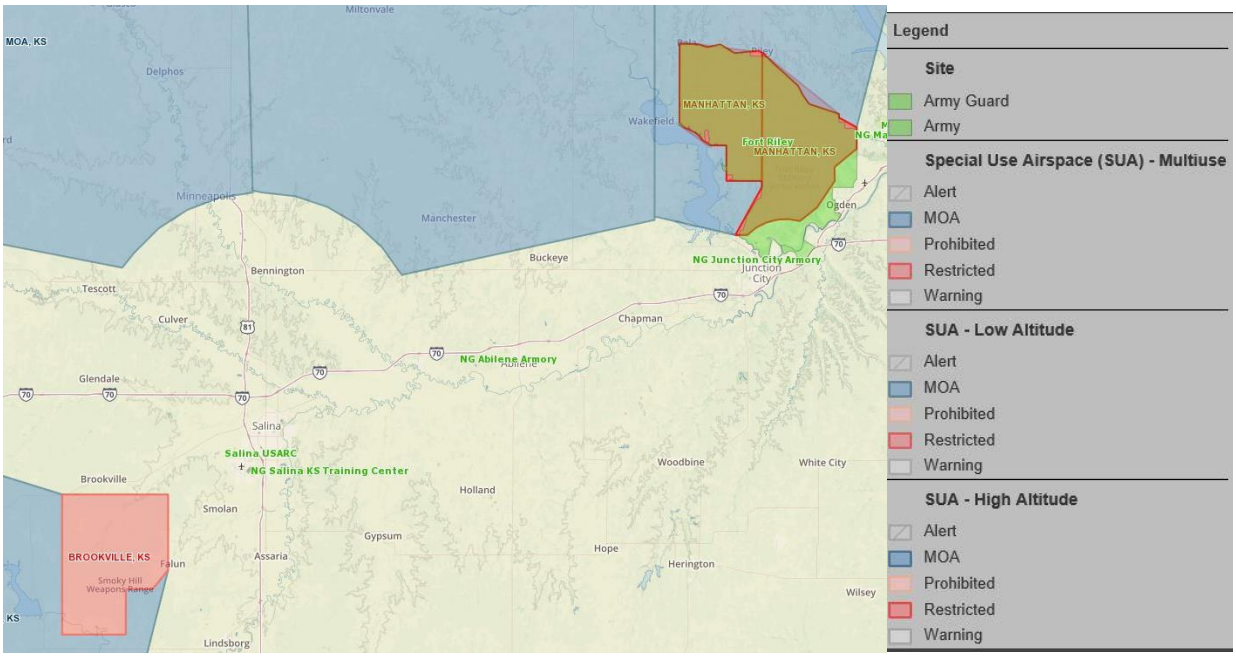


Figure 3.4-6. Map of SUA for Smoky Hill Range Relative to Fort Riley[81]



[80] DISDI Atlas. https://rsgisias.crrel.usace.army.mil/disdi_atlas/ Accessed on April 28, 2020.
[81] DISDI Atlas. https://rsgisias.crrel.usace.army.mil/disdi_atlas/ Accessed on April 28, 2020.

3.4.4 Biological Resources

3.4.4.1 Affected Environment

3.4.4.1.1 Flora

At Fort Riley, grasslands comprise approximately 67 percent of the installation (Fort Riley 2016). The native grasslands of Fort Riley consist primarily of tallgrass prairie (Figure 3.4-7). Some elements of the mixed-grass prairie exist because Fort Riley is located near the transition zone between the tallgrass prairie and the mixed-grass prairie to the west (Kuchler 1974).

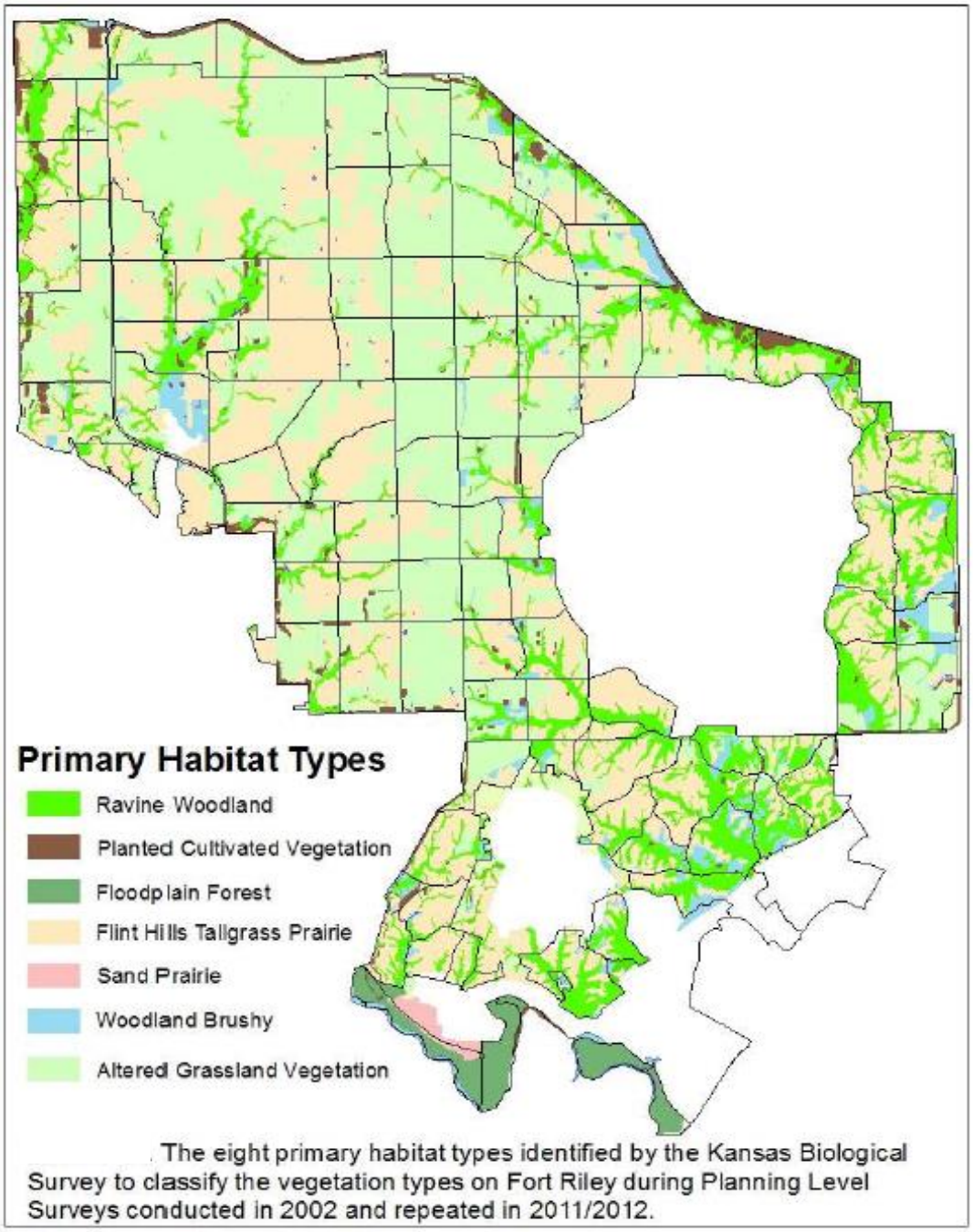
The native grasslands on Fort Riley generally do not exhibit classic tallgrass prairie, which would be composed of big bluestem, indiangrass, switchgrass, or the mixed-grass prairie, such as little bluestem and sideoats grama. Past land-use activities, minimal management, lack of large herbivore grazing, and military training exercises have produced native grasslands that exhibit a less than pristine species composition and that have been invaded by woody species. The grasslands with the least disturbance contain the highest percentages of native warm-season grasses and associated forbs (Fort Riley 2016).

Prairie grasslands cover approximately 92 percent of the 33,873-acre Smoky Hill Range. They include native grasslands and disturbed or brome-dominated grasslands. The native grasslands are dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and switchgrass (*Panicum virgatum*) and also include various wildflowers such as aster (*Aster spp.*), goldenrod (*Solidago spp.*), and prairie coneflower (*Ratibida spp.*) (Kansas Biological Survey (KBS) 2006). Other native grasslands are dominated by big bluestem, Indiangrass (*Sorghastrum nutans*), little bluestem, side-oats grama (*Bouteloua curtipendula*), and blue grama (*Bouteloua gracilis*) (KBS 2006). The grasslands that have been subjected to manmade disturbances, mainly agriculture, are dominated by smooth brome (*Bromopsis inermis*). Many of the disturbed grasslands are in varying stages of recolonization by native grassland species.

Forestlands comprise approximately 16 percent of Fort Riley. Most of this acreage is associated with the bottomland forests along the Republican and Kansas Rivers and the woodlands within the drainages of Threemile, Sevenmile, and Wildcat Creeks. However, upland forests occur along the mainstems of most streams on the installation.

Freeman and Delisle (2004) identified three forest communities (Eastern cottonwood-Willow Forest, Eastern cottonwood-Sycamore Forest, and Green ash-Elm-Hackberry Forest) and one woodland community (Chinquapin oak-Bur oak Ravine Woodland) on Fort Riley. Forest communities generally had 61–100 percent tree canopy cover, three distinct canopy layers (over-story trees, understory shrubs, herbaceous layer), and trees >5 m tall. Woodland communities usually had 26–60 percent canopy cover and trees <5 m tall (Fort Riley 2016).

Figure 3.4-7. Primary Habitat Types on Fort Riley



The eight primary habitat types identified by the Kansas Biological Survey to classify the vegetation types on Fort Riley during Planning Level Surveys conducted in 2002 and repeated in 2011/2012.

Upland forests and woodlands encompass approximately 4.5 percent of the Smoky Hill Range including planted bur oak (*Quercus macrocarpa*)[82]. Other timber species found at Smoky Hill Range include black walnut (*Juglans nigra*), osage orange (*Maclura pomifera*), smooth sumac (*Rhus glabra*), mulberry (*Morus spp.*), cottonwood (*Populus deltoids*), and boxelder (*Acer negundo*) which provide valuable wildlife habitat and protection. Smooth sumac and osage

[82] Personal communication, Mr G Wiens, Smoky Hill Range Natural Resources Manager, 14 January 2021.

orange are undesirable invasive species in the pasturelands (Kansas Air National Guard (KSANG) 2001).

3.4.4.1.2 Fauna

Fort Riley's habitat supports at least 40 species of mammals, 269 species of birds, 47 species of turtles, reptiles, and amphibians, and 60 species of fish (Fort Riley 2016a). This includes a variety of upland game birds, big game species, and furbearer species (U.S. Army 2018).

Wildlife habitat on Smoky Hill Range is associated with prairie grassland, woodland, and riparian vegetation types. The majority of wildlife on the range is associated with prairie grassland habitats. Riparian habitats along intermittent streams also provide habitat for wildlife species. Existing data on wildlife species and descriptions of wildlife habitats present on the range are documented in the INRMP (KSANG, 2007) and a Natural Features Inventory of the Smoky Hill Air National Guard Range (KBS, 2004).

Mammals

Approximately 42 species of mammals, including 25 species of small mammals, reside on Smoky Hill Range. Typical carnivores observed include red fox (*Vulpes vulpes*), bobcat (*Felis rufus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), and striped skunk (*Mephitis mephitis*). White-tailed deer (*Odocoileus virginianus*) inhabit the range, especially in riparian corridors and undeveloped portions of the property. Small mammals found on Smoky Hill Range, including the eastern mole (*Scalopus aquaticus*), Elliot's short-tailed shrew (*Blarina hylophaga*), and eastern woodrat (*Neotoma floridana*), are the major prey base for raptors, snakes, and carnivorous mammals (KSANG, 2001). The black-tailed prairie dog (*Cynomys ludovicianus*), is resident on the KSTC but not the remainder of Smoky Hill Range. Mammal species at Fort Riley are similar, with the exception of black-tailed prairie dogs.

Birds

The avifauna of Fort Riley is rich and diverse, with 269 bird species documented on the installation (Fort Riley, 2016). As is typical for Kansas, most of these species are migrant, non-game songbirds. The birds occupy a wide range of habitat types on the installation, from riverine sandbars to interior woodlands.

Numerous inventories of birds have been conducted on Fort Riley. Surveys have documented 134 bird species on Fort Riley during "breeding safe dates," i.e., periods when migrants of that species are expected to be absent from Kansas. Of these, 110 are confirmed or probable breeders. The most abundant breeding birds are brown-headed cowbird, dickcissel, grasshopper sparrow, eastern meadowlark and mourning dove.

Other notable breeding birds include Henslow's sparrow, loggerhead shrike, and the interior woodland species ovenbird, wood thrush, and prothonotary warbler. Common woodland species

include blue jay, black-capped chickadee, and northern cardinal. Common shrubby edge species include brown thrasher, common yellowthroat, and field sparrow.

Common raptors are the red-tailed hawk, northern harrier, great horned owl, barred owl, bald eagle, eastern screech-owl, and American kestrel. Common shorebirds are killdeer, greater yellowlegs, lesser yellowlegs, least sandpiper, and spotted sandpiper. Common wading birds are great blue heron, great egret, and little blue heron. Common winter birds are Harris's sparrow, American tree sparrow, and dark-eyed junco.

Birds use a variety of habitats on Smoky Hill Range, including marshes, forests, shrublands, and grasslands. Smoky Hill Range supports habitat for approximately 142 species of birds, including 19 game species, 90 breeding birds, and 33 wintering bird species. Raptor species seen on the range include osprey (*Pandion haliaetus*), northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk (*Buteo jamaicensis*). Common wading birds in the area include the black-crowned night heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and the green heron (*Butorides virescens*). Shorebirds, including killdeer (*Charadrius vociferus*), semipalmated plover (*Charadrius semipalmatus*), ring-billed gull (*Larus delawarensis*), black tern (*Chlidonias niger*), and sandhill cranes (*Grus canadensis*), have the potential to occur on Smoky Hill Range (KSANG, 2001).

Reptiles and Amphibians

Fort Riley supports the variety of snakes, turtles, lizards, frogs, and toads commonly found in the tallgrass prairie region (Busby et al. 1994). Forty-seven species of reptiles and amphibians (21 species of snakes, 9 lizards, 7 turtles, and 10 amphibians) have been captured or observed on Fort Riley (Fort Riley 2016). The most common species are ringneck snake and western chorus frog. No listed threatened or endangered species are known to occur. The venomous copperhead is common in woodlands on Fort Riley. In 2005, there was a report of a massasauga in Maneuver Area N. However, the snake was not captured, no picture was taken to confirm the identification, and the individual was not certain of the identification. Thus, the species is not included. A photo of a timber rattlesnake reportedly taken from Fort Riley in 2010 has been received by the Conservation Branch (Fort Riley 2016).

Approximately 30 species of reptiles and 16 species of amphibians are found on Smoky Hill Range. Typical herptile species include common snapping turtle (*Chelydra serpentina*), yellow mud turtle (*Kinosternon flavescens*), red-eared slider (*Chrysemys scripta*), ornate box turtle (*Terrepene ornate*), hognose snake (*Heterodon nasicus* and *H. platyrhinos*), massasauga (*Sistrurus catenatus*), bull snake (Pituophis catenifer), western ribbon snake (*Thamnophis proximus*), prairie rattlesnake (*Crotalus viridus*), diamondback water snake (*Nerodia rhombifera*), northern water snake (*Nerodia sipedon*), and Graham's crayfish snake (*Regina grahami*) (KSANG 2001).

3.4.4.1.3 Protected Species

The three federally listed species that are documented on Fort Riley are the endangered Topeka shiner (*Notropis Topeka*), and the piping plover (*Charadrius melodus*) and black rail (*Laterallus jamaicensis)* which are threatened. The least tern was recently delisted by the USFWS. The bald eagle, delisted in 2007, is a year-round resident. The Topeka shiner has been found in Wildcat, Sevenmile, Wind, Honey, Silver and Little Arkansas Creeks (Figure 3.4-8). It is believed that Topeka shiners potentially may immigrate into Fourmile, Threemile, and Forsyth Creeks. The piping plover is uncommon, primarily a transient migrant, but also a potential breeder along the Republican and Kansas Rivers' sandbars. The piping plover has been observed along the Republican and Kansas Rivers sandbars. Potential habitat for these species is shown in Figure 3.4-9. The black rail is uncommon, but is a potential breeder in wetland areas. The black rail has been observed in upland habitats on Fort Riley during the migratory seasons. Fort Riley falls within the migratory path and historic range of three other rare species. The endangered whooping crane is a spring and fall migrant has been observed on the Milford lake wildlife area within two and a half miles of Fort Riley. The historic range of threatened northern long-eared bat includes much of Kansas, but has not been found in the Fort Riley area. The threatened red knot is a rare spring and fall transient shorebird that could be found throughout Kansas. It remains possible that these species may be encountered within the installation's boundaries or airspace.

There are three resident species of Fort Riley that were petitioned to list under the ESA and are currently under review. The monarch butterfly and the regal fritillary butterfly are common residents of the Fort Riley prairie landscapes. The tri-colored bat has been documented during acoustic bat surveys and observed in multiple roost sites and in one hibernacula.

The Army created a SAR (Species at Risk) list to identify imperiled species that would have a significant impact on military missions if federally-listed as threatened or endangered. The objective of creating the SAR list is to proactively conserve these species and thereby preclude the need for a future listing. Army-designated SARs that occur on Fort Riley are the Henslow's sparrow, regal fritillary butterfly, rusty blackbird and Texas horned lizard.

Figure 3.4-8. Streams with Topeka Shiner Captures or Possessing Apparently Suitable Habitat

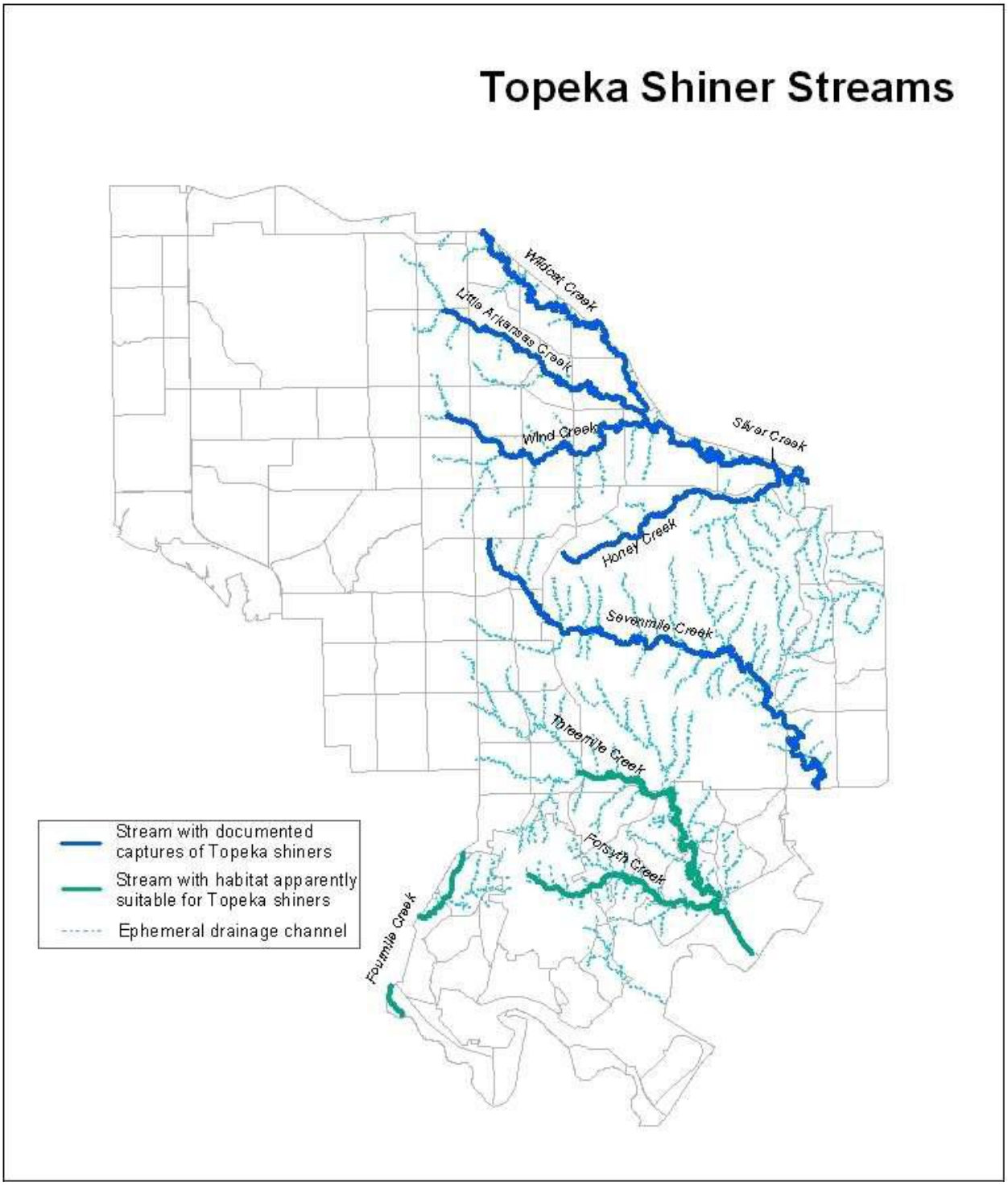
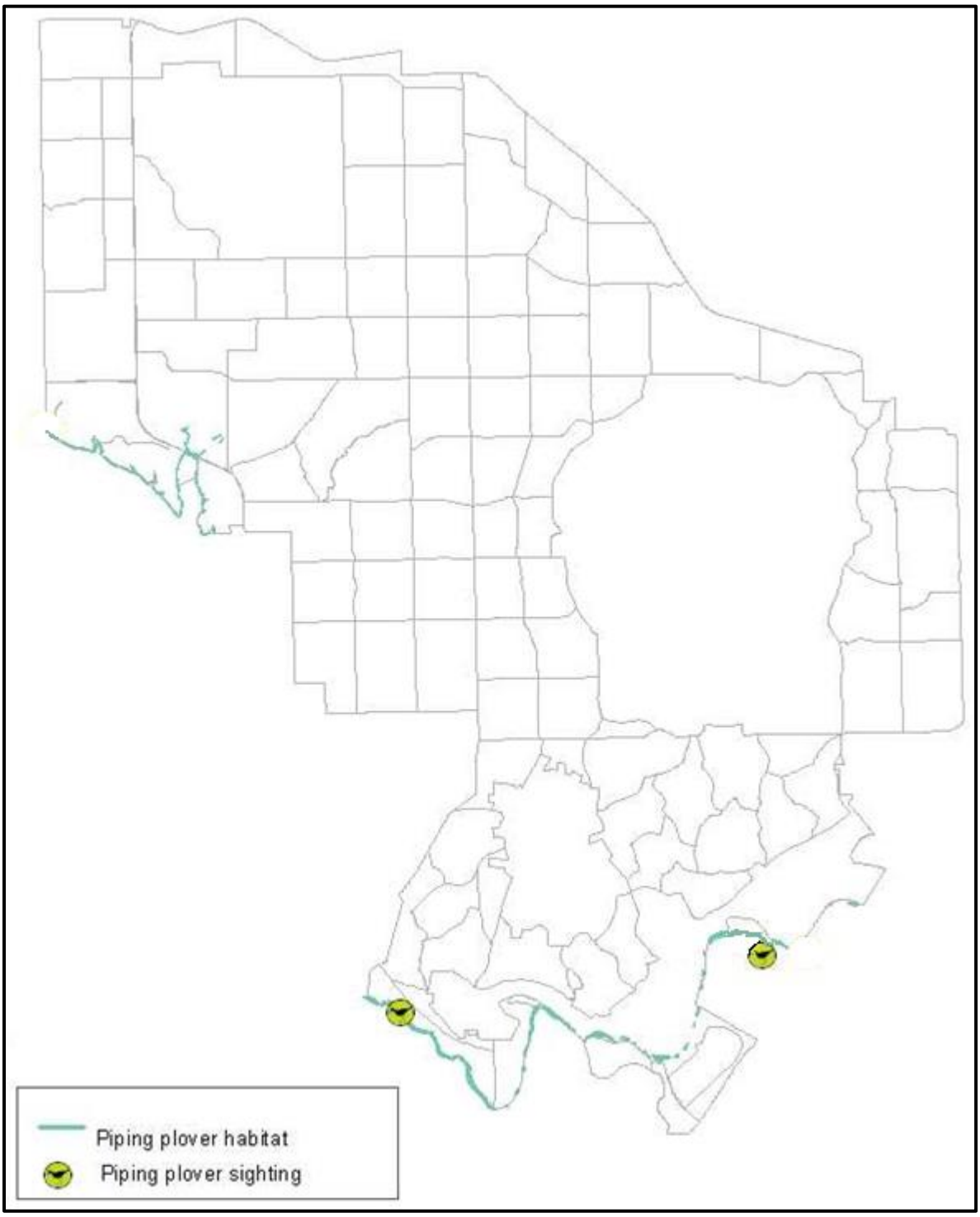


Figure 3.4-9. Sandbar/Beach Habitat that Attracts Piping Plovers with Sightings



Source: Fort Riley 2016 as modified by USAEC 2021 to account for least tern delisting

No federally listed species are known to occur on Smoky Hill Range (U.S. Army 2010a).

The bald eagle, while no longer federally-listed as threatened, still receives federal protection under the BGEPA (16 U.S.C. 668-668c), enacted in 1940. Five locations with eagle nests occur

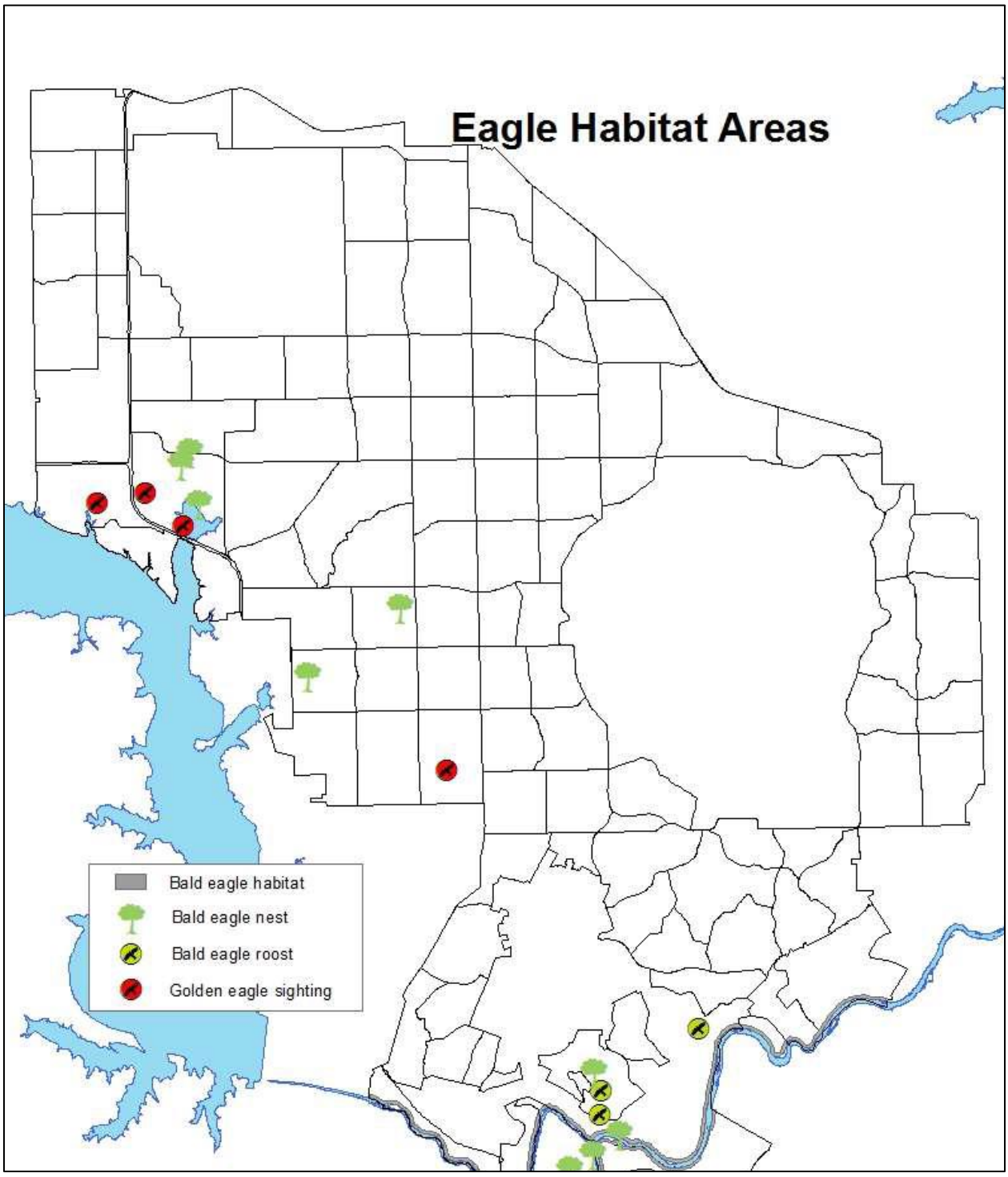
on and around Fort Riley. Three eagle nests occur near Madison Creek Cove, Milford Lake on Fort Riley. This area has had one pair of nesting eagles annually since 2004. The second area with an eagle nest is on USACE property along Farnum Creek, adjacent to Fort Riley. This nest was first used in 2005, was occupied annually for 11 years, but was unoccupied in 2016. Meanwhile, a new, active bald eagle nest was located on Fort Riley (TA 54) in 2016, approximately 3.5 miles from the Farnum Creek nest. The fourth area is around the confluence of the Kansas River, where four nests exist. Two nests are along the Kansas River on Fort Riley, and two nests are along the Smoky Hill River just upstream from the installation. One pair of nesting eagles have been active in this locale annually since 2009. Additionally, a fifth eagle nesting location exists approximately one mile west of the installation along the old channel of the Republican River below Milford Dam. Bald eagles roost along the Kansas and Smoky Hill rivers, and are frequently observed perched along the Republican River, Kansas River, and Milford Lake shorelines, and flying over Fort Riley. Important bald eagle habitat areas and golden eagle sightings are shown in Figure 3.4-10. Additionally, Fort Riley has documented sightings of golden eagles in Maneuver Areas A, G, and H. Golden eagles also are protected by the BGEPA.

Bald and Golden Eagles are not known to inhabit or use the Smoky Hill Range (U.S. Army, 2010a).

There is no federally listed critical habitat on Fort Riley. The Department of the Interior initiated a policy to exclude military facilities from critical habitat if there was an approved INRMP for that facility, which addressed the species in question. The rationale for this policy was that an INRMP is a planning document that allows the military to implement landscape-level management of its natural resources while coordinating with various stakeholders.

There are no critical habitat designations in McPherson or Saline Counties.

Figure 3.4-10. Eagle Habitat and Sighting Areas



3.4.4.2 Environmental Consequences

No significant impacts are expected to biological resources at Smoky Hill Range. There are no known threatened or endangered species, critical habitat, or bald and golden eagles at Smoky

Hill Range. Also, there are no unique floral or faunal communities at Smoky Hill Range. No soldiers would be stationed at Smoky Hill Range.

Impacts from Construction

Within the cantonment area, Fort Riley may construct two barracks of approximately 4.5 acres each. Impacts would include grading and removal of vegetation which could support wildlife habitats.

Construction of a battalion complex may also be required. The battalion area complex may encompass 45 acres, but actual ground disturbance for each building would be substantially less. The battalion area would consist of a battalion HQ, battery HQs, a company HQ, a vehicle maintenance shop, an oil storage building, and an organizational vehicle parking area. The HQ buildings may be combined into a single HQ complex. The vehicle maintenance shop and oil storage building would be constructed within the confines of the organizational vehicle parking area. In the vicinity of the possible location of the complex, there exists a small pond and some riparian areas with dense vegetation. Adverse impacts would include the removal of vegetation, grading, and filling which could alter wildlife habitats.

Construction within the cantonment would avoid streams documented to contain the federally listed Topeka shiner. In addition, construction would not occur in areas documented to contain the piping plover or bald and golden eagles.

Impacts from construction within the cantonment are expected to be minor because the planned sites may be previously disturbed terrain, partially overlap an existing parking lot, and adjacent to existing roads. All areas would be appropriately assessed and permitted before commencing construction. During construction, all required erosion and sediment control measures and appropriate BMPs would be used. Therefore, impacts are expected to be adverse but less than significant.

Construction of a new range[83] that can accommodate live-fire training of all weapon systems, including the M-SHORAD, is in the planning stages. The proposed location has been approved by the installation's leadership and is currently projected to occur at the northwest side of the impact area within training areas 46, 90, and 91 and extending into the impact area in a southeast direction. This range location would straddle Honey Creek and ephemeral tributaries to Wind Creek. Honey Creek and Wind Creek are known to be occupied by the federally listed Topeka shiner. Construction within the new range would be planned to avoid or minimize impacts to the Topeka Shiner. No other listed species have been documented to occur in the area. Therefore, impacts are expected to be adverse but less than significant.

No construction is required for maneuver training or at Smoky Hill Range as a result of the Proposed Action.

[83] Please note that the proposed new range is a separate project from the Proposed Action and will undergo separate environmental review.

Impacts from Live Fire Training

Live-fire training takes place within the designated range complex at Fort Riley. Seven Mile Creek, Three Mile Creek, Honey Creek, and tributaries to Wind Creek flow through the range complex. These creeks hold populations or have suitable habitat for the Topeka shiner. Use of the live-fire ranges may increase erosion, soil compaction, and the potential for range fires within the ravine woodland, flint hills tall grass prairie, and altered grassland plant communities present in the range complex. Consequences of these activities may adversely impact the Topeka shiner by increasing erosion and sedimentation into the creeks and tributaries. Other listed species are not documented to occupy the area. These impacts are expected to be less than significant because Fort Riley implements erosion and sediment control measures, land rehabilitation and maintenance, and range assessments to minimize negative impacts.

Impacts from Maneuver Training

Impacts from maneuver training are similar to those of live-fire training but would encompass all known Topeka shiner habitat on Fort Riley. Also, a bald and golden eagle habitat occurs within the maneuver training areas. However, there are 200-meter buffers around eagle roost and nest sites, and no tree removal is permitted within 100 meters of a nest increasing to 200 meters during the breeding season. Therefore, impacts are expected to be less than significant.

Impacts from Increase in the Number of Soldiers

Documented habitat and sightings of bald and golden eagles, as well as the piping plover, occur near the cantonment area along the Kansas and Republican Rivers. The increase in soldiers and families resulting from the Proposed Action could increase human presence, traffic, noise, pets, and trash within and near the occupied habitat. As a result, species could be disturbed and avoid or abandon the area. These impacts are expected to be less than significant because Fort Riley has established and marked appropriate buffer zones around eagle nesting and roosting areas and riparian areas in the INRMP (2016).

3.4.4.3 Cumulative Effects

Fielding eight of the 13 systems is not expected to result in new facility construction but may require expansion or renovation of existing facilities. An expected increase of approximately 3 percent more soldiers would be using the maneuver and live-fire ranges resulting in minor increases in the intensity and frequency of use of the training areas that are expected to be less than significant. Adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Riley is expected to have a less than significant cumulative impacts to biological resources because it represents a small population increase of less than 0.9 percent within the ROI.

3.4.5 Cultural Resources

3.4.5.1 Affected Environment

3.4.5.1.1 Cultural Resources Present at Fort Riley

Fort Riley has identified and manages 985 archeological sites—472 historic civilian, 135 historic military, 30 multi-component, and 348 prehistoric archeological sites. To date, 56 archeological sites have been determined eligible for the NRHP (Fort Riley 2020 pers. comm.[84]). The Cultural Resource Management Program staff also manages three Historic Districts, including the Main Post Historic District, the Packers Camp, Marshall Army Airfield. The Main Post Historic District is a one-mile square area (2.6 km^2) containing 259 historic facilities and has been listed on the NRHP since 1974. The three historic districts are shown in Figure 3.4-11. A more detailed list is below.

- **Archaeological survey**
  - 83,055 total acreage of installation
  - 65,277 acres surveyed (78.6 percent)
- **985 total archaeological sites**
  - Site types
    - 472 Historic civilian
    - 135 Historic military
    - 348 prehistoric
    - 30 multicomponent
  - Designation status
    - 56 evaluated and determined eligible for the NRHP
    - 628 evaluated and determined not eligible
    - 14 sacred sites (no need for further evaluation)
    - 57 located in Impact Zone or MPRC (too hazardous for evaluation)
- **754 facilities age 50 or over on installation**
  - 457 are historic
  - 147 determined not historic
  - 150 not evaluated (treat as historic), of which many are located on the ranges
- **Three Districts**
  - Main Post
    - Listed on National Register
    - 259 historic facilities (148 privatized)
  - Packers Camp
    - 2 historic facilities
  - Marshall Army Air Field
    - 20 historic facilities (12 privatized)
- **WWII Temporary Bldgs** – 4 facilities in Funston addressed by Programmatic Memorandum of Agreement
- **WWII & Cold War Ammo** – 9 facilities in ASP area addressed by Program Comment
- **Capehart-Wherry** – 142 housing facilities in Custer Hill Family Housing Area addressed by Program Comment

[84] Theresa de la Garza. 2020. Email regarding updated cultural resources information on Nov 18, 2020.

- **Cold War Unaccompanied Personnel Housing** – 16 facilities on Custer Hill Troop Area addressed by Programmatic Memorandum of Agreement
- **Inter-War Era Housing** – 55 housing facilities (and other ancillary features) in the Main Post Historic District and Marshal Army Airfield addressed by new Program Comment[85]

Figure 3.4-11. The Historic Districts on Fort Riley

[85] Per 36 CFR § 800.14 (e) a Program Comment is an alternative that allows a federal agency to request the ACHP comment on a category of undertakings in lieu of commenting on a case-by-case basis.

Known Cultural Resource Sites at Smoky Hill Range

Smoky Hill Range is overseen by the KSANG 184th Wing located at McConnell AFB, Kansas, and is maintained and operated by the 184 WG/Det 1, located at Smoky Hill Range.

Following Section 106 of the NHPA, cultural resource surveys have been completed throughout much of the Smoky Hill Range and the installation staff has consulted with the SHPO on these surveys. A total of 67 archaeology sites have been identified at Smoky Hill Range, including 22 prehistoric and 45 historic sites (Air National Guard Readiness Center (ANGRC) 2005). Currently, no sites are listed on the NRHP. Evaluation (Kansas Phase III) to determine eligibility for listing on the NRHP has been recommended for four archaeological sites (three prehistoric sites and one historic site). Another historic site identified through a previous reconnaissance survey has been recommended for subsurface testing (Kansas Phase IIB). The remaining 62 sites have been determined to be ineligible for listing on the NRHP and require no further work (ANGRC 2005).

Built resources typically must be 50 years of age to be eligible for listing on the NRHP unless the resources meet Criterion Consideration G for "exceptional significance." All buildings on the range were examined in 1998 for eligibility to the NRHP (ANGRC 2005). Currently, none of the buildings has reached the 50-year age requirement, nor did they meet Criterion Consideration G; therefore, no buildings are currently eligible for listing on the NRHP. However, the Integrated Cultural Resources Management Plant (ICRMP) recommends architectural evaluation of Smoky Hill Range Buildings 6001 and 6011 in 2009 (ANGRC 2005). Several branches of the DoD also are exploring whether or not Cold War-era facilities (1946 through 1989) meet Criterion Consideration G. If guidelines for evaluating Air National Guard (ANG) properties during that period become available, additional consideration may be given to evaluating the significance of these buildings.

Among the structures located at Smoky Hill Range are 18 bridges and culverts built during the 1930s under the Work Progress Administration (WPA) and other federal programs. Those structures that occur on the KSARNG portion of the range have been evaluated and none were found to be eligible for the NRHP. The bridges that occur on other portions of the range have not received a formal survey by a qualified architectural historian. However, their locations have been mapped and they have been photographed during an archaeological reconnaissance survey. A formal architectural evaluation of these bridges and culverts and any additional WPA projects not previously identified have been recommended, as has an architectural evaluation of four World War II-era bunkers on the range (ANGRC 2005). Until a determination of NRHP eligibility is made for these resources, they must be treated as if they are historic resources.

Potential Cultural Resource Sites at Smoky Hill Range

There are 4,426 acres at Smoky Hill Range with a high probability of containing both prehistoric and historic cultural resources. Of these, 3,059 acres have not yet received an archaeological

survey, including 1,403 acres within the impact area and 1,656 acres in the buffer zone and leased lands. An intensive survey (Kansas Phase IIB) should be conducted on any high probability areas before any activities that have the potential to disturb archaeological sites. Survey methods for various types of terrain are specified in the ICRMP (ANGRC 2005). The remaining 26,166 acres are classified as a low probability for archaeological resources and are of no further management concern (ANGRC 2005).

A historic probability model created by examining historical atlases of Saline County identified potential sites of 54 previously unknown 19th-century homesteads on Smoky Hill Range. Of these, 38 have been visited. The remaining 16 locations, as well as many homesteads that continued to be occupied into the twentieth century, have not received a reconnaissance survey and have been designated high probability zones for historic resources. Five previously unsurveyed homesteads settled by African Americans also are considered to be high probability areas, possibly with high potential levels of significance. Finally, there are 63 wells and cisterns that may have the potential to indicate the presence of associated homesteads, and small high probability areas have been designated around each of these wells. An intensive survey (Kansas Phase IIB) also has been recommended for all high probability areas (ANGRC 2005).

3.4.5.1.2 Consultation and Coordination with State and Tribal Governments

Fort Riley operates under the 2016 *Programmatic Agreement Among the United States Army Garrison Fort Riley, The Kansas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Operation, Maintenance, and Development of Fort Riley Clay, Geary and Riley Counties, Kansas* (Fort Riley 2016b). The PA ties together the more specific management practices and activities that the garrison had been accomplishing under several individual management plans and agreements. Stipulations within the PA include ground disturbance review protocols with the Cultural Resources Manager, protection measures, a monitoring strategy, and annual reporting to the SHPO. The PA also includes a list of activities exempted from further consultation as Fort Riley analyzes effects on historic properties and protected properties from military training, other activities, and natural processes.

As of 2015, 12 federally-recognized tribes indicated continued interest in prehistoric archeological resources at Fort Riley and expressed a desire to continue consultation under various preservation laws. The tribes with which Fort Riley consults and has informal NHPA Section 106 consultation agreements, include the Cheyenne River Sioux Tribe; Kaw Nation of Oklahoma; Kickapoo Tribe in Kansas; Kiowa Tribe of Oklahoma; Osage Nation; Otoe-Missouria Tribe of Indians; Pawnee Nation of Oklahoma; Ponca Tribes of Oklahoma and Nebraska; Prairie Band Potawatomi Nation; Sac and Fox Nation of Missouri in Kansas and Nebraska; and the Wichita and Affiliated Tribes. Fort Riley also maintains formal Comprehensive Agreements, related to compliance with NAGPRA, with both the Kaw Nation of Oklahoma and Pawnee Nation of Oklahoma.

3.4.5.2 Environmental Consequences

No activities related to the Proposed Action would take place within any Fort Riley historic district. Fort Riley has taken the necessary steps to protect cultural resources during the implementation of the Proposed Action.

Impacts from Construction

The Proposed Action may impact known cultural resources. All areas disturbed by construction within the cantonment, maneuver, and live-fire range areas would be surveyed for cultural resources unless a survey has been previously completed. There is at least one unevaluated range building in the cluster of facilities proposed for use with the M-SHORAD and a likely to be historic unaccompanied personnel housing and family housing facilities that are historic, but mitigated through a program comment. If other cultural resources are found, required consultations would be completed and appropriate mitigations would be implemented to meet federal, state, and Tribal requirements. Therefore, no significant impacts to cultural resources are anticipated.

Impacts from Live-Fire Training

When live for training is scheduled at a live fire range, the presence of cultural resources is taken into account and appropriate mitigations implemented to avoid or minimize adverse impacts to those resources and meet federal, state, and Tribal requirements. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Maneuver Training

In the maneuver training areas, any known cultural resources are appropriately documented and marked as off-limits to prevent damage. Soldiers are trained to recognize the off-limits markings and are required to avoid such areas. Therefore, less than significant impacts to cultural resources are anticipated.

Impacts from Increase in the Number of Soldiers

The increase in Soldiers and families resulting from the Proposed Action could increase human presence and traffic near cultural resources. As a result, the resources could be damaged by increases in access and general wear and tear, vibrations caused by traffic, or vandalism. These impacts are expected to be negligible because Fort Riley has established appropriate protective measures per their Cultural Resources standard operating procedures..

3.4.5.3 Cumulative Effects

Fielding of the eight new systems is not expected to result in new facility construction but may require expansion or renovation of existing facilities. An expected increase of approximately 3 percent more soldiers would be using the maneuver and live-fire ranges resulting in minor increases in the intensity and frequency of use of the training areas that are expected to be less

than significant. Adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Riley is expected to have a less than significant cumulative impacts to cultural resources because it represents a small population increase of less than 0.9 percent within the ROI.

3.4.6 Soils

3.4.6.1 Affected Environment

The primary soil association encountered in Fort Riley is the Wymore-Irwin. It is a deep, nearly level group of silty, clay loams found in the upland. The Smolan-Geary and the Clime-Sogn are also prevalent (Jantz et al, 1975). Smolan soils are composed of deep, gently sloping to sloping materials and are typically formed in loess. These tend to be moderately well to well -drained soils with slow permeability. Geary soils consist of deep, gently sloping and sloping deposits that are well drained and have moderate permeability. Clime soils consist of moderately deep, sloping to moderately steep deposits that are calcareous as a result of being formed from the weathered residuum of calcareous clayey shales. These soils have moderately well to well – drained characteristics with moderately slow permeability. Sogn soils are shallow, sloping underlain by limestone and were formed in residual material weathered from shale and limestone. They have moderate permeability and can be excessively drained. The Eudora-Haynie-Sarpy Eudora association is found on floodplains & terraces. The soils tend to be deep, nearly level silt loams, very fine sandy loams, and loamy fine sands with well-drained characteristics and are moderately permeable (Figure 3.4-12).

3.4.6.2 Environmental Consequences

Impacts from Construction

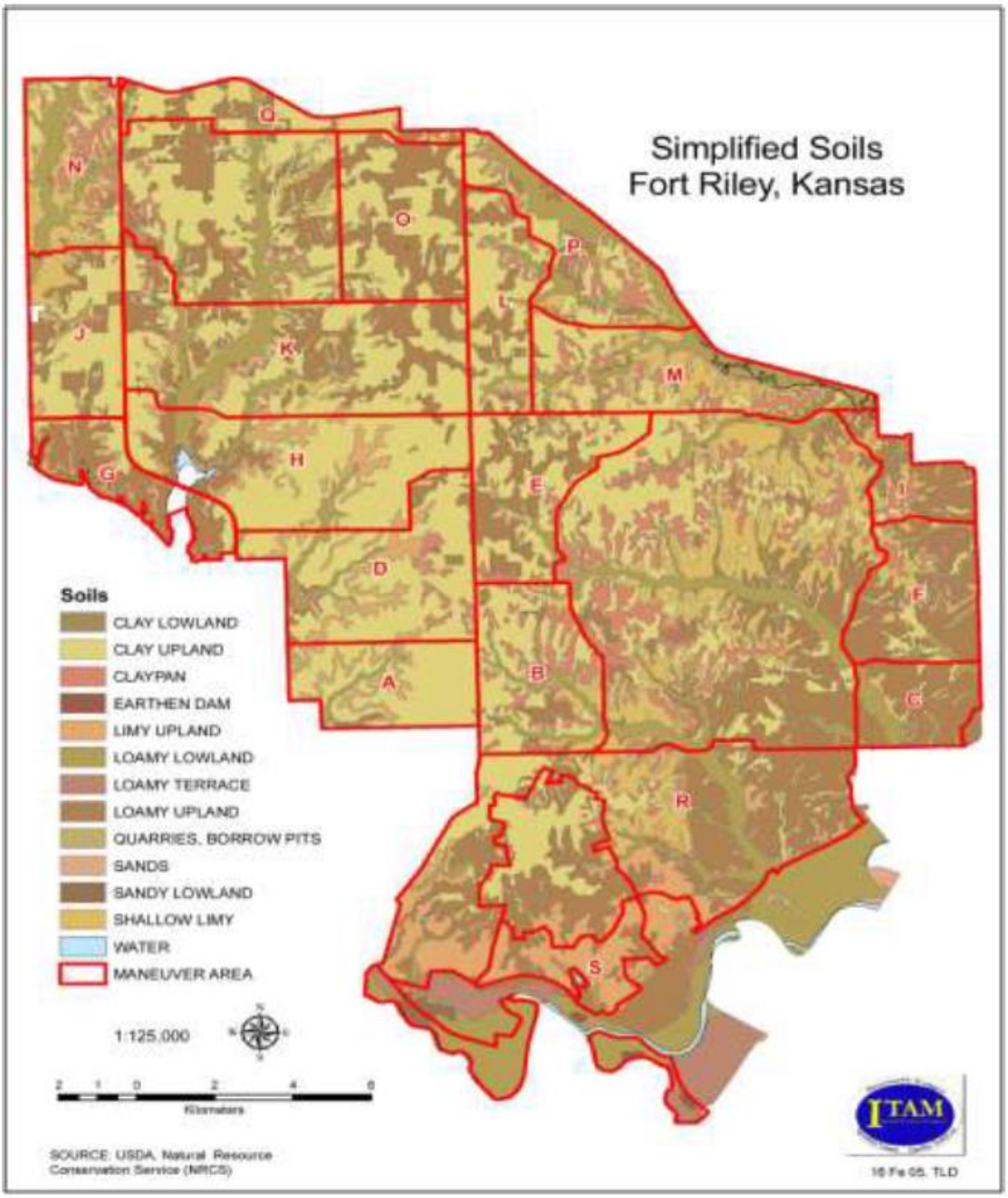
Proposed construction of the M-SHORAD battalion facilities would occur predominately on silty, silt loam, silty clay loams, and silty clay soils which have erodibilities that are medium to high. The proposed range facility site falls predominately within silty clay and silty clay loam soils of medium erodibility. As described in Section 3.1.5.2, the measures employed by the Army would control soil erosion resulting from construction activities; therefore, impacts are expected to be localized and less than significant.

Impacts to soils from live-fire and maneuver training, and the increase in the number of soldiers are fully addressed in Section 3.1.5.2.

3.4.6.3 Cumulative Effects

Fielding of the eight new systems is expected to add less than 150 additional soldiers to Fort Riley. The additional systems would cause slight increases in the intensity of use within the live-fire range and maneuver complexes. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to soils.

Figure 3.4-12. Simplified Soil Types on Fort Riley[86]



[86] Fort Riley.2016. INRMP

3.4.7 Land Use and Compatibility

3.4.7.1 Affected Environment

Fort Riley land use is divided between the cantonment and training ranges. Cantonment areas provide housing, community/recreation, and industrial and transportation operations and are mostly in the southern portion of the installation in six distinct areas (Figure 3.4-13). The training/range land-use category is the dominant one on Fort Riley.

3.4.7.1.1 Cantonment

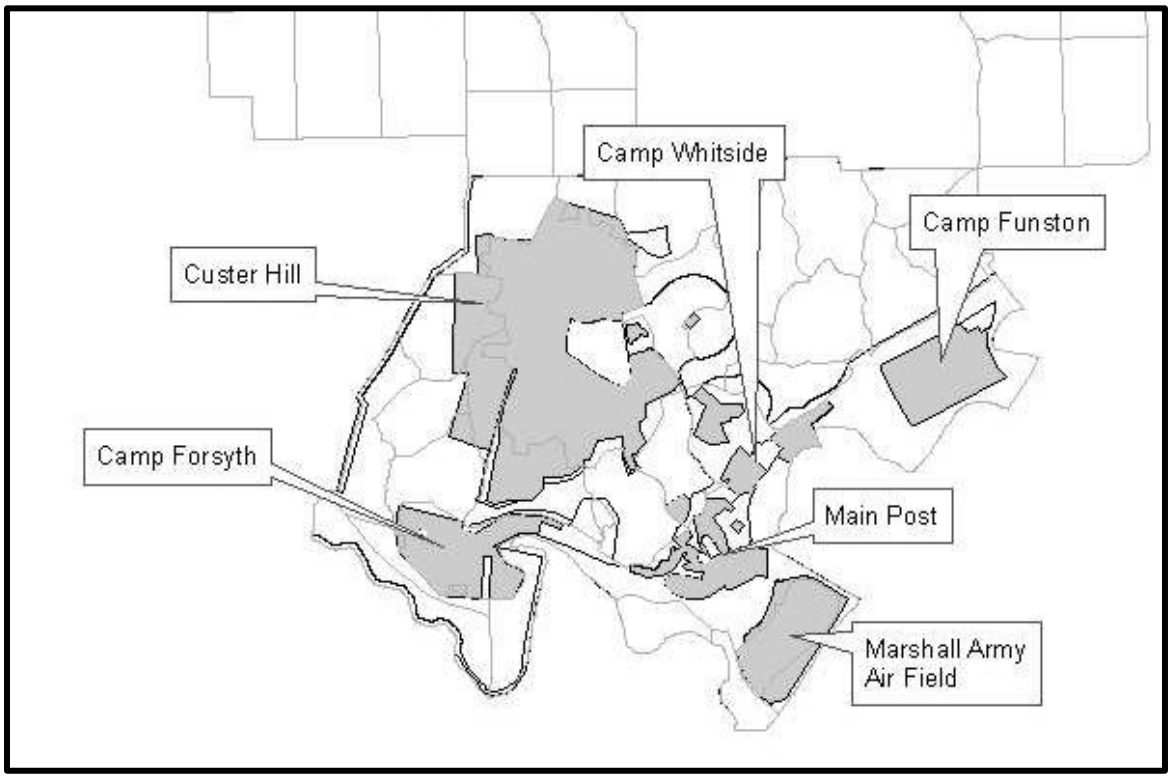
Cantonment (or developed) areas total approximately 12,000 acres and are Main Post, Camp Forsyth, Camp Funston, Camp Whitside, Custer Hill, and Marshall AAF (MAAF).

Improved grounds include improved and semi-improved areas. Improved grounds contain many native and non-native trees, shrubs, and groundcovers on approximately 5,613 acres. Improved areas are maintained as mowed turf and planted with ornamental and native trees and shrubs. Semi-improved areas are grassy fields and larger groves of trees that receive periodic mowing and maintenance.

Outdoor Recreational Facilities

Custer Hill Golf Course was a 170 acre 18-hole course that has been converted to the Adventure Park. Three additional parks/picnic areas totaling approximately 60 acres are maintained in a semi-natural condition; they are Moon Lake and McCormick and Wyman Parks.

Figure 3.4-13. The Six Distinct Cantonment Areas in the Southern Portion of Fort Riley



3.4.7.1.2 Range Complex

One-hundred and three designated TAs, 76 of which are combined into 17 larger maneuver areas, comprising approximately 70,000 acres.

The main impact area and the surrounding training live-fire ranges in the eastern portion cover approximately 16,200 acres. These areas are off-limits to maneuver training, public use, and most management activities.

The Douthit Gunnery Complex in the northwestern portion includes approximately 2,000 acres. Training and maneuvers that usually occur within the Douthit Gunnery Complex Safety Fan cease when either the DMPRC or DMPTR is active. The Douthit Gunnery Complex live-fire danger fan covers approximately 30,500 acres and includes TAs 40-46, 57-62, 66-74, 77, 78, 83, 84, 88, 89, and 93-96.

Fort Riley aviation units complete air-to-ground weapons training at the Smoky Hill Range. The KSTC supports non-dud producing live-fire maneuver training of Army infantry and tracked vehicle equipped units, combat aviation units, combat support, and combat service support units.

3.4.7.2 Environmental Consequences

The construction of the new barracks and battalion HQ complex comprising approximately 54 acres and one live-fire range of at least 865 acres would not change the designated land use and compatibility. Impacts to land use and compatibility resulting from construction, live-fire range, maneuver training, and the increased soldier population are fully addressed in Section 3.1.6.2.

3.4.7.3 Cumulative Effects

Fielding of the eight new systems is expected to have less than significant effects because they would be fielded to existing units with no changes to land use or compatibility.

3.4.8 Socioeconomics

3.4.8.1 Affected Environment

The ROI for the socioeconomic and environmental justice analyses includes Geary and Riley Counties for Fort Riley proper and Saline and McPherson Counties for Smoky Ridge, Kansas. Socioeconomic data are presented for the ROI regional socioeconomic conditions are compared with those of the state. Existing conditions for environmental justice are analyzed through demographic characterization, particularly ethnicity and poverty status for the ROI.

3.4.8.1.1 Population

Table 3-26 presents the population of the ROI of Saline, McPherson, Geary, and Riley Counties, and the state of Kansas as of 2018, which is the most recent census data available for the United States. The total population estimate for these four counties is 189,235. Geary County had a population decline of 5.1 percent, whereas Riley County experienced a 3.6 percent population

growth over an eight-year period (2010 to 2018). Both Saline and McPherson Counties experienced a population decline of 2.2 percent during the same period.[87]

Table 3-2526. Population Statistics for ROI at Fort Riley and Smoky Hill Range[88]

Area	Population Total in 2018
Riley County	73,703
Geary County	32,594
McPherson County Residents	28,537
Saline County Residents	54,401
State of Kansas	2,912,000

Fort Riley has an estimated 21,984 total employed garrison population in 2020, including 15,824 military personnel and 6,160 total civilian personnel (ASIP 2020).

3.4.8.1.2 Race/Origin Demographics

This PEA gives particular attention to the distribution of race and poverty in areas potentially impacted by the implementation of the Proposed Action.

Table 3-27 displays the demographics for the ROIs compared to the state of Kansas as of 2018. Geary County has the highest number of minorities in the ROI at 41 percent (excluding residents of 2 two or more races), whereas McPherson County had the lowest at 7.2 percent in 2018.

Table 3-2627. Racial Demographics for Riley, Geary, Saline, and McPherson Counties, and Kansas as of 2018

Race	Riley County (percent)	Geary County (percent)	McPherson County (percent)	Saline County (percent)	Kansas (percent)
White, only	83.6	69.1	95.3	90.2	86.4
Black or African American, only	6.8	18.5	1.3	3.6	6.1
Native American, Alaska Native, or Pacific Islander only	1.0	2.5	0.7	0.9	1.3
Asian, only	5.1	3.5	0.9	2.3	3.1
Hispanic or Latino	8.5	16.6	4.3	11.4	12.1
Two or more Races	3.5	6.4	1.9	3.0	3.0

Source: Census 2018 Data.
*Hispanic or Latino is not a race but an origin. To get the total percent for race, subtract this origin.

[87] Census. 2018. Quick Facts. https://www.census.gov/quickfacts/fact/table/salinecountykansas,mcphersoncountykansas,gearycountykansas,rileycountykansas/PST045219 Accessed on May 4, 2020.
[88] Census, 2020. https://www.census.gov/quickfacts/fact/table/salinecountykansas,KS,mcphersoncountykansas,gearycountykansas,rileycountykansas/PST045219 Accessed on 16 Sep 2020.

3.4.8.1.3 Income and Employment

Table 3-28 presents the per capita income for counties in the ROI, and the state of Kansas as of 2018, which is the most recent census data available for the United States. The per capita income of the state of Kansas is between that of the ROI. The most common jobs found in Riley County are education instruction, and library occupations, office and administrative support occupations, and management occupations.[89] In Geary County, most people are employed in office and administrative support occupations, education instruction, and library occupations, and sales and related occupations.[90] The most common jobs found in Saline County and McPherson Counties include office and administrative support, production, and management occupations.[91,92]

Table 3-2728. Per Capita Income for ROI at Fort Riley

Area	Per Capita Income 2018
Riley County	$49,910
Geary County	$49,185
McPherson County Residents	$30,234
Saline County Residents	$27,737
State of Kansas	$30,146

3.4.8.2 Environmental Consequences

Impacts to socioeconomics at Fort Riley are expected to be negligible and are fully addressed in Section 3.1.7.2. The increase of 550 soldiers and 786 family members on average represents a 0.7 percent increase in population within the ROI. The contribution of the M-SHORAD battalion wages of $31.4 million represents only 0.41 percent of the total estimated ROI income of $7.0 billion.

The per capita income of the ROI is more than the M-SHORAD battalion per capita income because all four counties in the ROI have per capita incomes ranging from about $28,000 to $50,000. The Proposed Action would not prove to be a significant impact because the total contribution is only 0.41 percent of the total income within the ROI.

3.4.8.3 Cumulative Effects

Fielding of the eight new systems is expected to add less than 150 additional soldiers in addition to the M-SHORAD battalion to Fort Riley. The cumulative effects of adding an approximate total of 700 soldiers, 370 spouses, and 630 children at Fort Riley is expected to be less than significant because it represents a population increase of less than 0.9 percent within the ROI.

[89] Deloitte. 2020. https://datausa.io/profile/geo/riley-county-ks. Accessed on May 4, 2020.
[90] Deloitte. 2020. https://datausa.io/profile/geo/geary-county-ks. Accessed on May 4, 2020.
[91] Deloitte. 2020. https://datausa.io/profile/geo/saline-county-ks. Accessed on May 4, 2020.
[92] Deloitte. 2020. https://datausa.io/profile/geo/mcpherson-county-ks. Accessed on May 4, 2020.

3.4.9 Traffic and Transportation

3.4.9.1 Affected Environment

The ROI of the affected environment for traffic and transportation aspects of the Proposed Action includes Fort Riley and several neighboring counties including Riley, Geary, and Clay, and the cities of Manhattan, Junction City, and Ogden. Major road routes in the region include I-70, an east-west interstate highway that passes less than 0.5 miles (0.8 km) to the south of the cantonment area. Other major routes include U.S. Route 77 and Kansas State Routes 18, 57, and 82.

Existing Roadway Network

The Surface Deployment Distribution Command-Transportation Engineering Agency (SDDC-TEA) has identified needed transportation projects on Fort Riley in reports completed in 2011 and 2017. Some of these projects have not yet been completed. An increase in off-post traffic would have a minimal adverse impact on traffic in the community overall.

Smoky Hill Range is located about 11 miles southwest of the city of Salina, which is located just southeast of the junction of Interstate Highway 70 (I-70) and I-135. Major highways providing access to the range include Highway 141 to the west, State Highway 4 to the south, I-135 to the east, and State Highway 140 (“Old Highway 40”) to the north.

The main entrance to Smoky Hill Range is at the headquarters area, which is situated in the northeastern corner of the range. From Salina, the main entrance can be reached via State Highway 140, South Link Road, and Farrelly Road.

The majority of Army troops proposed to train on Smoky Hill Range would be coming from Fort Riley, which is located near I-70, about 50 miles east of Salina.

Transportation Conditions on the Range

The range maintains approximately 38 miles of gravel roads and 15 miles of dirt roads. These roads are used for access to the Operations Area and target areas and leaseholder access. The range also maintains approximately 45 miles of firebreaks, which are wide strips of plowed land that function as roadways. The firebreaks are used for fire control and access to remote portions of the range (KSANG 2001).

Most vehicle traffic at the range is concentrated between the headquarters area in the northeast and the Operations Complex in the approximate center of the range. Soderberg Road, running north-south, and Parsons Road, running east-west, link the Headquarters Area and the Operations Complex and handle most range traffic. Brownhill Road, running north-south from the Operations Complex to the southern part of the range, also is a frequently used road. In addition to the main entrance near the Headquarters Area, the range has a south entry gate and a main Army gate to the Kansas Regional Training Center (KRTC) to the east (KSANG 2001). Most

roads at the range follow Public Land Survey System (PLSS) boundaries in a semi-regular north-south, east-west pattern.

Several of the unimproved roads at Smoky Hill Range are nearly impassable when wet. Vehicles crossing inundated areas may cause significant road damage. Furthermore, limited access caused by wet conditions may result in delayed wildfire response times (KSANG 2001).

Vehicle operations consist of both on- and off-road government vehicles and POVs. Government vehicles, controlled by the range, include 16 heavy-duty diesel-powered vehicles, six light-duty diesel-powered trucks, one heavy-duty gasoline-fueled vehicle, and one light-duty gasoline-fueled vehicle (passenger car). Current annual vehicle usage on the range is approximately 80,000 miles.

3.4.9.2 Environmental Consequences

The addition of an M-SHORAD battalion at Fort Riley would add 550 new soldiers representing an increase of approximately 2.5 percent. Including the anticipated number of spouses and children, the ROI population would increase by approximately 0.7 percent. Therefore, the impacts to traffic and transportation within the ROI and the installation are expected to be negligible.

If a training exercise would be scheduled at Smoky Hill Range, the participating vehicles may form a convoy to transit from Fort Riley to Smoky Hill Range. Convoy operations would be accomplished per Army Technical Publication (ATP) 4-11 *Army Motor Transport Operations*.[93] Compliance with ATP 4-11 would ensure appropriate notifications are provided to civil authorities and the correct permits are obtained. Properly completed convoy operations would ensure minimal impacts to traffic and transportation along the convoy route.

3.4.9.3 Cumulative Effects

Fielding of the eight new systems is expected to add approximately 150 additional soldiers to Fort Riley. The cumulative effects of adding approximately 700 soldiers and 370 spouses at Fort Riley are expected to have less than significant effects to traffic and transportation. It is assumed that most children would be below driving age and therefore not included in the effects on traffic and transportation.

3.4.10 Facilities

3.4.10.1 Affected Environment

The family housing on Fort Riley is spread through five neighborhoods and is under the management of the RCI partner Corvias Property Management. At present, the Corvias management contract allows occupancy by Active-duty service members with dependents and stationed within 50 miles of Fort Riley. Additionally, active-duty unaccompanied service members and E6 and above service members receiving Basic Allowance for Housing (BAH) and

[93] Accessed at https://rdl.train.army.mil/ on 17Aug20.

stationed within 50 miles of Fort Riley are eligible for on-post housing. On-post housing waiting lists, families get priority over unaccompanied and single personnel.[94]

The six cantonment areas, also addressed briefly in Land Use and Compatibility, contain the heaviest concentration of facilities and mission support activities on Fort Riley. Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical facilities, community facilities, and MAAF.

Army facilities are built to meet the standards of the Uniform Facilities Criteria using standard designs of MILCON requirements, standardization, and integration or similar documents. Exceptions to the standard are available and if granted for a facility, it would be considered adequate.

3.4.10.2 Environmental Consequences

The excess or deficit of facilities available to support the M-SHORAD battalion at Fort Riley were assessed based on the Army RPLANS records. The results are shown in Table 3-29 with deficits shown in parentheses.

Table 3-2829. M-SHORAD Expected Facility Requirements FY 2021 Data

Facility name	Number required	Total sq ft	Total acres	Ft Riley
Battalion HQ Building	1	48,520	1.1	(73,715)
Company HQ Building	1	33,646	0.8	(258,764)
Company HQ Building	4	103,104	2.4	(258,764)
Vehicle Maintenance Shop	1	100,800	2.3	(119,265)
Oil Storage Building	1	480	0.0	(7,876)
Organizational Vehicle Parking	1	450,000	10.3	950,368
Dining Facility	1	41,116	0.9	37,794
Barracks Permanent Party	1	76,140	1.7	26,952

If funding becomes available in the future, Fort Riley would construct a battalion HQ complex on a parcel of approximately 45 acres. The battalion HQ complex would include the battalion and company HQ buildings, a vehicle maintenance shop, an oil storage building, and the organizational vehicle parking to support the M-SHORAD battalion. Two permanent party barracks would be constructed on two nearby parcels of approximately 4.5 acres each to provide soldier housing. The new facilities would be constructed in an area that is designated for battalion support facilities near the intersection of Thomas Ave. and Trooper Dr. Construction of

[94] http://www.riley.corviasmilitaryliving.com/ accessed 1 June 2020.

the battalion HQ complex and barracks, if funded in the future, would require additional analysis such as an assessment tiering from or supplementing this PEA.

The PEA assumes that two thirds of M-SHORAD soldier population would not reside in barracks and would acquire family housing on post through Corvais Property Management or reside off post. There is a possibility indirect effects of the proposed action could impact the availability of housing off-post for university students in the local historic districts. These effects are expected to be less than significant because housing for students is also available on campus or in non-historic districts near the university.

To enhance live-fire training, Fort Riley has been planning to construct a new range and has a proposed location approved by the installation's leadership. Funding for the project has not been appropriated. All systems, including the M-SHORAD, would train on the new range. The minimum Army standard for this range is greater than 500 acres. Fort Riley intends to construct the new range in an area already designated and used for training to the north of the cantonment area and on the northwest side of the impact area.

Facility impacts are addressed in Section 3.1.9.2 and are expected to be less than significant.

3.4.10.3 Cumulative Effects

Fielding of the eight new systems is expected to have less than significant effects because these new systems would be fielded to existing units with no additional facility requirements anticipated.

3.4.11 Water Resources

3.4.11.1 Affected Environment

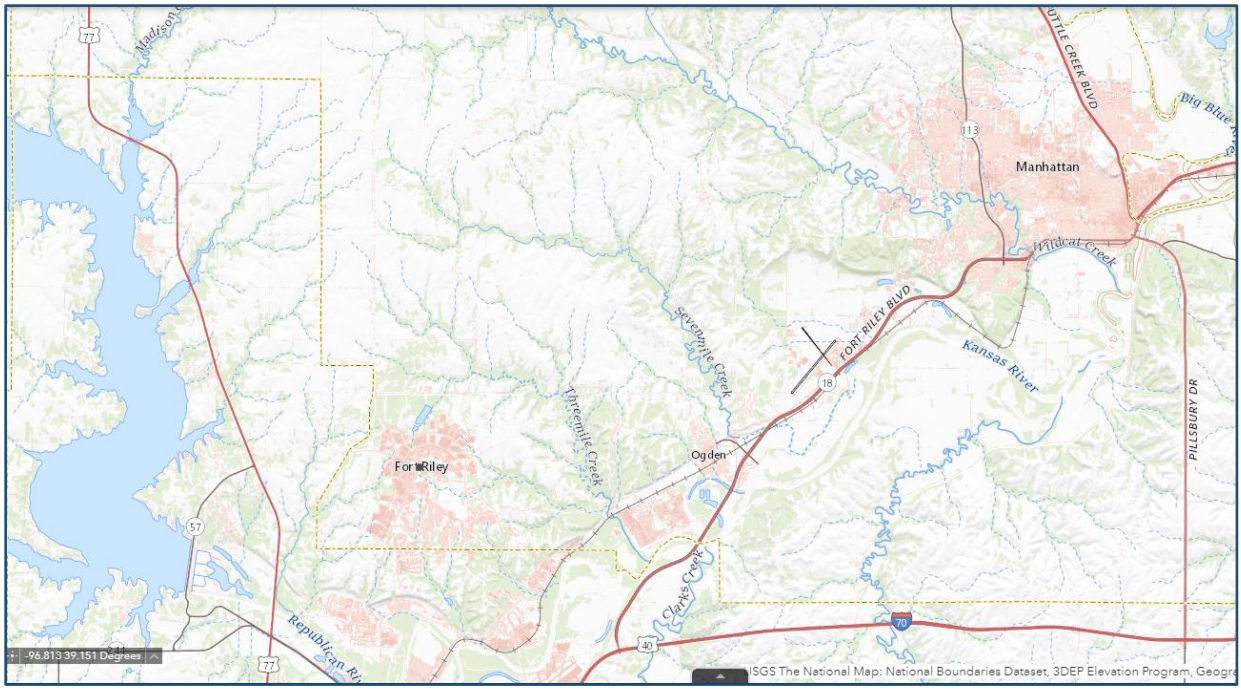
3.4.11.1.1 Surface Water

Surface water resources analyzed in this PEA include lakes, rivers, and streams (Figure 3.4-14). On Fort Riley, the Kansas Department of Health and Environment (KDHE) has designated surface water use categories for the Republican, Smoky Hill, and Kansas Rivers; Fourmile, Rush, Timber, Little Arkansas, Sevenmile, Threemile, and Wildcat Creeks; and Milford Lake (Fort Riley 2016a). The KDHE has determined these surface water bodies are suitable for and should be protected for, contact recreation, expected or special aquatic life, food procurement, domestic water supply, irrigation, livestock watering, industrial water supply, and groundwater recharge (Fort Riley 2016a).

The KDHE listed Wildcat Creek as an impaired stream, under Section 303d of the CWA, due to high fecal coliform bacteria count and low dissolved oxygen. Anecdotal information provided by Riley County indicated the quality of water in Wildcat Creek passing through Fort Riley was good. It is suspected that high fecal coliform counts occurring in the lower end of the stream, below the confluence of Little Kitten Creek, are related to poorly functioning on-site waste systems in the vicinity of Manhattan (Fort Riley 2016a). Urban development occurring on the

west side of Manhattan, downstream from Fort Riley, is altering hydrogeomorphology and thereby increasing sediment and contaminant loads in Wildcat Creek.

Figure 3.4-14. Surface Waters on Fort Riley

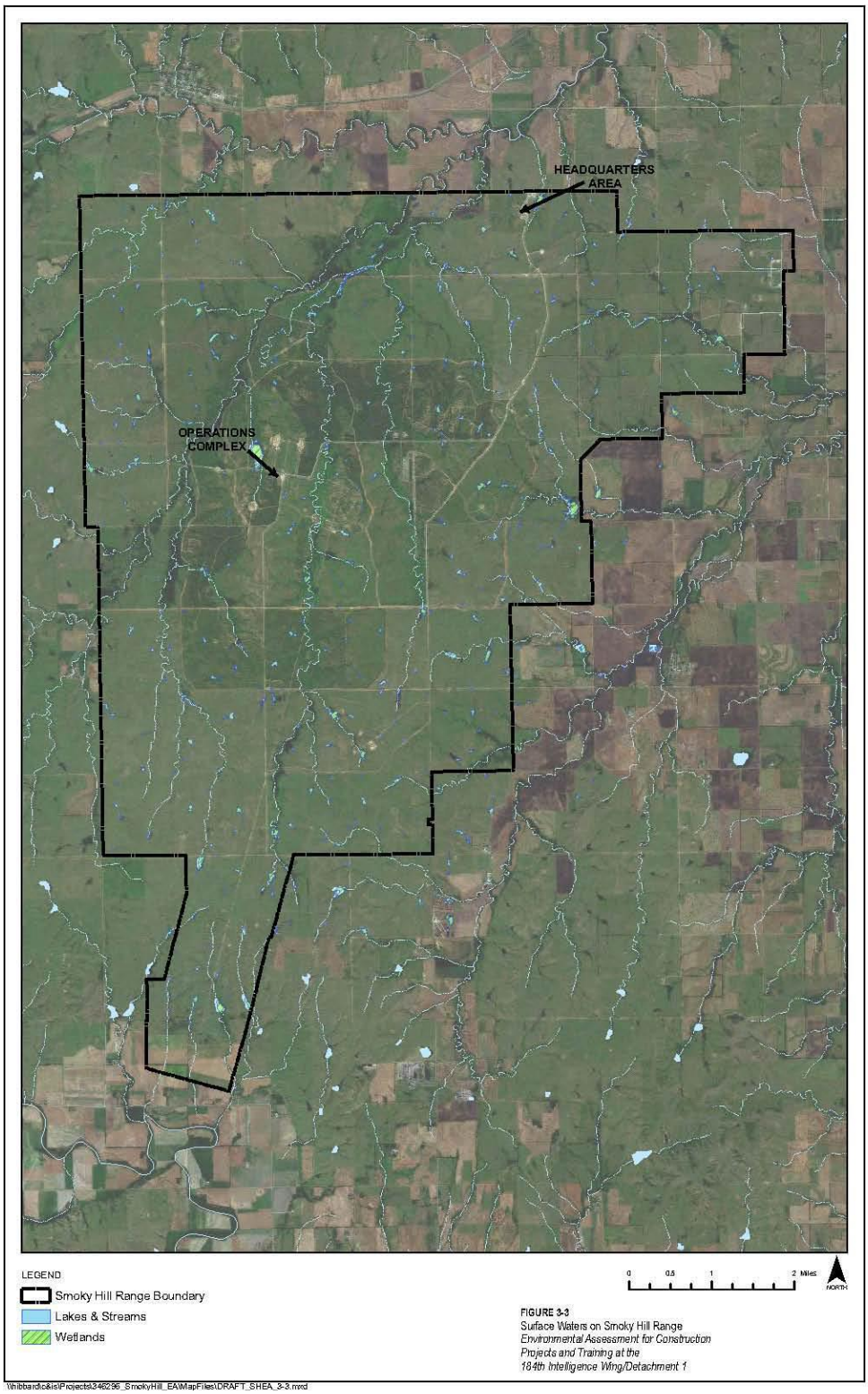


Surface water at Smoky Hill Range is limited to ponds and intermittent streams and their tributaries. Intermittent streams are those that have measurable flow only during certain times of the hydrologic year. The major intermittent streams at Smoky Hill Range are Ralston Creek, Castle Creek, Spring Creek, and M-60 Creek. These streams flow north to northeast, eventually draining into the Smoky Hill River. Also, there are approximately 140 ponds located on the Smoky Hill Range installation for water storage and livestock access. Some siltation occurs from livestock trampling and excrement and from runoff along the firebreaks, which results in a decrease in water quality. The potential for chemical contamination is managed by spraying pesticides under DoD instructions and Measures of Merit regarding pesticide use. Stormwater from Smoky Hill Range flows via overland flow to the northern portion of the base. There are no stormwater inlets or storm sewer pipes at the base. Stormwater from the headquarters area and the Operations Complex flows toward an unnamed tributary that discharges into Spring Creek. Spring Creek discharges to the Saline River approximately 13 miles northeast of the Headquarters Area. The Saline River then flows southeast for approximately 5 miles before it discharges to the Smoky Hill River.

A National Pollutant Discharge Elimination System (NPDES) covers the Smoky Hill Range general permit for stormwater discharges associated with industrial activities (Figure 3.4-15). This permit regulates stormwater discharges at the base. The range also adheres to a Storm Water

Pollution Prevention Plan (SWPPP) that provides strategies to control stormwater discharges and to minimize pollution of nearby surface waters (KSANG 2000).

Figure 3.4-15. Surface Water Found on Smoky Hill Range



The range SWPPP (KSANG 2000) is an engineering and management strategy prepared specifically for the range to improve the quality of the stormwater runoff and thereby improve the quality of the receiving waters. The SWPPP consists of a series of steps and activities to identify potential sources, including significant materials, storm water pollution or contamination, and to implement BMPs. BMPs are processes, procedures, schedules of activities, prohibitions on practices, and other management practices that could prevent or reduce the number of pollutants in stormwater runoff.

3.4.11.1.2 Groundwater

Groundwater in the area emanates from the large subterranean sand and gravel deposits that are found throughout Kansas. Smoky Hill Range overlies confined sandstone aquifers inter-bedded with siltstone or shale. According to the U.S. Geological Survey (USGS), the hydraulic conductivity of sandstone aquifers is low to moderate. Still, because they extend over the large areas, these aquifers provide large amounts of water.

The geology controls the rate of groundwater movement. In this area, the Dakota Formation of the uplands is composed of much finer-grained materials than the Pleistocene alluvial deposits in the valley and, therefore, has a lower permeability. Movement of water through the finer material is slower than through the coarser material, and steeper or higher slopes are required to move the same quantity of water through the finer upland deposits. Depth to groundwater ranges from a few feet to more than 40 feet, but in most cases, it is between 20 and 30 feet-below ground surface. Groundwater in this region is generally too salty for use as potable water, although the shallowest aquifers are sometimes used as sources of drinking water.

3.4.11.1.3 Water Quality[95,96]

The KDHE administers the CWA in Kansas. The CWA provides the framework for management of water quality in the nation's surface waters. The goal of the CWA is to achieve water quality standards such that all waters are fishable and swimmable. The State Water Resource Planning Act provides the statutory authorization for addressing water quality management. The KDHE Bureau of Water ensures compliance with state and federal regulations applicable to groundwater. No umbrella federal legislation exists for groundwater. Surface waters are regulated under the Kansas Administrative Regulations, Article 16. This article states that, "For all surface waters of the State, if existing water quality is better than applicable water quality criteria established in these regulations, that existing water quality shall be fully maintained and protected."

Drinking water on Fort Riley is obtained from multiple ground water wells that are owned and operated by the Fort Riley Utility Services (FRUS) Inc. which is a subsidiary of American States

[95] Fort Riley. 2018. Environmental Assessment, *Integrated Natural Resources Management Plan*, Kansas Training Center, 19 December 2018.
[96] Fort Riley. 2010. *Final Environmental Assessment of Army Mechanized Maneuver Training on Kansas Air National Guard's Smoky Hill Bombing Range & the Kansas Army National Guard's Kansas Training Center* January 2010.

Utility Services, Inc. Fort Riley has retained the water rights. The State of Kansas may not impose any restrictions on usage. FRUS operate three separate drinking water systems on the installation.

Fort Riley is located at the end of the Lower Republican River HUC 10250017 and at the beginning of the Upper Kansas River (HUC) 10270101. The Lower Republican is listed as being impaired by dissolved oxygen for aquatic life and eutrophication for aquatic life. The Upper Kansas is listed as being impaired by sulfate for water supply uses, E. coli for recreation, total suspended solids for aquatic life and total phosphorus for aquatic life.

Fort Riley is covered by two NPDES permits. The first covers the domestic sewage treatment and is owned by FRUS. The second is held by the Environmental Division of Fort Riley's DPW. This permit covers the Industrial Wastewater System, Industrial Stormwater discharges and Borrow Area Management. Fort Riley has created a Stormwater Pollution Prevention Plan, Environmental Compliance Plan and a Borrow Area Management plan that implement a series of Best Management Practices (BMPs), training classes, inspection programs, prohibitions on practices, and other management practices that could prevent or reduce the amount of pollutants in storm water runoff.

A watershed study of the Kansas Training Center (KSTC), which includes Smoky Hill Range, was completed in 2007 (Applied Ecological Services [AES], 2008) and stated the condition of the watershed is stable. Smoky Hill Range is part of KSTC. It noted, however, that if and as the military training mission of the KSTC changes, the potential for added erosion could increase, thereby impacting water quality. The watershed study included a vulnerability assessment that concluded there is increased stormwater runoff volumes with construction of new facilities, particularly on the east portion of the property.

The Lower Smoky Hill watershed in which the KSTC is located is identified as Hydrologic Unit Code (HUC) 10260008. According to the Kansas Department of Health and Environment *2018 303(d) List of All Impaired and Potentially Impaired Waters*, the Lower Smoky Hill watershed is listed as being impaired by nitrate for water supply uses, total phosphorus for aquatic life, biology for aquatic life, and total suspended solids for aquatic life.

Smoky Hill Range is covered by a NPDES General Permit for Storm Water Discharges Associated with Industrial Activities. This permit regulates storm water discharges at the base. The Range also adheres to a SWPPP that provides strategies to control storm water discharges and to minimize pollution of nearby surface waters (KSANG 2000) (see Section 3.12, "Hazardous Materials and Waste").

The Smoky Hill Range SWPPP (KSANG 2000) is an engineering and management strategy prepared specifically for the Smoky Hill Range to improve the quality of the storm water runoff and thereby improve the quality of the receiving waters. The SWPPP consists of a series of steps and activities to identify potential sources, including significant materials, of storm water

pollution or contamination and to implement BMPs. BMPs are processes, procedures, schedules of activities, prohibitions on practices, and other management practices that could prevent or reduce the amount of pollutants in storm water runoff.

Groundwater in this region is generally too salty for use as potable water, although the shallowest aquifers are sometimes used as sources of drinking water.

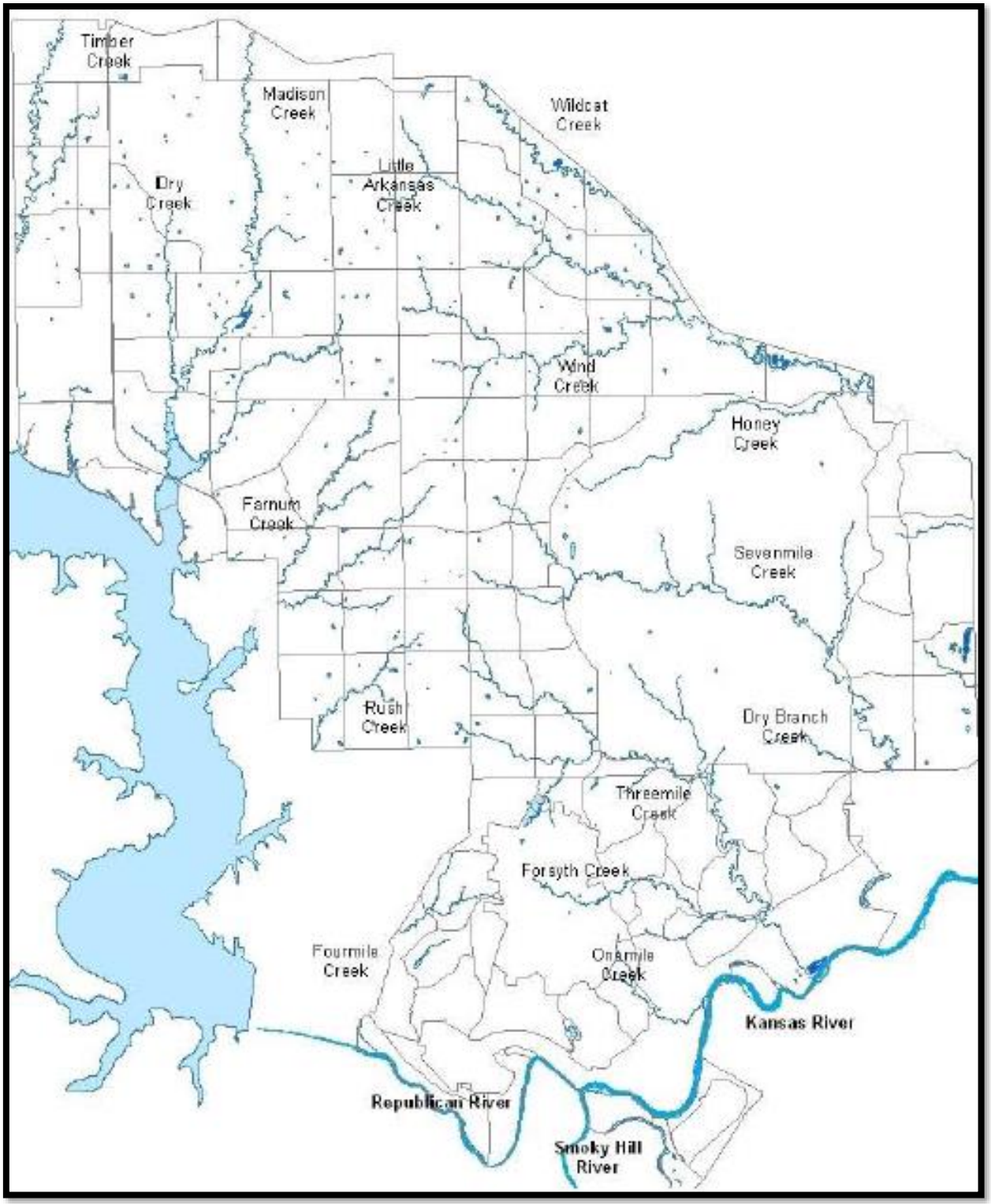
3.4.11.1.4 Wetlands and Floodplains

Wetland areas on Fort Riley include springs and seeps, streams, rivers, ponds and lakes, low areas behind terraces in abandoned crop-fields, and emergent marshes along the periphery of water bodies (Figure 3.4-16), such as those within the Madison Creek and Farnum Creek arms of Milford Lake. In 1991, the USFWS documented approximately 1,449 acres of wetlands. Approximately another 84 acres have been constructed since the inventory (total 1,533 acres in 2002). Of this total, 972 acres are considered permanently inundated. The riverine habitat comprises 145 miles and encompasses 748 acres (Fort Riley 2008).

Wetlands, including riparian forests, woodlands, and shrublands, encompass approximately 1 percent of Smoky Hill Range. Most wetlands at Smoky Hill Range are associated with intermittent stream drainages and ponds. The NWI has classified all wetlands on Smoky Hill Range as palustrine wetland systems. Palustrine wetlands of the Great Plains include wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens in situations traditionally called marshes, swamps, prairies, etc., as well as those occurring along the edges of streams, lakes, or ponds (Cowardin et al. 1979). Palustrine wetlands at the range include various types of marshes dominated by great bulrush (*Scirpus validus*), cattails (*Typha sp.*), bur-reed (*Sparganium sp.*), bulrush (*Scirpus pungens, Scirpus americanus*), and/or spike rush (*Eleocharis sp.*) (KBS 2006).

Riparian areas refer to the banks of streams and ponds that support a variety of water-dependent vegetation not found in drier upland areas; thus, they are considered to be wetlands. Riparian vegetation of Smoky Hill Range is dominated by woody trees, shrubs, and shade-tolerant herbaceous species and supports a variety of habitats and associated plant and wildlife species. The dominant trees found in the riparian areas of Smoky Hill Range are osage orange and elm (*Ulmus spp.*).

Figure 3.4-16. Springs, Seeps, Streams, Rivers, Ponds, Lakes, Vernal Pools and Emergent Marshes on Fort Riley



Floodplains

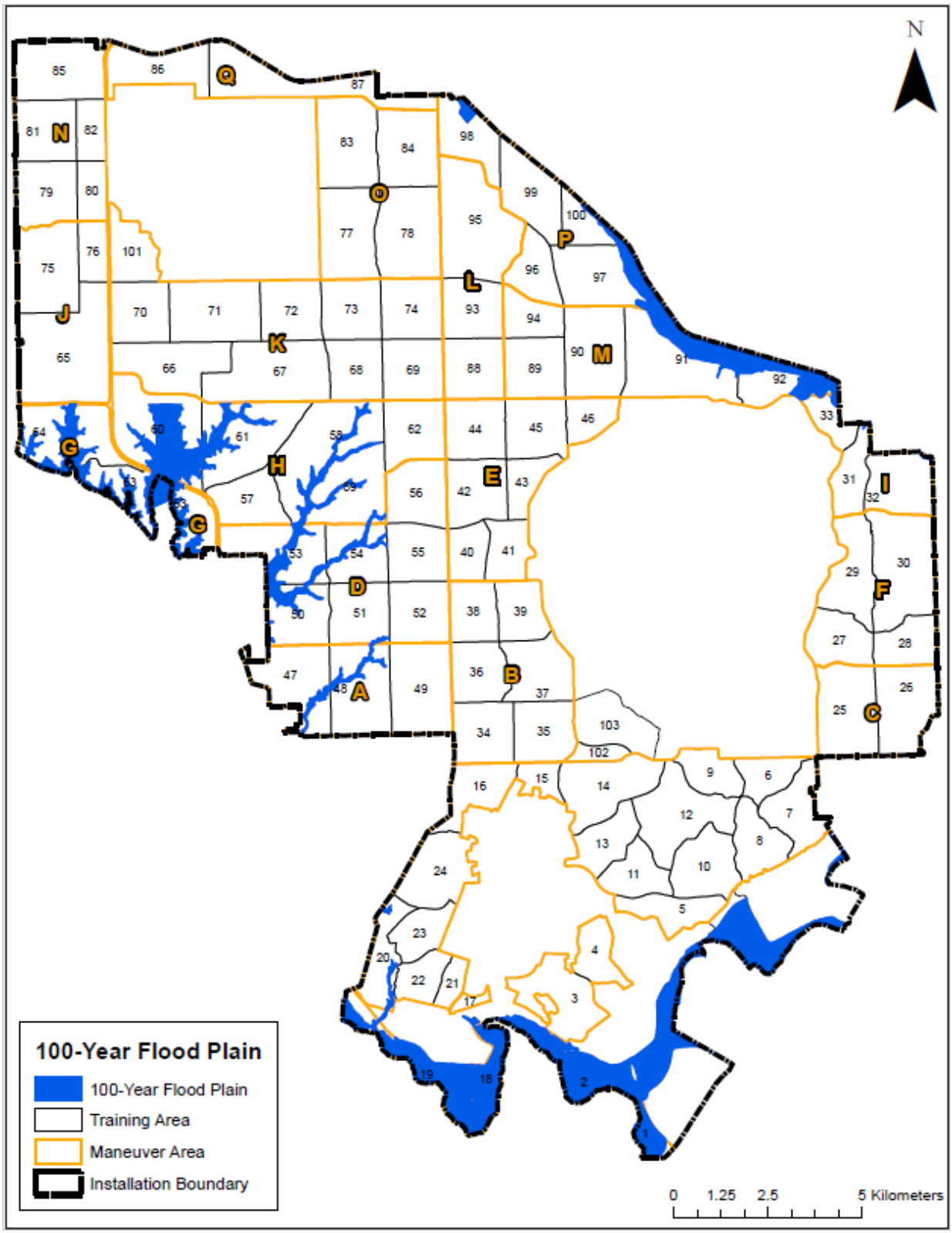
Figures 3.4-17 and 3.4-18 provide the locations of floodplains and wetlands on Fort Riley.

Under Kansas state law, the floodplain is considered to be the land adjoining lakes and rivers that are covered by the 100-year or regional flood. The principal concern with flooding is the potential for loss of or damage to troops, livestock, and property. All three intermittent streams and their major tributaries are within the 100-year floodplain.

The 100 year floodplain of Fort Riley consists of 6,155 acres located near the Republican and Kansas Rivers, Wildcat , Rush , Farnum and Madison Creek. A system of levees has been constructed adjacent to the Kansas River, making the areas safe and acceptable for building sites.

Figure 3.4-17. Map of Wetlands and Floodplains on Fort Riley

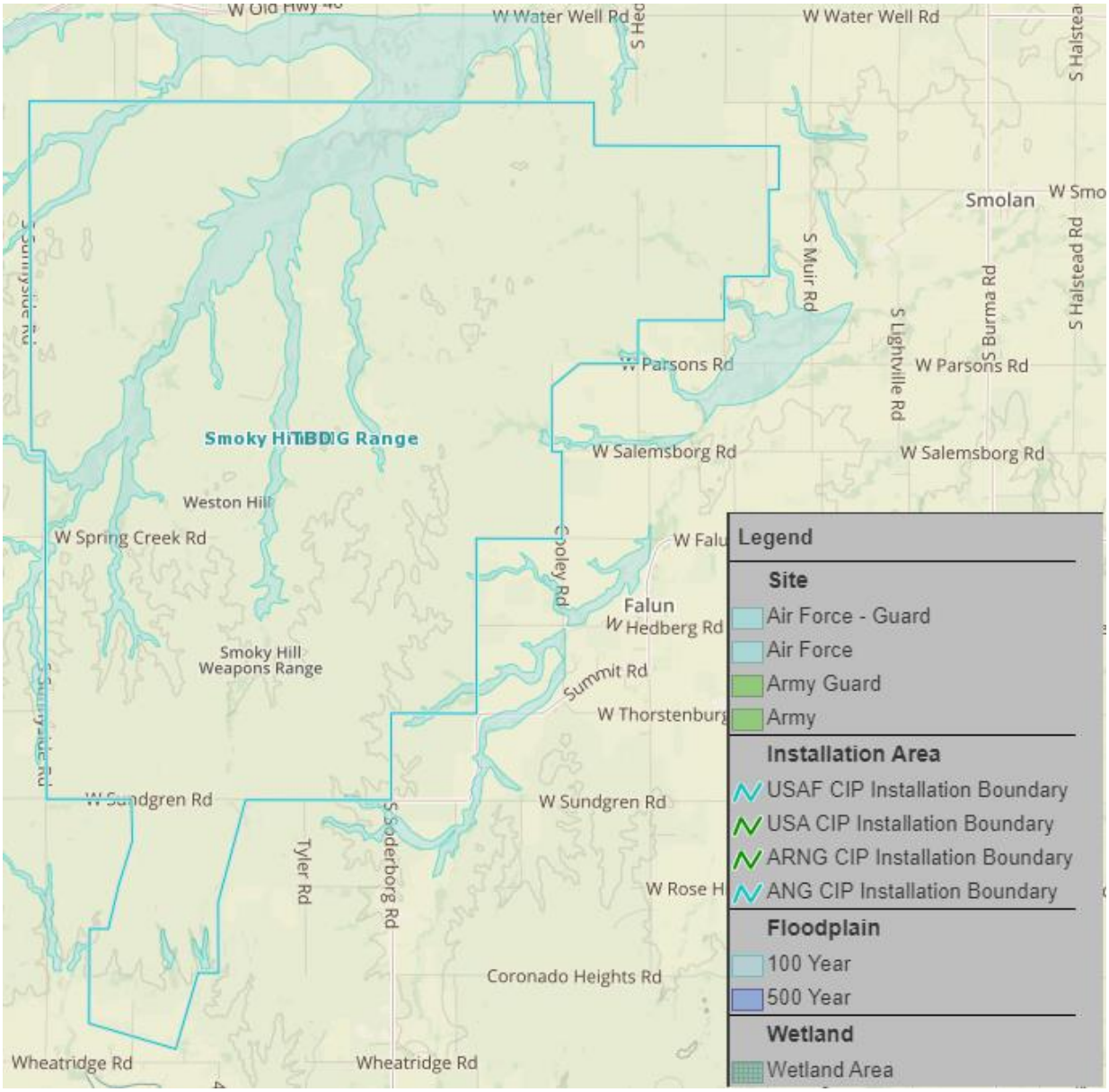
Figure 3.4-18. 100 Year Floodplains on Fort Riley



During the spring and summer months, dirt roads serving the range may occasionally become inundated, causing transportation difficulties or temporarily halting transportation to some areas. Flash floods also may occur along the smaller streams from brief, intense periods of rainfall during these months.

Figure 3.4-19 provide the locations of floodplains and wetlands on Smoky Hill Range.

Figure 3.4-19. Map of Wetlands and Floodplains on Smoky Hill Range



The frequency of short-duration stream flooding on Smoky Hill Range is not well documented because USGS does not maintain streamflow gauging stations on any of the range's streams. However, flood information is available for other nearby streams. Spring Creek, which runs through the range, is a tributary of Mulberry Creek, with which it has a confluence about 10

miles northeast of the range. Mulberry Creek exhibits overbank flooding every 10 to 25 years and last exceeded the flood stage in 1995 (Perry 2005). Mulberry Creek has a flood stage of 24 feet; the 1995 flood produced a stage reading of 27.14 feet and 8,440 feet^3 per second (Perry 2005). While USGS does not monitor flows along Spring Creek, flood conditions within the range are similar to those found along Mulberry Creek.

3.4.11.2 Environmental Consequences

Surface Water

Impacts from Construction

The proposed construction of the M-SHORAD battalion facilities would occur in an area that is bisected by two intermittent streams and may require appropriate permits if fill material needs to be placed for construction. In addition to the placement of fill, the increase in the impermeable surface would increase the amount of runoff flowing to surface water bodies during precipitation events.

Surface waters of Honey Creek and tributaries, as well as tributaries to Wind Creek, flow through the site of a proposed new range. Construction would be planned to avoid placing of fill material within surface water bodies the maximum extent practicable. If required, appropriate permits would be obtained before placing fill.

Construction actions at both locations could also cause a short-term increase in erosion potential and lead to increased sedimentation of surface waters. The impacts from construction to surface waters is expected to be less than significant because the appropriate permits would be obtained, a SWMP would be followed, construction BMPs would be implemented, and the construction of stormwater retention basins mitigate the increased runoff.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers,

Impacts to surface waters from live-fire and maneuver training and the increased soldier population are fully addressed in Section 3.1.10.2.1.

Groundwater

Impacts to groundwater as a result of the Proposed Action are fully addressed in Section 3.1.10.2.2.

Water Quality

The impacts to water quality as a result of the Proposed Action are addressed in Section 3.1.10.2.3.

Wetlands and Floodplains

Impacts from Construction

There would be no impacts to wetlands and floodplains in the area planned for constructing the M-SHORAD battalion HQ complex and barracks as none are present.

Construction of a proposed new range would be in an area known to contain wetlands but not floodplains. Impacts are expected to be less than significant because the requirements and practices stated in Section 3.1.10.4 would be followed.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts to wetlands and floodplains from live-fire and maneuver training and the increased soldier population are fully addressed in Section 3.1.10.2.4.

3.4.11.3 Cumulative Effects

Fielding of the eight new systems is expected to have less than significant effects to all water resources because these new systems would be fielded to existing units with no additional facility, live-fire range, or maneuver area requirements are anticipated. Only a nominal increase in population and the intensity of training area use is anticipated.

3.5 FORT STEWART, GEORGIA

3.5.1 Background

Fort Stewart is a U.S. Army post in Georgia, primarily in Liberty and Bryan Counties, but also extending into smaller portions of Evans, Long, and Tattnall Counties (Figure 3.5-1). The installation is located approximately 41 miles (66 km) southwest of the city of Savannah and is the largest Army installation east of the Mississippi River. The Fort Stewart Military Reservation covers approximately 280,000 acres (113,312 ha) of land. Wright AAF and Evans AAF lie within the boundaries of Fort Stewart proper.

Hunter AAF is a separate facility approximately 35 miles northeast of Fort Stewart. Although they fall under the same commander, the Proposed Action will have negligible impacts at Hunter AAF, and with a few exceptions, is not discussed further.

Fort Stewart and Hunter AAF are the Army's training and military armored power projection combination on the eastern seaboard of the United States. Tank, field artillery, helicopter gunnery, and small arms ranges operate simultaneously throughout the year.

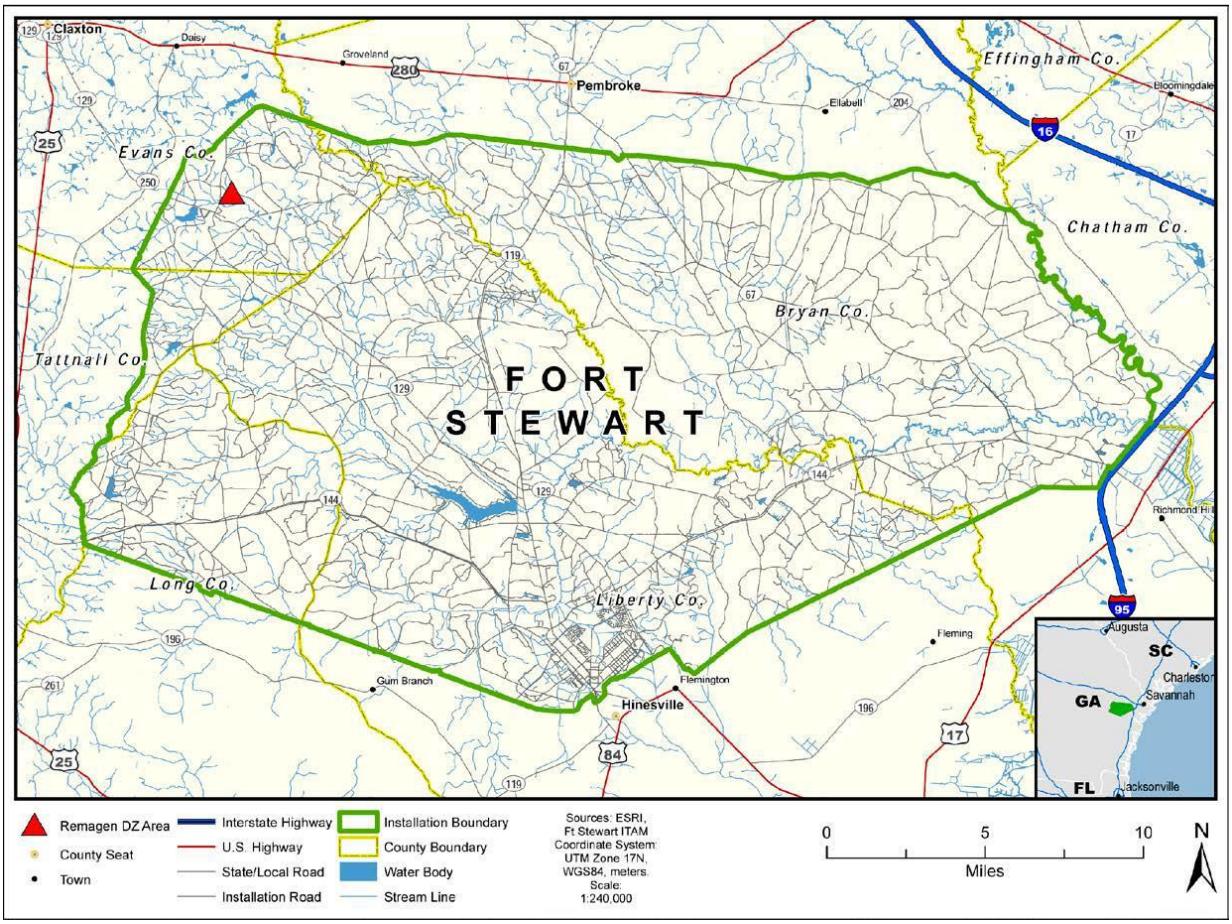
Primary units stationed at Fort Stewart include:

- 3rd ID,
- 1st ABCT (1/3 ABCT),
- 2nd ABCT (2/3 ABCT),

- 3rd ID Sustainment Brigade,
- 3rd Combat Aviation Brigade
- 3rd ID Artillery

Fort Stewart–Hunter AAF's mission is to provide a safe, secure, and responsive community that enhances the Fort Stewart–Hunter AAF power projection platform in support of national security objectives.

Figure 3.5-1. Location of Fort Stewart, Georgia



3.5.2 Air Quality

3.5.2.1 Affected Environment

Fort Stewart is located in the Savannah Georgia – Beaufort South Carolina Interstate AQCR (40 CFR 81.113). The AQCR includes the Georgia counties of Bryan, Bulloch, Candler, Chatham, Effingham, Evans, Liberty, and Tattnall. The ROI for air quality analysis includes Bryan and

Liberty counties, as these two counties cover the majority of the installation. The ROI for Fort Stewart is in attainment status as of April 2020.[97]

Fort Stewart is considered a major source of air emissions and falls under Title V of the CAA because it has the potential to emit 100 tpy of any one criteria pollutant and 25 tpy of total combined hazardous air pollutants. The state of Georgia issued Fort Stewart a Title V Permit (Part 70 Operating Permit No. 9711-179-0018-V-03-0) on July 8, 2015. There were also 3 Amendments to the Permit (9711-179-0018-V-03-1, 9711-179-0018-V-03-2, and 9711-179-0018-V-03-3). These Amendments were issued on August 8, 2016; March 11, 2019; and May 7, 2020. Federal New Source Performance Standards (NSPS), 40 CFR 60, Subpart A "General Provisions," and Subpart D "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" apply to boilers that have an input capacity from $10x10^6$ Btu/hr. to $100x10^6$ Btu/hr. built after June 1989. Three boilers (ID H009-H011) at Fort Stewart are subject to these requirements.

The largest source of actual criteria pollutant emissions at Fort Stewart is prescribed burning. Criteria emissions from this category far exceed all other emissions. But the impacts on GHG emissions would also be greater from uncontrolled fires. The consensus is that prescribed fire increases carbon sequestration by (a) returning nutrients, which increase tree growth, to the soil and (b) reducing the risk of catastrophic fire, which would remove most of the accumulated biomass and increase GHG emissions.

3.5.2.2 Environmental Consequences

Air quality at Fort Stewart is in attainment for all criteria pollutants. As noted in Section 3.1.1.2, dust will contribute to the emissions of PM_{10} and $PM_{2.5}$ at Fort Stewart. The total increase is anticipated to be 265 tons per year with approximately 231 tons as PM_{10} and 34 tons as $PM_{2.5}$. The PM_{10} should settle out of the air rapidly and not impact air quality away from the activities generating the dust. With the addition of the dust emissions, the impacts are as described in Section 3.1.1.2. Air quality impacts from the Proposed Action are expected to be less than significant due to stationing 235 additional tactical vehicles at Fort Stewart. This is approximately 5.2 percent of the total number of tactical vehicles.

The M-SHORAD battalion would not routinely use HAAF therefore the Proposed Action would have negligible effects at HAAF.

3.5.2.3 Cumulative Effects

It is anticipated that adding eight of the 13 systems in addition to the Proposed Action at Fort Stewart would only cause minimal increases in the emission of pollutants. Many of these

[97] EPA. 2020. Current Nonattainment Counties for All Criteria Pollutants. Data is current as of May 6, 2020. https://www.epa.gov/green-book and 2020 https://www3.epa.gov/airquality/greenbook/anayo_ga.html Accessed on May 6, 2020.

systems are replacing existing systems on a one-for-one basis. There would only be a minimal increase of additional vehicles operated during training, and most of the new systems would operate from fixed or semi-fixed positions. Therefore effects are expected to be less than significant.

3.5.3 Airspace

3.5.3.1 Affected Environment

The ROI for airspace is the SUA areas above and nearby the installation that is controlled by Fort Stewart. The airspace is defined on aeronautical charts and may be exclusive, limiting non-participating (e.g., commercial and general aviation) users or it may simply be advisory, indicating to non-participating users of the airspace that military operations are occurring in certain areas, requiring an extra measure of vigilance.

The SUA is a complex set of restricted areas for exclusive use and Military Operations Areas (MOAs) that are advisory. The SUA is designed to ensure the segregation of incompatible, non-participating aircraft from potentially hazardous operations occurring either in flight (e.g., munitions releases, UAS operations) or on the ground (e.g., artillery ranges, testing activities). A MOA does not provide the exclusive use required to support M-SHORAD range activities and will not be addressed in this document. Fort Stewart restricted air space reaches a maximum altitude of 29,000 feet and an approximate area of 1,059.71 km^2 (Figure 3.5-2). If required, Fort Stewart can request and receive an Altitude Reservation from the Jacksonville Center FAA facility. The Altitude Reservation can extend up to 45,000 ft. and overly their range complex. This will provide the exclusive use airspace required to safely conduct M-SHORAD training.

The major airspace units are subdivided vertically and horizontally, enabling airspace managers and schedulers to activate particular blocks of airspace that are sized appropriately to the activities occurring within them. A wide variety of activities occur within the SUA; however, for the SUA managed by Fort Stewart, the principal uses and purposes of the SUA supporting the M-SHORAD are:

- To protect non-participating aircraft from range activities occurring on the ground.
- To promote realistic training, allowing scenarios to unfold without training distracters such as suspensions required when civilian aircraft penetrate the restricted areas.

3.5.3.2 Environmental Consequences

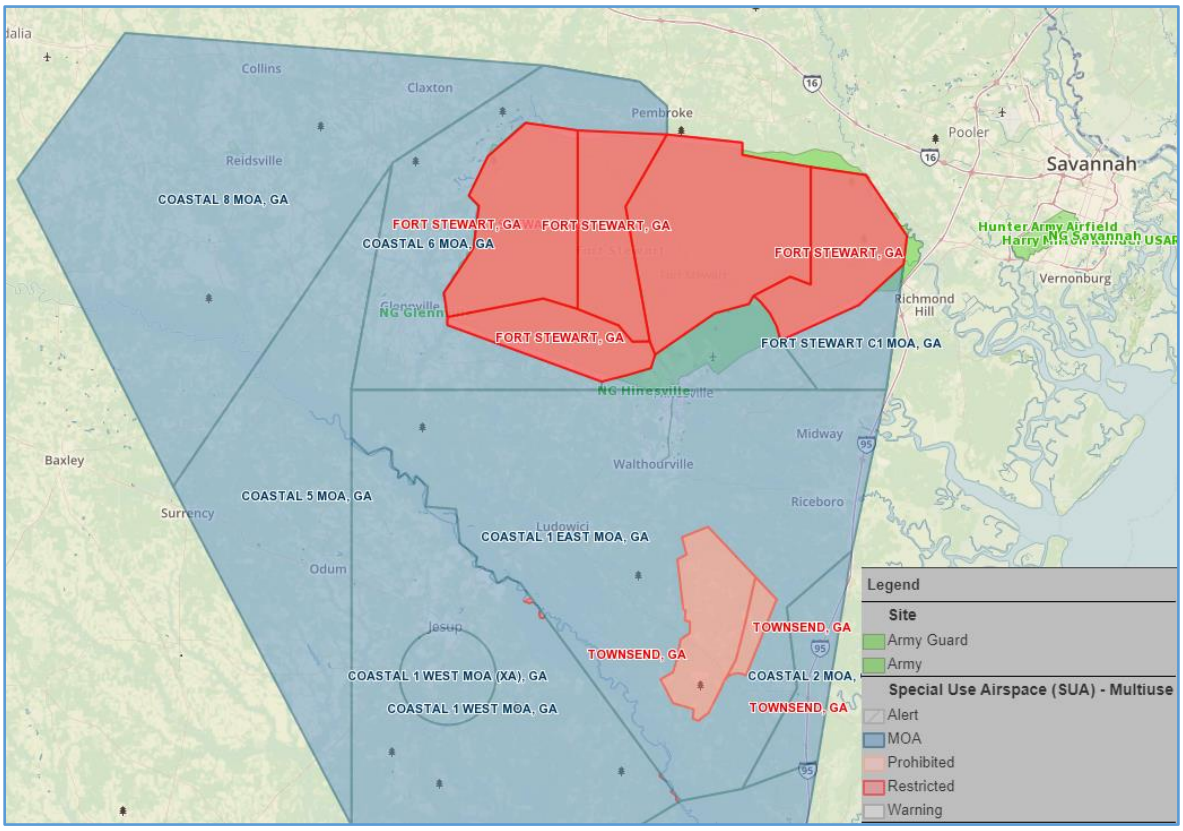
Fielding the M-SHORAD battalion at Fort Stewart may cause a slight, less than significant increase in Airspace use that can be accommodated within the current Airspace available to Fort Stewart.

The M-SHORAD battalion would not routinely use HAAF; therefore, the Proposed Action would have negligible effects at HAAF.

3.5.3.3 Cumulative Effects

There could be a small increase in Airspace use due to adding eight new systems at Fort Stewart. Any required increases in use can be accommodated within the current Airspace available to Fort Stewart. Therefore, cumulative effects to Airspace are expected to be less than significant.

Figure 3.5-2. SUA for Fort Stewart[98]



3.5.4 Biological Resources

3.5.4.1 Affected Environment

The longleaf pine community dominates Fort Stewart's natural resources. There are numerous habitat types on the installation, including: longleaf pine forests, mesic lowland pine forests, evergreen scrub forests, lowland broadleaf evergreen forest hammocks, dwarf oak forests, upland broadleaf deciduous-needleleaf forests, bay swamp, herb bogs, shrub bogs, gum and cypress ponds, blackwater streams, and the blackwater river and swamp system.

3.5.4.1.1 Flora

The Nature Conservancy (1995) found 1,066 taxa from 724 sites on Fort Stewart–Hunter AAF. Species found represent 465 genera and 139 families.

[98] Source: DISDI Atlas 2020. https://rsgisias.crrel.usace.army.mil/disdi_atlas/ Accessed on April 2, 2020.

3.5.4.1.2 Fauna

Natural animal communities on Fort Stewart include especially large mammals and have been affected by urbanization in the Southeast. Two prominent examples are panthers (*Felis concolor*) and black bears (*Ursus americanus*), which were extirpated from the area before Army occupation of the lands at Fort Stewart. White-tailed deer (*Odocoileus virginianus*) and feral hogs (*Sus scrofa*) are common, as are many smaller mammals, which are relatively undisturbed by urbanization (Thomas et al. 1996).

3.5.4.1.3 Protected Species

Fort Stewart is occupied by 10 protected species, including eight federally listed species (Table 3-30). Federally listed threatened and endangered species are discussed below.

Table 3-2930. Federal Protected Species that Occur on Fort Stewart

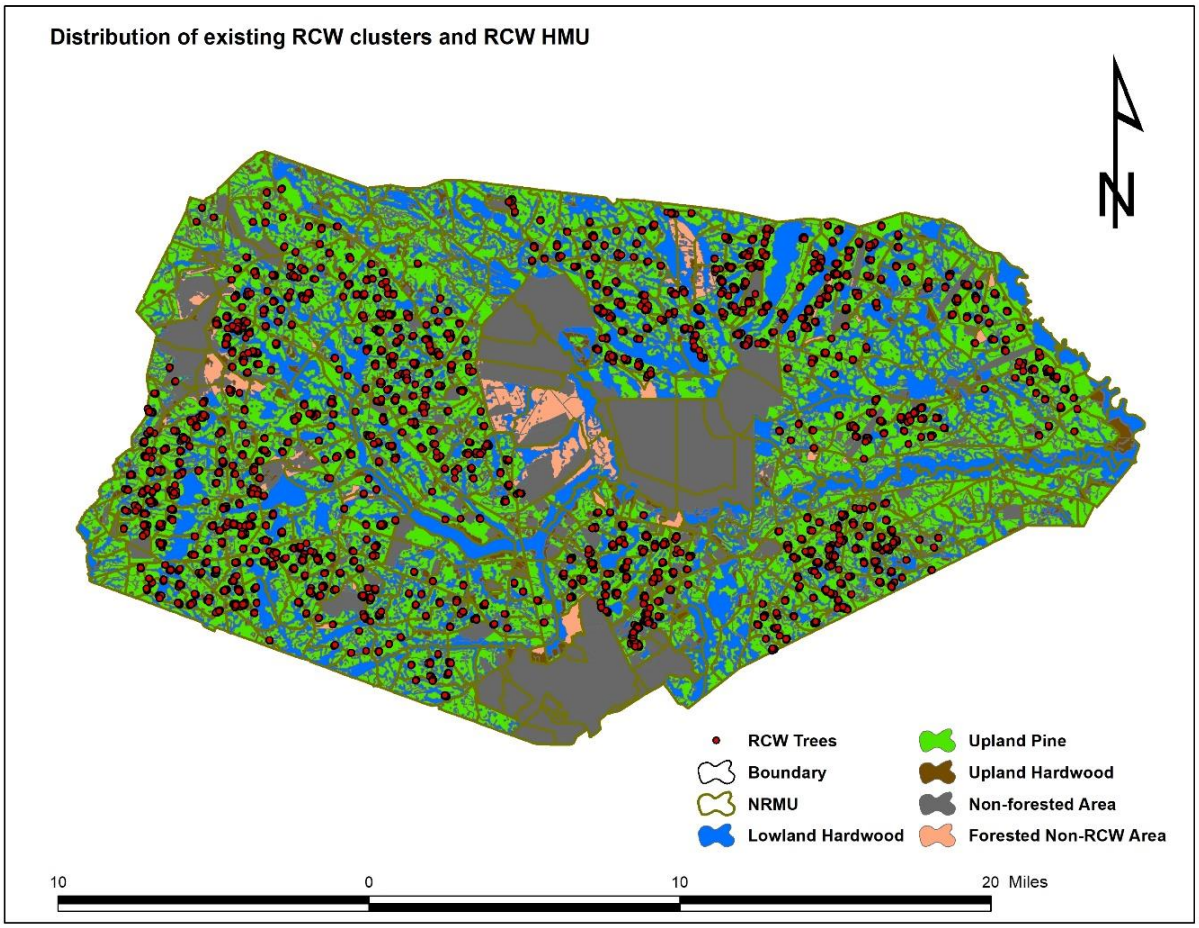
Common Name	Scientific Name	Listing Status
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Wood stork	*Mycteria Americana*	Threatened
Eastern black rail	*Laterallus jamaicensis ssp. jamaicensis*	Threatened
Bald eagle	*Haliaeetus leucocephalus*	BGEPA[99] protected
Eastern indigo snake	*Drymarchon corais*	Threatened
Gopher tortoise	*Gopherus polyphemus*	Candidate
Frosted flatwoods salamander	*Ambystoma cingulatum*	Threatened
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Endangered
Smooth coneflower	*Echinacea laevigata*	Endangered

Red-Cockaded Woodpecker (RCW)

As of 2020, Fort Stewart had approximately 607 active clusters and 582 potential breeding groups (personal communication Kendrick, M. Fort Stewart, Sep 21, 2020). Due to achieving recovery goals, Fort Stewart received concurrence from the USFWS in September 22, 2015 for the deprotection of all RCW clusters. Figure 3.5-3 provides locations on RCW trees as well as habitat management units (HMU).

[99] BGEPA = Bald and Golden Eagle Protection Act

Figure 3.5-3. Distribution of Existing RCW Clusters and HMUs, as of 2020



Wood Stork

The wood stork occasionally forages on Fort Stewart but is not known to nest here (Fort Stewart 2001). Habitat management guidelines for the wood stork recommend prohibiting aircraft operation within 500 feet of a nesting colony (Fort Stewart 2010).

Eastern black rail

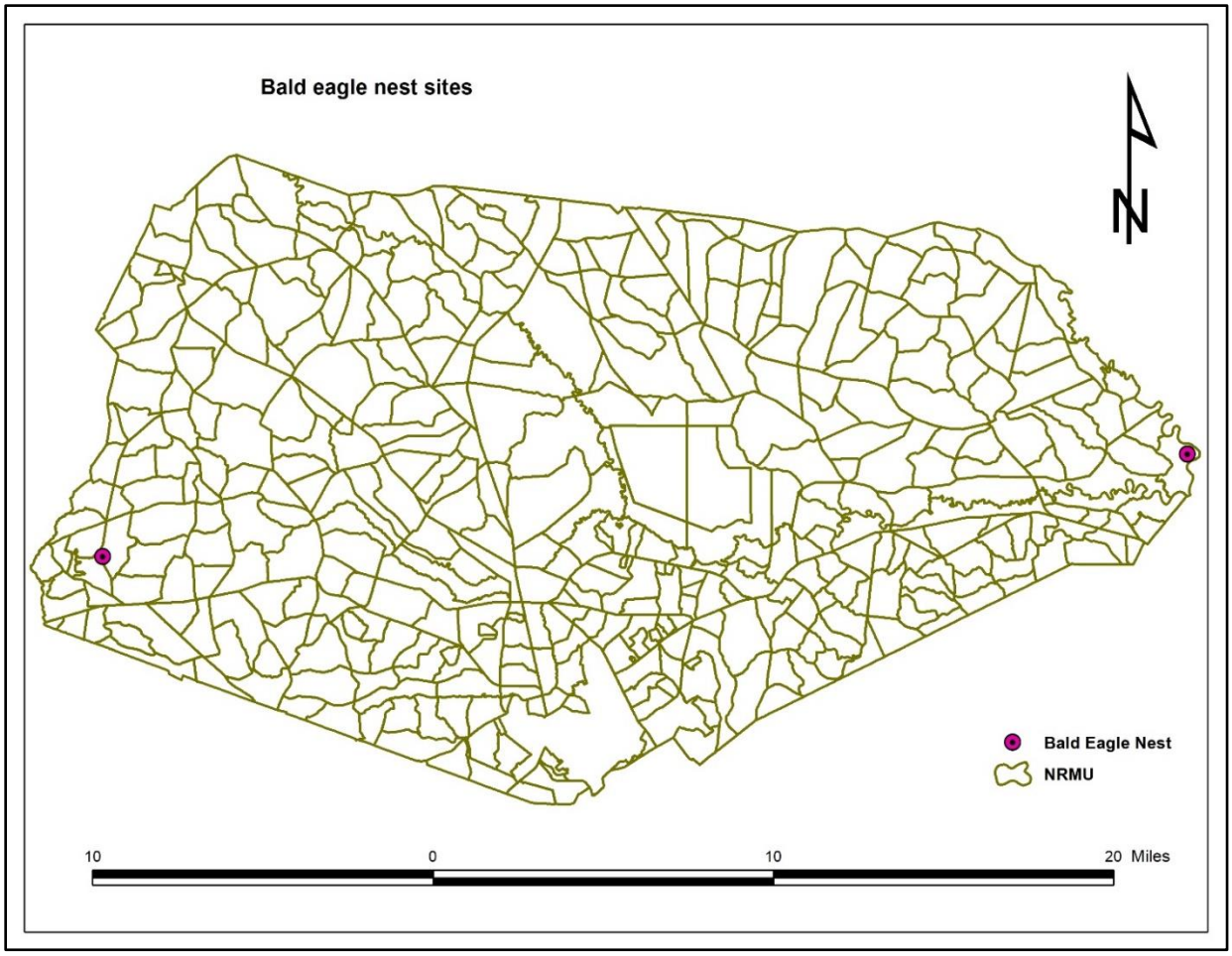
In southeastern Atlantic coast states, the eastern black rail habitat includes impounded fresh, salt, and brackish marshes. The black rail is a potential breeder in wetland areas. The black rail has been observed during the migratory seasons. The species is known or believed to occur in Georgia.

Bald Eagle

As of 2020, there were three HMUs for the bald eagle on Fort Stewart. One was located in TA E13 and two others in TA C17. Habitat management guidelines for the bald eagle recommend prohibiting aircraft operation below 1000 feet of a bald eagle nest during the bald eagle nesting

season from October to May (Fort Stewart 2010). Figure 3.5-4 provides locations of bald eagle nests as of 2020.

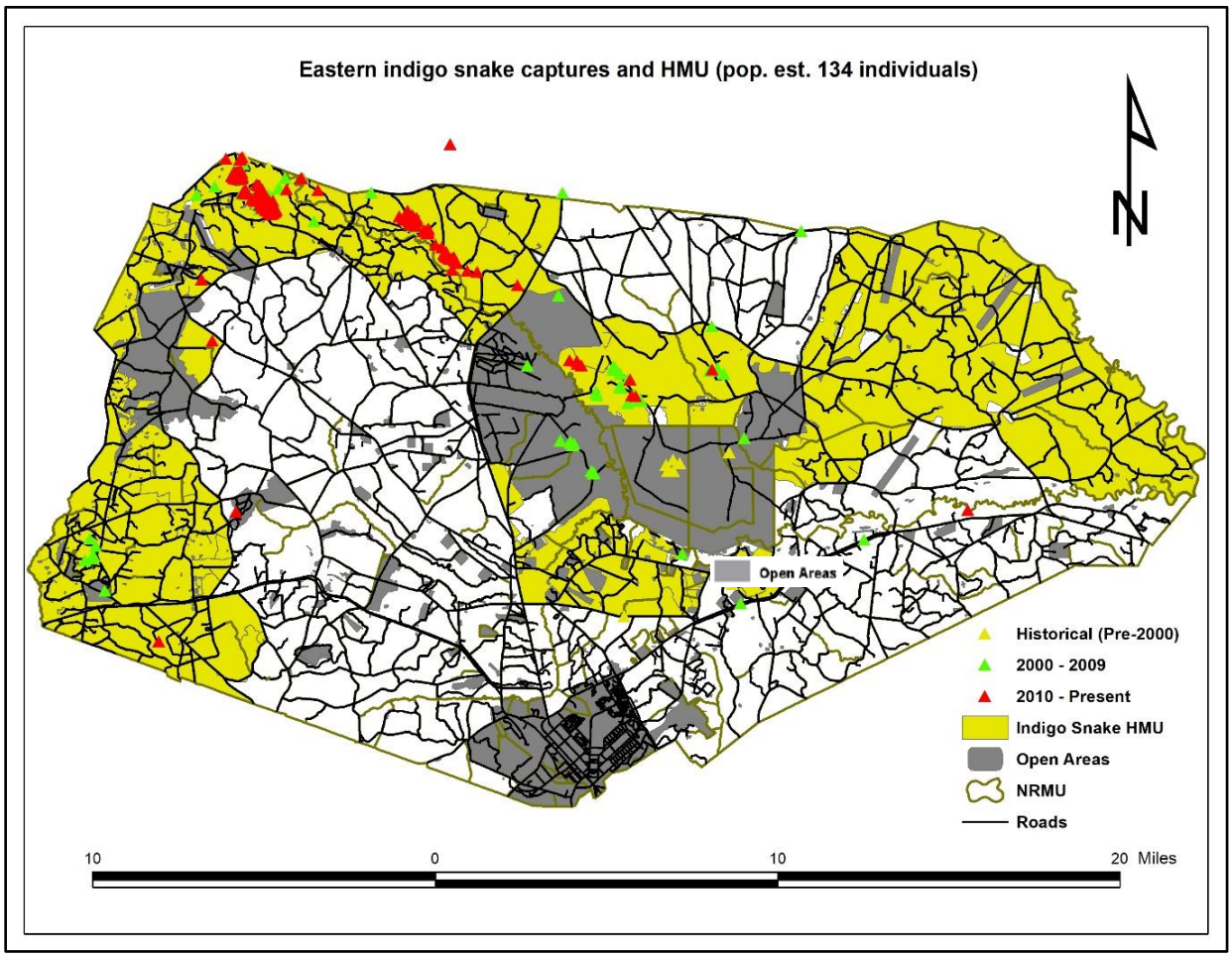
Figure 3.5-4. Bald Eagle Nest Sites and Management Zones as of 2020



Eastern Indigo Snake

Figure 3.5-5 shows the locations of indigo snake populations and their HMUs.

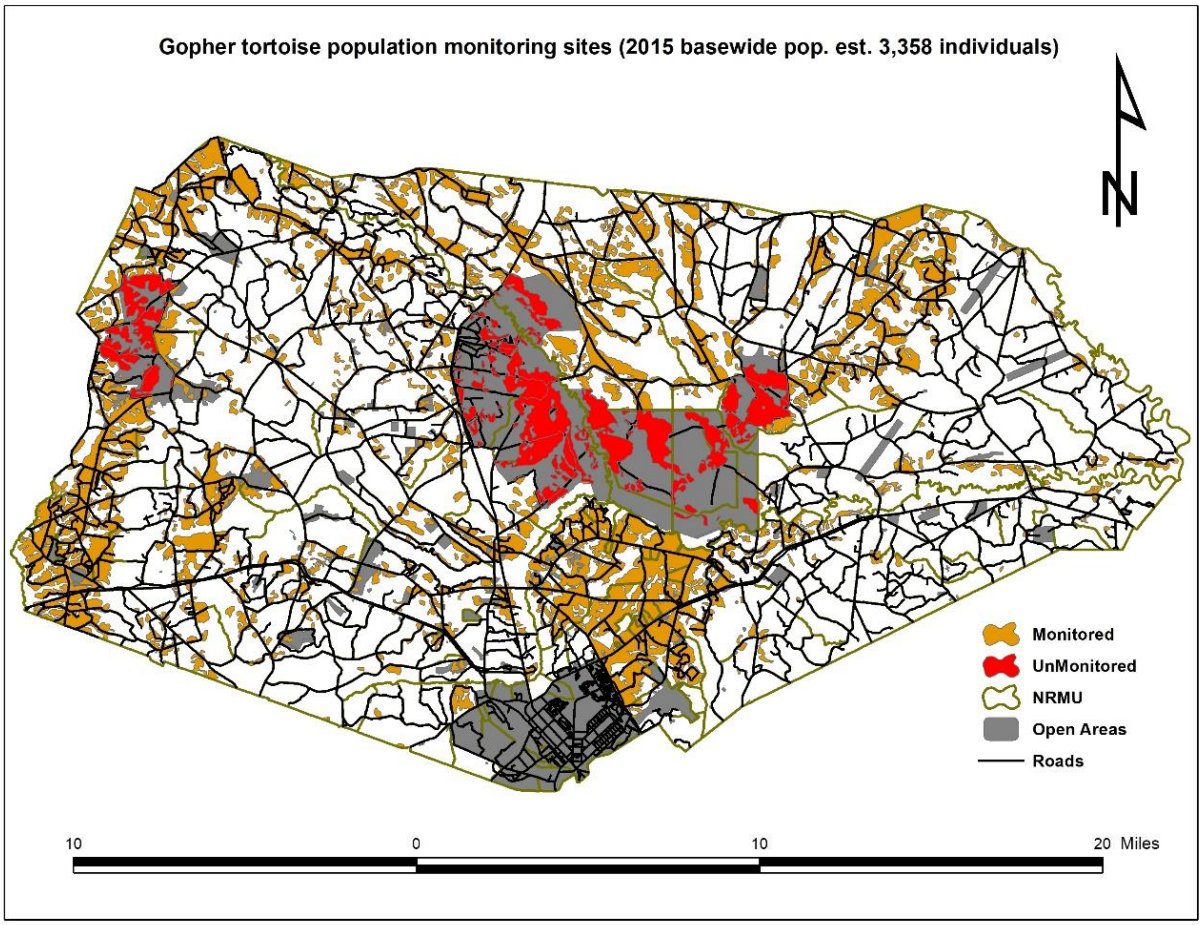
Figure 3.5-5. Indigo Snake Locations and Associated HMUs as of 2020



Gopher Tortoise

Gopher tortoises are widespread and common throughout most of the sandhill areas inhabited by this eastern indigo snake population. Figure 3.5-6 provides general locations of gopher tortoise populations and monitoring sites as of 2020.

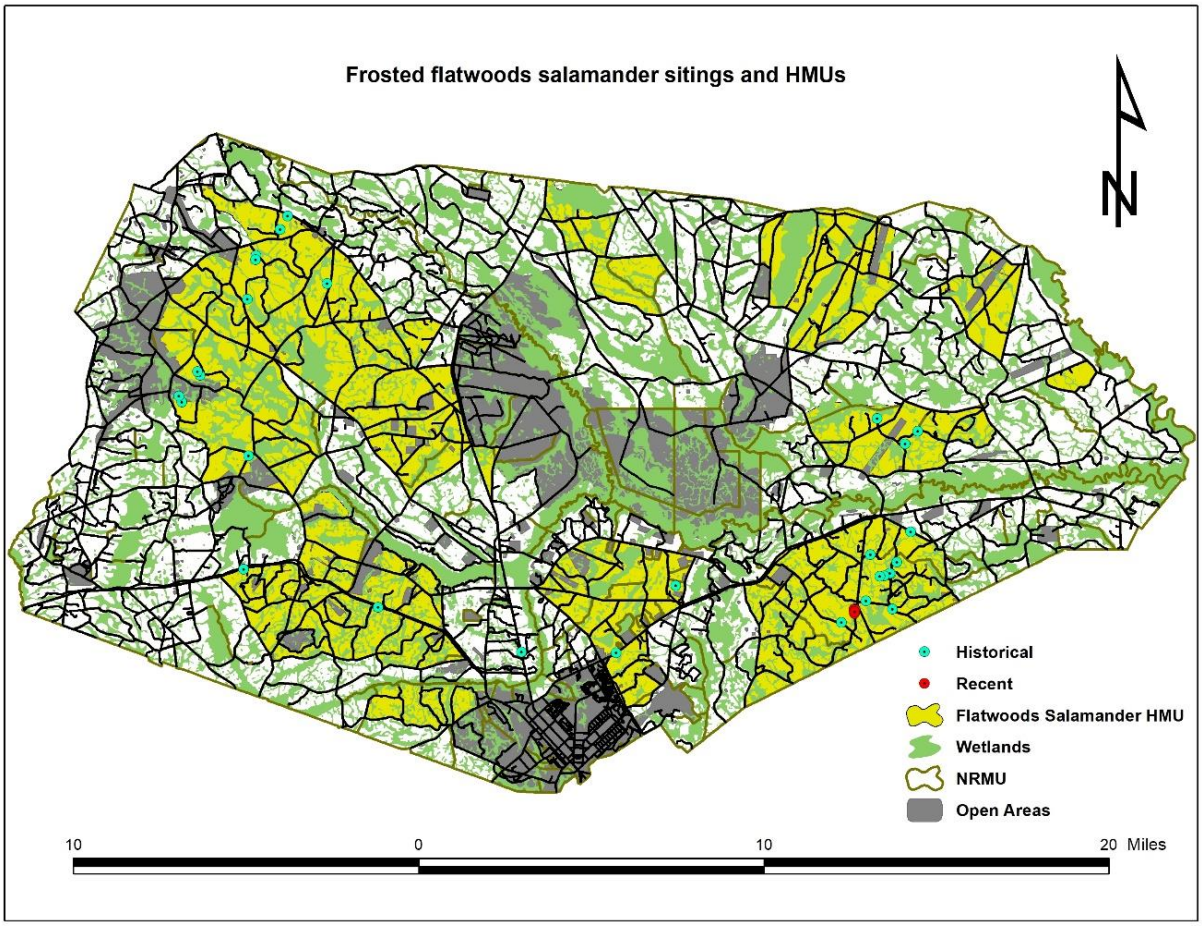
Figure 3.5-6. Gopher Tortoise Burrows and Monitoring Sites, as of 2020



Frosted Flatwoods Salamander

Suitable habitat for this species is extensive and widespread on the installation and has been promoted through past and current management practices especially prescribed burning (Fort Stewart 2001). Figure 3.5-7 provides locations of frosted flatwoods salamander habitat as of 2020.

Figure 3.5-7. Frosted Flatwoods Salamander HMUs as of 2020



Short Nose and Atlantic Sturgeon

This species historically has been collected in the lower Ogeechee River. An estimated 300 short nose sturgeons inhabit the Ogeechee River as of 2001, but none are known to inhabit the Canoochee River. Fort Stewart borders the Ogeechee River and its tributary, the Canoochee River, flows across the installation. The species is vulnerable to several threats, including decreased water quality, loss of adequate habitat by sedimentation, and lack of summer thermal refuges (Fort Stewart 2001).

The Atlantic sturgeon is a long-lived species that has been documented in the Ogeechee and Canoochee Rivers. The most significant threats to Atlantic sturgeon are accidental catch in some

commercial fisheries, dams that block access to spawning areas, poor water quality, dredging of spawning areas, water withdrawals from rivers, and vessel strikes.

Smooth coneflower

The smooth coneflower is a perennial herb measuring approximately 3.3 ft. tall with light purple petals. It is known to occur in the northwestern corner of the installation.

3.5.4.2 Environmental Consequences

The M-SHORAD battalion would not routinely use HAAF; therefore, the Proposed Action would have negligible effects at HAAF.

Impacts from Construction

Fort Stewart would initially house and train the M-SHORAD battalion in existing facilities and on existing ranges and maneuver areas. As funding allows, new construction is planned for M-SHORAD cantonment facilities in the vicinity of 6th and 15th Streets. Planned construction for the expected ranges is in the north-central and north-eastern part of the training area east of Route 119 and south of Highway 280. Impacts to vegetation and fauna are adequately addressed in Section 3.1.3.2 and are expected to be less than significant.

If tree removal is required to build/install these facilities, the Fort Stewart Forestry Branch will evaluate each project site for a possible timber harvest.

It is standard practice on Fort Stewart that all proposed range projects are sited to avoid and minimize environmental resource impacts to the greatest extent practicable. For example, new ranges are sited over existing ranges. Design processes yield an even greater opportunity to minimize environmental impact. For example, target placement would be designed to avoid direct impacts to RCW cavity trees as well as to minimize wetland impacts for associated target berms.

Protected species that may be impacted include the endangered RCW and shortnose sturgeon and the threatened wood stork, eastern indigo snake, and frosted Flatwoods salamander. The gopher tortoise is a candidate species and the bald eagle may also be present. The installations will consult with the FWS or the NMFS, as appropriate. Impacts are expected to be less than significant as described below.

There are two RCW clusters near the planned cantonment construction area and numerous RCW clusters in the vicinity of the range construction area. Once exact construction sites are pinpointed, any required consultation with USFWS would be completed to minimize species impacts to less than significant. Also, impacts to the RCW are expected to be less than significant because it is well documented that the RCW clusters do coexist with Army activities on training lands.

The shortnose sturgeon occupies the Ogeechee and Altamaha Rivers, while the Atlantic sturgeon occupies the Ogeechee and Canoochee Rivers. Cantonment construction is planned near Mill Creek, which flows to the Canoochee River which then flows into the Ogeechee River. Range construction is planned near the Canoochee River. Construction near the Canoochee and its tributaries could cause increases in sediment loading of the Canoochee River that may indirectly impact the Ogeechee River and shortnose and Atlantic sturgeons. The Altamaha River is west of Fort Stewart and a number of tributaries drain some far west training areas where no construction is planned. These impacts are expected to be less than significant because Fort Stewart would implement construction techniques and BMPs to limit erosion and sedimentation of streams.

Construction is not expected to occur in the northwest portions of the installation, therefore no impacts are expected to the smooth coneflower.

The wood stork could occupy riparian areas such as a freshwater wetland and prefers cypress and mangrove swamps. There are no known wood stork nesting areas on Fort Stewart but they may forage on the installation. Army activities could result in flushing wood storks from foraging areas. If a nesting site was found, Fort Stewart would establish a buffer around the site and prohibit flight at less than 500 feet from the nest site.

Construction is not expected to occur in marshes and wetland areas, but if necessary, appropriate permits and consultations would occur to address impacts to these resources as well as the eastern black rail. The installation would reduce impacts from sedimentation and erosion that could affect water quality in areas used by the species through BMPs and required erosion control measures.

The frosted flatwoods salamander habitat is outside the cantonment area but does occur in the area planned for range construction. There have been no recent sightings in the area planned for range construction. There may be adverse effects to the frosted flatwoods salamander during construction and operation of the range. Once exact construction sites are pinpointed, if adverse effects are known or anticipated, Fort Stewart will consult with the USFWS to minimize species impacts before construction. Therefore, impacts are expected to be less than significant.

The eastern indigo snake habitat is outside the cantonment area but does occur in the area planned for range construction. There have been no recent sightings in the area planned for range construction. There may be adverse effects to the eastern indigo snake during construction and operation of the range. Once exact construction sites are pinpointed, if adverse effects are known or anticipated, Fort Stewart will consult with the USFWS to minimize species impacts before construction. Therefore, impacts are expected to be less than significant.

Gopher tortoise habitat is near the planned construction area in the cantonment and also occurs in the area planned for range construction. There may be adverse effects to the gopher tortoise during construction in both areas and operation of the range. Once exact construction sites are pinpointed, if adverse effects are known or anticipated, Fort Stewart will consult with the

USFWS to minimize species impacts before construction. Therefore, impacts are expected to be less than significant.

Bald eagles may occur on Fort Stewart, but they are currently located in the far west portion of the training areas. The proposed construction sites are not near the documented bald eagle nesting sites therefore impacts are expected to be less than significant.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts to biological resources are adequately addressed in Section 3.1.3.2 and are expected to be less than significant.

3.5.4.3 Cumulative Effects

There could be a small increase in the intensity of use of training areas and a small additional increase in the soldier population by adding eight new systems. Any required increases in use could be accommodated through scheduling flexibility provided by the SRM or ReARMM, additional assessments, and land rehabilitation and maintenance to maintain the quality of habitat. Therefore, the cumulative effects to biological resources are expected to be less than significant.

3.5.5 Cultural Resources

3.5.5.1 Affected Environment

The ROI for Fort Stewart extends to the installation boundary.

3.5.5.1.1 Cultural Resources Present

Archeological Resources

Of the 279,270 acres on Fort Stewart, 220, 525 acres of training lands has been surveyed and 951 acres remain (Fort Stewart pers.com 2020[100]). From this work, the Army developed a refined site prediction model that identified 59,219 acres, or 21 percent of the installation, as having a high probability for the occurrence of archaeological resources. Approximately 225,548 acres, or 79 percent of the installation, have been identified as having low probabilities for the occurrence of archaeological resources (Fort Stewart 2014).

Although archaeological sites that are ineligible for the NRHP do not require protection from an unauthorized excavation under the NHPA, *all* archaeological sites that are at least 100 years old and are of scientific value are prohibited from unauthorized disturbance under the ARPA. As such, Fort Stewart routinely monitors archaeological sites susceptible to vandalism and looting. Furthermore, Fort Stewart prohibits metal detection to recover artifacts without an ARPA permit.

[100] Pers. Comm. Oct 2020.B. Greer, Archeologist, Ft. Stewart, GA

National Register of Historic Places eligibility of archaeological resources identified on Fort Stewart are summarized in Table 3-31. To protect them, in accordance with NHPA and ARPA, the location of these archaeological resources are not graphically depicted within this public document, although general information regarding their location and eligibility to the NRHP is provided. Cultural resource management personnel schedule surveys as needed. As a result of these surveys, Fort Stewart has identified 4,139 archaeological sites, as of 2020.[101]

Table 3-3031. Archaeological Resource Eligibility on Fort Stewart and Hunter AAF

Eligibility Status	Number of Sites
Listed on NRHP	1
Eligible for NRHP Inclusion	74
Potentially Eligible for NRHP Inclusion	66
Indeterminate Eligibility for the NRHP inclusion (includes sites not fully delineated or pending final Phase I analysis)	89
Not Eligible for NHRP	3,909

Source: Fort Stewart 2010.

There are 103 range and impact areas totaling 25,856 acres on Fort Stewart, including pistol, rifle, machine gun, tank, anti-tank, aerial gunnery, and demolition ranges (Pirnie 2006a). In addition to these official range footprints, 110,472 additional maneuver area acres have been identified as having an elevated potential for unexploded ordnance (UXO). With this added acreage, there is an estimated total of 136,328 acres on Fort Stewart that are potentially UXO-contaminated.

In some cases, previously identified cultural resources have been recommended potentially eligible and were subsequently identified as containing UXO. Although these resources have remained potentially eligible, it is anticipated that these sites will be re-evaluated for the NRHP on a case-by-case basis.

All lands that are neither cantonment nor range/impact areas are considered maneuver areas, which total approximately 250,000 acres on Fort Stewart (this count includes the 110,472 UXO-contaminated maneuver areas) and 2,600 acres on Hunter AAF (Pirnie 2006b). Training activities in maneuver areas include artillery firing, demolition training, and tactical training exercises. The term “maneuver areas,” for this document, also includes special-use areas, such as firing points and bivouac areas.

Cemeteries

When the military acquired Fort Stewart and Hunter AAF, it also took responsibility for cemeteries that had been previously established on the properties. The Army, subject to available resources, is dedicated to the preservation of the cemeteries on the military reservation.

[101] Pers. Comm. Oct 2020.B. Greer, Archeologist, Ft. Stewart, GA

Sacred Sites

Native American resources are limited on Fort Stewart (relative to its size) and are associated with one confirmed site (the Lewis Mound) and three potential sacred sites. Fort Stewart consults with the federally recognized Native American Tribes regarding effects to historic properties and ensures Tribal concerns are taken into account following the appropriate cultural resource laws (Fort Stewart 2010). Furthermore, Fort Stewart recognizes the importance of access to sacred sites and has established procedures that integrate not only the military mission, but also the safety and well-being of the requestor, and the rights and privacies of the requesting tribes.

3.5.5.1.2 Consultation and Coordination with Tribal Governments

Fort Stewart Programmatic Agreement (PA)

Fort Stewart and the Georgia SHPO developed a PA in May 2011, and it expires in May 2021, but a follow-on agreement is expected. It provides Fort Stewart with a flexible tool to manage its cultural resources, allowing Fort Stewart to meet the requirements of the Cultural Resource Management review of undertakings with no effect or no adverse effect without waiting for the 30-day response from the SHPO. In short, the PA is the Cultural Resource Management program's regulatory backbone, guiding and streamlining the program's compliance with federal laws and regulations while providing a timely, effective method of managing Fort Stewart's cultural resources.

3.5.5.2 Environmental Consequences

The M-SHORAD battalion would not routinely use HAAF; therefore, the Proposed Action would have negligible effects at HAAF.

Impacts from Construction

Construction would be as described in Section 3.1.4.2. In the cantonment area, there are no known cemeteries, prehistoric sites, or historic sites that would be impacted by the planned construction. However, in the range area, planned construction could impact cemeteries, prehistoric sites, or historic sites. Portions of the range construction areas have not been surveyed and the probability of containing cultural resources varies from very low to high. All non-exempt areas disturbed by construction within the cantonment, maneuver, and live-fire range areas would be surveyed for cultural resources unless a survey has been previously completed. If cultural resources are found required consultations would be completed and appropriate mitigations would be implemented to meet federal, state, and Tribal requirements. Therefore, no significant impacts to cultural resources are anticipated. Fort Stewart has implemented a Programmatic Agreement with the Georgia SHPO that allows additional flexibility in meeting the requirements of the NHPA.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts to cultural resources are adequately addressed in Section 3.1.4.2 and are expected to be less than significant.

3.5.5.3 Cumulative Effects

There are no anticipated construction requirements for the eight new systems. There could be a small increase in the intensity of use of training areas and a small additional increase in the soldier population by adding the eight new systems. Any required increases in use could be accommodated through scheduling flexibility provided by the SRM or ReARMM and additional assessments. All soldiers reporting to support the eight additional systems would receive the appropriate training in recognition, avoidance, and protection of cultural resources. Therefore, the cumulative effects to cultural resources are expected to be less than significant.

3.5.6 Soils

3.5.6.1 Affected Environment

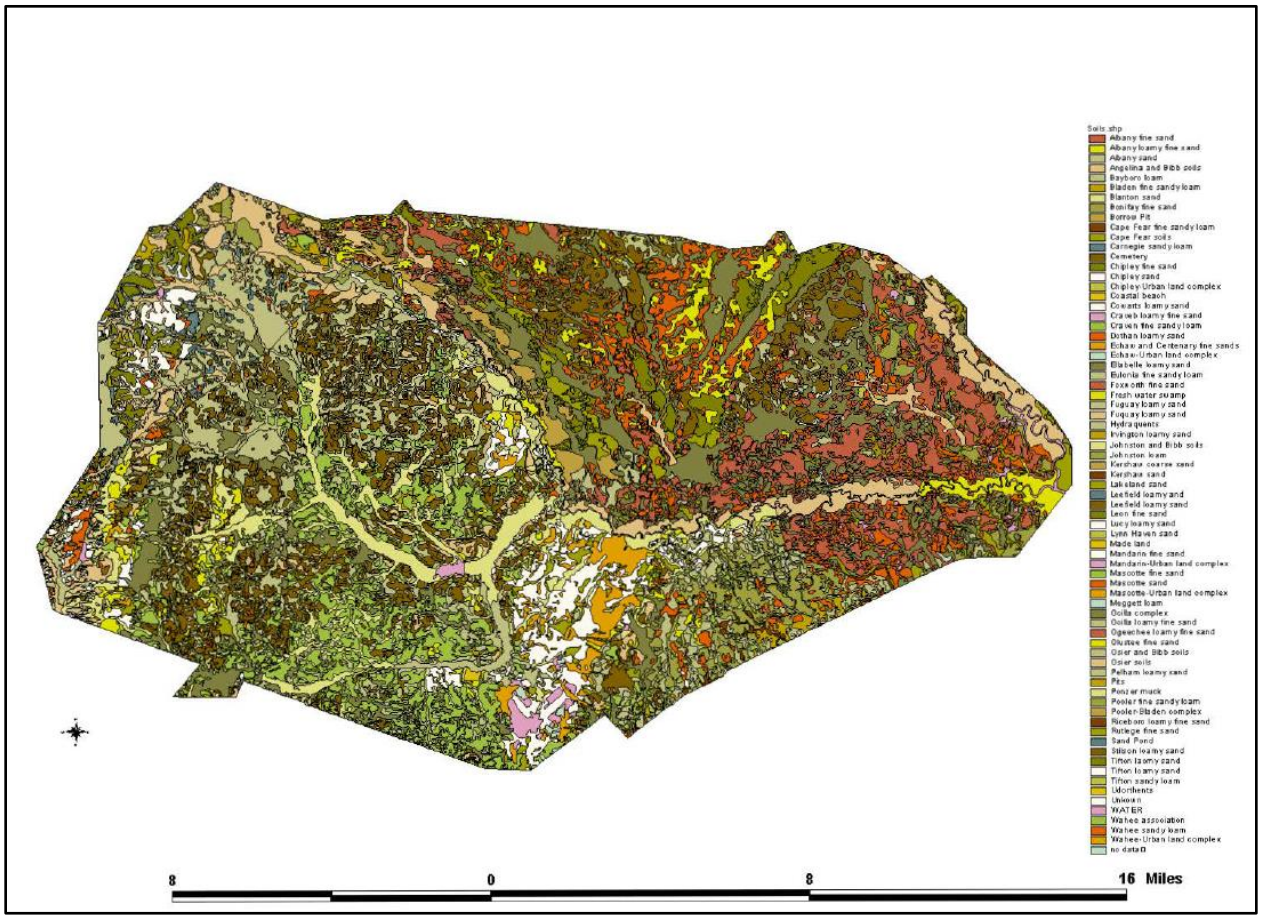
In coastal Georgia, drainage from three physiographic provinces, the Blue Ridge Mountains, Piedmont Plateau, and Coastal Plain, affect the composition of alluvial deposits. Near Fort Stewart–HAAF, the parent material for all soils is water-lain sediments deposited during and before the Pleistocene (Thomas et al. 1996).

As a result of the mild climate, freezing and thawing cycles have little effect on soil weathering. Much of the rainfall percolates through the soil and moves dissolved and suspended materials downward. As a result, most soils on uplands are highly weathered, leached, strongly acid, and low in natural fertility and organic matter (Thomas et al. 1996). Figure 3.5-8 provides a soil map for Fort Stewart.

Soil surveys have been completed for both installations by the USDA Natural Resources Conservation Service (then the Soil Conservation Service). Site-specific soil testing may be required for grounds maintenance or turf management, but a further classification of soil series is unnecessary (Directorate of Engineering and Housing (DEH) 1993).

Most soils on the two installations are classified as sandy and infertile. The majority of soils at Hunter AAF are in the Cape Fear, Ellabelle loamy sand, Ocilla, and salty tidal marsh series. At Fort Stewart, Ellabelle loamy sand, Ogeechee, Pelham, Stilson, Rutlege, Leefield, and Mascotte are common soil series. Many of these series are well suited to the production of forest trees and are unsuitable to cross-country movements of heavy equipment during wet periods (DEH 1993).

Figure 3.5-8. Fort Stewart Soil Map



3.5.6.2 Environmental Consequences

The M-SHORAD battalion would not routinely use HAAF; therefore, the Proposed Action would have negligible effects at HAAF.

Impacts from Construction

Construction would be as described in Section 3.1.5.2. Construction in the cantonment area would take place predominately on fine sand and loamy sand soils which are highly erodible. In the range construction area, the predominant soil types are sands, fine sands, and loamy sands which are also highly erodible. As described in Section 3.1.5.2, the measures employed by the Army would control soil erosion resulting from construction activities; therefore, impacts are expected to be localized and less than significant.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Section 3.1.5.2 adequately addresses the measures employed by the Army to control soil erosion resulting from live-fire and maneuver training and the increase in the soldier population. Therefore, impacts are expected to be localized and less than significant.

3.5.6.3 Cumulative Effects

Fielding of the eight new systems is expected to add less than 150 additional soldiers to Fort Stewart. The additional systems would cause slight increases in the intensity of use within the live-fire range and maneuver complexes. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to soils.

3.5.7 Land Use and Compatibility

3.5.7.1 Affected Environment

3.5.7.1.1 Cantonment

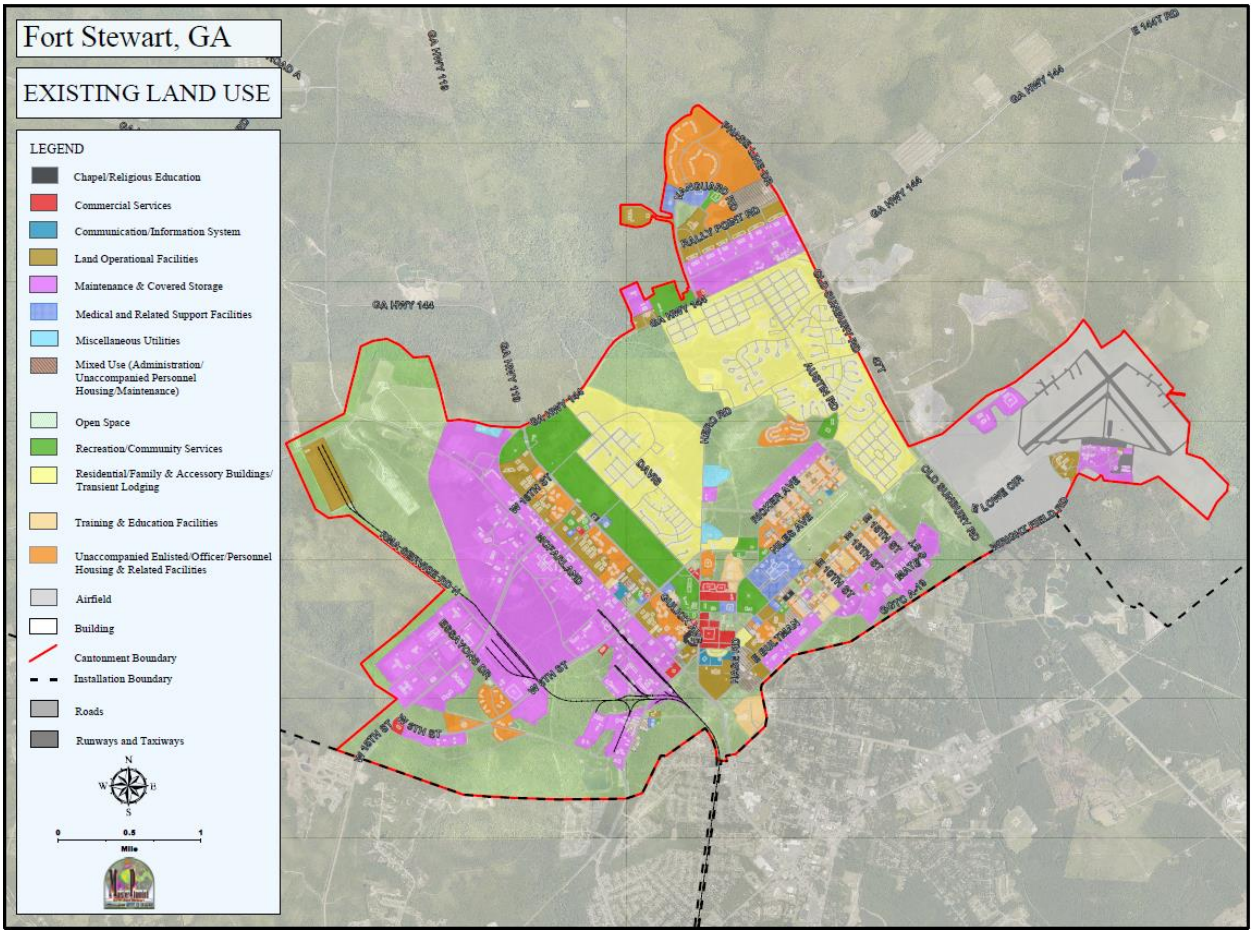
The Fort Stewart cantonment area is a single complex in the south-central portion of Fort Stewart next to the city of Hinesville and consists of the administrative, operational, and residential portions of Fort Stewart. The cantonment area encompasses about 8,465 acres and comprises the majority of development on Fort Stewart, including buildings, roads, parking, and adjacent open spaces for administrative functions, community activities, housing, barracks, installation support services, and Wright AAF (Figure 3.5-9) (Fort Stewart 2010).

Recreation

Recreational resources include areas for swimming, boating, hiking, hunting, and fishing. Fort Stewart has allowed the public access to installation lands for hunting and fishing since 1959. In general, any hunting or fishing area not closed for military use is open to the public with appropriate permits and restrictions. Access is denied to specific areas when safety or security concerns exist, prescribed burning is underway, or natural resources do not support such usage. As of 2010, about 1,500 to 2,000 people had permits to hunt at Fort Stewart, and they make 40,000 to 50,000 hunting trips annually (Fort Stewart 2010). About 3,000 to 4,000 people held a fishing permit, and they make 60,000 to 80,000 fishing trips annually. Existing fishing facilities include piers, docks, and boat ramps on installation ponds and waterways. A limited number of landing sites provide access to the Canoochee and Ogeechee Rivers.

White-tailed deer, feral hogs, and wild turkeys are prominent game species on Fort Stewart, and largemouth bass and redbreast sunfish are popular species for anglers. Additional outdoor recreation activities include wildlife observation, camping, shooting sports (including archery and skeet), volleyball, horseshoes, and playgrounds, which are in the Holbrook Pond Recreational Area.

Figure 3.5-9. Cantonment Map of Fort Stewart

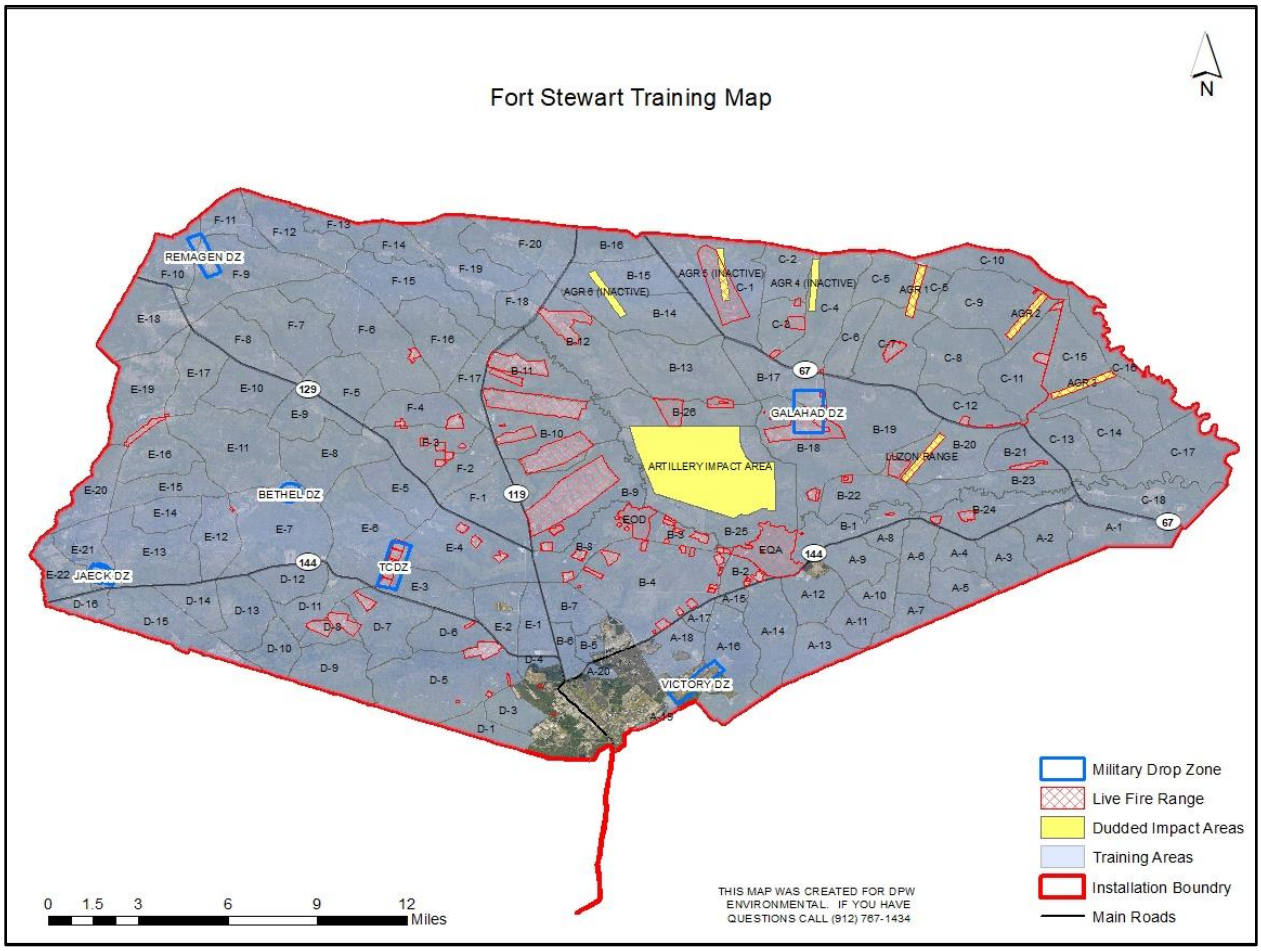


3.5.7.1.2 Range Complex

Fort Stewart's range and training land infrastructure supports Abrams Tank, Bradley Fighting Vehicle, Aerial Gunnery, Artillery, and other live-fire training, maneuver training, and individual team and collective tasks (Figure 3.5-10). Range Support Operations estimates about 200,000 soldiers annually use the range facilities at Fort Stewart for mounted and dismounted individual weapons and crew qualifications. This number includes Company/Team through Brigade Combat Team maneuver exercises.

Heavy training activities occur in maneuver lands in the western portion of Fort Stewart, and light infantry training occurs in the eastern portion. The *heavy* designation refers to armor and mechanized infantry forces or to areas where maneuvers are unrestricted consisting of all types of vehicles and equipment, including tracked vehicles. *Light* refers to light infantry forces or to areas where maneuvers may be restricted to only small units or units having only wheeled vehicles.

Figure 3.5-10. Range and Training Lands on Fort Stewart



Small-arms ranges are concentrated in the southwestern Delta training area of Fort Stewart. Dismounted infantry training occurs south of Highway 144, primarily in the southeastern Alpha training areas. Training on established maneuver areas simulates battlefield conditions. Large-scale maneuver training events build on all the individual skills that soldiers possess and test each rank of the BCT command. Both active-duty and reserve soldiers train at Fort Stewart. Currently, live-fire and maneuver training can occur simultaneously in separate areas of Fort Stewart. Existing Fort Stewart ranges, maneuver areas, and facilities will support mission-essential training requirements and not tax existing training resources. However, the frequency and type of training may need to be changed as the Army works to meet current and future national security needs. Although mission-essential training requirements are identified in Army doctrines, some training is based on a commander's intent, discretionary need, and the availability of training resources.

3.5.7.2 Environmental Consequences

The M-SHORAD battalion would not routinely use HAAF; therefore, the Proposed Action would have negligible effects at HAAF.

Fort Stewart would use existing facilities initially to house and train the M-SHORAD battalion. New construction would occur for M-SHORAD cantonment facilities in the vicinity of 6th and 15th Streets, consistent with the existing land use as funding allows. Proposed construction within the range area is consistent with the current land use. Impacts to land use and compatibility resulting from construction, live-fire range and maneuver training are less than significant and are fully addressed in Section 3.1.6.2. The impacts from the increase in soldier population on the deficit of soldier housing will be mitigated to below significant impacts by new construction as funding allows.

3.5.7.3 Cumulative Effects

Fielding of the eight new systems is expected to have less than significant effects. These new systems would be fielded to existing units with no changes to land use or compatibility.

3.5.8 Socioeconomics

3.5.8.1 Affected Environment

The affected environment for this analysis includes Fort Stewart, its surrounding communities, such as Hinesville, and Liberty County.

3.5.8.1.1 Population

The cantonment area of Fort Stewart lies within Liberty County, Georgia. The population of Liberty County, as of 2019 was 61,435, representing a decrease of 3.4 percent since 2010.[102] Socioeconomic impacts may be felt to a lesser extent within the counties of Tattnall, Bryan, Long, and Evans; this lesser impact is anticipated due to their distance from the main cantonment area; therefore, they are not addressed.

Fort Stewart has a total employed population of 22,319 for FY 2020, including 16,955 total military and 5,359 total civilian personnel (ASIP 2020).

3.5.8.1.2 Race/Origin Demographics

Whites and African Americans make up the top two percentages of the population in Liberty County. The minority population (excluding African Americans but including two or more races) make up 21 percent of the population (see Table 3-32). This county represents higher diversity than the state, overall.

[102] Source: Census. 2019. Quick Facts: https://www.census.gov/quickfacts/libertycountygeorgia Accessed on March 26, 2020.

Table 3-3132. Demographic Statistics for Liberty County Compared to Georgia

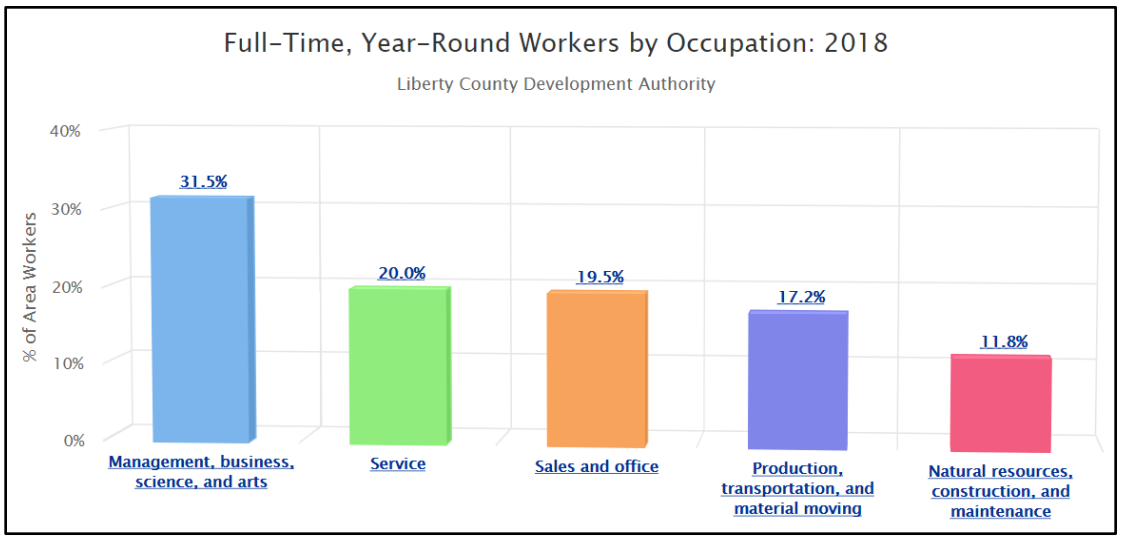
Race/ Origin	Percent of the Population In Liberty County	Percent of the Population In Georgia
White only	47.2	60.5
Black or African American only	44.5	32.4
Native American and Alaskan only	0.7	0.5
Asian only	2.2	4.3
Native Hawaiian or Other Pacific Islander	0.6	0.1
Hispanic or Latino*	12.8	9.8
Two or more races	4.8	2.2

Source: Census 2019
*Hispanic or Latino is not a race but an origin. To get the total percent for race, subtract this origin.

3.5.8.1.3 Income and Employment

The annual per capita income for Liberty County is $21,430 in 2018. The unemployment rate is slightly higher at 3.3 percent as of December 2019, compared to that of Georgia at 3.1 percent for the same time period. Management, business, science and arts form the industries with the highest employment in this county (Figure 3.5-11).

Figure 3.5-11. Employment by Industry for Liberty County, Georgia[103]



3.5.8.2 Environmental Consequences

Impacts to socioeconomics at Fort Stewart are expected to be negligible and are fully addressed in Section 3.1.7.2. The increase of 550 soldiers and 786 family members on average represents a

[103] Source: Census 2018 and Liberty County Development Authority. http://www.lcda.com/Major-Industries.aspx Accessed on March 26, 2020.

2.2 percent increase in population within the ROI. The contribution of the M-SHORAD battalion wages of $31.4 million represents only 2.39 percent of the total estimated ROI income of $1.3 billion.

Although housing is available at and near Fort Stewart, a small number of M-SHORAD battalion soldiers and their families may reside in housing on HAAF. The impacts are expected to be negligible and are fully addressed in Section 3.1.7.2.

3.5.8.3 Cumulative Effects

Fielding of the eight new systems is expected to add less than 150 additional soldiers to Fort Stewart. The cumulative effects of adding approximately 700 soldiers, 370 spouses, and 630 children at Fort Stewart is expected to be less than significant because it represents a population increase of less than 2.8 percent within the ROI.

3.5.9 Traffic and Transportation

3.5.9.1 Affected Environment

For this PEA, transportation resources surrounding and within Fort Stewart are the affected environment for analysis. Regional access to Fort Stewart and Hinesville is from U.S. Interstates 95 and 16, U.S. Highway 84, and Georgia highways 119 and 144 (Fort Stewart 2010). Georgia Highway 119, a north-south highway, bisects Fort Stewart and separates the primary heavy maneuver training areas from the collective firing ranges. Georgia Highway 144, an east-west highway, separates TAs A and D to the south from TAs B, C, E, and F in the northern portion of Fort Stewart and is the primary ground route to Hunter AAF, Savannah, and I-95. A network of improved roads serves the main cantonment area. About 400 miles of tank trails and unpaved roadways are outside the cantonment areas (Fort Stewart 2010).

The two main entrances to the Fort Stewart cantonment area are on General Screven Way (Gate #1) to the south and Highway 119 (Gate #5) to the north. Additionally, there are five secondary access points located at 4th Street (Gate #2), Harmon Avenue (Gate #3), Austin Road (Gate #4), 15th Street (Gate #7), and Frank Cochran Drive (Gate #8). Gate #4 is a temporary gate with limited hours of operation.

Daily Traffic Volumes

Twenty-four-hour traffic counts (or average daily traffic, ADT) were collected on December 5-6, 2006. The ADT counts identified the amount of traffic on each roadway on a typical day at peak traffic periods, as well as the amount of traffic for any particular hour of the day. Gate 1 (main) has the heaviest in-bound and out-bound traffic, followed by Gate 8 (Frank Cochran Drive) and Gate 5 (Gulick Avenue).

The access points feed the primary internal roadway network, which disperses traffic onto secondary roadways to reach different destinations on Post. Gulick Avenue carries 15,620 vpd with 7,930 traveling northbound and 7,690 southbound. Hero Road north of Gulick Avenue has

11,050 vpd with equal volumes in each direction. 6th Street carries 11,810 vpd with 5,480 vehicles eastbound and 6,330 vehicles westbound. Hase Road carries 5,250 vehicles northbound and 5,190 vehicles southbound per day. East Bultman Avenue has a total traffic volume of 11,120 vpd with 5,430 traveling eastbound and 5,690 westbound. Harmon Avenue has 5,330 vpd with eastbound and westbound evenly split. Austin Road, serving mainly residential land uses, carries 5,570 vpd with 2,750 eastbound and 2,820 westbound.

Capacity Analysis

Intersections currently experiencing traffic congestion and poor operating conditions were analyzed to determine if improvements were warranted. Operational capacity analyses were performed during the morning, noon, and afternoon peak hours. The capacity analyses determined the operating LOS at the studied intersections. LOS for an intersection is based on the vehicular delay at the intersection and is a typical measure of effectiveness. The Highway Capacity Manual provides ranges of delay for each LOS definition, spanning from very minimal (LOS A) to high (LOS F). LOS F is considered unacceptable for most drivers. The capacity analyses indicate the following intersections are operating at poor LOS (LOS F) on the minor street approaches during at least one peak period of a typical weekday: Hero Road at Bundy Avenue, Hase Road at McNeely Avenue, Hero Road at Davis Drive, Frank Cochran Drive at McFarland Avenue, and McFarland Avenue at 15th Street.

3.5.9.2 Environmental Consequences

The addition of an M-SHORAD battalion at Fort Stewart would add 550 new soldiers representing an increase of approximately 2.5 percent. Including the anticipated number of spouses and children, the ROI population would increase by approximately 2.2 percent. Therefore, the impacts to traffic and transportation within the ROI and the installation are expected to be negligible.

If a deployment would be scheduled from HAAF, the participating vehicles may form a convoy to transit from Fort Stewart to HAAF. Convoy operations would be accomplished per Army Technical Publication (ATP) 4-11 *Army Motor Transport Operations*.[104] Compliance with ATP 4-11 would ensure appropriate notifications are provided to civil authorities and the correct permits are obtained. Properly completed convoy operations would ensure minimal impacts to traffic and transportation along the convoy route.

3.5.9.3 Cumulative Effects

Fielding of the eight new systems is expected to add approximately 150 additional soldiers to Fort Stewart. The cumulative effects of adding approximately 700 soldiers and 370 spouses at Fort Stewart are expected to have less than significant effects to traffic and transportation. It is

[104] Accessed at https://rdl.train.army.mil/ on 17Aug20.

assumed that most children would be below driving age and therefore not included in the effects on traffic and transportation.

3.5.10 Facilities

3.5.10.1 Affected Environment

The family housing on Fort Stewart is under the management of the RCI partner Fort Stewart Family Homes (FSFH). FSFH is comprised of 10 distinct neighborhoods and serves the on-base housing community of active-duty Army families assigned to Fort Stewart and also welcomes qualified military retiree, DoD civilian and general public applicants in select neighborhoods,[105]

The garrison area or cantonment, also addressed briefly in Land Use and Compatibility, contains the heaviest concentration of facilities and mission support activities on Fort Stewart. Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical, and community facilities.

Army facilities are built to meet the standards of the uniform facilities criteria using standard designs of MILCON requirements, standardization, and integration or similar documents. Exceptions to the standard are available, and if granted for a facility, it would be considered adequate.

3.5.10.2 Environmental Consequences

The excess or deficit of facilities available to support the M-SHORAD battalion at Fort Stewart were assessed based on the Army RPLANS records. The results are shown in Table 3-33 with deficits shown in parentheses.

Table 3-3233. M-SHORAD Expected Facility Requirements FY 2021 Data

Facility name	Number required	Total sq ft	Total acres	Ft Stewart
Battalion HQ Building	1	48,520	1.1	(43,530)
Company HQ Building	1	33,646	0.8	(257,631)
Company HQ Building	4	103,104	2.4	(257,631)
Vehicle Maintenance Shop	1	100,800	2.3	(36,623)
Oil Storage Building	1	480	0.0	(6,414)
Organizational Vehicle Parking	1	450,000	10.3	1,138,161
Dining Facility	1	41,116	0.9	45,547
Barracks Permanent Party	1	76,140	1.7	88,239

[105] https://www.fortstewartfamilyhomes.com/ accessed 2 June 2020.

Fort Stewart would use existing facilities initially to house and train the M-SHORAD battalion. In the future, the expected new Army standard facilities needed include the following: a battalion HQ, COF(s) for up to five companies, a vehicle maintenance shop, and a permanent party barracks.

Fort Stewart has a future stationing capacity build-out plan should new construction funding become available for any one of these garrison support facilities. This plan includes many potential build-out areas that could be used to construct the M-SHORAD MILCON garrison facilities near 6th and 15th Streets.

Fort Stewart would not construct new ranges or maneuver areas solely to support the M-SHORAD battalion, but to enhance the overall training mission. If funding is made available Fort Stewart has preferred locations and types for range construction. Such actions would be addressed by tiering from or supplementing this PEA or in a separate environmental analysis. Training requirements would be met through appropriate scheduling per the SRM or ReARMM or the use of acceptable alternate ranges.

Efforts to avoid and minimize sensitive environmental resources were implemented during the capacity planning process. It is anticipated that additional effort to avoid and minimize impacts would be accomplished through the design process of each garrison facility.

Facility impacts are addressed in Section 3.1.9.2 and are expected to be less than significant.

Facilities are not expected to be constructed at HAAF; therefore, no impacts are expected.

3.5.10.3 Cumulative Effects

Fielding of the eight new systems is expected to have less than significant effects because these new systems would be fielded to existing units with no additional facility requirements anticipated.

3.5.11 Water Resources

3.5.11.1 Affected Environment

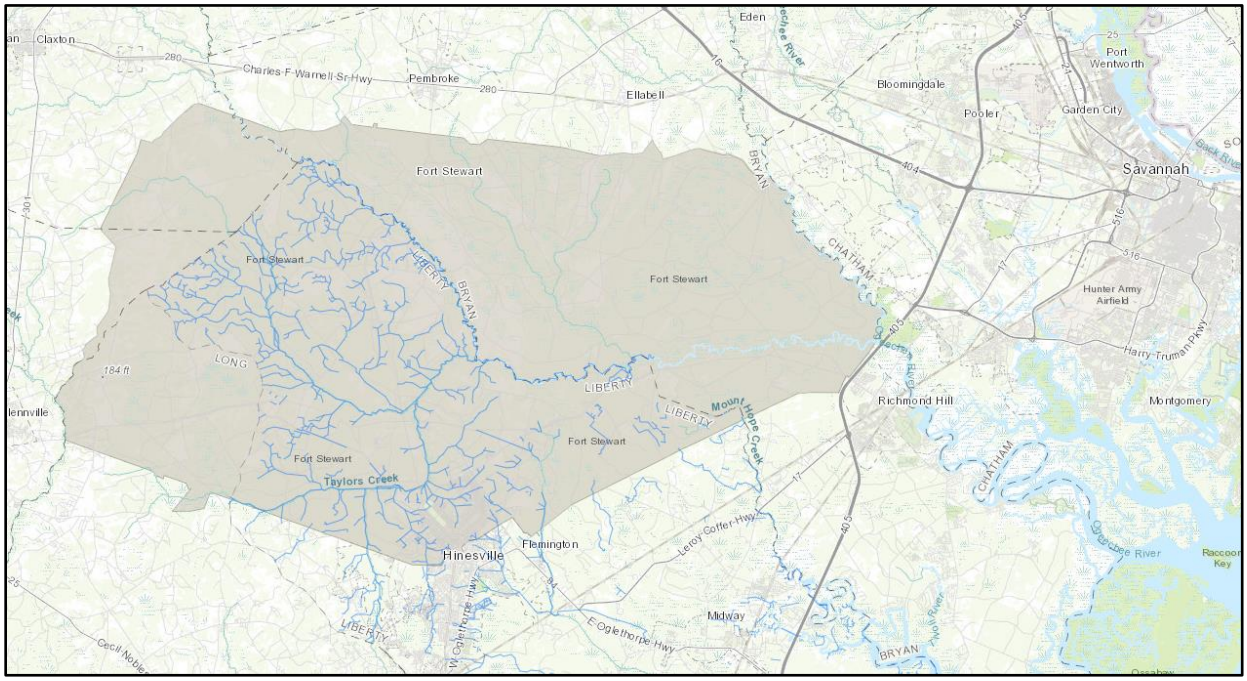
Aquatic resources at Fort Stewart include natural cypress bogs, evergreen bays, streams and rivers, and their associated bottomland hardwood swamps. Some manmade facilities were present before military occupation, including millponds and rice fields. Existing aquatic resources are discussed as surface water bodies, groundwater, surface water quality, and wetlands and floodplains.

Four watersheds occur within Fort Stewart’s boundaries: the Altamaha, Canoochee, Lower Ogeechee, and Ogeechee Coastal watersheds. Most of Fort Stewart is in the Canoochee River watershed, which is also the site of most of the ranges. The Canoochee River traverses from the northwest corner to the eastern side (Figure 3.5-12) with about 30 miles inside Fort Stewart. The Canoochee River originates in Emanuel County, Georgia, about 60 miles northwest of Fort Stewart (The Nature Conservancy 1995).

3.5.11.1.1 Surface Water

Within the greater Fort Stewart watershed, surface water resources are diverse and include over 265 miles of freshwater rivers, streams, and creeks, numerous ponds and lakes, and over 12 miles of brackish streams (Fort Stewart 2010). Although Fort Stewart occupies parts of four separate watersheds, the majority of the installation lies within the Canoochee and Ogeechee coastal watersheds (Figure 3.5-12). The Canoochee River crosses the installation from its northwest corner to its eastern side. The Ogeechee River forms the eastern boundary of the installation and discharges into the ocean. In addition, the southeast boundary of Fort Stewart drains into Goshen Swamp, which ultimately discharges into Peacock Creek , a 303(d) impaired water body designated by the Georgia Department of Natural Resources (DNR) as impaired due to high levels of fecal coliform and low levels of dissolved oxygen. As there are navigable waters and streams present, additional specific requirements would apply to timber harvest and construction if locations in the area are selected.

Figure 3.5-12. Surface Water Bodies on Fort Stewart



The Ogeechee River also originates in the Coastal Plain, about 130 miles north-northwest of Fort Stewart in Hancock County, Georgia. The Ogeechee drains the extreme northeastern portion of Fort Stewart. The Ogeechee joins the Canoochee at the eastern boundary of Fort Stewart. From its confluence with the Canoochee, the Ogeechee flows into the Atlantic Ocean, about 30 river miles away. Two additional watersheds drain to the Ogeechee River: the Lower Ogeechee River and Coastal Ogeechee watersheds. The Coastal Ogeechee watershed has two sub-watersheds: the Midway River and North Newport River.

While the Ogeechee generally carries a high silt load, the Canoochee River does not carry a heavy silt load, and has not developed large natural levees. The floodplain is generally narrow with little migration of the stream channel. Organic matter content is generally high in the Canoochee River (Fort Stewart 2010). Both the Ogeechee River and the Canoochee River are blackwater streams, which are acidic with low nutrient concentrations and low buffer capacity; the high quantity of dissolved organic carbon results in a dark color.

A small portion of Fort Stewart, along the extreme western boundary, is within the Altamaha River watershed. Beards Creek and Slades Branch are part of this drainage. A portion of the southeastern border of Fort Stewart drains southward to the Jerico River and the North Newport River. Streams in this drainage include Raccoon Branch, Mouat Hope Creek, and numerous unnamed tributaries (The Nature Conservancy 1995). A small section of the Little Creek and Black Creek watershed occurs in the northeast section of Fort Stewart. Little Creek flows into Black Creek, which flows into the Ogeechee River north of Fort Stewart. Mill Creek drains the western portion of the cantonment area, flowing toward Taylors Creek. Mill Creek originates in a blackwater swamp known as Terrils Mill pond and receives stormwater runoff from the city of Hinesville before flowing onto the western portion of the cantonment area. The eastern portion of the cantonment area, including WAAF, drains to Goshen Swamp, which drains to Peacock Creek. A small portion in the southeastern cantonment area, containing the soldiers residential family housing and Georgia National Guard Training Center, drains to Melvin Swamp, which joins Goshen Swamp to form Peacock Creek near the unincorporated town of McIntosh.

The central cantonment area and the Liberty Woods development (along the northeastern edge of the cantonment area) drain toward Taylors Creek. Taylors Creek flows to Canoochee Creek and then to Canoochee River, generally flowing in an easterly direction through the center of Fort Stewart. The Canoochee River joins the Ogeechee River at the city of Richmond Hill. The Ogeechee River flows southward and forms the eastern boundary of Fort Stewart.

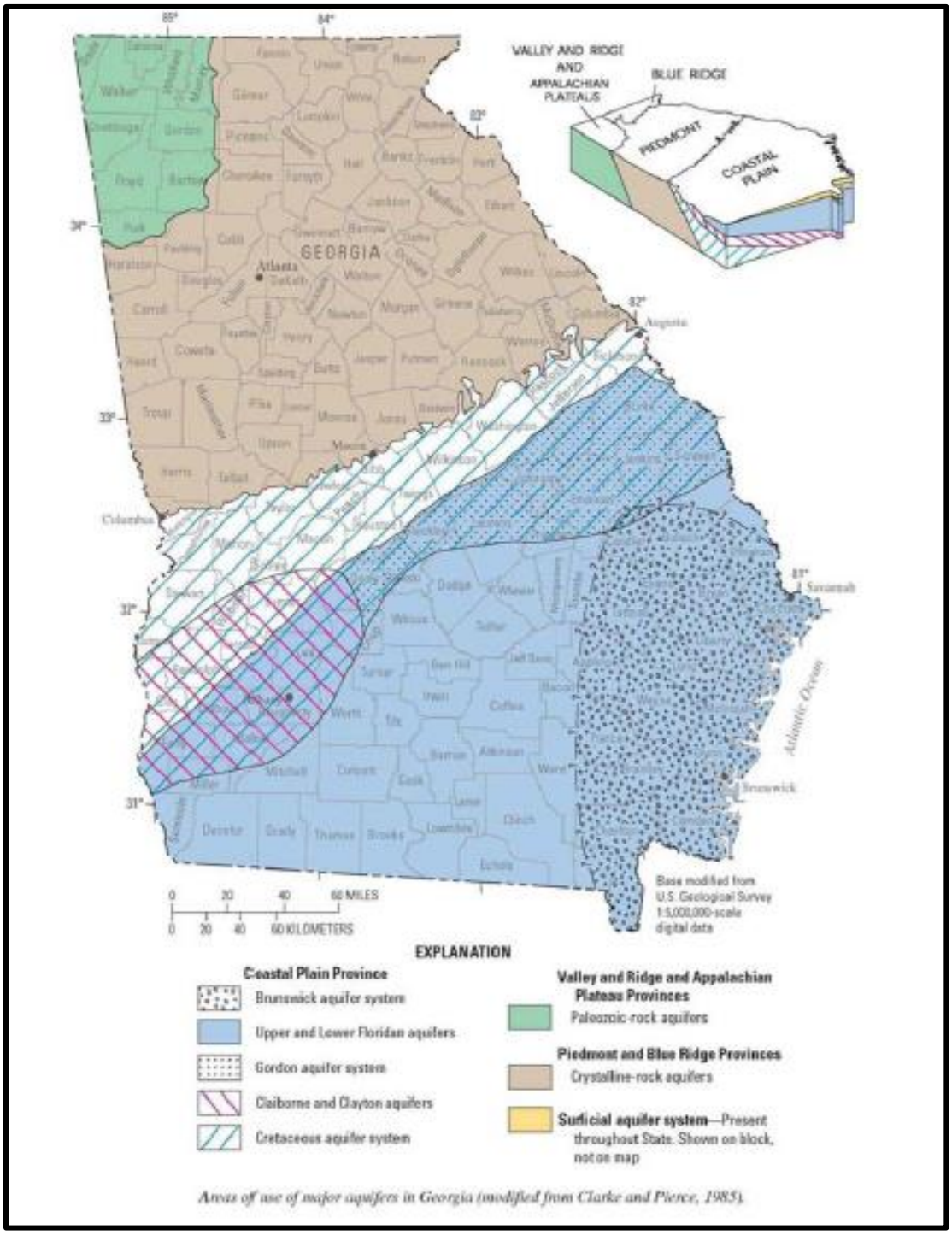
3.5.11.1.2 Groundwater

The Fort Stewart region has three distinct aquifer systems: the Floridan, Brunswick, and surficial (near surface) (Figure 3.5-13). The Floridan aquifer system is a deep sequence of limestone and is located 40- to 900-feet-below the surface. It comprises two distinct layers: the Upper Floridan and the Lower Floridan (Fort Stewart 2010).

The principal artesian aquifer (Floridan) is a deep sequence of limestones of Eocene to Oligocene age, the primary source of large ground water withdrawals in the coastal area. This aquifer is generally 300 to 500-feet-below the surface and is comprised of two distinct layers. The upper layer is derived from the Oligocene Series of sandy, phosphatic limestone and is not generally used as a water source. It is underlain by the Ocala Limestone of Eocene age (Thomas and et al. 1996; Fort Stewart 2001).

The principal artesian aquifer is overlain by two shallow aquifer systems. A 120 to 150 meter-thick series of Miocene clays, sandy clays, and gravel lies directly above the principal artesian aquifer. Several industries in the coastal area have wells with yields greater than 200 gallons per minute from this aquifer. It is recharged largely by percolation from the surface aquifer, as well as some discharge from the principal artesian aquifer (Thomas and et al. 1996; Fort Stewart 2001).

Figure 3.5-13. Fort Stewart Aquifer Systems



Areas of use of major aquifers in Georgia (modified from Clarke and Pierce, 1985).

The surface aquifer is composed of a relatively thin layer of sands, gravels, and clays, extending to a depth of approximately 25 meters near the coast. The surface aquifer is recharged directly from rainfall percolating through sediments. During dry months the base flow of streams and rivers of the coastal area is maintained by discharge from the surface aquifer. Water quality varies from very low total dissolved solids to slightly alkaline, moderately hard water. The two shallow aquifer systems are used almost exclusively for domestic water, but primarily as a secondary water supply rather than for drinking water (Thomas and et al. 1996; Fort Stewart 2001).

3.5.11.1.3 Water Quality

Existing impairments to surface water quality include both point sources and nonpoint sources. The most common point sources are municipal or industrial activities and wastewater treatment plants. The NPDES permit, required under the Georgia Water Quality Assessment program and Georgia Erosion and Sediment Control Act, regulates the discharge of point source pollutants from industrial activities and construction projects within both the cantonment and training areas.

Nonpoint sources in the region include stormwater runoff from urban areas, agricultural, construction, and range training activities, golf course irrigation, and forest timber harvesting. The Georgia NPDES MS4 Permit regulates the nonpoint source discharges.

Off-post agricultural activity in the Ogeechee River watershed affects water quality by increasing the input of nutrients and pesticides, increasing soil erosion, and increasing channelization of off-Post tributaries to drain wetlands.

The Georgia DNR-Environmental Protection Division (EPD) has listed oxygen depletion as a problem in water bodies of the Ogeechee River watershed. Historically, the largest threat to maintaining adequate oxygen levels to support aquatic life has come from the discharge of oxygen-demanding wastes from wastewater treatment plants. According to state standards, a stream is considered impaired when the dissolved oxygen level falls below 4 milligrams per liter (mg/L).

Water quality in the main stem of the Canoochee River is affected by urban runoff and nonpoint source pollution. A fish consumption advisory exists in the two segments of the Canoochee River and in the Ogeechee River, where mercury concentrations in the fish tissue exceed the public health standards of 0.3 mg/kg. The Georgia EPD lists a segment of Taylors Creek and Canoochee Creek as impaired for low dissolved oxygen, attributed to the discharge from the Hinesville/Fort Stewart Waste Water Treatment Plant (WWTP), a municipal facility. In addition, a tributary to Taylors Creek is also impaired for high levels of fecal coliform. Nonpoint sources of erosion and sediment from Fort Stewart activities in training areas, roadside ditches, construction activities, steam pit sump pumps, and nutrient loads from the golf course and residential landscapes are possible causes of the low dissolved oxygen impairment of Canoochee Creek and Canoochee River. Minimization measures for these potential effects include proper stream bank stabilization for prevention of erosion and/or scouring of banks, and implementation

of appropriate low impact development BMPs in the USACE Public Works Technical Bulletin (200-1-62 October 2008).

Peacock Creek and its tributaries are identified as impaired because they exceed fecal coliform standards and have low dissolved oxygen concentrations. Off-site activities that could contribute to exceeding the limits include septic systems, sanitary sewer overflows, rural nonpoint sources, and animal wastes. Contributing on-site activities include urban nonpoint sources, such as construction, roadside ditches, nutrient loads from residential landscapes, Georgia ARNG Training Center-Central Vehicle Wash Facility, and animal wastes.

Three of the Ogeechee River's permitted discharges are on Fort Stewart. Within Fort Stewart boundaries, a municipal discharge plant on Taylors Creek (run by the city of Hinesville) serves both the city and Fort Stewart. Several off-site facilities, such as farming and commercial food stock industries, are upstream of Fort Stewart and may influence water quality at Fort Stewart. The low dissolved oxygen level of blackwater streams makes them particularly vulnerable to these discharges (Fort Stewart 2010).

Most of the cantonment area on Fort Stewart—including administrative buildings, impervious parking lots, railroad, regulated industrial activities (such as washracks, central vehicle wash facility, motorpools, industrial WWTP, and the Central Energy Plant)——drain to Mill Creek, which then drains to Taylors Creek, and ultimately discharges into a tributary of Canoochee Creek. The majority of runoff from the city of Hinesville enters Fort Stewart and drains to Mill Creek. An increase in sediment loads, higher stream velocities, overbank flooding, and turbidity occurs in Mill Creek, especially during heavy storm events. Fort Stewart also actively works to minimize impacts to impaired streams from the construction, operation, and maintenance of its ranges. For example, the installation recently installed a rock check dam system for Tank Trail 144, upstream of Taylors Creek, one of our listed impaired streams. The Fort Stewart Stormwater Maintenance SOP of 2005 and the EPA's own "Guidelines for Dirt Road Installation and Turnouts" are also utilized in range areas, in addition to dirt roads and forestry trails.

The Hinesville/Fort Stewart WWTP, existing small arms ranges, training roads, industrial activities north of Georgia Highway 144 East, residential areas, soldiers barracks, administrative buildings, parking lots, and the Taylors Creek Golf Course drain north to Taylors Creek, which then drains to a tributary of Canoochee Creek. The Georgia ARNG Training Center, EAAF, WWTP and land application system (LAS), and WAAF and LAS drain south to Goshen Swamp and Melvin Swamp, which drains to Peacock Creek in Liberty County, ultimately to the Ogeechee River (Fort Stewart 2010).

Stormwater runoff can be a major source of pollutants to receiving water bodies. The Canoochee or the Ogeechee River captures most surface water runoff at Fort Stewart; however, along the southeastern border of Fort Stewart, surface water runoff flows southward along a number of tributaries into the Jerico River and the North Newport River.

The amount of impervious surfaces in an area—such as rooftops, driveways, sidewalks, paved roads, and parking lots—impacts stormwater runoff because impervious surfaces collect pollutants that can rapidly wash into streams when it rains. The installation's stormwater collection system is mainly open water ditches or channels. Developed portions of the cantonment area drain by engineered stormwater collection systems consisting of storm sewer pipes, catch basins and inlets, and concrete culverts that eventually discharge to maintained grass drainage ditches/swales and trapezoid-shaped drainage channels. These structural features are primarily found in areas with impervious surfaces and development. In the less-developed areas of Fort Stewart, stormwater drainage is primarily overland flow following the topography of the land (Versar 2003). The extensive stormwater drainage system at the Fort Stewart cantonment allows for infiltration and some treatment in retention and/or detention basins to meet regulatory requirements for post-construction runoff.

Fort Stewart only utilizes sedimentation ponds and basins during the construction phase of a project. The existing retention ponds and detention basins on the installation are post construction measures (structural BMPs), meant to ensure NPDES permitting for runoff reduction, water quality, and total suspended solids removal of 80 percent are being met, as required.

Fort Stewart adheres to the requirements of the MS4 NPDES Permit requirements, the Georgia Stormwater Management Manual/Coastal Stormwater Supplement, the Energy Independence Security Act (EISA)-Section 438, and all applicable Executive Orders for all projects within the cantonment or range areas.

Because Fort Stewart is flat and the surficial (near the surface) water table is high, some portions of the collection system have groundwater infiltration; in other areas, standing water collects in the ditches and the water temperature is very high on warm days. Because dissolved oxygen is low in waters with high temperature, much of the water that discharges from the slow-moving ditches to receiving water bodies is low in dissolved oxygen and may be a source of low dissolved oxygen for nearby water bodies such as Taylors and Canoochee Creeks (Fort Stewart 2010).

3.5.11.1.4 Wetlands and Floodplains

Fort Stewart contains approximately 82,148 acres of wetlands (Fort Stewart geographic information system database). Palustrine wetlands comprise 77.3 percent of the total, while forested wetlands comprise 68.8 percent of the Palustrine system (DEH 1993; Fort Stewart 2001).

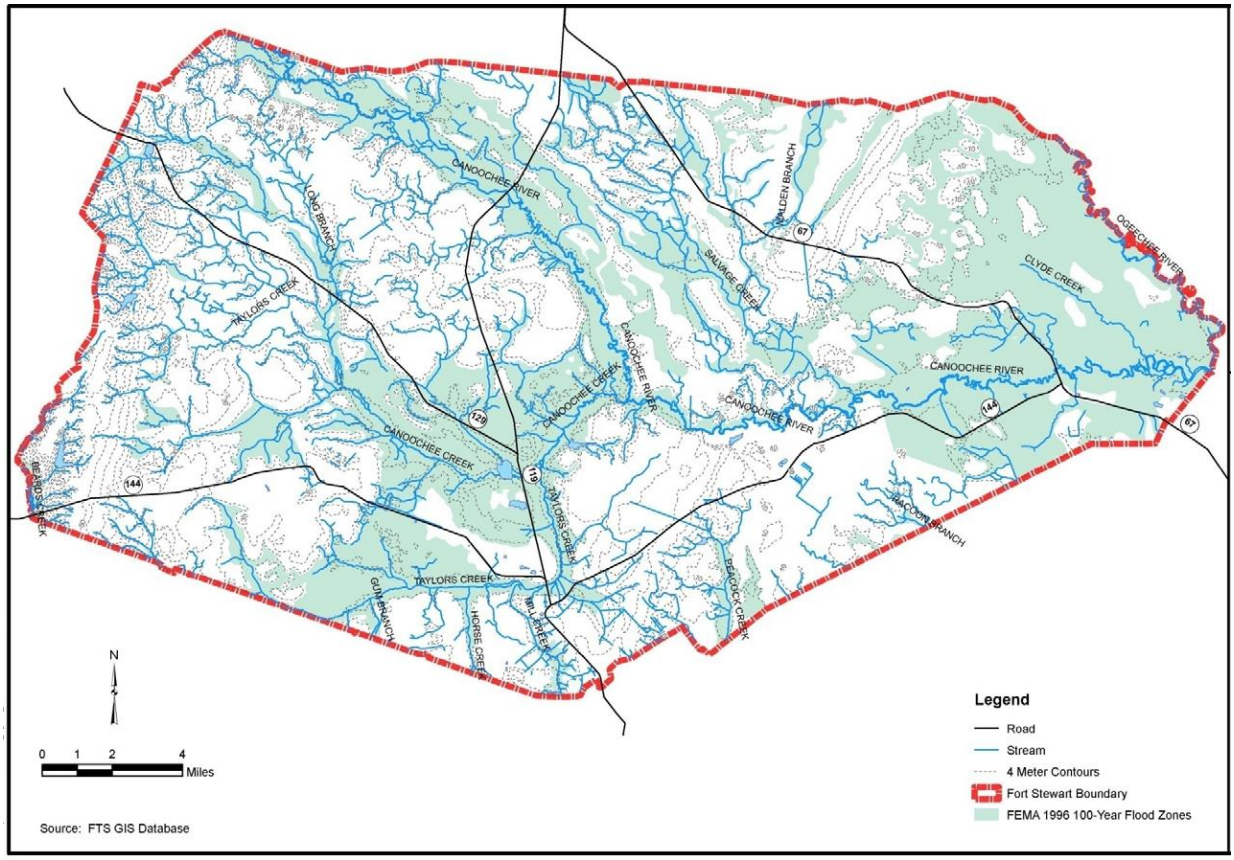
Given the prevalence of wetlands on the installation, Fort Stewart has made avoidance and minimization of wetlands impacts a top priority and wetlands are one of the primary factors to be considered when siting a new project. In this manner, much of the avoidance and minimization of wetlands impacts takes place before actual site selection actually occurs.

The FEMA maps flood-prone areas and lands, to include those lying within the 100-year floodplain in Fort Stewart. There are approximately 120,000 acres of 100-year floodplain on Fort

Stewart and approximately 90,000 acres of wetlands, based on the NWI, a map-based planning tool first initiated by the USFWS in 1974.

Floodplains adjacent to the Ogeechee River, Canoochee River, and the lower reaches of Canoochee Creek, Taylors Creek, and Savage Creek may be inundated for eight months or more annually (Figure 3.5-14).

Figure 3.5-14. Fort Stewart Flood Zone Map[106]



3.5.11.2 Environmental Consequences

Surface Water

If funded cantonment construction is planned near Mill Creek, which flows to the Canoochee River which then flows into the Ogeechee River. Range construction is planned near the Canoochee River if funded. Construction near the Canoochee and its tributaries could cause increases in sediment loading of the Canoochee River that may indirectly impact the Ogeechee River. Due to the distance of the Proposed Action, no impacts are expected to the impaired

[106] Source: http://hinesville-gis.maps.arcgis.com/apps/webappviewer/index.html?id=7488f097dbd2462f8e707c1bd86fd13b. Accessed on March 26, 2020.

waters of Peacock Creek. All impacts to surface water are expected to be less than significant and are addressed in Section 3.1.10.2.1.

Groundwater

All impacts to groundwater are expected to be less than significant and are addressed in Section 3.1.10.2.2.

Water Quality

All impacts to water quality are expected to be less than significant and are addressed in Section 3.1.10.2.3.

Wetlands and Floodplains

Of the total of approximately 280,000 acres, Fort Stewart has approximately 120,000 acres of floodplains and 86,000 acres of wetlands (Fort Stewart 2012). Therefore, nearly all construction and training activities impact one or both resources.

Impacts from Construction

If funded cantonment construction is planned near Mill Creek, and range construction is planned near the Canoochee River. If the actual site designs cannot avoid wetlands, Fort Stewart would deduct credits from the existing installation managed wetland mitigation bank. Similarly, if floodplains cannot be avoided, Fort Stewart would comply with site design and construction standards and BMPs and with Section 438 of the Energy Independence and Security Act of 2007.

Impacts from Live-Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts from live-fire and maneuver training and the increase in the number of soldiers are expected to be less than significant and are addressed in Section 3.1.10.2.4.

3.5.11.3 Cumulative Effects

Fielding of the eight new systems is expected to have less than significant effects to all water resources because these new systems would be fielded to existing units with no additional facility, live-fire range, or maneuver area requirements are anticipated. Only a nominal increase in population and the intensity of training area use is anticipated.

3.6 FORT CARSON, COLORADO

No construction activities or stationing of additional soldiers are anticipated at PCMS. Environmental impacts from live-fire and maneuver training at PCMS are fully addressed in Alternative 1A of the *Piñon Canyon Maneuver Site Training and Operations Final*

Environmental Impact Statement (October 2014). Therefore, this Final EIS is incorporated by reference, and no further analysis of impacts at PCMS is included in this document.

3.6.1 Background

Fort Carson is a U.S. Army installation located primarily in El Paso County, Colorado, near the city of Colorado Springs. It was established in 1942 and named after General "Kit" Carson. See Figure 3.6-1. Fort Carson is home to:

- 4th ID
- 10th Special Forces Group
- 440th Civil Affairs Battalion U.S. Army Reserve (USAR)
- 71st Ordnance Group
- 4th Engineer Battalion
- 759th Military Police Battalion
- 10th Combat Support Hospital, MEDDAC, and U.S. Army Dental Activity
- 43rd Sustainment Brigade
- Army Field Support Battalion-Fort Carson
- 423rd Transportation Company (USAR)
- 13th Air Support Operations Squadron of the U.S. Air Force.

The post also hosts additional units of the Army Reserve, Navy Reserve, and the Colorado ARNG (COARNG).

The Fort Carson garrison is responsible for supporting the living and training requirements of Army troops stationed at the installation. Fort Carson's downrange area is used for weapons qualification and field training. The downrange area comprises the land area outside the cantonment (main post) area, including firing ranges, TAs, and impact areas. The approximately 137,000-acre (55,000 ha) installation extends southward from El Paso County into Pueblo and Fremont Counties.

Fort Carson also manages its sub-installation, Piñon Canyon Maneuver Site (PCMS), primarily used to support maneuver training for units stationed at Fort Carson when large contiguous maneuver and TAs are required. PCMS covers approximately 235,000 acres (95,101 ha), which includes a cantonment area of approximately 1,660 acres (672 ha).

PCMS is located in southeastern Colorado in Las Animas County, approximately 150 miles (241.4 km) southeast of Fort Carson. PCMS is bounded by U.S. Highway 350 (US 350) to the west, Purgatoire River Canyon to the east, Las Animas County Road 54 to the south, and Otero County to the north. Nearby cities include Trinidad to the southwest and La Junta to the northeast. PCMS includes a small cantonment area at the entrance gate on US 350, containing austere facilities to support training.

The Army analyzed maneuver operations at PCMS in the 2015 PCMS Training and Operations EIS (2015 PCMS EIS; Fort Carson 2015).[107] The 2015 PCMS EIS and its ROD[108] are incorporated by reference in this PEA. The purpose and need of the actions in the 2015 PCMS EIS were to maintain the ability to conduct realistic and coordinated large-scale training that integrates the ground and air resources of assigned and visiting units, including mechanized, infantry, support, and combat aviation assets.

The 2015 PCMS EIS included limitations to training, designed to complement the 4.7-month restriction on training. This allows the Army to rest and rotate the land effectively and supports our restorative programs. To complement the training month limitation and provide more protection to the natural resources of PCMS, the Army established a BCT-level training intensity limit using standard maneuver areas (SMAs) and total task miles to complement the 4.7-month brigade-level training period duration. SMAs are the ideal amount of area required for a specific training task and how many miles a vehicle would drive to accomplish the task is the total task miles. This approach allows the Army to manage brigade-level training periods using intensity and duration metrics rather than just duration alone and provides the Army with an additional measure regarding the intensity of BCT training to manage training lands.

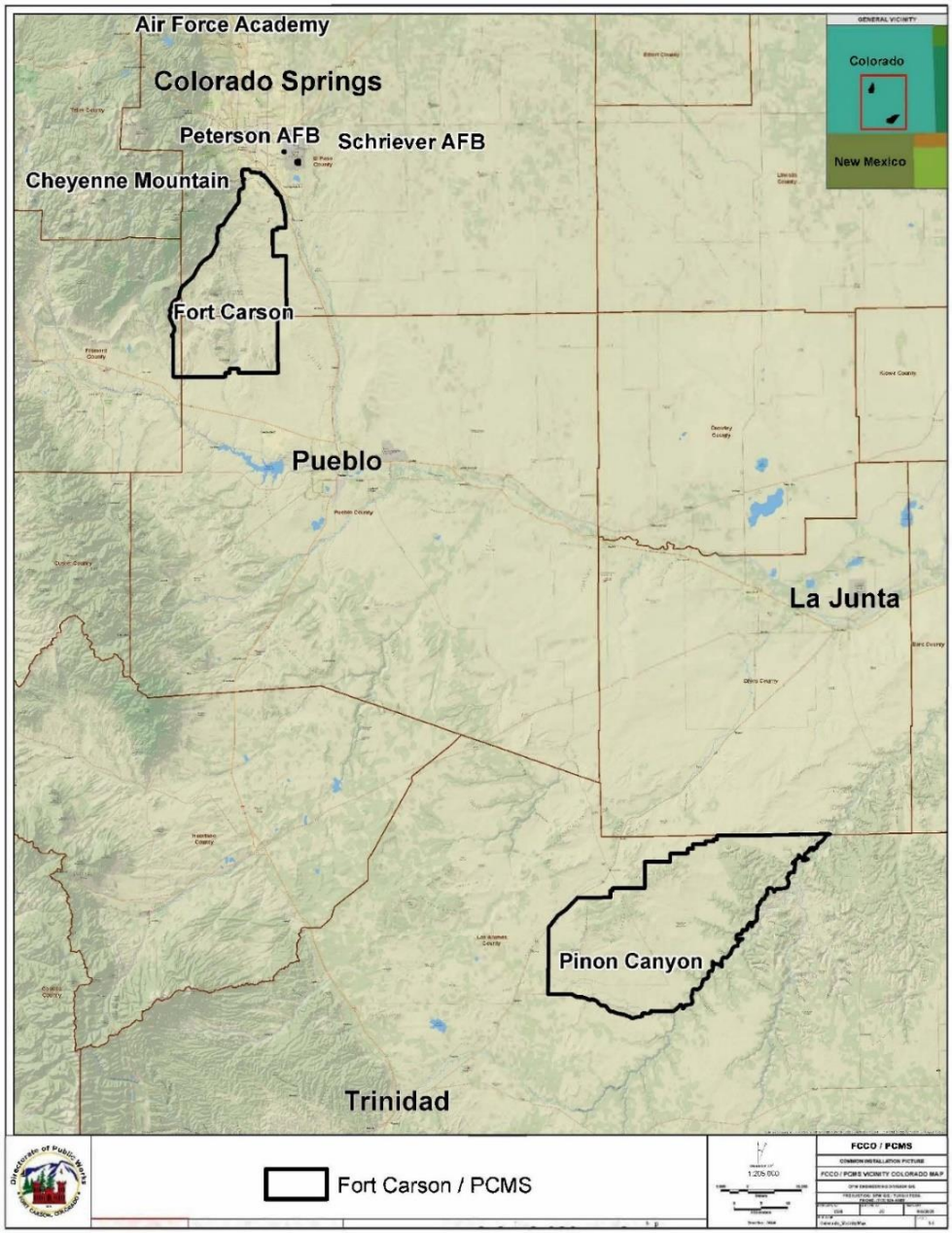
In 2018, as a result of a proposed Infantry BCT to Stryker BCT conversion, Fort Carson reviewed information about the affected environment that has become available since completion of the 2015 PCMS EIS and ROD. This review was to determine whether there have been substantial changes in the Proposed Action that are relevant to environmental concerns, or significant new circumstances or information relevant to environmental concerns and bearing on the Proposed Action or its impacts (See 40 CFR 1502.9(c) and 32 CFR 651.5(g)). Fort Carson determined that these factors do not exist and that supplementation of the 2015 PCMS EIS was not required. The finding was documented in a Record of Environmental Consideration (REC) available on the Fort Carson website[109].

The alternative selected from the 2015 PCMS EIS was to train BCTs in full brigade-size exercises at PCMS, allow additional training opportunities using new tactics and equipment and sought restricted airspace through the FAA within the Piñon Canyon Military Operations Areas (MOAs). The analysis in the 2015 PCMS EIS includes Stryker vehicle maneuver training. There is no impact area at PCMS so there would be no live fire of the new M-SHORAD system at PCMS. They may accompany BCTs during training at PCMS but all firing would be simulated. This leaves this proposed action in this PEA essentially maneuver training for Stryker vehicles and other typical support and command and control vehicles at PCMS.

[107] Fort Carson NEPA webpage https://www.carson.army.mil/assets/docs/dpw/NEPA/2014-pcms-training-and-operations-final-eis.pdf. Accessed on June 9, 2020.
[108]Fort Carson NEPA webpage https://www.carson.army.mil/assets/docs/dpw/NEPA/pcms-trainingops-rod.pdf. Accessed June 9, 2020.
[109] Fort Carson NEPA webpage https://www.carson.army.mil/assets/docs/dpw/NEPA/fnsi-pcms-rec-programmatic-ea-ibct-conversion.pdf, page 18. Accessed June 9, 2020.

Implementation of the 2015 PCMS EIS decision was expected to result in direct, indirect, and cumulative impacts, to include potentially significant impacts on soils, vegetation, wildlife, and water resources. To minimize the potential adverse impacts from implementation of the action, the Army adopted a variety of mitigation measures, as described in the ROD.

Figure 3.6-1. Vicinity Map for Fort Carson and Piñon Canyon Maneuver Site, Colorado



The Proposed Action under consideration in this PEA involves stationing of an M-SHORAD battalion to Fort Carson. PCMS would be available for training by the battalion. The overall amount of possible training at PCMS would not exceed the limitations in the 2015 PCMS EIS. Because training by the additional battalion at PCMS would not exceed the limits in the 2015

PCMS EIS (which does not require supplementation) and would be subject to the mitigation measures and restrictions in the 2015 PCMS EIS ROD, that training is adequately covered by the 2015 PCMS EIS, and additional analysis is not required. The Proposed Action is adequately covered by the 2015 PCMS EIS in that it covers the maneuver training by the Stryker and other support vehicles at PCMS. Because of this, potential impacts of the Proposed Action at PCMS are not considered in this PEA; instead the 2015 PCMS EIS and ROD are incorporated by reference into this PEA and only Fort Carson is analyzed in this PEA in detail.

3.6.2 Air Quality

3.6.2.1 Affected Environment

Fort Carson is located in the San Isabel Intrastate AQCR (40 CFR 81.175). The entire AQCR includes the Colorado counties of Chaffee, Custer, El Paso, Fremont, Huerfano, Lake, Las Animas, Park, Pueblo, and Teller. Fort Carson is located in the portion of the AQCR that includes El Paso and Fremont Counties. The ROI for air quality analysis includes this portion of the AQCR, which includes the city of Colorado Springs.

The 2011 emissions inventory for El Paso, Fremont, and Pueblo Counties[110] are shown in Table 3-35. VOCs and oxides of nitrogen (NO_x) emissions are used to represent ozone (O_3) generation because they are precursors of O_3. The inventory includes stationary sources, such as industrial sites and residential fuel combustion, as well as mobile sources and area sources such as fires.

The Colorado Department of Public Health and Environment (CDPHE) has adopted the NAAQS. Colorado also maintains its own ambient air quality standard for oxides of sulfur (SO_x), which is a three-hour standard of 0.267 parts per million that cannot be exceeded more than once annually (CDPHE 2010).

The northern portion of Fort Carson (main post) is located in a maintenance area for carbon monoxide (CO). The main post of Fort Carson is part of a larger area over the city of Colorado Springs, which was re-designated from nonattainment to attainment on October 25, 1999 (CDPHE 2009). The Revised Carbon Monoxide Attainment/Maintenance Plan Colorado Springs Attainment/Maintenance Area covers Colorado Springs as a maintenance area through the calendar year 2020 (CDPHE 2009; EPA 2013). Upon successful completion of the maintenance period, the area will revert to attainment only, and general conformity requirements will no longer apply. If future changes in mobile source models or other unforeseen considerations raise potential issues with the conformity process, the State of Colorado will address the need to revise the attainment/maintenance plan at that time.

Fort Carson is a major source for oxides of nitrogen (NO_x) and carbon monoxide (CO) and, as a result, has a Title V Operating Permit. The Title V Operating Permit covers emissions of both criteria pollutants and HAPs installation-wide. Fort Carson updated this permit, 95OPEP110, in

[110]Colorado Department of Public Health and Environment: Air Quality Division https://www.colorado.gov/airquality/inv_maps.aspx accessed on June 10, 2020.

2018 and requires renewal every 5 years. Table 3-34 below illustrates Fort Carson's emissions over a two-year period. Table 3-35 shows criteria pollutant emissions for the three nearby counties from 2011.

Table 3-3334. Fort Carson Criteria Pollutants for Stationary Sources Comparing Calendar Year 2018 to Calendar Year 2019

Criteria Pollutant	Actual Emissions from Stationary Sources (tons per year)	
	2018	2019
Carbon Monoxide (CO)	152.481	120.683
Oxides of Nitrogen (NO_x)	75.719	37.779
Particulate Matter (PM_{10})	25.025	35.235
Particulate Matter ($PM_{2.5}$)	17.167	25.009
Oxides of Sulfur (SO_2)	0.507	0.587
Volatile Organic Compounds (VOC)	35.311	29.403
Hazardous Air Pollutants (HAP)	7.222	9.86

Table 3-3435. 2011 Criteria Pollutant Values: Pueblo, Fremont, & El Paso Counties, Colorado[111]

Criteria Pollutant	Value for Pueblo County	Value for Fremont County	Value for El Paso County
Carbon Monoxide (CO)	37,616 TPY	10,481 TPY	154,965 TPY
Nitrogen (NO_2)	10,229 TPY	2,800 TPY	19,377 TPY
Particle Pollution (PM_{10})	8,222 TPY	2,261 TPY	17,175 TPY
Sulfur Dioxide (SO_2)	3,239 TPY	1,621 TPY	9,607 TPY
Volatile Organic Compounds (VOC)	5,772 TPY	2,562 TPY	21,544 TPY

TPY = tons per year.

3.6.2.2 Environmental Consequences

Air quality at Fort Carson is in attainment for all criteria pollutants. As noted in Section 3.1.1.2, dust will contribute to the emissions of PM_{10} and $PM_{2.5}$ at Fort Carson. The total increase is anticipated to be 779.3 tons per year with approximately 678 tons as PM_{10} and 101 tons as $PM_{2.5}$. The PM_{10} should settle out of the air rapidly and not impact air quality away from the activities generating the dust. With the addition of the dust emissions, the impacts are as described in Section 3.1.1.2. Air quality impacts from the Proposed Action are expected to be less than

[111] Colorado Department of Public Health and Environment: Air Quality Division https://www.colorado.gov/airquality/tech_doc_repository.aspx. Accessed on June 10, 2020.

significant due to stationing 235 additional tactical vehicles at Fort Carson. This is approximately 4.1 percent of the total number of tactical vehicles.

3.6.2.3 Cumulative Effects

Fielding seven of the 13 systems in addition to the Proposed Action at Fort Carson would only cause minimal increases in the emission of pollutants. Many of these systems are replacing existing systems on a one-for-one basis. There would only be a minimal increase of additional vehicles operated during training, and most of the new systems would operate from fixed or semi-fixed positions.

3.6.3 Airspace

3.6.3.1 Affected Environment

The ROI for airspace is the SUA areas above and nearby the installation that is controlled by Fort Carson. The airspace is defined on aeronautical charts and may be exclusive, limiting non-participating (e.g., commercial and general aviation) users or it may simply be advisory, indicating to non-participating users of the airspace that military operations are occurring in certain areas, requiring an extra measure of vigilance.

The SUA is a complex set of restricted areas for exclusive use and MOAs that are advisory. The SUA is designed to ensure the segregation of incompatible, non-participating aircraft from potentially hazardous operations occurring either in flight (e.g., munitions releases, UAS operations) or on the ground (e.g., artillery ranges, testing activities). A MOA does not provide the exclusive use required to support M-SHORAD range activities and will not be addressed in this document.

Fort Carson has 160 square miles (414 km^2) of FAA-designated restricted airspace with a maximum altitude of 60,000 feet (Figure 3.6-2). The FAA of Denver, Colorado, controls the airspace. The installation has access to the airspace continuously. Army aviation assets are stationed at and flight operations are conducted out of Butts AAF. The airspace is used by helicopters, fixed-winged aircraft, and transient aircraft flights. The U.S. Air Force and ANG also use the installation's airspace. The airspace prevents flights from unauthorized aircraft; civilian aircraft are restricted, and military aircraft are permitted under controlled conditions while firing, including artillery, mortar, and missile projectiles, is in progress. Commercial and military institutions use airspace adjacent to Fort Carson.

At PCMS, the FAA-designated restricted airspace is 277 square miles (717.5 km^2) with a maximum altitude of 10,000 feet (Figure 3.6-3). The FAA of Denver, Colorado, also controls this airspace. The installation can reserve the airspace with 24-hour advance notice. The airspace prevents flights from unauthorized aircraft. Civilian aircraft are restricted and military aircraft are permitted under controlled conditions.

The major airspace units are subdivided vertically and horizontally, enabling airspace managers and schedulers to activate particular blocks of airspace that are sized appropriately to the

activities occurring within them. A wide variety of activities occur within the SUA; however, for the SUA managed by Fort Carson, the principal uses and purposes of the SUA supporting the M-SHORAD are:

- To protect non-participating aircraft from range activities occurring on the ground.
- To promote realistic training, allowing scenarios to unfold without training distracters such as suspensions required when civilian aircraft penetrate the restricted areas.

Figure 3.6-2. Restricted Airspace at Fort Carson

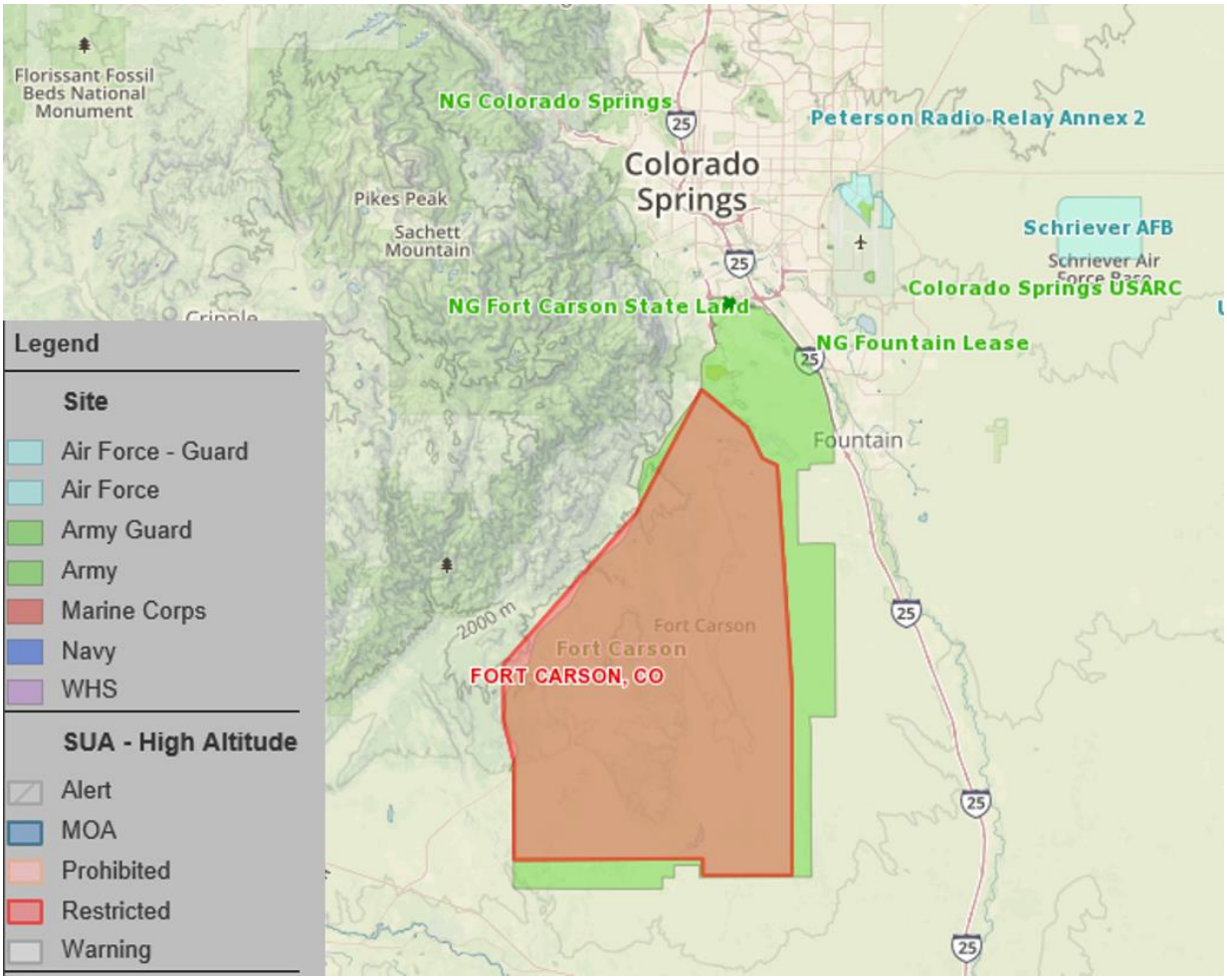
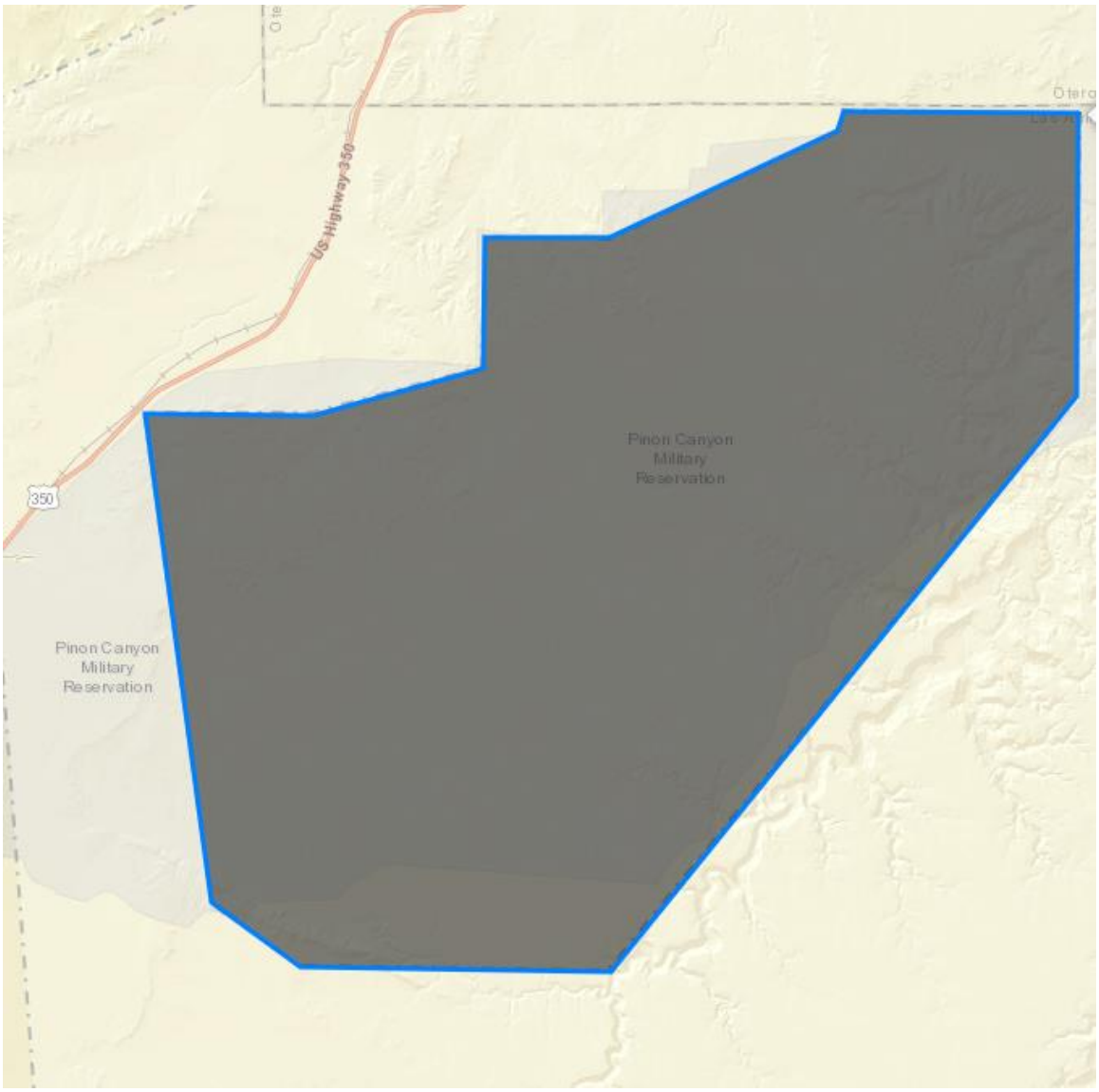


Figure 3.6-3. Restricted Airspace at PCMS



3.6.3.2 Environmental Consequences

Fielding the M-SHORAD battalion at Fort Carson may cause a minor, less than significant increase in Airspace use that can be accommodated within the current Airspace available to Fort Carson.

3.6.3.3 Cumulative Effects

There could be a small increase in Airspace use due to adding all seven new systems at Fort Carson. Any required increases in use can be accommodated within the current Airspace available to Fort Carson. Therefore, cumulative effects to Airspace are expected to be less than significant.

3.6.4 Biological Resources

3.6.4.1 Affected Environment

The purpose of natural resources management at Fort Carson is to maintain high-quality lands for training, biodiversity, and recreation. Fort Carson manages natural resources through the INRMP that outlines plans, goals, and objectives regarding natural resources programs on Fort Carson and integrates conservation management actions with Army military mission activities to meet natural resource management goals.

Fort Carson uses an adaptive ecosystem management strategy to protect, conserve, enhance, and monitor resources and to adjust INRMP management objectives based upon the effects of training activities. Management decisions are made based on the best available science and attempt, where practical, to mimic the natural historical disturbance regimes for the ecoregion. Ecosystem management is an evolving management scheme. As new information and ideas are gleaned from current research, Fort Carson's resource management will change to reflect the best information available. Monitoring programs indicate whether management measures and strategies are effective in achieving the intended objectives. This adaptive management approach preserves natural resources while providing the optimum environmental conditions required to sustain the military mission and realistic training conditions.

Management of natural resources also involves the ITAM Program, which establishes a uniform land management program and includes inventorying and monitoring land conditions, integrating training requirements with land carrying capacity while training to standard, educating land users to minimize adverse impacts, and prioritizing and implementing rehabilitation and maintenance projects. Fort Carson's ITAM is governed by AR 350-19 and Fort Carson (FC) Regulation 350-9, Integrated Training Area Management.

3.6.4.1.1 Flora

Fort Carson is in the Central Shortgrass Prairie ecoregion, which is dominated by shortgrass species such as buffalo grass (*Buchloe dactyloides*), blue grama (*Bouteloua gracilis*), and western wheatgrass (*Pascopyrum smithii*) (Fort Carson 2014). The ecoregion encompasses approximately 56 million acres (22.7 million ha) and includes parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming.

Fort Carson and PCMS consist of a combination of shortgrass prairie grasslands, shrublands, and forest/woodlands (Figures 3.6-4 and 3.6-5). Shortgrass prairie grasslands comprise about 48 percent of Fort Carson and 41 percent of the PCMS (Fort Carson 2020). Shrublands comprise about 15 percent of the vegetation of Fort Carson and 33 percent of the PCMS (Figure 3.6-6). Deciduous shrubland, whose species include Gambel oak, tamarisk, snowberry, and willow, is found along major drainages (Fort Carson 2020). Forest/Woodlands constitute about 37 percent of Fort Carson and 17 percent of the PCMS. Ponderosa pine, piñon pine, and one-seed juniper are the dominant species of higher elevation woodlands on rocky and steeper slopes, and cottonwood, willow, and chokecherry dominate woodlands near drainages (Fort Carson 2020).

The remaining Fort Carson and PCMS lands are developed or barren areas, classified as non-vegetation.

There are four Army species at risk (SAR) plant species on Fort Carson. These plant species are Pueblo goldenweed (*Oonopsis puebloensis*), golden blazingstar (*Mentzelia chrysantha*), roundleaf four o'clock (*Mirabilis rotundifolius*), and dwarf milkweed (*Asclepius uncialis ssp. uncialus*).

Additionally, Arkansas River feverfew (*Parthenium tetraneuris*) is a regional endemic that was recently downgraded from NatureServe Rank[112] G2 to G3, or from imperiled to vulnerable. NatureServe ranks have been designated primarily for species and ecological communities in the United States and Canada. Fort Carson biologists, in cooperation with the Colorado Natural Heritage Program, surveyed for the species on Fort Carson and determined golden blazingstar, roundleaf four o'clock, and Arkansas River feverfew were mostly localized endemic species to the shale barrens on the installation. Fort Carson has over 40 percent of the States known population for roundleaf four o'clock and Arkansas River feverfew. Pueblo goldenweed (*Oonopsis puebloensis*) occur in finer textured soils and tend to concentrate at toeslopes, on sideslopes, and in landscape swales, often below the hogback ridges that support roundleaf four o'clock and Arkansas River feverfew. Habitat of dwarf milkweed (*Asclepias uncialis ssp. uncialis*) is primarily grasslands, especially at the interface with piñon-juniper woodlands.

At least 30 state-listed species of noxious weeds have invaded both natural and urbanized landscapes at Fort Carson and PCMS (Fort Carson 2020). At Fort Carson, species such as Dalmatian toadflax, (*Linaria dalmatica* and *Linaria genistifolia*), yellow toadflax (*Linaria vulgaris*), Scotch thistle (*Onopordum acanthium*), leafy spurge (*Euphobia esula*), whitetop (*Cardaria draba*), Russian knapweed (*Acroptilon repens*), annual wheatgrass (*Eremopyrum triticeum*), and wild mignonette (*Reseda lutea*) are among the noxious weeds targeted for management (Fort Carson 2020). At PCMS, the priority weed species for management include: Russian knapweed (*Acroptilon repens*), whitetop (*Cardaria draba*), Canada thistle (*Cirsium arvense*), spotted knapweed (*Centaurea stoebe*), and tamarisk (*Tamarix sp.*) (Fort Carson 2020).

To manage invasive plant populations, Fort Carson uses integrated pest management techniques including biological controls, herbicide applications, prescribed burning, cultural controls, and physical/mechanical measures. The installation's comprehensive, long-term weed management program promotes and sustains the military mission and protects the natural environment.

[112] https://www.natureserve.org/

Figure 3.6-4. General Vegetation Classes for Fort Carson. Areas with Limited Vegetation Include Urban, Rocky, and Bare Soil Areas

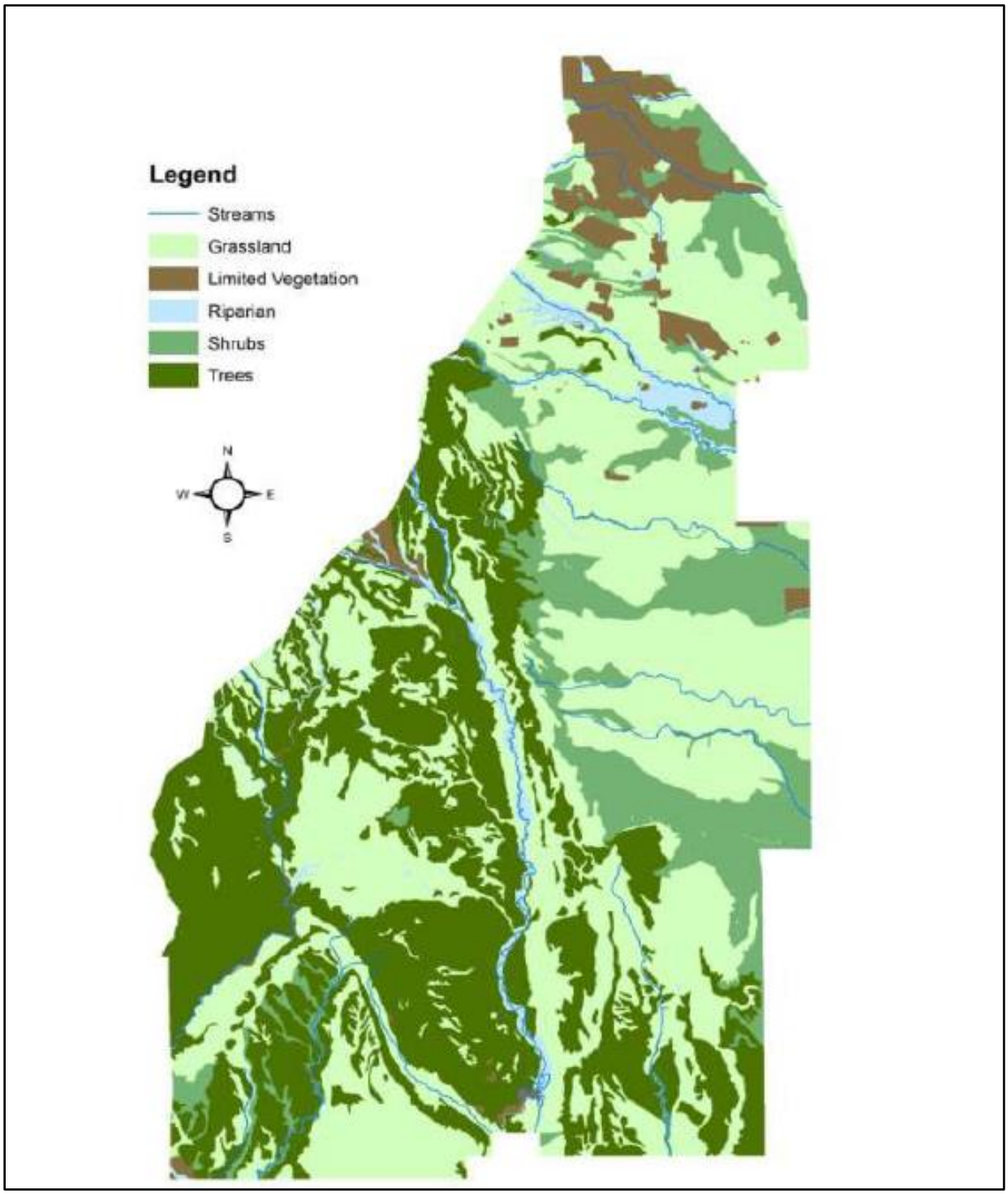


Figure 3.6-5. Fort Carson Plant Communities

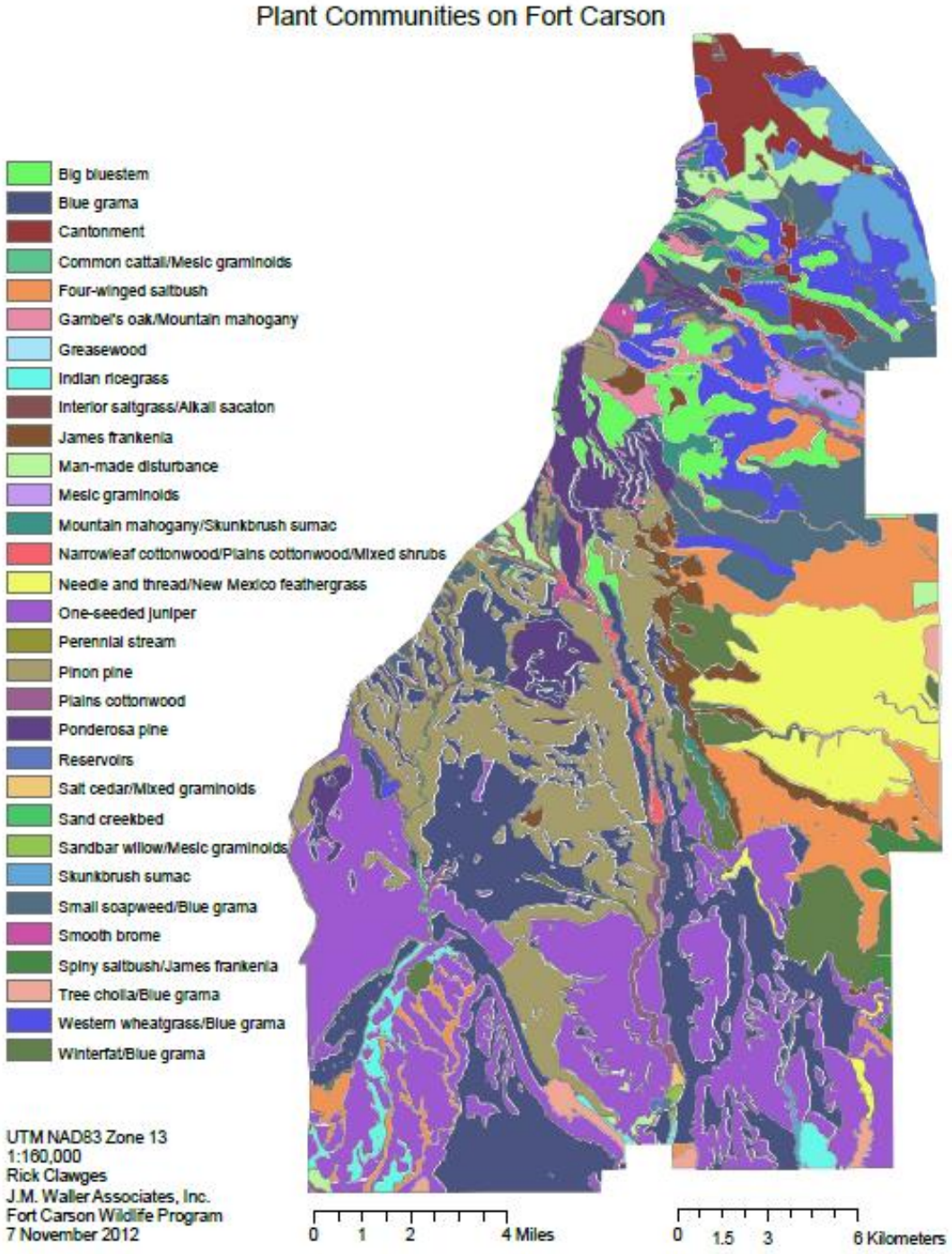
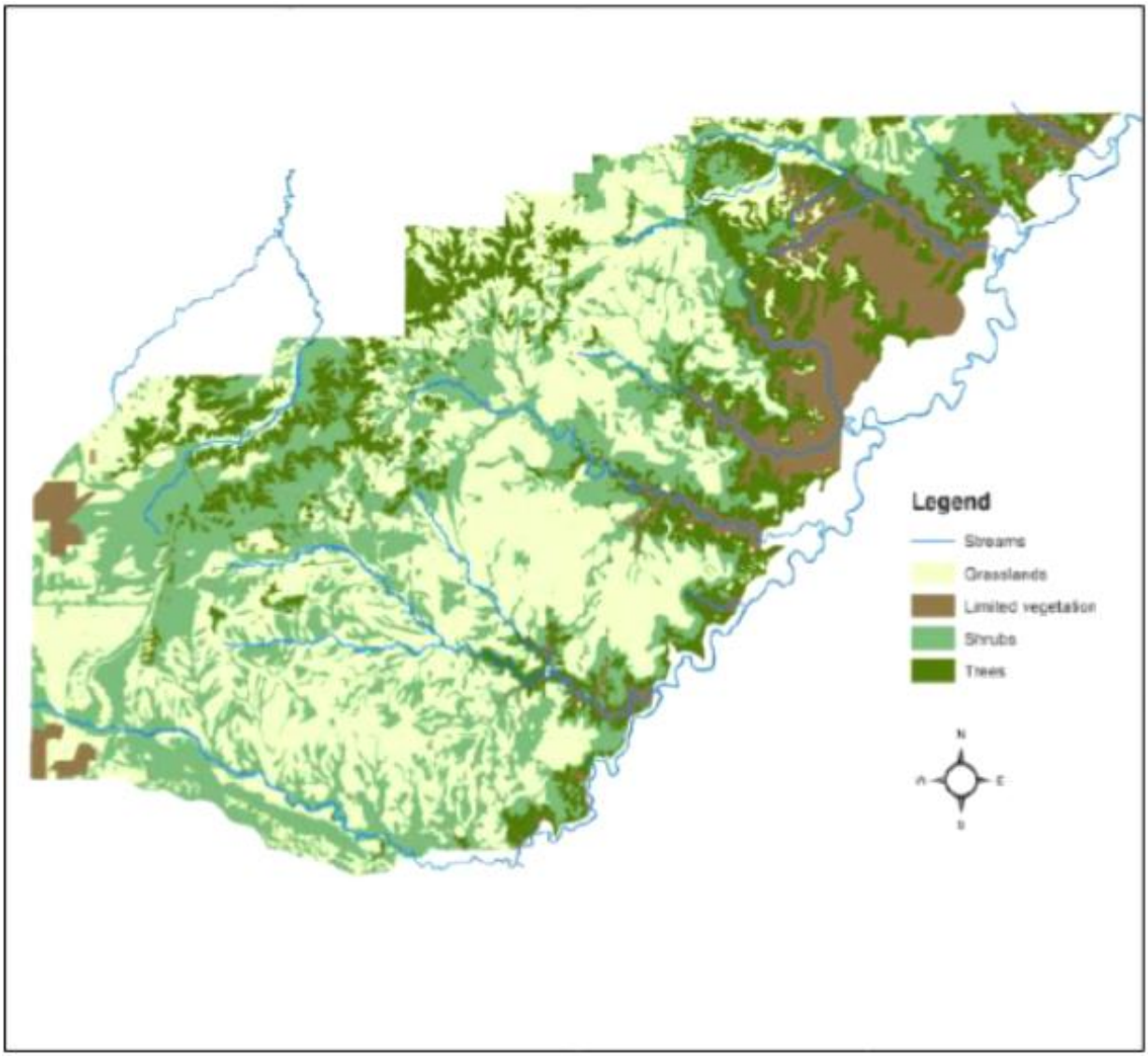


Figure 3.6-6. General Vegetation Classes for PCMS



3.6.4.1.2 Fauna

Seventy-three species of mammals are known to occur on Fort Carson (Fort Carson 2014). Fort Carson supports a relatively intact large-mammal community (e.g., elk, mountain lion, pronghorn, bighorn sheep, black bear, mule deer, and white-tailed deer). Fifteen species of native fish are known to occur on Fort Carson.

3.6.4.1.3 Protected Species

On Fort Carson, 285 species of birds have been recorded, of which 44 are species of concern. This includes USFWS Birds of Conservation Concern, Colorado State threatened species and state species of concern, and Colorado State Wildlife Action Plan Tier 1 and Tier 2 species. On Fort Carson, 24 species of fish have been recorded, including 15 native species, one state endangered species, one state threatened species, and one species of state special concern. Table

3-36 shows the two federally listed species that occur on the installation, plus five species that are under review for listing. The 2020–2025 Fort Carson and Piñon Canyon Maneuver Site Integrated Natural Resource Plan outlines the details of the fauna of Fort Carson and current management strategies in place to ensure habitat sustainability and population viability.[113]

Table 3-3536. Federally Listed and Under Review Species That Occur on Fort Carson

Common Name	Scientific Name	Status
Western bumblebee	*Bombus occidentalis*	Under Review
Eastern (plains) spotted skunk	*Spilogale putorus interrupta*	Under Review
Tricolored bat	*Perimyotis subflavus*	Under Review
Black-footed ferret	*Mustela nigripes*	E
Little brown bat	*Myotis lucifugus*	Under Review
Mexican spotted owl	*Strix occidentalis lucida*	T

Western Bumblebee

This species, which has been under review since 2016, has the potential to occur on both Fort Carson and the PCMS, as it is has been found in multiple locations along the Front Range. Both installations have a habitat that is appropriate for the bumblebee, but no baseline arthropod surveys have been conducted at either installation.

Plains Spotted Skunk

The plains spotted skunk is one of three subspecies of the Eastern spotted skunk. Spotted skunks are found in woodlands, prairies, and sometimes rocky areas of the eastern and central United States, Canada (southeast Manitoba and northwestern Ontario), and northeast Mexico (Drago and Honeycutt 1981). They seem to prefer forest edges and upland prairie grasslands, especially where rocky outcrops and shrub clumps are present. The species has the potential to be found on Fort Carson, as one of the few documented cases in Colorado involved a road-killed animal in Pueblo County. However, no surveys have been conducted and there are no documented occurrences of the plains spotted skunk at Fort Carson.

Tricolored Bat

The tri-colored bat prefers to hibernate in caves, rock crevices, and mines and may use these sites for summer roosts as well. During the summer months, it also roosts in trees using foliage for diurnal cover. The bat prefers riparian areas with large insect food sources. Since 2006, the tri-colored bat has been devastated by the invasive fungal disease known as white-nose syndrome (WNS). As WNS has spread across the continent, numbers of the tri-colored bat have plummeted

[113] 2020–2025 Fort Carson and Pinon Canyon Maneuver Site Integrated Natural Resource Plan https://www.carson.army.mil/assets/docs/dpw/NEPA/2020-2025-inrmp.pdf accessed on June 15, 2020.

along with several other bat species. Mortality rates up to 100 percent have been reported in affected hibernacula.

The first documented occurrence of the tri-colored bat on Fort Carson was in an abandoned mine on the southern end of the installation on April 2, 2008. Fort Carson has three separate ecosystems utilized by the tri-colored bat: riparian zones, forests, and mines. The mines on Fort Carson are located in a narrow canyon area consisting of the piñon pine-juniper landscape. No bat surveys have occurred since then until recently when a planning level survey of all bat species on Fort Carson was conducted. In 2019, capture surveys, a single tri-colored bat was captured on the north end of Fort Carson at the golf course pond.

Black-Footed Ferret

Listed as endangered in 1967 and again in 1970,[114] the black-footed ferret was reintroduced on adjacent private landowner property in October of 2013 and subsequently immigrated onto Fort Carson along the southern boundary.

Little Brown Bat

Little brown bats are the most widespread *Myotis* species in North America, extending from Alaska to Newfoundland on the northern edge of their range and from South Carolina to southern California on the southern edge, excluding the southern Great Plains region. The greatest current threat facing little brown bats is WNS, a disease caused by the cold-loving fungus *Pseudogymnoascus destructans*. The disease was first found in the United States in 2006 in a hibernaculum in New York and has since spread to 38 states and seven Canadian provinces.

Prior Colorado Parks and Wildlife (CPW) acoustic survey in 2012, there was only a single confirmed species record from the 1970s. The 2012 acoustic surveys recorded little brown bats in the Stone City area, and broader acoustic surveys started in 2016 recorded little brown bats elsewhere on Fort Carson. Acoustic monitoring in the fall of 2018 detected likely little brown bat calls at all 10 acoustic recording sites on Fort Carson, suggesting that the species is widespread on Fort Carson.

Mexican Spotted Owl

The Mexican spotted owl is a federally threatened species known to winter in the rugged mountainous terrain located in the south-central part of Fort Carson, which includes Booth Mountain. The owl's habitat is managed according to provisions specified in the Mexican spotted owl management plan (Gene Stout and Associates 2002, revised in 2016 by the Fort Carson Wildlife Office). Protections for the owl include resource management and limiting the types of training and recreational activities that can occur in areas occupied by the owl.

[114] Source: https://ecos.fws.gov/ServCat/DownloadFile/169265.

3.6.4.2 Environmental Consequences

While there may be adverse impacts to biological resources at Fort Carson, they are expected to be less than significant as detailed in the sections below.

Impacts from Construction

Construction of a battalion complex may be required. The proposed site is along Wilderness Road and west of Butts AAF. The battalion area complex may encompass up to approximately 40 acres, but actual ground disturbance for each building would be substantially less. The battalion area would consist of a battalion HQ, battery HQs, a company HQ, a vehicle maintenance shop, an oil storage building, and an organizational vehicle parking area. The HQ buildings may be combined into a single HQ complex. The vehicle maintenance shop and oil storage building would be constructed within the confines of the Organizational Vehicle Parking area. Additional barracks are already planned in a nearby location about one-half mile east of the battalion complex. The complex and barracks would be constructed within grassland plant communities and no substantive fauna are present. This area is undergoing development per the installation master plan.

Fort Carson would not construct new ranges or maneuver areas to support the M-SHORAD battalion, unless funding is made available. Such actions would be addressed in a separate environmental analysis. Training requirements would be met through appropriate scheduling per the SRM or ReARMM or the use of acceptable alternate ranges.

The black-footed ferret occurs in proximity to their primary prey, the prairie dog, and could potentially occur within the area where the battalion complex would be built.[115] An assessment of the area would occur before the commencement of construction; if prairie dog colonies are present, the USFWS would be consulted before construction.

Based on previous surveys,[116] the little brown bat could occur within El Paso County but it is unlikely to occur in the area of construction because it lacks deciduous woody vegetation or riparian forests that is the preferred habitat.

The tri-colored bat has expanded its range west to include Colorado and could occur on Fort Carson. However, impacts are expected to be less than significant because they occur in forested landscapes and along waterways,[117] neither of which are nearby the construction area,

The eastern spotted skunk may occur within the construction area as they prefer forest edges and upland prairie grasslands. However, impacts are expected to be less than significant because there have been no documented sightings on Fort Carson and only one in El Paso County.

[115] https://ecos.fws.gov/ServCat/DownloadFile/169265 accessed on 8/27/20
[116] Armstrong et. al., 1994
[117] https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.102580/Perimyotis_subflavus#:~:text=Habitat,-Habitat%20Type%3A&text=Habitat%20Comments%3A,(e.g.%2C%20Ellis%20et%20al. accessed 31Aug20.

No impacts are anticipated to the western bumblebee because historical sightings[118] place the populations north and west of Fort Carson, or the Mexican spotted owl because they occupy forested areas in the mountains.

Impacts from Live-Fire Training

Training conducted by the M-SHORAD battalion could affect all plant communities. These impacts would be distributed across wide areas of the Fort Carson training area. The impacts are expected to be less than significant because the Army completes assessments and rehabilitation and maintenance regularly to ensure training areas are realistic, well-vegetated, and remain as similar to the pre-existing natural habitat as possible.

There is a potential for adverse effects to fauna and protected species as a result of live-fire training. However, the impacts are expected to be less than significant because fauna and protected species would normally avoid areas where live-fire training occurs. Also, ranges are not located where they would interfere with protected species unless the impacts were appropriately addressed in a previously issued biological opinion or other appropriate documentation for species covered by the MBTA or BGEPA.

Impacts from Maneuver Training

All plant communities could be affected by maneuver training conducted by the M-SHORAD battalion. These impacts would be distributed across wide areas of the Fort Carson training area. The impacts are expected to be less than significant because the Army completes assessments and rehabilitation and maintenance regularly to ensure training areas are realistic, well-vegetated, and remain as similar to the pre-existing natural habitat as possible.

There is a potential for adverse effects to fauna and protected species as a result of maneuver training. However, the impacts are expected to be less than significant because fauna and protected species would normally avoid areas during maneuver training. Also, trails within maneuver areas are not located where they would interfere with protected species unless the impacts were appropriately addressed in a previously issued biological opinion or other appropriate documentation for species covered by the MBTA or BGEPA. Any known protected species habitat within a maneuver area would be marked as off-limits with an appropriate buffer area to preclude species disturbance.

Impacts from Increase in the Number of Soldiers

The impacts of increasing soldier population are adequately addressed in Section 3.1.3.

[118] https://xerces.org/sites/default/files/2019-10/xerces_2008_bombus_status_review_0.pdf accessed 31Aug20.

3.6.4.3 Cumulative Effects

There could be a small increase in the intensity of use of training areas and a small additional increase in the soldier population by adding the seven new systems. Any required increases in use could be accommodated through scheduling flexibility provided by the SRM or ReARMM, additional assessments, and land rehabilitation and maintenance to maintain the quality of habitat. Therefore, the cumulative effects to biological resources are expected to be less than significant.

3.6.5 Cultural Resources

3.6.5.1 Affected Environment

Management of cultural resources for Fort Carson is detailed in the Fort Carson ICRMP (Fort Carson 2017). Fort Carson manages cultural resources associated with all major prehistoric and historic cultural periods recognized on the southern Great Plains and the Rocky Mountains at Fort Carson. Cultural resources management on installation encompasses conservation and preservation of historic properties, as well as properties of religious, traditional, and cultural importance to Native Americans.

3.6.5.1.1 Cultural Resources Present

Based on the Fort Carson ICRMP (Fort Carson, 2017), as of May 2019, approximately 85 percent of Fort Carson-managed lands have been surveyed, resulting in the identification of approximately 2,377 known cultural resources at Fort Carson and 6,183 cultural resources at PCMS. Fort Carson has three designated historic districts: the Turkey Creek Ranch Historic District, located within the Turkey Creek Complex; the Incinerator Complex, located on Main Post; and the Turkey Creek Rock Art District, located downrange Fort Carson. The Turkey Creek Rock Art District is listed on the NRHP. The Turkey Creek Rock Art District is located downrange, west of the digital multipurpose range complex.

3.6.5.1.2 Consultation and Coordination with Tribal Governments

In order to streamline the Section 106 process in accordance with 36 CFR 800.14(b), Fort Carson developed a PA for locations on both Fort Carson and the PCMS:

- Programmatic Agreement Among the U.S. Army Garrison Fort Carson, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Construction, Maintenance, and Operations Activities for Areas of Fort Carson, Colorado (Fort Carson 2013). This PA (referred to as the Fort Carson Built Environment PA) was executed in March 2013, amended in February 2018, and again in December 2019. Both amendments were to extend the expiration date so a new PA could be developed. It streamlines the Section 106 consultation process for certain undertakings that occur within the built environment areas on Fort Carson. In addition, it establishes a requirement to prepare an annual report of undertakings and actions completed during the FY.

- Programmatic Agreement among U.S. Army Garrison Fort Carson, Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding Military Training and Operational Support Activities Down Range Fort Carson, Colorado (Fort Carson 2014a). This PA (referred to as the Fort Carson Downrange PA) was executed in March 2014 and amended in May 2018. It streamlines the Section 106 consultation process for certain undertakings that occur within the 122,503-acre parcel, referred to as downrange Fort Carson. In addition, it establishes site monitoring and protection procedures for archaeological resources located within downrange Fort Carson. It also requires annual cultural resources awareness training and an annual report of activities.

Stipulations within these PAs establish protection measures, monitoring strategies, and a list of activities exempted from further consultation. Fort Carson analyzes effects on historic properties and protected properties from military training, other activities, and natural processes. In cases where Section 106 consultation would be necessary, review, evaluation, and analysis regarding the potential for adverse effects to historic properties would consider all characteristics that qualify a site for inclusion on the NRHP.

3.6.5.2 Environmental Consequences

Fort Carson has three designated historic districts: Turkey Creek Ranch Historic District, located within the Turkey Creek Complex; the Incinerator Complex, located on Main Post; and the Turkey Creek Rock Art District, located downrange at Fort Carson. Construction of new facilities within the cantonment are considered exempted undertakings under the Fort Carson Built Environment PA, and will not require additional Section 106 consultation. However, no construction is planned to occur within the three historic districts. Live-fire or maneuver training could occur within the historic districts with appropriate existing restrictions. Impacts to cultural resources at Fort Carson are less than significant and are adequately addressed in Section 3.1.4.2.

3.6.5.3 Cumulative Effects

There are no anticipated construction requirements for the seven new systems. There could be a small increase in the intensity of use of training areas and a small additional increase in the soldier population by adding the seven new systems. Any required increases in use could be accommodated through scheduling flexibility provided by the SRM or ReARMM and additional assessments. All soldiers reporting to support the seven additional systems would receive the appropriate training in recognition, avoidance, and protection of cultural resources. Therefore, the cumulative effects to cultural resources are expected to be less than significant.

3.6.6 Soils

3.6.6.1 Affected Environment

Soil types commonly occurring in the Fort Carson region are also aridisol (dry, desert-like soils) and entisol (soils that do not show any profile development and which are largely unaltered from

their parent rock) soils. These soil types are characterized by moderate-to-severe erodibility, landslides, and unstable clay formation movement due to variations in moisture content and temperature. Soil erosion is a problem at Fort Carson. Soils of greatest concern for erosion are clays, silty clays, and clay loams. In particular, the eastern portion of Fort Carson, located within the Fountain Creek Watershed, and the southwest corner of the post draining to Beaver Creek, contain soils that have been identified as being moderately to highly susceptible to erosion.

Natural resource management at Fort Carson focuses on maintaining the structure and integrity of soil resources, while maintaining high-quality lands for training, biodiversity, and recreation. Fort Carson manages natural resources, including soils, through the INRMP. The INRMP outlines plans, goals, and objectives for the natural resources programs on Fort Carson, and integrates conservation management actions with Army mission.

Fort Carson uses an adaptive ecosystem management strategy to protect, conserve, enhance, and monitor resources and to adjust INRMP management objectives based upon the effects of training activities. Management decisions are made based on the best available science and attempt, where practical, to mimic the natural historical disturbance regimes for the ecoregion. Monitoring programs generate the soils and land recovery data needed to determine whether the management measures and strategies are effective in achieving their intended goals and objectives. These include maintaining sustainable training lands and minimizing soil movement, minimizing soil loss from water and wind erosion.

Units are briefed prior to each training event regarding sensitive areas on post such as highly erodible soils, and what is allowed or prohibited within certain areas. This management approach preserves soil resources while also providing the optimum environmental conditions required to sustain the military mission and realistic training conditions (Fort Carson 2014).

Management of natural resources also involves the ITAM Program that establishes a uniform land management program and includes inventorying and monitoring land condition. The program also involves integration of training requirements with land carrying capacity while at the same time training to Army standard; educating land users to minimize adverse impacts; and prioritizing and implementing rehabilitation and maintenance projects. Fort Carson's ITAM is governed by AR 350-19 and FC Regulation 350-9, Integrated Training Area Management.

3.6.6.2 Environmental Consequences

Proposed construction of the M-SHORAD battalion facilities and previously planned barracks would occur predominately on loams, silty clay loams, and gravelly loams that have medium erodibilities. Fort Carson has recognized the greater potential for erosion on the installation and has implemented an Erosion and Sediment Control Program, which outlines techniques to minimize and mitigate the effects of soil erosion and sedimentation at the installation. As described in Section 3.1.5.2, the measures employed by Fort Carson would control soil erosion resulting from construction activities; therefore, impacts are expected to be localized and less than significant.

Impacts from Live-Fire and Maneuver Training

Impacts to soils from live-fire and maneuver training are fully addressed in Section 3.1.5.2.

Impacts from Increase in the Number of Soldiers

Impacts to soils from the increase in the number of soldiers are fully addressed in Section 3.1.5.2.

3.6.6.3 Cumulative Effects

Fielding of the seven new systems is expected to add less than 90 additional soldiers to Fort Carson. The additional systems would cause slight increases in the intensity of use within the live-fire range and maneuver complexes. The effects of the additional actions, when combined with those of the Proposed Action, are expected to result in less than significant cumulative adverse effects to soils.

3.6.7 Land Use and Compatibility

3.6.7.1 Affected Environment

Fort Carson is in central Colorado at the foot of the Rocky Mountains and occupies portions of El Paso, Fremont, and Pueblo Counties. The installation is bounded by State Highway 115 on the west and Interstate 25 and mixed development to the east. Colorado Springs and Denver lie approximately 8 and 75 miles, respectively, to the north; while the city of Pueblo (not shown on the map) is located approximately 35 miles south of the Main Post area.

Fort Carson covers approximately 137,000 acres, and extends between 2 and 15 miles, east to west, and approximately 24 miles, north to south. The Main Post, located in the northern portion of the installation, covers approximately 6,000 acres. Of Fort Carson's total acreage, more than half provides maneuver land suited for vehicle and non-vehicular military training (HDQA 2011a).

Fort Carson is an active military training facility for both weapons qualifications and field training. Land use falls generally into three broad categories: the Main Post which consists of developed land and a high density of urban uses; downrange areas, which consists of open land used for training purposes; and land specified for non-training uses, which are designated in various areas and are accessible by the public (Figures 3.6-7 and 3.6-8).

3.6.7.1.1 Cantonment

The Main Post area comprises approximately 6,000 acres and contains most of the installation infrastructure, such as soldier and family housing; administrative, maintenance, community support, recreation, supply, and storage facilities; utilities; and classroom and simulation training facilities. Principal industrial operations include the repair and maintenance of vehicles. These operations mostly occur within the vicinity of the “banana belt” (so called because it is a banana-shaped arc of brick buildings) located along the north and east side of the Main Post area.

Figure 3.6-7. Land Use at Fort Carson

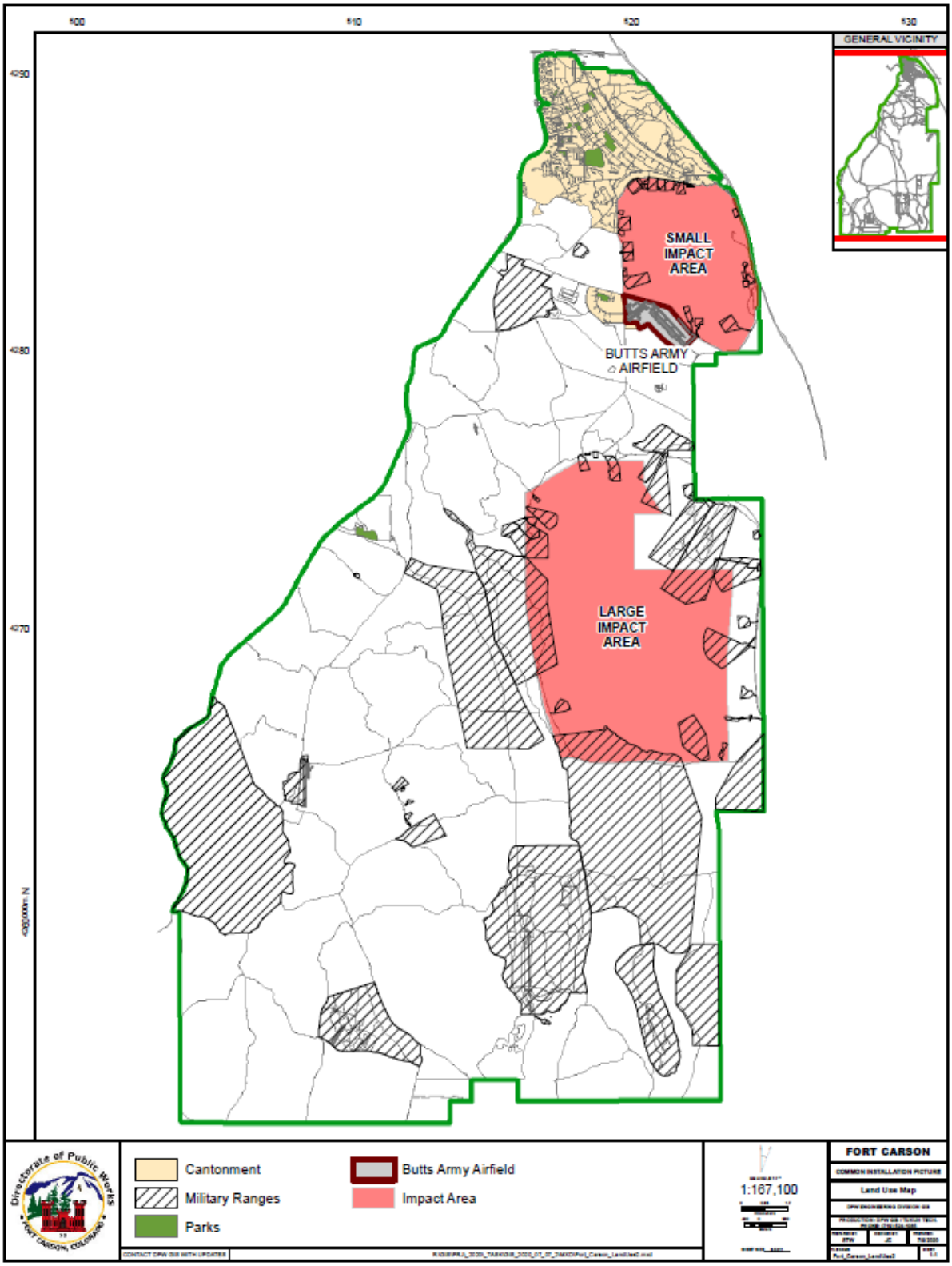
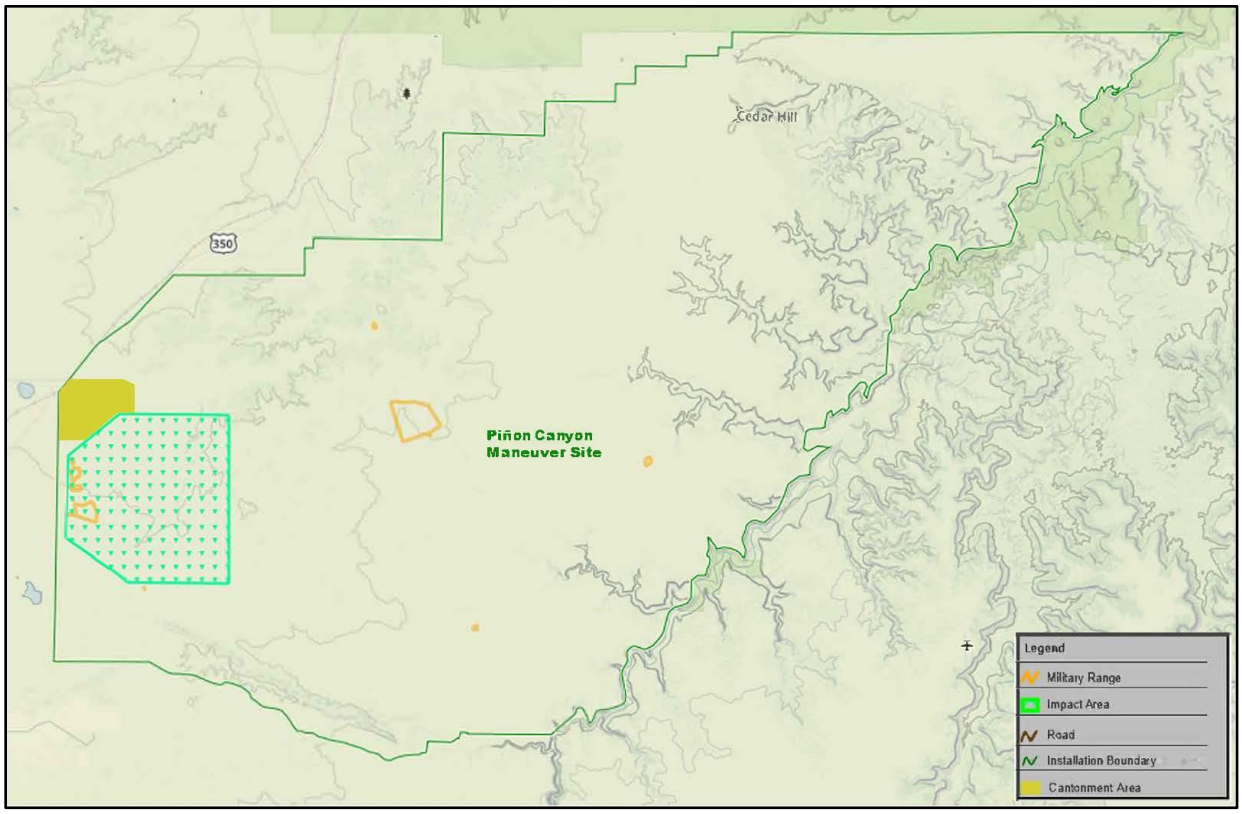


Figure 3.6-8. Land Use at Piñon Canyon



3.6.7.1.2 Range Complex

The downrange area consists of 56 training areas (approximately 131,000 acres) and Camp Red Devil (1,166 acres). Downrange areas, except for Camp Red Devil, are generally unimproved, meaning it has either no permanent facilities or very limited facilities used by troops to complete training missions. Camp Red Devil consists of several permanent and semi-permanent facilities that support extended duration tactical training on Fort Carson.

Portions of the downrange area are restricted from use or are available for limited training to protect natural and cultural resources, fragile soils, recreation areas, or other environmental concerns.

Recreational uses include hunting, fishing, dog training, and activities such as picnics and trail rides. Military training is generally off limits at these sites, and the intensity, level, and type of recreational activities vary by site. Most of the sites that support recreational uses are also waterfowl nesting refuges; some sites also protect other species, including fish. Two permits have been issued by the State of Colorado to mine refractive clay on Fort Carson, near the Stone City site. Fort Carson is required by law to allow mining at existing sites provided permit conditions continue to be met by permittees.

3.6.7.1.3 Surrounding Off-Post Land Uses/Regional Land Use Planning

Off-post land use remains consistent with that described in the 2011 CAB Stationing PEIS (Department of the Army 2011), and 2012 Fort Carson Combat Aviation Brigade Stationing Implementation EA (Fort Carson 2012). Developed land and land planned for future development border the northern one-third of Fort Carson. These lands are part of unincorporated El Paso County to the west, the City of Colorado Springs to the north and west, and Security-Widefield and the city of Fountain to the east. The town of Penrose is located to the west of the southwest corner of Fort Carson. Land bordering the southern and southeastern portion of Fort Carson is generally comprised of undeveloped agricultural land with parcels protected from development with conservation easements as part of the installation's ACUB program.

The goal of the ACUB program is to buffer the ranges and training areas along the southern and eastern boundaries of Fort Carson. Although there is conservation value to some of the land, the primary driver for the buffers is to prevent training restrictions due to incompatible development. By the end of September 2013, 24,288 acres were protected from non-compatible use (23,252 acres with permanent conservation easements and 1,036 acres with fee simple title) through the ACUB program. By precluding incompatible development off-post through ACUB, the installation is mitigating factors that would otherwise affect the use of training ranges, including: decreasing civilian safety concerns associated with illegal trespass, mitigating off-installation lighting sources that limit use of night vision devices and other night mission training, and decreasing public complaints regarding dust, smoke, noise, and vibrations.

3.6.7.2 Environmental Consequences

The battalion complex and barracks are planned along Wilderness Road. These areas are designated appropriately in the RPMP for these uses. The previously planned barracks and construction of the new battalion HQ complex, comprising approximately 40 acres, would not change the designated land use and compatibility. No new live-fire ranges or maneuver areas are required. Impacts to land use and compatibility resulting from construction, live-fire range and maneuver training, and the increased soldier population are fully addressed in Section 3.1.6.2. They are expected to be less than significant.

3.6.7.3 Cumulative Effects

Fielding of the seven new systems is expected to have less than significant effects because these new systems would be fielded to existing units with no changes to land use or compatibility.

3.6.8 Socioeconomics

3.6.8.1 Affected Environment

Fort Carson's ROI consists of El Paso, Pueblo, and Fremont Counties. Fort Carson is an Army post located near Colorado Springs, primarily in El Paso County, Colorado, and extending south into Pueblo and Fremont Counties.

3.6.8.1.1 Population

The estimated population for Pueblo County in 2019 was 168,424, Fremont County was 47,839, and El Paso County was 720,403, totaling 936,666. The values represent a 5.9, 2.2 and 15.8 percent growth, respectively, since 2010. In comparison, Colorado experienced a population increase of 14.5 percent during the same period.[119]

Fort Carson's population includes 24,300 permanent party, transient military, and rotational military. The civilian working population is 6,700 and includes Army civilians, contractors, and other civilians. The total employed population for FY 2020 is 32,474 (ASIP 2020). There are 36,000 family members in total. Fort Carson currently has 3,287 accompanied soldiers residing in family housing with 12,200 family members residing in them. Fort Carson has 3,415 family housing units that are 95 percent occupied. Housing is managed through the RCI partnership. unaccompanied personnel housing (UPH) has 6,775 single soldiers (unaccompanied) living in on-post barracks. All unaccompanied soldiers, Staff Sergeant and above, must live off-post.

3.6.8.1.2 Race/Origin Demographics

The largest minority/place of origin group across the ROI in 2019 was the Hispanic/Latino population, followed by Native American community in Pueblo County, Black or African American community in Fremont and El Paso Counties, similar to the state of Colorado population. More complete demographic statistics for the ROI are shown in Table 3-37.

Table 3-3637. Demographic Comparison between the ROI and the State of Colorado

Race/ Origin	Percent of the Population In Pueblo County	Percent of the Population In Fremont County	Percent of the Population In El Paso County	Percent of the Population In Colorado
White only	90.2	91.2	83.3	87.1
Black or African American only	2.6	3.9	6.9	4.6
Native American and Alaskan only	3.1	1.8	1.4	1.6
Asian only	1.1	1.0	3.1	3.5
Native Hawaiian or Other Pacific Islander	0.2	0.1	0.4	0.2
Hispanic or Latino	43.1	13.5	17.5	21.7
Two or more races	2.9	2.0	4.9	3.1

Source: Census 2019.
*Hispanic or Latino is not a race but an origin. To get the total percent for race, subtract this origin.

[119] Census. 2019. QuickFacts: https://www.census.gov/quickfacts/fact/table/CO,elpasocountycolorado,fremontcountycolorado,pueblocountycolorado,US/PST045219 Accessed on June 9, 2020.

3.6.8.1.3 Income and Employment

The per capita income in 2018 was $24,257, $21,965, and $32,348 for Pueblo, Fremont, and El Paso Counties. Thus, the average per capita income for the ROI in 2018 was $30,363. The per capita income was $36,415 for the state of Colorado for that same timeframe. The largest employment industry in the ROI is the military installations in the area as well as on the aerospace and electronics industries.[120]

The unemployment rate for Pueblo County in 2019 was 4.6 percent, compared to 5.3 percent for Fremont County, and 3.7 percent for El Paso County. The unemployment rate for Colorado for 2019 was 2.5 percent[121]

3.6.8.2 Environmental Consequences

Impacts to Socioeconomics at Fort Carson are expected to be negligible and are fully addressed in Section 3.1.7.2. The increase of 550 soldiers and 786 family members on average represents a 0.2 percent increase in population within the ROI. The contribution of the M-SHORAD battalion wages of $31.4 million represents only 0.11 percent of the total estimated ROI income of $28.4 billion.

The per capita income of the ROI is more than the M-SHORAD battalion per capita income because El Paso County has a higher population and income than Pueblo and Fremont Counties and notably raises the income levels. The Proposed Action would not prove to be a significant impact because the total contribution is only 0.11 percent of the total income within the ROI.

3.6.8.3 Cumulative Effects

Fielding of the seven new systems is expected to add less than 150 additional soldiers to Fort Carson. The cumulative effects of adding approximately 640 soldiers, 339 spouses, and 576 children at Fort Carson is expected to be less than significant because it represents a population increase of less than 0.2 percent within the ROI.

3.6.9 Traffic and Transportation

3.6.9.1 Affected Environment

For the purposes of this PEA, transportation resources surrounding and within Fort Carson are the affected environment for analysis. Regional access to Fort Carson is from I-25 and Colorado Highways 83 and 115.

Federal and State Highways Providing Access to Fort Carson

Colorado Springs and Pueblo, Colorado, are the largest cities located near Fort Carson. The installation traffic impacts areas in the western portion of El Paso County, to include the

[120] Census. 2019. QuickFacts https://www.census.gov/quickfacts/fact/table/fremontcountycolorado,pueblocountycolorado,elpasocountycolorado/PST04521 Accessed on June 3, 2020.
[121] Bureau of Labor Statistics https://www.bls.gov/web/metro/laucntycur14.txt Accessed on June 8, 2020.

communities of Colorado Springs, Stratmoor, Cimarron Hills, and other nearby communities. There are many civilian and active military personnel that commute from these areas. Major roads that border Fort Carson are I-25 to the east, State Highway (SH) 115 to the west, and Academy Boulevard to the north. Other major routes in the area include U.S. 24, SHs 85, 16, and 21.

Fort Carson is bounded by three roadways which define the northern limits of the post:

- I-25 is a north-south interstate facility located east of Fort Carson. It provides indirect access to Fort Carson via Gate 19 (by way of Santa Fe Avenue and Charter Oak Ranch Road) and Gate 20 (by way of SH 16, which is renamed Magrath Avenue within Fort Carson).
- Academy Boulevard is an east-west roadway located north of Fort Carson. It provides direct access to Fort Carson via Gates 3 and 4.
- SH 115 is north-south roadway located west of Fort Carson. It provides direct access to Fort Carson via Gates: 1, 2, 5, and 6.

Internal Roadways

Within Fort Carson, on-base residential housing is primarily located between SH 115 and Chiles Avenue; barracks are located predominantly along Barkeley Avenue. Recreational fields, restaurants, office buildings, and training facilities are predominantly located east of Chiles Avenue and south of O'Connell Boulevard. The primary routes within Fort Carson include:

- O'Connell Boulevard
- Chiles Avenue
- Prussman Boulevard
- Barkeley Avenue / Magrath Avenue (one-way pair)
- Specker Avenue / Wetzel Avenue (one-way pair)
- Butts Road
- Titus Boulevard
- Wilderness Road
- Essayons Road

Access Control Points

The roadway network within Fort Carson features a grid network of vehicular transportation facilities in the northern cantonment area of the base. Fort Carson is accessed via eight access control points (ACPs). To the west, Gates 1, 2, 5, and 6 provide a vehicular connection to SH 115; to the north, Gates 3 and 4 provide a vehicular connection to Academy Boulevard; and to the east, Gates 19 and 20 provide a vehicular connection to I-25.

3.6.9.2 Environmental Consequences

The addition of an M-SHORAD battalion at Fort Carson would add 550 new soldiers, representing an increase of approximately 1.7 percent. Including the anticipated number of spouses and children, the ROI population would increase by approximately 0.2 percent. Therefore, the impacts to traffic and transportation within the ROI and the installation are expected to be negligible.

If a training exercise would be scheduled at PCMS, the participating vehicles may form a convoy to transit from Fort Carson to PCMS. Convoy operations would be accomplished per ATP 4-11 *Army Motor Transport Operations*.[122] Compliance with ATP 4-11 would ensure appropriate notifications are provided to civil authorities and the correct permits are obtained. Properly completed convoy operations would ensure minimal impacts to traffic and transportation along the convoy route.

3.6.9.3 Cumulative Effects

Fielding of the seven new systems is expected to add approximately 90 additional soldiers to Fort Carson. The cumulative effects of adding approximately 640 soldiers and 339 spouses at Fort Carson are expected to have less than significant effects to traffic and transportation. It is assumed that most children would be below driving age and therefore not included in the effects on traffic and transportation.

3.6.10 Facilities

3.6.10.1 Affected Environment

The family housing on Fort Carson is under the management of the RCI partner Fort Carson Family Homes (FCFH). FCFH is comprised of 16 distinct neighborhoods and serves the on-base housing community of active duty Army families assigned to Fort Carson and welcomes qualified military retiree and DoD civilian employee applicants in select neighborhoods.[123]

The garrison area or cantonment, also addressed briefly in Land Use and Compatibility, contains the heaviest concentration of facilities and mission support activities on Fort Carson. Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical, and community facilities.

Army facilities are built to meet the standards of the uniform facilities criteria using standard designs of MILCON requirements, standardization, and integration or similar documents. Exceptions to standard are available and if granted for a facility it would be considered adequate.

[122] Accessed at https://rdl.train.army.mil/ on 17Aug20.
[123] https://www.fortcarsonfamilyhomes.com/ accessed 25 June 2020.

3.6.10.2 Environmental Consequences

The excess or deficit of facilities available to support the M-SHORAD battalion at Fort Carson was assessed based on the Army RPLANS records. The results are shown in Table 3-38 with deficits shown in parentheses.

Table 3-3738. M-SHORAD Expected Facility Requirements FY 2021 Data

Facility name	Number required	Total sq ft	Total acres	Ft Carson
Battalion HQ Building	1	48,520	1.1	(131,997)
Company HQ Building	1	33,646	0.8	(435,882)
Company HQ Building	4	103,104	2.4	(435,882)
Vehicle Maintenance Shop	1	100,800	2.3	(51,657)
Oil Storage Building	1	480	0.0	(4,097)
Organizational Vehicle Parking	1	450,000	10.3	670,817
Dining Facility	1	41,116	0.9	67,463
Barracks Permanent Party	1	76,140	1.7	120,720

Fort Carson would construct a battalion complex on a parcel of approximately 40 acres. The battalion complex would include the battalion and company HQ buildings, a vehicle maintenance shop, an oil storage building, and the organizational vehicle parking to support the M-SHORAD battalion. The required barracks for the M-SHORAD soldiers would be met by previously planned barracks that will be constructed on a nearby parcel to the east. The new facilities would be constructed in an area that is designated for battalion support facilities and barracks along Wilderness Road. No new live-fire ranges or maneuver areas are required.

Facility impacts are addressed in Section 3.1.9.2 and are expected to be less than significant.

3.6.10.3 Cumulative Effects

Fielding of the seven new systems is expected to have less than significant effects because these new systems would be fielded to existing units with no additional facility requirements anticipated.

3.6.11 Water Resources

3.6.11.1 Affected Environment

3.6.11.1.1 Surface Water

The northern and eastern portions of Fort Carson are located within the Fountain Creek watershed of the Arkansas River Basin and drain southeasterly into Fountain Creek. Stormwater runoff in the northern portion of the installation flows into one of four main drainages: B-Ditch, Clover Ditch, Infantry Creek, or Rock Creek, which are all tributaries to Fountain Creek. The

southern and western portions of the installation drain directly into the Arkansas River to the south (Fort Carson Grow the Army [GTA] EIS 2009).

These northern drainages have historically been considered ephemeral or intermittent, in which no flow occurs in some reaches for long periods during the year, and with the high flow occurring between April and September (Fort Carson GTA EIS 2009). Modern day conditions within the watershed, however, have changed the system dynamics, which now typically exhibit perennial flows in most areas of these drainages. Most flows in these drainages consist of runoff from precipitation and snowmelt that have increased due to the higher percentages of impervious areas within the watershed. Groundwater seepage and return flows also contribute to baseflows in these drainages (Fort Carson GTA EIS 2009).

3.6.11.1.2 Groundwater

The availability, movement, and quality of groundwater is largely dependent on the distribution, permeability, and composition of the rock units that comprise the aquifers. Successively older sedimentary rock units uplifted with the Rocky Mountains are exposed from east to west in the installation. Groundwater at Fort Carson occurs in both alluvial and bedrock aquifers. Alluvial aquifers are formed from unconsolidated deposits of stream alluvium that are moderately permeable. However, their dependability is limited by their areal extent, thickness, and available recharge. The alluvial aquifers can provide well yields from 10 to more than 100 gallons per minute.

The principal bedrock aquifer at Fort Carson is the Dakota-Purgatoire aquifer, which is comprised of massive bedded sandstones in the Dakota Sandstone and Lytle Sandstone Member of the Purgatoire Formation. This bedrock aquifer can yield 10 gallons per minute, but local fracturing can increase the permeability and yield to over 200 gallons per minute. Recharge of bedrock aquifers is from infiltration of precipitation and stream flow in areas where the aquifer is exposed at the land surface. Discharge occurs mostly from well pumping and leakage through overlying formations.

3.6.11.1.3 Water Quality

Teller Reservoir, the largest downrange water body, has been listed as an impaired water body on Colorado's CWA Section 303(d) list and is on Colorado's Monitoring and Evaluation List to be re-evaluated. The impairment is the result of a fish consumption advisory that has been imposed because of mercury-contaminated soils leading to biological accumulation of mercury in plants, and fish tissues (CDPHE 2016). The 303(d) list does not identify the source of mercury contamination.

3.6.11.1.4 Wetlands and Floodplains

Wetlands identified on Fort Carson are generally characterized as linear (e.g., streambeds) or small and isolated. Linear wetlands on Fort Carson occur along intermittent and perennial stream channels and tributaries, primarily of B-Ditch, Clover Ditch, Infantry, Rock, Little Fountain,

Turkey, Little Turkey, Red, Sand, and Wild Horse Creeks. The current estimate of wetlands on Fort Carson is approximately 750 acres. Isolated wetlands usually occur where a dam has been built for erosion control or for water storage. Most of these areas are 1–2 acres (0.4-0.8 ha) in size. The largest downrange wetland is on the upper reaches of Teller Reservoir, encompassing approximately 100 acres (40.5 ha). In addition to cattails, rushes and sedges, common wetland woody species are cottonwood and willow. Some wetlands have been invaded by tamarisk and Russian olive, woody noxious weeds of primary wetland management concern. Other invasive weeds of wetlands are Canada thistle and teasel. About six major springs occur on Fort Carson, and they have very small associated wetlands. They are Cottonwood, Mary Ellen, TA 17, Lytle, Turkey Creek at Orchard Canyon, and Pierce Gulch springs. There are also several wetland areas scattered throughout the area, typically in natural or stormwater runoff drainages and Cottonwood Spring in an area south of Butts AAF (BAAF) (Fort Carson GTA EIS, 2009).

3.6.11.2 Environmental Consequences

Surface Water

Impacts from Construction

The proposed construction of the M-SHORAD battalion facilities and previously planned barracks are in areas that are not near surface water resources. Construction would occur predominately on loams, silty clay loams, and gravelly loams which have medium erodibilities. If uncontrolled, erosion could cause sedimentation in streams to the east and south of the construction site. However, the Fort Carson Erosion and Sediment Control Program would reduce the effects of soil erosion and sedimentation to less than significant.

Impacts from Live Fire and Maneuver Training

Impacts to surface waters from live-fire training are fully addressed in Section 3.1.10.2.1.

Impacts from Increase in the Number of Soldiers

Impacts to surface waters from the increased soldier population are fully addressed in Section 3.1.10.2.1.

Groundwater

Impacts to groundwater as a result of the Proposed Action are fully addressed in Section 3.1.10.2.2.

Water Quality

The impacts to water quality as a result of the Proposed Action are addressed in Section 3.1.10.2.3.

Wetlands and Floodplains

Impacts from Construction

No construction would occur within or near wetlands or floodplains due to the Proposed Action therefore there would be no impact.

Impacts from Live Fire Training and Maneuver Training

Wetlands and floodplains exist in small disbursed areas where live-fire and maneuver training occurs. Impacts to wetlands and floodplains from live-fire training are fully addressed in Section 3.1.10.2.4.

Impacts from Increase in the Number of Soldiers

Impacts to wetlands and floodplains from the increased soldier population are fully addressed in Section 3.1.10.2.4.

3.6.11.3 Cumulative Effects

Fielding of the seven new systems is expected to have less than significant effects to all water resources because these new systems would be fielded to existing units with no additional facility, live-fire range, or maneuver area requirements are anticipated. Only a nominal increase in population and the intensity of training area use is anticipated.

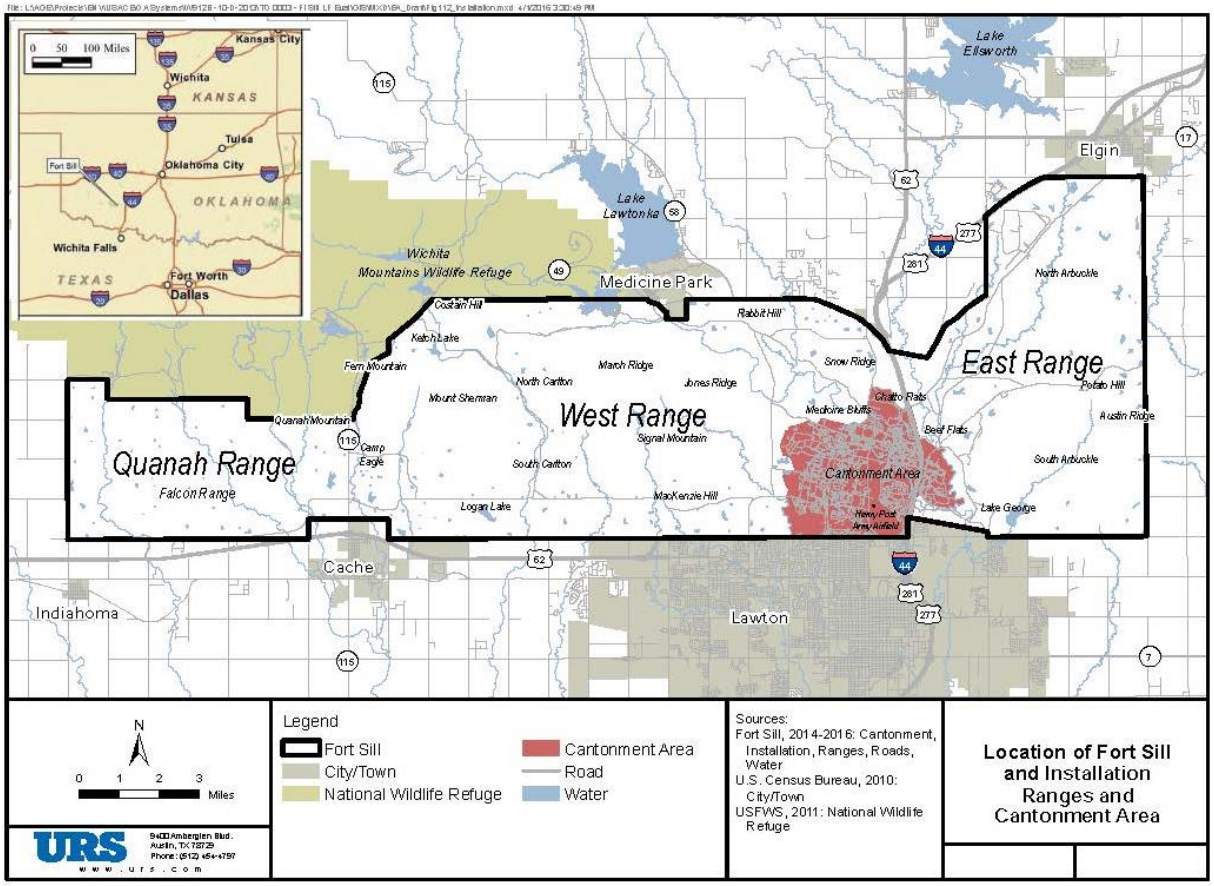
Fort Carson plans to construct two projects adjacent to the M-SHORAD battalion complex to the east along Wilderness Road. The furthest east project is a future medical training complex. It is planned to be constructed adjacent to a perennial stream that drains into a wetland area east of Butts Road. Fort Carson has recognized the greater potential for erosion on the installation and has implemented an Erosion and Sediment Control Program, which outlines techniques to minimize and mitigate the effects of soil erosion and sedimentation at the installation. The measures employed by Fort Carson would control soil erosion resulting from construction activities; therefore, impacts to water resources are expected to be localized and less than significant.

3.7 FORT SILL, OKLAHOMA

3.7.1 Background

Fort Sill encompasses approximately 93,679 acres and is located in Comanche County, Oklahoma. Fort Sill is approximately 90 miles southwest of Oklahoma City, Oklahoma, and approximately 50 miles north of Wichita Falls, Texas, on I-44 (Figure 3.7-1). The town of Indiahoma and the cities of Cache and Lawton are located on the southern border of Fort Sill, and Elgin and Medicine Park are located on the northern border. The Wichita Mountains National Wildlife Refuge is located along the northwestern border of Fort Sill. Oklahoma City is about 90 miles northeast. Altus AFB is 50 miles west in Altus, Oklahoma.

Figure 3.7-1. Location of Fort Sill, Oklahoma



3.7.2 Air Quality

3.7.2.1 Affected Environment

Comanche County is the ROI for the air quality analysis for Fort Sill.

The National Emissions Inventory data for the ROI in 2017 is presented in Table 3-39.

Table 3-~~38~~39. 2017 Criteria Pollutant Emissions Inventory for Comanche County, Oklahoma[124]

Criteria Pollutants	tpy
CO	22,224
NO_x	5,093
PM_{10}	17,355
$PM_{2.5}$	2,841
SO_2	107
VOCs	16,520

CO= carbon monoxide NO_x = nitrogen oxides PM = particulate matter-total
PM_{10} = PM less than 10 microns in diameter $PM_{2.5}$ = PM less than 2.5 microns in diameter
SO_2 = sulfur dioxide tpy = tons per year VOC = volatile organic compounds

[124] EPA 2017b

According to the EPA, Comanche County is in attainment or unclassifiable for all criteria pollutants.[125]

3.7.2.2 Environmental Consequences

Air quality at Fort Sill is in attainment for all criteria pollutants. While it is noted in Section 3.1.1.2 that dust will contribute to the emissions of PM_{10} and $PM_{2.5}$ at Fort Sill, the contribution will be very small. Fort Sill is only receiving a small subset of M-SHORAD vehicles, anticipated to be less than 10. Therefore, the dust contribution to air quality will be negligible and is not estimated. The impacts are as described in Section 3.1.1.2. Air quality impacts from the Proposed Action are expected to be less than significant because only a small subset of M-SHORAD battalion vehicles would be stationed at Fort Sill to provide training opportunities for battalion soldiers.

3.7.2.3 Cumulative Effects

It is anticipated that adding 13 systems in addition to the Proposed Action at Fort Sill would only cause minimal increases in the emission of pollutants. There would not be a significant amount of maneuver training for any of these systems at Fort Sill. The maneuver training is the primary generator of emissions from these systems. In addition, there would only be a small subset of the system vehicles stationed at Fort Sill to provide soldier training.

3.7.3 Airspace

3.7.3.1 Affected Environment

The ROI for airspace is the SUA areas above and nearby the installation that is controlled by Fort Sill. The airspace is defined on aeronautical charts and may be exclusive, limiting non-participating (e.g., commercial and general aviation) users or it may simply be advisory, indicating to non-participating users of the airspace that military operations are occurring in certain areas, requiring an extra measure of vigilance.

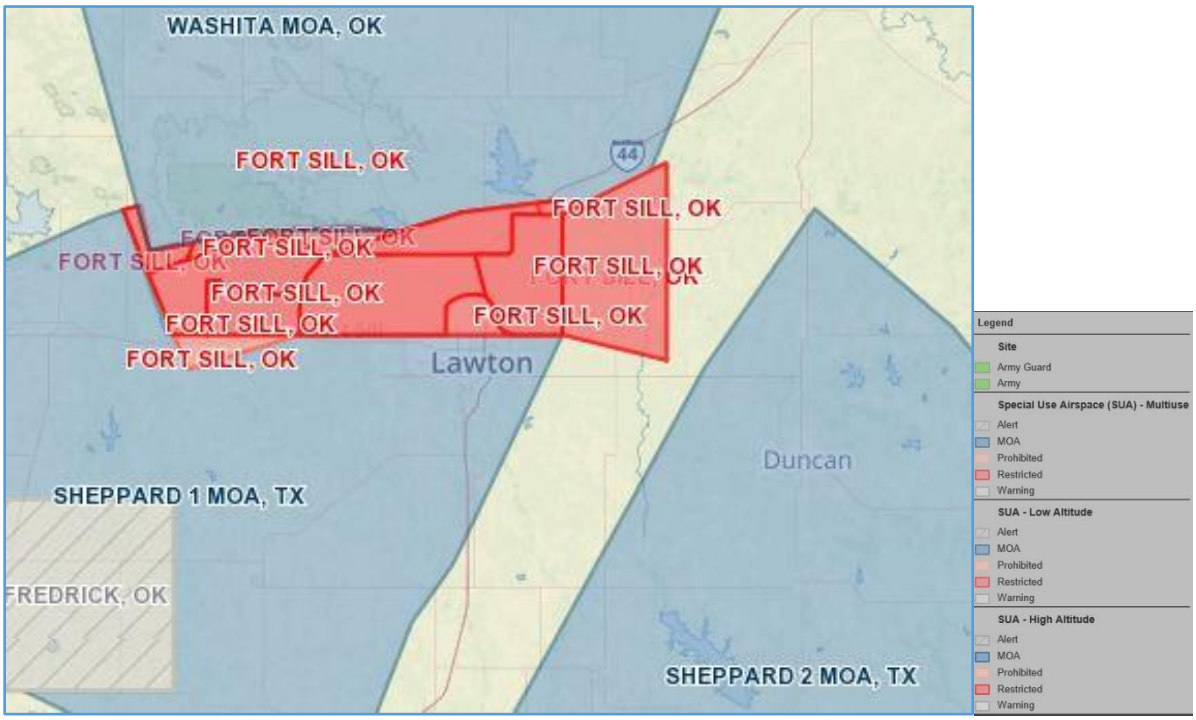
The SUA is a complex set of restricted areas for exclusive use and MOAs that are advisory. The SUA is designed to ensure the segregation of incompatible, non-participating aircraft from potentially hazardous operations occurring either in flight (e.g., munitions releases, UAS operations) or on the ground (e.g., artillery ranges, testing activities). A MOA does not provide the exclusive use required to support M-SHORAD range activities and will not be addressed in this document. Fort Sill restricted air space reaches a maximum altitude of 60,000 feet and an approximate area of 1,297.58 km^2 (Figure 3.7-2).

The major airspace units are subdivided vertically and horizontally, enabling airspace managers and schedulers to activate particular blocks of airspace that are sized appropriately to the activities occurring within them. A wide variety of activities occur within the SUA; however, for the SUA managed by Fort Sill, the principal uses and purposes of the SUA supporting the M-SHORAD are:

[125] https://www3.epa.gov/airquality/greenbook/ancl.html

- To protect non-participating aircraft from range activities occurring on the ground.
- To promote realistic training, allowing scenarios to unfold without training distracters such as suspensions required when civilian aircraft penetrate the restricted areas.

Figure 3.7-2. SUA for Fort Sill[126]



3.7.3.2 Environmental Consequences

A full M-SHORAD battalion would not be fielded at Fort Sill. Fort Sill would provide training to soldiers slated for the M-SHORAD battalions throughout the Army. M-SHORAD training at Fort Sill would not need the same Airspace requirements as other installations. Therefore, environmental effects to Airspace are expected to be less than significant.

3.7.3.3 Cumulative Effects

There could be a small increase in Airspace use due to adding 13 new systems at Fort Sill. Any required increases in use can be accommodated within the current Airspace available to Fort Sill. Therefore, cumulative effects to Airspace are expected to be less than significant.

3.7.4 Biological Resources

3.7.4.1 Affected Environment

3.7.4.1.1 Flora[127]

Fort Sill is located within an ecological transition area in which tall-grass prairie merges with short grass prairie and soil variation has created diverse plant communities. More than 70 percent of the

[126] DISDI Atlas. 2020. https://rsgisias.crrel.usace.army.mil/disdi_atlas/ Accessed on April 2, 2020.
[127] Source: Fort Sill INRMP 2014.

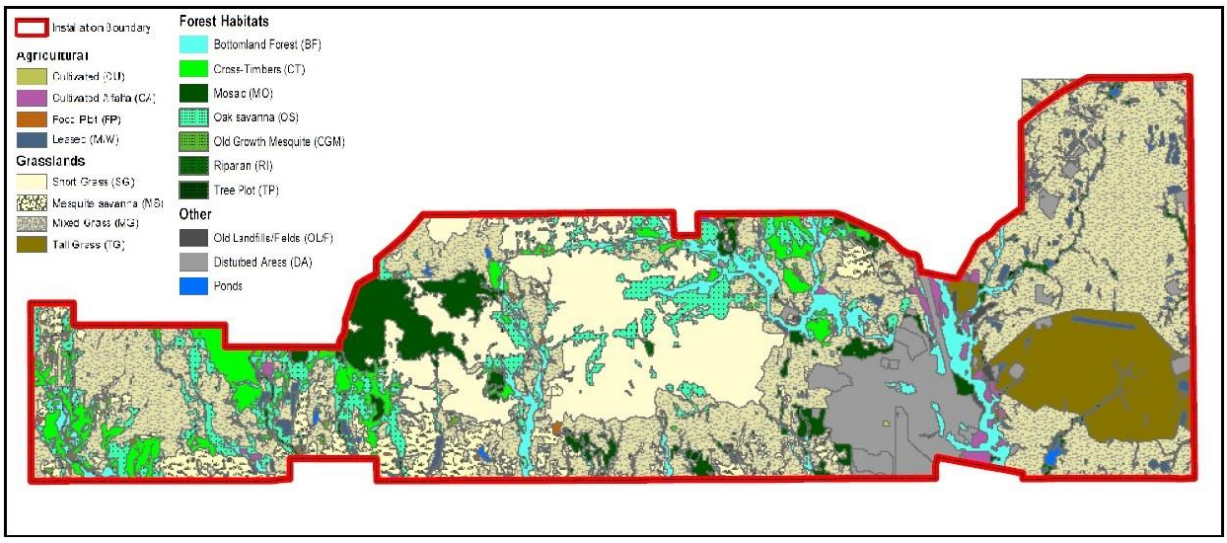
installation is comprised of grassland communities, while a mix of dense woodland, riparian areas, oak savannah, and agricultural lease lands constitute the remaining areas (Figure 3.7-3).

Dense woodlands are found along streams and on sandy, gravelly, and some stony upland areas. Principal trees along streams are elm, pecan, hackberry, and red (*Quercus shumardii*), blackjack (*Q. marilandica*), bur (*Q. macrocarpa*), post (*Q. stellata*), and white oak (*Q. alba*). The most common trees on upland sites are blackjack, post, and white oaks. An understory of grasses, forbs, and woody shrubs occurs in most wooded sites. Mesquite trees are found on many hardland and slickspot soil or disturbed areas growing in association with blue and sideoats grama. Red cedar occurs on all soil types.

Former cropland areas have a wide variety of vegetation. Old fields in creek bottoms have dense stands of johnsongrass, annual brome grasses (*Bromus spp.*), or smaller amounts of native grasses. Old fields on uplands usually have annual grasses, such as three awn (*Aristida spp.*), gumweed (*Grindelia spp.*), and other invasive species.

Many upland areas with tall grass are well suited to hay production. Other areas with tall or mid-grasses are too rough or rocky for haying operations. Areas with short and mid-grasses, such as gramas, are not productive enough for commercial haying. Much of the unimproved area is suitable for livestock grazing, but severe interference with military training activities would occur. The wide variety of vegetation and topography make Fort Sill a desirable area for wildlife and associated recreational uses.

Figure 3.7-3. Fort Sill Vegetation Types



3.7.4.1.2 Fauna

Information on wildlife occurring at Fort Sill is provided in the INRMP (Fort Sill 2014). Fort Sill has a diversity of habitats that support a variety of fauna, including mammals, birds, fish, reptiles, and amphibians.

Mammals

The diversity of natural environments at Fort Sill provides suitable habitat for a variety of mammal species. Common mammal species include coyote (*Canis latrans*), armadillo (*Dasypus novemcinctus*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), gray fox (*Urocyon cinereoargenteus*), cottontail rabbit (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), beaver (*Castor canadensis*), deer mouse (*Peromyscus maniculatus*), and white-tailed deer (*Odocoileus virginianus*). Mountain lions (*Puma concolor*) have been observed on the installation. Bison inhabit the WMWR and have, on occasion, been found on Fort Sill Fort Sill 2014). Game species include white-tailed deer, elk (*Cervus canadensis*), raccoons, feral pigs (*Sus scrofa*), and coyotes. Bat species potentially occurring on Fort Sill include the silver-haired bat (*Lasionycteris noctivagans*), Mexican free-tailed bat (*Tadarida brasiliensis*), eastern red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*) (Fort Sill 2014).

Birds

The state of Oklahoma is within the Central Flyway migration corridor, which is utilized by more than 400 avian species. Fort Sill provides a suitable stopover or resident habitat for many of these species. Bird species commonly observed at Fort Sill include American crow (*Corvus brachyrhynchos*), black-capped vireo (*Vireo atricapillus)*, common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), turkey vulture (*Cathartes aura*), bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*), pheasants (*Phasianus colchicus*), and several species of swallows (*Hirundo spp.*). Avian game species on the installation include bobwhite quail, mourning dove, pheasants, and waterfowl species such as mallard, teal, and Canada and snow geese. Several natural areas providing habitat and refuge for birds, as well as many other wildlife species, have been established on the installation (Fort Sill 2014).

Fort Sill is within the Oaks and Prairies Bird Conservation Region (19), which includes 19 species: little blue heron, swallow-tailed kite, bald eagle, peregrine falcon, black rail, upland sandpiper, long-billed curlew, Hudsonian godwit, buff-breasted sandpiper, red-headed woodpecker, scissor-tailed flycatcher, Sprague's pipit, Smith's longspur, Bell’s vireo, loggerhead shrike, Swainson’s warbler, orchard oriole, and Harris’s sparrow (USFWS 2008; Fort Sill 2014).

Fish

Aquatic habitat within Fort Sill includes several creeks and associated tributaries and ponds. Common fish species that could inhabit these waters include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), green sunfish (*L. cyanellus*), channel catfish (*Ictalurus punctatus*), and others (Fort Sill 2014).

Reptiles and Amphibians

A herpetological survey documenting species observations for the installation was performed at Fort Sill in 1991. Forty-five different species were either collected or verified by sightings (Fort Sill 2014). Reptile species with the potential to occur within Fort Sill could include a wide

variety of turtles, lizards, and snakes. Amphibians, including salamanders, frogs, and toads, could also be present.

3.7.4.1.3 Protected Species

Fort Sill is located within the central mixed-grass prairie region. One plant species is under review for listing on the ESA—Hall's bulrush (*Schoenoplectiella hallii*).

In 2012 Hall's bulrush was confirmed along the edge of the western end of Lake Elmer Thomas (Hideaway). The few scattered plants were in an area noticeably disturbed by feral hogs. These plants are also abundant along the northern end of Engineer Lake and near Pottawatomi Twins pond as noted in the current INRMP (Fort Sill 2019a). Currently the Hall's bulrush can be found along all edges of Lake Elmer Thomas and Engineer, Pottawatomi Twins, and Zani ponds. The Hall's bulrush seed floats and gets washed around with wind and disturbance, any bank on impoundment that has appropriate conditions can and will have plants grow. There may be other populations on post that have not been documented due to lack of intensive surveying. As of May 2021 the Hall's Bulrush was determined to not warrant listing as a threatened or endangered species.[128]

3.7.4.2 Environmental Consequences

Impacts from Construction

Fort Sill is planning to construct a General Instruction Building to support M-SHORAD training. The facility would expand the existing Counter Rockets, Artillery, and Mortar instructional facility at the corner of Currie and Miner Roads. The location is expected to be approximately 6.5 acres. Fort Sill is also planning to construct a barracks at the corner of Thomas Street and Bragg Road. The site is approximately 9 acres, but construction may take place on a smaller portion. Both locations are within previously disturbed areas of the main cantonment that do not support substantive flora or fauna communities and no protected species are nearby. Therefore, impacts to biological resources from construction are expected to be negligible.

Impacts from Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

M-SHORAD training at Fort Sill would be significantly smaller in scope than at other installations. Substantially less than a full battalion of soldiers would be stationed at Fort Sill in a student capacity to complete classroom and individual field training and not train as a full battalion. Soldiers would complete routine individual small arms training on existing ranges. M-SHORAD vehicle-mounted weapons system training would be provided in an individual or small group setting on existing ranges to familiarize students with the proper operation of the system. Only a few of the M-SHORAD vehicles would be fielded at Fort Sill. Therefore, training would not extend to war-fighting scenarios as it would at other installations hosting M-SHORAD. Maneuver

[128] *Federal Register* / Vol. 86, No. 89 / Tuesday, May 11, 2021 at https://www.govinfo.gov/content/pkg/FR-2021-05-11/pdf/2021-09748.pdf#page=1 accessed 28Jul21.

training would consist primarily of proper, safe driving and operation of the vehicle and not delve deeply into battlefield tactics. Impacts are expected to be less than significant because live-fire and maneuver training would be substantially smaller in scope and completed on existing ranges and there would be substantially fewer soldiers on the installation at any given time.

3.7.4.3 Cumulative Effects

It is anticipated that adding 13 systems in addition to the Proposed Action at Fort Sill could result in stationing a small subset of the system vehicles for training and temporary stationing of soldiers to be trained. Construction of new facilities to support system training could occur but would most likely be in previously disturbed areas of the main cantonment. Implementation of the planned live-fire and maneuver training, and the number of soldiers for these additional systems at Fort Sill is expected to be similar to that discussed in Section 3.7.4.2 above for the M-SHORAD. Impacts are expected to be less than significant because construction would be in previously disturbed areas and there would be substantially fewer soldiers on the installation at any given time. Live-fire and maneuver training would be substantially smaller in scope and completed on existing ranges scheduled through the SRM or ReARMM to allow sufficient scheduling flexibility to reduce the intensity of training and avoid significant impacts.

3.7.5 Cultural Resources

3.7.5.1 Affected Environment

3.7.5.1.1 Cultural Resources Present

As of October 2020, all standing properties and structures constructed before 1975, and nearly 200 archaeological sites, have been evaluated for NRHP eligibility. (Fort Sill 2018 and pers. Comm. 2020[129]).

Five properties on Fort Sill are currently listed in the NRHP, and more than 420 NRHP eligible properties, sites, and resources—65 archeological sites; 18 individual architectural/historic buildings, structures, and sites; and 10 historic districts containing approximately 340 standing resources[130]—are located on the installation. No NRHP-eligible properties are known to occur in the APEs (Ft. Sill pers. comm. 2020)[131].

Undiscovered resources would be handled using procedures described in the Fort Sill ICRMP and could include stopping training and mechanized excavation, notification of appropriate parties, and protection of materials.

[129] Pers. Comm. Oct 2020. Selena Bagnara Milan. Ft. Sill Cultural Resources.
[130] The number of contributing members to the districts is subject to review/change due to the new Inter-War Era Historic Housing (1919-1940) Program Comment adopted by the ACHP on September 4, 2020.
[131] Fort Sill. 2020. Pers. Comm with Ms. Selena Bagnara Milan, Historical Architect, via email on Nov 23, 2020.

3.7.5.1.2 Consultation and Coordination with Tribal Governments

Fort Sill consults with Native American tribes to provide access to sacred sites (including plants, animals, and landscapes considered sacred) located on Fort Sill.

3.7.5.2 Environmental Consequences

Fort Sill would consult with Oklahoma SHPO, the Oklahoma Archaeological Survey, the Fort Sill-affiliated Native American tribes, and the public per Section 106 of the National Historic Preservation Act. Consultations with the nine Native American tribes would provide access to sacred sites (including cemeteries, plants, animals, and landscapes considered sacred) located on Fort Sill. Fort Sill would use one or more of the seven program alternatives for Section 106 consultation available in its cultural resources Office toolbox. Implementation of each program alternative would be monitored to ensure that the particular terms of the program alternative are being implemented accurately and in conjunction with other applicable program alternatives or Section 106 considerations.

Impacts from Construction

Construction would be as described in Section 3.7.4.2. Both locations are within previously disturbed areas of the main cantonment in an area that does not contain cultural resources. A survey will be conducted before ground-disturbing activities if either location has not been previously surveyed for cultural resources. Therefore, impacts to cultural resources from construction are expected to be negligible.

Impacts from Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Less than significant effects to cultural resources are anticipated for the same reasons described in Section 3.7.4.2.

3.7.5.3 Cumulative Effects

It is anticipated that adding 13 systems in addition to the Proposed Action at Fort Sill could result in stationing a small subset of the system vehicles for training and temporary stationing of soldiers to be trained. Construction of new facilities to support system training could occur but would most likely be in previously disturbed areas of the main cantonment. Implementation of the planned live-fire and maneuver training and the number of soldiers for these additional systems at Fort Sill is expected to be similar to that discussed in Section 3.7.4.2 above for the M-SHORAD. Impacts are expected to be less than significant for the same reasons described in Section 3.8.4.3.

3.7.6 Soils

3.7.6.1 Affected Environment

Surface soils and rocks on Fort Sill are varied, including igneous rocks (Cambrian); limestones, dolomites, shales, sandstones, and conglomerates (Ordovician and Permian); and unconsolidated alluvium (Quaternary).

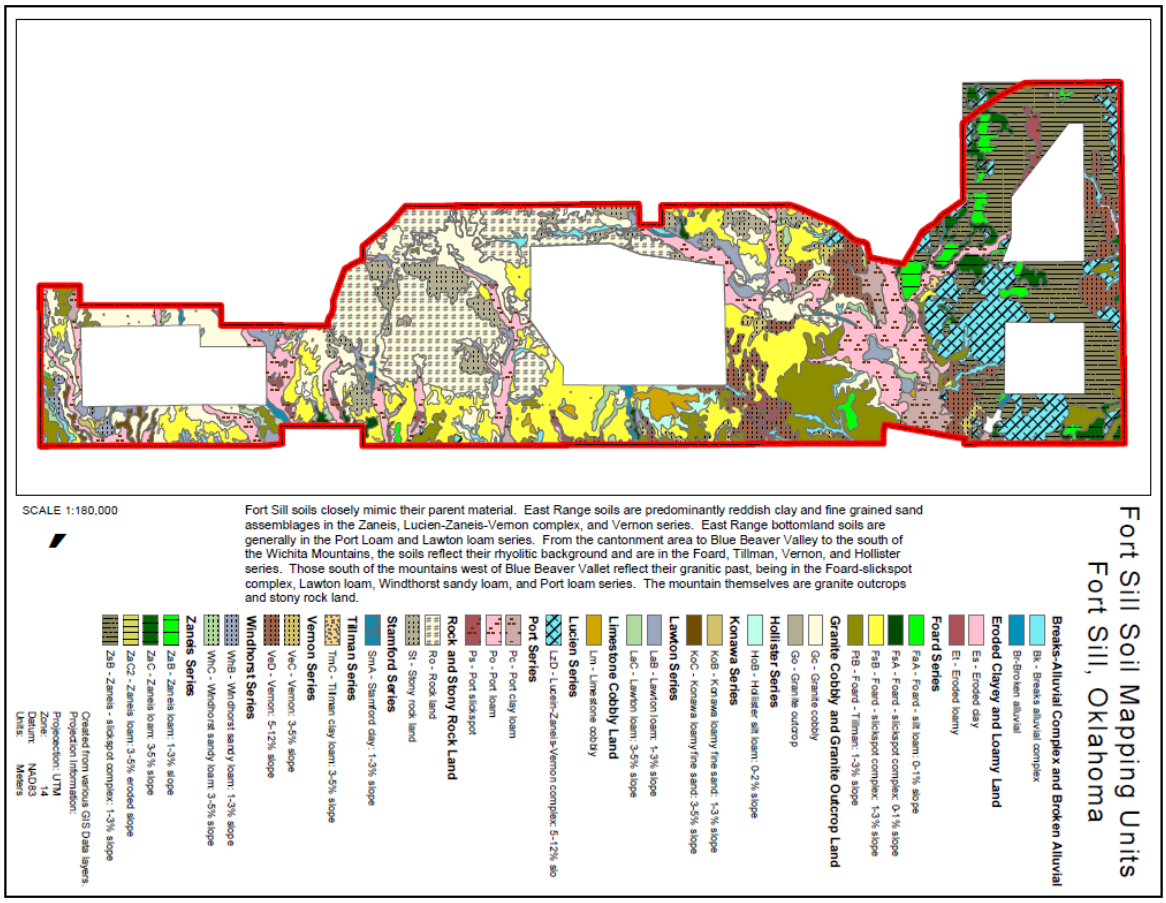
Soils of Fort Sill (Figure 3.7-4) are located along the major land resource area (MLRA) boundaries of the Wichita Mountains, Central Rolling Red Plains, and Central Rolling Red Prairies. Comanche County is drained mostly by tributaries of the Red River. Small areas are drained by the Washita River and its tributaries. The topography ranges from the nearly level floodplains along the rivers to steep uplands associated with the Wichita Mountains.

Although no farmlands in Comanche County are classified as “unique,” nine soil series in the county are classified as prime farmland soils. Four of the nine series occur on Fort Sill, but only two cover large areas of land on Fort Sill. Approximately 25,066 acres (38 percent) of Fort Sill are classified as prime farmland soils.

Soil disturbance that is not properly managed results in erosion. Fort Sill recognizes the importance of keeping its soils in place to support plant growth because a variety of vegetation communities are important for training exercises. The transport of sediment during erosion has been identified as the number one pollutant of waterways on Fort Sill. Sedimentation has also led to indirect impacts on other resources. For these reasons, Fort Sill has adopted an aggressive soil erosion management policy.

To comprehensively manage and protect soil resources on Fort Sill, the INRMP (Fort Sill 2014) contains soil management goals and objectives designed to protect soil resources and prevent soil destabilization and erosion. Impacts on soil resources are reduced through the implementation of the existing soil resource environmental stewardship guidelines contained within the INRMP. Frequent land evaluations determine which remediation measure is needed and if installation activities must be rotated to other areas while designated land areas recover (Fort Sill 2019b).

Figure 3.7-4. Fort Sill Soil Mapping Units



3.7.6.2 Environmental Consequences

Impacts from Construction

Construction would be as described in Section. 3.7.4.2. Both locations are within previously disturbed areas of the main cantonment. Impacts to soils from construction are expected to be less than significant and are adequately addressed in Section 3.1.5.2.

Impacts from Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts to soils from live-fire training, maneuver training, and the increase in soldier population are expected to be less than significant and are adequately addressed in Section 3.1.5.2.

3.7.6.3 Cumulative Effects

It is anticipated that adding 13 systems in addition to the Proposed Action at Fort Sill could result in stationing a small subset of the system vehicles for training and temporary stationing of soldiers to be trained. Construction of new facilities to support system training could occur but would most likely be in previously disturbed areas of the main cantonment. Impacts could increase slightly in intensity but are expected to remain less than significant for the same reasons described in Section 3.8.6.2.

3.7.7 Land Use and Compatibility

3.7.7.1 Affected Environment

Land use at Fort Sill is primarily designated for military training purposes. The installation is divided into the cantonment area, TAs, live-fire training ranges, artillery firing points, impact areas, and areas unsuitable for training.

3.7.7.1.1 Cantonment

The cantonment area contains the administrative areas, medical facilities, the Henry Post AAF, a cemetery, family housing, barracks, and other soldier housing. The cantonment area and areas unsuitable for training (landfill, recreation area, cultural sites, ammunition supply point, etc.) comprise 8,312 acres.

3.7.7.1.2 Range Complex

The TAs comprise 45,266 acres (38,735 acres of which are classified as heavy and 6,531 acres of which are classified as light) and provide land for dismounted maneuver training and mounted heavy and light vehicle maneuver training. The four live-fire training range impact areas (dudded and non-dudded) and other non-maneuver-areas comprise 39,991 acres.

Fort Sill is divided into three ranges: East, West, and Quanah. The ranges on Fort Sill are shown on Figure 3.7-5. The East Range is used primarily for field artillery and small arms weapon training. The West Range is used for artillery, live aircraft bombing, and aerial gunnery training. The Falcon Range in the Quanah Range is used primarily by the Air Force for air-to-surface munitions training (inert and training bombs, rockets, strafe, and laser) and maneuvers (Fort Sill 2005).

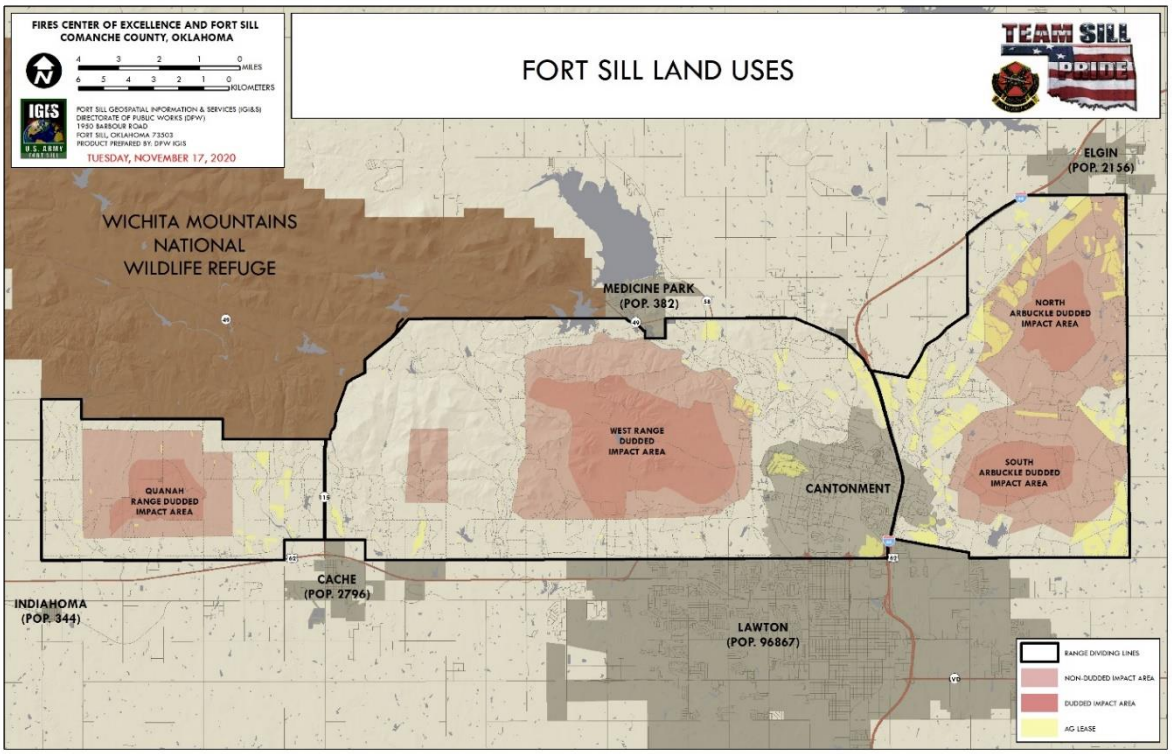
Due to the delisting of the black-capped vireo in 2018, the installation no longer imposes training restrictions for the species. However, in accordance with a letter from the Army to the USFWS (Department of the Army 2017) the installation will continue to adaptively manage the species populations within its boundaries.

Recreational activities (e.g., hunting and fishing) are an allowed use at Fort Sill. The installation has been divided into hunter use compartments and areas. These divisions are based on habitat type and are available for hunting depending on the impact areas and TAs and the military training schedule. Those who want to hunt or fish on Fort Sill are required to take the Fort Sill Sportsman Safety Class (Fort Sill 2014). The responsibilities, procedures, and rules for hunting and fishing are provided in Fort Sill Regulation 200-1, *Recreational Use, Management, Harvest, and Protection of Natural Resources* (Fort Sill 2015b).

Additional land use within Fort Sill and the West and East Range areas includes approximately 5,000 acres of leased agricultural land (Fort Sill 2014). These leases include cultivated fields, wildlife food plots, and mowed and hayed fields. These lands are within the TAs and the non-dudded impact buffer zone and are considered safe for agricultural purposes. All agricultural areas have been cleared of UXO, and the chance of a dud-related accident is remote (Fort Sill 2014). Fort Sill agricultural lease crop fields are off-limits to vehicle training (Fort Sill 2015c).

The agricultural lease areas pose training and operational constraints in the West and East Range areas. These constraints are shown in Figure 3.7-5. The surface danger zones (SDZs) associated with live-fire training cannot be utilized for recreational purposes while active.

Figure 3.7-5. Fort Sill Land Use and Potential Constraints



3.7.7.2 Environmental Consequences

Impacts from Construction

Construction would be as described in Section. 3.7.4.2. Both locations are within the main cantonment area. No impacts are expected to land use and compatibility as the land use designation would not change, and the planned uses are compatible with the surrounding properties.

Impacts from Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts are expected to be negligible since the current land use designations would not change and are adequately addressed in Section 3.1.6.2.

3.7.7.3 Cumulative Effects

It is anticipated that adding 13 systems in addition to the Proposed Action at Fort Sill could result in stationing a small subset of the system vehicles for training and temporary stationing of soldiers to be trained. Construction of new facilities to support system training could occur but would most likely be in previously disturbed areas of the main cantonment with the same land use designation. No anticipated changes are resulting from live-fire and maneuver training or the increase in soldier population.

3.7.8 Socioeconomics

3.7.8.1 Affected Environment

3.7.8.1.1 Population

The estimated population for Comanche County in 2019 is 120,749, representing a 5.5 percent growth since 2010. In comparison, the state of Oklahoma experienced a population decrease of 2.7 percent during the same period.[132]

Fort Sill has a total employed population of 24,933 for FY 2020, including 18,712 total military and 6,221 total civilian personnel (ASIP 2020). Fort Sill is a major training installation. Of the total military population, 10,206 are temporary duty students and trainees (ASIP 2020).

3.7.8.1.2 Race/Origin Demographics

Minorities comprise approximately 41.1 percent of Comanche County, the highest being Black or African American, followed by Hispanic or Latinos. Approximately 30.5 percent of the Oklahoma population is made up of minorities, with the highest populations being the Hispanic/Latino population, followed by Native Americans (Table 3-40).

[132] Census. 2019. QuickFacts: https://www.census.gov/quickfacts/fact/table/OK,comanchecountyoklahoma/PST045219 Accessed on April 3, 2020.

Table 3-3940. Demographic Comparison between the ROI and the State[133]

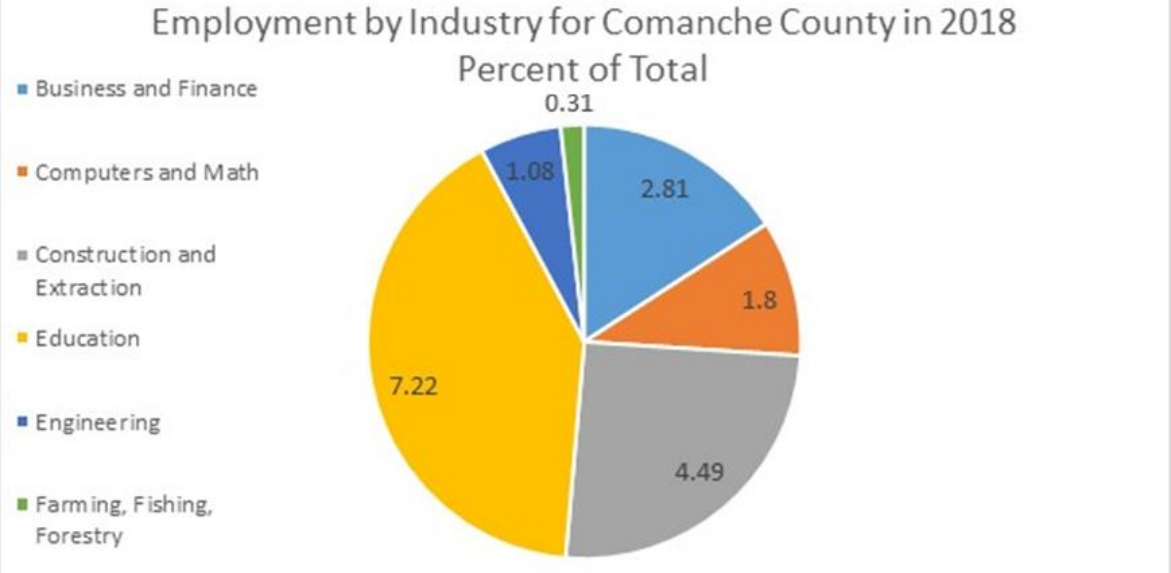
Race/ Origin	Percent of the Population In Comanche County	Percent of the Population In Oklahoma
White only	65.5	74.2
Black or African American only	17.6	7.8
Native American and Alaskan only	6.7	9.3
Asian only	2.7	2.3
Native Hawaiian or Other Pacific Islander	0.7	0.2
Hispanic or Latino	13.4	10.9
Two or more races	6.8	6.2

*Hispanic or Latino is not a race but an origin. To get the total percent for race, subtract this origin.

3.7.8.1.3 Income and Employment

The per capita income for Comanche County in 2018 was $26,149 and that of the state of Oklahoma was slightly higher at $27,432.[134] The largest employment industry in the ROI is education, followed by construction and extraction and business and finance (Figure 3.7-6). The total employed workforce on Fort Sill in FY 2020 is 24,933 (ASIP 2020)

Figure 3.7-6. Employment by Industry for ROI in 2018[135]



[133] Census. 2019. QuickFacts: https://www.census.gov/quickfacts/fact/table/OK,comanchecountyoklahoma/PST045219 Accessed on April 3, 2020.
[134] Census. 2019. QuickFacts: https://www.census.gov/quickfacts/fact/table/OK,comanchecountyoklahoma/PST045219 Accessed on April 3, 2020.
[135] Open Data Network. https://www.opendatanetwork.com/entity/0500000US40031/Comanche_County_OK/jobs.occupations.employed?occupation=Business%20and%20Finance&year=2018 Accessed on April 3, 2020.

The unemployment rate for Comanche County in 2019 was 3.5 percent,[136] compared to 3.3 percent for the state of Oklahoma.[137]

3.7.8.2 Environmental Consequences

In support of M-SHORAD training at Fort Sill, a full battalion would not be fielded. It is expected that only 260 soldiers per year would be stationed in a temporary duty status for training. These soldiers are not expected to be accompanied by family members and would be housed in barracks spaces on the installation. The Proposed Action represents a negligible change in the population of the ROI and overall socioeconomic impact.

3.7.8.3 Cumulative Effects

Fielding of the 13 new systems is expected to add less than 275 additional soldiers to Fort Sill. The cumulative effects of adding approximately 535 soldiers are expected to be less than significant because it represents a population increase of less than 0.2 percent within the ROI. It is assumed that spouses and children would not accompany soldiers coming to Fort Sill and therefore are not included in the socioeconomics effects.

3.7.9 Traffic and Transportation

3.7.9.1 Affected Environment

Federal and State Highways Providing Access to Fort Sill

I-44 provides regional north-south site access. I-44 runs through the eastern portion of Fort Sill, connects Fort Sill with Lawton and Wichita Falls to the south, and connects with Chickasha and Oklahoma City to the north. The State of Oklahoma has performed traffic volume counts for I-44. The 2010 AADT on I-44 was 28,200 vpd (total for both directions) just north of Fort Sill (Fort Sill 2013c).

U.S. Route 62 runs east-west on the south side of Fort Sill, connects to the west with SH 115, and to the east joins I-44 as a concurrent route for 8 miles through the Fort Sill and then splits on direction. The 2010 AADT on U.S. Route 62 was 22,500 vpd (total for both directions) at 0.5 mile east of Fort Sill Blvd (Fort Sill 2013c).

SH 49 is classified as a multi-lane highway with two travel lanes in each direction north of Fort Sill. SH 49 runs east-west, connects to the west with SH 115 and transverse the Wichita Mountains Wildlife Refuge, and connects to the east with I-44 southeast of Medicine Park. The 2010 AADT on SH 49 was 5,300 vpd (total for both directions) at 1.5 miles west of I-44 (Fort Sill 2013c).

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[136] Federal Reserve Bank of St. Louis. 2019. Economic Research: https://fred.stlouisfed.org/series/TXCOMA3URN Accessed on April 3, 2020.

[137] Bureau of Labor Statistics. 2019. https://www.google.com/publicdata/explore?ds=z1ebjpgk2654c1_&met_y=unemployment_rate&fdim_y=seasonality:S&idim=state:ST4000000000000:ST4800000000000:ST3900000000000&hl=en&dl=en Accessed on April 3, 2020.

Internal Roadways

Sheridan Road and Fort Sill Boulevard are the primary internal roads providing access to the installation. To the south of Fort Sill, Sheridan Road is a four-lane road that runs north-south and passes U.S. Route 62, turns a 90-degree angle, and intersects with I-44 on the east side of the Fort Sill cantonment area. Fort Sill Boulevard is a four-lane north-south road that intersects to the south with U.S. Route 62 and to the north with King Road within the installation (Fort Sill 2013c).

Access Control Points

Seven main ACPs provide access to Fort Sill. The southern gates at Fort Sill Boulevard and Sheridan Road are the most heavily used during the morning peak hour, followed by Key Gate West and 52nd Street gate (Fort Sill 2013c).

3.7.9.2 Environmental Consequences

In support of M-SHORAD training at Fort Sill, a full battalion would not be fielded. It is expected that only 260 soldiers per year would be stationed in a temporary duty status for training representing approximately a 1.0 percent increase. Spouses and children are not expected to accompany soldiers in a temporary duty status leading to a ROI population increase of approximately 0.2 percent. Therefore, the impacts to traffic and transportation within the ROI and the installation are expected to be negligible.

3.7.9.3 Cumulative Effects

Fielding of the 13 new systems is expected to add approximately 275 additional soldiers to Fort Sill. The cumulative effects of adding approximately 535 soldiers at Fort Sill are expected to have less than significant effects to traffic and transportation. It is assumed that spouses and children would not accompany soldiers coming to Fort Sill and therefore are not included in the effects on traffic and transportation.

3.7.10 Facilities

3.7.10.1 Affected Environment

The family housing on Fort Sill is under the management of the RCI partner Corvias Property Management. Fort Sill family housing is comprised of 14 distinct neighborhoods. It serves the on-base housing community of active-duty Army families assigned to Fort Sill.[138] The vast majority of soldiers associated with M-SHORAD stationing will be attending schools and training for the M-SHORAD system and will most likely be on temporary duty and not accompanied by family members.

The garrison area or cantonment, also addressed briefly in Land Use and Compatibility Section, contains the heaviest concentration of facilities and mission support activities on Fort Sill.

[138] https://sill.corviaspm.com/ accessed 2 June 2020.

Support services in the cantonment include administration, maintenance, service, storage and supply buildings, housing, medical, and community facilities.

Army facilities are built to meet the standards of the uniform facilities criteria using standard designs of MILCON requirements, standardization, and integration or similar documents. Exceptions to the standard are available and if granted for a facility, it would be considered adequate.

3.7.10.2 Environmental Consequences

The excess or deficit of facilities available to support the M-SHORAD battalion at Fort Sill was assessed based on the Army RPLANS records. The results are shown in Table 3-41 with deficits shown in parentheses.

Table 3-~~40~~41. M-SHORAD Expected Facility Requirements FY 2021 Data

Facility name	Number required	Total sq ft	Total acres	Ft Sill
Dining Facility	1	41,116	0.9	6,284
Barracks Trainee	1	54,730	1.3	(263,334)
General Instruction Building	1	86,200	2.0	N/A

Construction would be as described in Section. 3.7.4.2. Both locations are within previously disturbed areas of the main cantonment. No new live-fire ranges or maneuver areas are required. The growth in the soldier population at Fort Sill would be substantially less than the other installations. M-SHORAD soldiers would be stationed at Fort Sill for the short term, in most cases less than one year, for training. The impacts to facilities are expected to be less than significant and are addressed in Section 3.1.9.2.

3.7.10.3 Cumulative Effects

It is anticipated that adding 13 systems in addition to the Proposed Action at Fort Sill could result in stationing a small subset of the system vehicles for training and temporary stationing of soldiers to be trained. Construction of new facilities to support system training could occur but would most likely be in previously disturbed areas of the main cantonment. Implementation of the planned live-fire and maneuver training and the number of soldiers for these additional systems at Fort Sill is expected to be similar to that discussed in Section 3.8.10.2 above for the M-SHORAD. Impacts are expected to be less than significant for the same reasons described in Section 3.8.10.2.

3.7.11 Water Resources

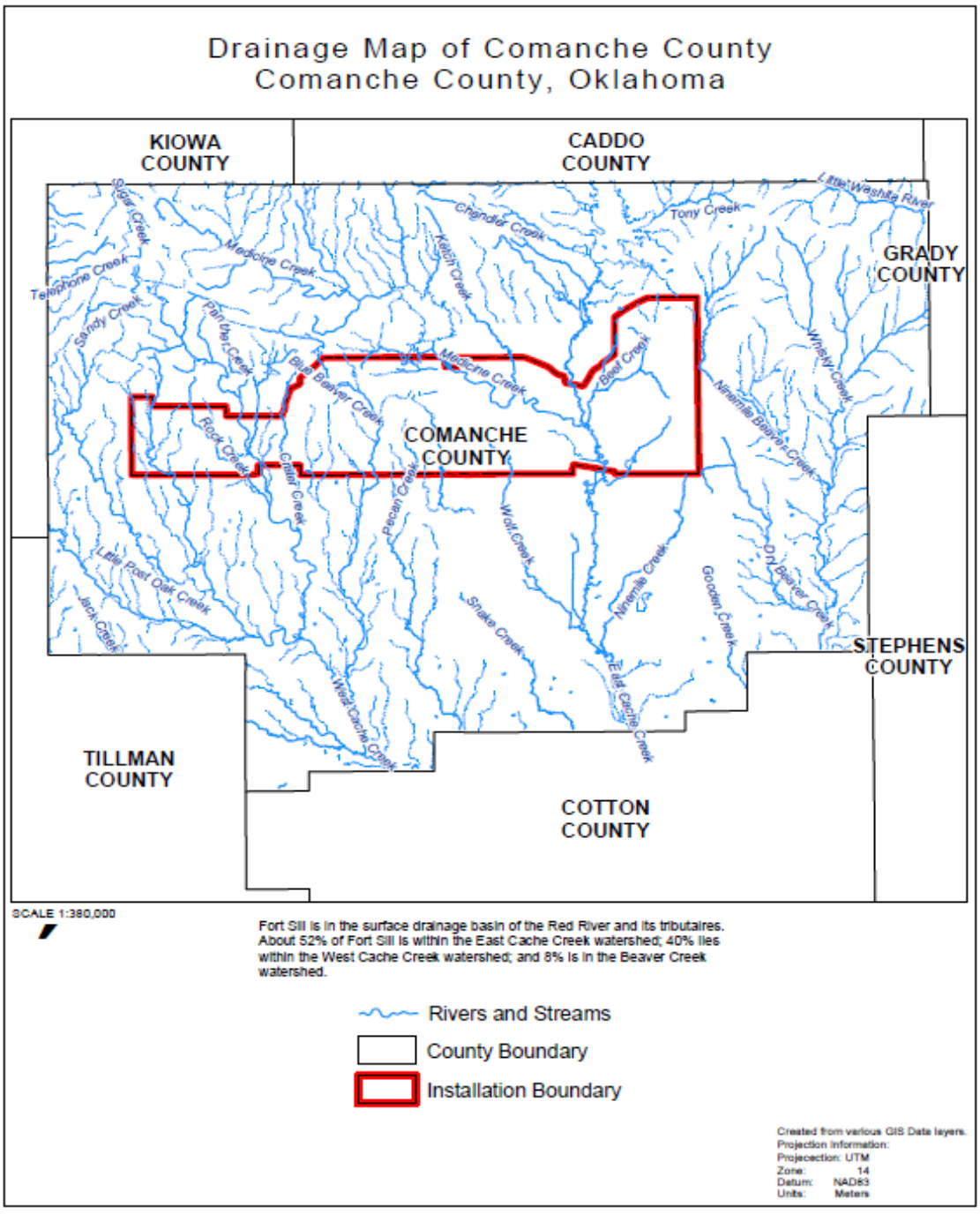
3.7.11.1 Affected Environment

3.7.11.1.1 Surface Water

Fort Sill is in the surface drainage basin of the Red River and its tributaries. The Cache Creek system, the primary tributary in the Lawton-Fort Sill area, drains from the north to south ending in the Red

River. Cache Creek has two main forks, East Cache and West Cache, which merge just before reaching the Red River. East Cache Creek is the main fork. On East Cache Creek and its primary tributary, Medicine Creek, two lakes (Lawtonka and Ellsworth) supply Fort Sill and Lawton with potable water. East Cache Creek is gauged near Walters, Oklahoma, at which point the drainage basin has an area of 675 square miles with an average annual flow of 133,200 acre-feet. Figure 3.7-7 shows the drainage pattern for Fort Sill and Comanche County.

Figure 3.7-7. Comanche County Drainage



Just east of Lawton and Fort Sill is the drainage basin of Beaver Creek, which supplies the Waurika Reservoir. This reservoir supplements the two aforementioned lakes to provide Lawton-Fort Sill and other communities with water. Portions of the East Range drain into Beaver Creek.

Beef Creek is another significant tributary to the East Cache Creek on Fort Sill. Blue Beaver, Rock, and Post Oak Creeks are significant Fort Sill tributaries to West Cache Creek. About 52 percent of Fort Sill is within the East Cache Creek watershed; 40 percent lies within the West Cache Creek watershed; 8 percent is in the Beaver Creek watershed.

Many small impoundments have been constructed on Fort Sill. There are 219 ponds and lakes ranging in size from less than one acre to the 333-acre Lake Elmer Thomas. Lake Elmer Thomas was drained in 1988 due to structural problems with the dam. A new dam was completed in 1993, and the lake was filled by 1996. Important lakes and ponds include Lake George, Ketch Lake, West Lake, Menard, Engineer, Logan, and Pottawatomi Twins. There are 142 ponds and lakes totaling 673 acres normally managed as fisheries (673 acres only includes the Army-owned portion of Lake Elmer Thomas). Other ponds are designated for wildlife use. All ponds are used for firefighting purposes.

3.7.11.1.2 Groundwater

Groundwater in the area around Fort Sill occurs in three aquifers: the Arbuckle Group (Cambrian and Ordovician), Post Oak Conglomerate (Permian and Cimarronian), and Alluvial (Quaternary). All are partially recharged from Fort Sill surface waters.

The Arbuckle Group aquifer is the largest source of groundwater in the immediate area of Lawton-Fort Sill, but it is generally poor quality. Several small communities in the area use this water source. This aquifer is characterized by limestone, dolomite, sandy dolomite, mudstone, and conglomerate, about 6,000-feet thick. It yields 90–600 gallons per minute to wells. Recharge is principally along the southern flank of the Wichita Mountains and through the overlying Post Oak conglomerate. Oklahoma has designated beneficial uses for the Arbuckle Group as irrigation, municipal and domestic water supply, industrial, and non-irrigation agricultural.

The Post Oak conglomerate consists of limestone conglomerate, about 40-feet thick near limestone outcrops. It generally yields only about 10 gallons per minute to wells. It is considered a minor aquifer.

The Alluvial aquifer is made up of sand, clay, and gravel along flood plains, and it is as much as 32-feet thick. Water yields vary from 5–500 gallons per minute. Recharge is by precipitation on flood plains and streambed infiltration. Most water produced is for domestic and stock use. It may occasionally exceed state drinking water primary or secondary standards.

3.7.11.1.3 Water Quality

The water quality of lakes and streams on Fort Sill is generally good. Total dissolved solids and hardness are generally lower in Comanche County than in surrounding counties. These waters

are generally of sufficient quality to support their designated uses. Oklahoma Water Quality Standards establish the following uses for West Cache, Blue Beaver, Post Oak, Crater, East Cache, Medicine, and Wolf Creeks:

- public and private water supply;
- fish and wildlife propagation, primary warm water fishery;
- agriculture;
- industrial and municipal process and cooling water;
- primary body contact recreation; and
- aesthetics.

Post Oak Creek is designated as one of Oklahoma's "High-Quality Waters." The Lake Elmer Thomas watershed is designated as a "Sensitive Public and Private Water Supply." Other surface waters on Fort Sill are designated for the following uses:

- agriculture,
- industrial and municipal process and cooling water,
- aesthetics,
- habitat limited fishery, and
- secondary body contact recreation.

The recent explosion of non-native feral hogs on Fort Sill has led to concerns regarding their impact on water quality. These hogs have been shown to contribute bacteria to water bodies and are known to carry *E. coli* strains that could infect humans and livestock. They also increase stream turbidity and decrease the health of watersheds and riparian communities (Peterson et al. 2012).

3.7.11.1.4 Wetlands and Floodplains

Wetlands on Fort Sill were inventoried through the evaluation of aerial photography from February 1983 and March 1984. In 1995, the USFWS verified this evaluation from 1995 aerial photography of the installation. This verification resulted in the identification of 1,174 acres of potential wetlands on Fort Sill (Fort Sill 2014). The 100-year floodplains have been mapped on Fort Sill for the following creeks and their tributaries: Medicine Creek, East and West Cache Creeks, Sitting Bear Creek, Post Oak Creek, and Blue Beaver Creek.

3.7.11.2 Environmental Consequences

Surface Water

Impacts from Construction

Fort Sill is planning to construct a General Instruction Building to support M-SHORAD training. The facility would be located at the corner of Currie and Miner Roads and extending west to Sheridan Road. The location is expected to be approximately 6.5 acres to include an organizational vehicle parking area, and most would be impervious surface potentially increasing

stormwater runoff. The nearest surface water body is an unnamed stream approximately 350 feet (107 meters) to the northwest and across Sheridan and Miner Roads. Fort Sill is also planning to construct a barracks at the corner of Thomas Street and Bragg Road. The site is approximately 9 acres but construction may take place on a smaller portion. The building and associated personal vehicle parking would be on an impervious surface and potentially increase stormwater runoff. The nearest surface water body is an unnamed stream at the northwest corner of the site. In addition, no new live-fire ranges or maneuver areas are required. Impacts to surface waters from construction are expected to be less than significant and are addressed in Section 3.1.10.2.1.

Impacts from Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Substantive surface waters on and near Fort Sill include Cache Creek, Beef Creek, Medicine Creek, Wolf Creek, Crater Creek, and Post Oak Creek. All of these waters eventually drain into the Red River. Impacts to surface waters from live-fire and maneuver training and the increase in soldier population are expected to be less than significant and are addressed in Section 3.1.10.2.1.

Groundwater

Impacts from Construction, Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts to groundwater are a minimal increase in impervious surface affecting the recharge rate and the 1 percent increase in soldier population minimally increasing groundwater consumption. Overall impacts to groundwater are expected to be less than significant and are further addressed in Section 3.1.10.2.2.

Water Quality

Impacts from Construction, Live Fire Training, Maneuver Training, and the Increase in the Number of Soldiers

Impacts to water quality are expected to be less than significant and are addressed in Section 3.1.10.2.3.

Wetlands and Floodplains

Impacts from Construction

The Proposed Action would not affect wetlands and floodplains in the cantonment area as no construction is planned near these features.

Impacts from Live Fire Training and Maneuver Training

In the live-fire ranges and maneuver areas, impacts from training would be a minor increase in the intensity of use that would not significantly change the current impacts.

Impacts from Increase in the Number of Soldiers

Impacts to wetlands and floodplains from the increased soldier population are fully addressed in Section 3.1.10.2.4.

3.7.11.3 Cumulative Effects

It is anticipated that adding 13 systems, in addition to implementing the Proposed Action at Fort Sill, could result in stationing a small subset of the system vehicles for training and temporary stationing of soldiers to be trained. Construction of new facilities to support system training could occur but would most likely be in previously disturbed areas of the main cantonment that are not near water resources. Implementation of the planned live-fire and maneuver training and the number of soldiers for these additional systems at Fort Sill is expected to be similar to those discussed in Section 3.8.11.2 with minimal increases in the intensity of use. Fort Sill would be receiving small subsets of the systems that would reduce the intensity of any effects; therefore, these changes are expected to be less than significant.

SECTION 4. APPENDIX A ACRONYMS AND ABBREVIATIONS

§ ..... Section

AAF ..... Army Airfield
AASLT..... Air Assualt
ABCT..... Armored Brigade Combat Team
ABN ..... Airborne
ACEC..... Area of Critical Environmental Concern
ACHP..... Advisory Council on Historic Preservation
ACM ..... Army Capabilities Manager
ACOM ..... Army Command
ACP..... Army Campaign Plan; *or*
..... access control point
ACUB ..... Army Compatible Use Buffer
ADA..... Air Defense Artillery
ADP ..... Area Development Plan
AFB..... Air Force Base
AGL ..... Above Ground Level
AIAMD..... Army Integrated Air and Missile Defense
AIRFA ..... American Indian Religious Freedom Act
AMC ..... U.S. Army Materiel Command
AMD ..... Air and Missile Defense
AMPTR..... Automated Multi-Purpose Training Range
AMPV..... Armored Multi-Purpose Vehicle
AMS..... Army Modernization Strategy
ANG..... Air National Guard
APA ..... Administrative Procedure Act
APE..... Area of Potential Effect
APHC..... Army Public Health Center
AR..... Army Regulation
ARF..... Automated Record Fire
ARNG ..... Army National Guard
ARPA..... Archaeological Resources Protection Act
ARRM..... Army Range Requirements Model
ARSTAF ..... Army Staff (an HQDA component)
ASCC..... Army Service Component Command

BA.....Biological Assessment
BCC .....Birds of Conservation Concern
BCT .....Brigade Combat Team
Bde.....Brigade
BGEPA .....Bald and Golden Eagle Protection Act
BLM .....Bureau of Land Management
BMC .....Battle Management Center
BMP.....best management practice
Bn .....Battalion
BO.....Biological Opinion
BRAC .....Base Realignment and Closure

C-RAM .....Counter Rocket, Artillery, and Mortar
C-UAS .....Counter Unmanned Aerial Systems
CAA.....Clean Air Act
CAB.....Combat Aviation Brigade
CBHD .....Clarksville Base Historic District
CDR.....Commander
CEQ .....Council on Environmental Quality
CFR.....Code of Federal Regulations
CG.....Commanding General
CM.....Cruise Missile
CMD .....Cruise Missile Defense
CNIC.....Comanche National Indian Cemetery
COM .....commercial (telephone number)
Commo .....Communications
CONUS.....Continental United States
COS .....Chief of Staff
CR.....cultural resources
CRBM.....Close Range Ballistic Missile
CRFC.....Conservation Reimbursable and Fee Collection
CRMP .....Cultural Resources Management Program
CSA .....Chief of Staff of the Army
CWA.....Clean Water Act
CX.....Categorical Exclusion
CZMA.....Coastal Zone Management Act

DA .....Department of the Army

DA PAM ..... Department of the Army Pamphlet
DAR ..... Department of the Army Representative (to the FAA)
DASA-ESOH .... Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health
DASA-IH&P ..... Deputy Assistant Secretary of the Army for Installations, Housing and Partnerships
db ..... decibel (used to measure sound level)
DBH ..... diameter at breast height
DCG ..... Deputy Commanding General
DCS ..... Deputy Chief of Staff
DD Form ..... Department of Defense Form
DE-SHORAD ... Directed Energy Short Range Air Defense
DEIS ..... Draft Environmental Impact Statement
DES ..... Director of Emergency Services; *or*
..... Directorate of Emergency Services
DFC ..... Desired Future Conditions
DHS ..... U.S. Department of Homeland Security
DIV ..... Division
DLA ..... Defense Logistics Agency
DMM ..... Discarded Military Munitions
DNR ..... Department of Natural Resources
DoD ..... Department of Defense
DoDI ..... Department of Defense Instruction
DOE ..... U.S. Department of Energy
DOPAA ..... Description of Proposed Action and Alternatives
DOTMLPF-P .... Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities, Policy
DPTMS ..... Director of Plans, Training, Mobilization and Security; *or*
..... Directorate of Plans, Training, Mobilization and Security
DPW ..... Director of Public Works; *or*
..... Directorate of Public Works
DPW-E ..... Directorate of Public Works, Environmental Division
DPW ENV ..... Directorate of Public Works, Environmental Division
DRU ..... Direct Reporting Unit
DSN ..... Defense Switched Network (telephone number)
DVD ..... Digital Versatile Disc

EA ..... Environmental Assessment
ECL ..... Environmental Checklist
E-Date ..... Effective Date
e.g. ..... exempli gratia (Latin, meaning "for example")
EIA ..... Environmental Impact Assessment (used on DA Form 4283 and refers to an EA)
EIS ..... Environmental Impact Statement
EISA ..... Energy Independence and Security Act
EMU ..... Ecological Management Unit
encl ..... enclosure
EO ..... Environmental Officer; *or*
..... Executive Order
EOD ..... Explosive Ordnance Disposal; *or* Explosive Ordnance Detachment
EPA ..... U.S. Environmental Protection Agency
EPAct ..... Energy Policy Act of 2005
EQ ..... Environmental Quality
EQCC ..... Environmental Quality Control Committee
ERCA ..... Extended Range Cannon Artillery
ES^2 ..... Energy Security & Sustainability
ESA ..... Endangered Species Act
ESCP ..... Erosion and Sedimentation Control Plan
ESMC ..... Endangered Species Management Component
ESMP ..... Endangered Species Management Plan

FA ..... Field Artillery
FAA ..... Federal Aviation Administration

FBI ..... U.S. Federal Bureau of Investigation
FBTC ..... Fort Bliss Training Center
FBWSC ..... Fort Bliss Water Services Company
FEIS ..... Final Environmental Impact Statement
FEMA ..... Federal Emergency Management Agency
FGS ..... Final Governing Standard
FIRM ..... Flood Insurance Rate Map
FMP ..... Forest Management Plan
FNSI ..... Finding of No Significant Impact (as used in current 32 C.F.R. Part 651; to be changed to 'FONSI')
FOB ..... Forward Operating Base
FONPA ..... Finding of No Practicable Alternative
FONSI ..... Finding of No Significant Impact (to be used by the Army when the 32 C.F.R. Part 651 revision is promulgated)
FORSCOM ..... U.S. Army Forces Command
FoV ..... Family of Vehicles
FR ..... Federal Register
FRUS ..... Fort Riley Utility Services
ft ..... feet
ft^2 ..... square feet
FTUAS ..... Future Tactical Unmanned Aerial System
FTX ..... Field Training Exercise
FY ..... fiscal year
FYXX-YY ..... fiscal year range (XX = start of range; YY = end of range)

GC ..... Garrison Commander
GHG ..... greenhouse gas
GIS ..... Geographic Information System
GM ..... Garrison Manager
GO ..... General Officer
GSA ..... General Services Administration
GSF ..... Gross Square Feet
GTA ..... Grow the Army (a past Army restructure initiative)
GW ..... gigawatt

H&S ..... health and safety
ha ..... hectare
HAP ..... hazardous air pollutant
HEL ..... highly erodible land
HEMTT ..... Heavy Expanded Mobility Tactical Truck
HET ..... Heavy Equipment Transporter
HHQ ..... higher headquarters (e.g., above garrison)
HIMARS ..... High Mobility Artillery Rocket System
HM ..... hazardous material
HMMP ..... Hazardous Materials Management Program
HMP ..... Habitat Management Plan
HPC ..... Historic Properties Component
HPO ..... Historic Preservation Officer
HQ ..... Headquarters
HQDA ..... Headquarters, Department of the Army
HUC ..... Hydrologic Unit Code
HW ..... hazardous waste

IAW ..... in accordance with
IBCS ..... Integrated Air and Missile Defense Battle Command System
IBCT ..... Infantry Brigade Combat Team
ICRMP ..... Integrated Cultural Resource Management Plan
ICUZ ..... Installation Compatible Use Zone (re: noise)
ID ..... identification
IDDS-A ..... Iron Dome Defense System – Army
i.e. ..... id est (Latin; meaning "that is", "namely", or "in other words")
IFPC ..... Indirect Fires Protection Capability
IMC ..... Information for Members of Congress
IMCOM ..... U.S. Army Installation Management Command
INRMP ..... Integrated Natural Resource Management Plan
IONMP ..... Installation Operational Noise Management Plan

IOSC ..... Installation On-Scene Coordinator (e.g., emergency response)
IPM ..... Integrated Pest Management
IPMP ..... Integrated Pest Management Plan
ISOWPP..... Initial Scope of Work Planning Package
ISWMP ..... Integrated Solid Waste Management Plan
ITAM ..... Integrated Training Area Management
IWFMP ..... Integrated Wildland Fire Management Plan

JAG ..... Judge Advocate General
JLUS ..... Joint Land Use Study

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k ..... thousand
KDFWR..... Kentucky Department of Fish and Wildlife Resources
KDHE ..... Kansas Department of Health and Environment
KEPPC..... Kentucky Exotic Pest Plant Council
km ..... kilometer
km^2..... square kilometer
KSTC ..... Kansas Training Center
kV..... kilovolt
kW..... kilowatt

LAS..... land application system
LFA..... live-fire area
LID..... low impact development
LINR ..... Locally Important Natural Resource
LOS..... Level of Service (e.g., transportation and traffic)
LRAM..... Land Rehabilitation and Maintenance
LRC..... Logistics Readiness Center
LRHW..... Long Range Hypersonic Weapon
LTAMDS..... Lower Tier Air and Missile Defense Sensor
LTC..... Lieutenant Colonel
LUA ..... Limited Use Area

M.....million
m .....meter
m^2.....square meters
mi^2.....square mile
mm .....millimeter
M-SHORAD.....Maneuver Short Range Air Defense
MBMS .....Migratory Bird Management Strategy
MBTA.....Migratory Bird Treaty Act
MC .....munitions constituent
MCL .....Maximum Contaminant Level
MDO.....Multi-Domain Operations
MEC .....munitions and explosives of concern
MFR.....Memorandum for Record
MFU .....Missile Firing Unit
MILCON .....Military Construction Account
MLRA.....Major Land Resource Area
MLRS .....Multiple Launch Rocket System
mm/dd/yyyy.....month, day, year date format
MMPA.....Marine Mammal Protection Act
MMR .....Multi-Mission Radar
MMRP .....Military Munitions Response Program
MOA.....Memorandum of Agreement; *or*
.....Military Operations Area (airspace)
MOU.....Memorandum of Understanding
MPMG.....Multipurpose Machinegun
MRAP.....Mine Resistant Ambush Protected Vehicle
MS4 .....Municipal Separate Storm Sewer System
mtg.....meeting
MU.....management unit
MW.....megawatt
MWh.....megawatt hour
MWR .....Morale, Welfare, and Recreation

N/A .....Not Applicable

NAAQS..... National Ambient Air Quality Standards
NAGPRA..... Native American Graves Protection and Repatriation Act
NDAA..... National Defense Authorization Act
NDS ..... National Defense Strategy
NEPA..... National Environmental Policy Act
NESHAP..... National Emission Standards for Hazardous Air Pollutants
NFH ..... North Fort Hood
NHPA..... National Historic Preservation Act
NLT..... no later than
nm ..... nautical mile
NMDGF..... New Mexico Department of Game and Fish
NMFS..... National Marine Fisheries Service
NOA..... Notice of Availability
NOAA..... National Oceanic and Atmospheric Administration
NOI ..... Notice of Intent
NOV..... Notice of Violation
NPDES..... National Pollutant Discharge Elimination System
NPS ..... National Park Service
NRCS..... Natural Resources Conservation Service
NR..... natural resources
NRHP..... National Register of Historic Places
NWI ..... National Wetlands Inventory

O&M..... operations & maintenance
OC..... Office of Counsel
OCONUS..... Outside the Continental United States
ODASA-ESOH. Office of the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health
OMFV..... Optionally Manned Fighting Vehicle
OSC..... On-Scene Coordinator (e.g., emergency response)
OSD ..... Office of the Secretary of Defense
OSHA .....Occupational Safety and Health Administration
OSJA.....Office of the Staff Judge Advocate
OTJAG .....Office of the Judge Advocate General

P2.....Pollution Prevention
PA .....Programmatic Agreement
PAO .....Public Affairs Office; *or*
.....Public Affairs Officer
PC .....Program Comment
PCMS .....Piñon Canyon Maneuver Site (p/o USAG Fort Carson)
PEA.....Programmatic Environmental Assessment
PEIS.....Programmatic Environmental Impact Statement
P.L. .....Public Law
PM .....Program Manager; *or*
.....Project Manager
$PM_{2.5}$ .....particulate matter equal to or less than 2.5 microns in diameter
PM_{10}.....particulate matter equal to or less than 10 microns in diameter
p/o .....part of
POC .....point of contact
POL.....petroleum, oils, and lubricants
POV .....Personally Owned Vehicle
PPA.....Prototype Programmatic Agreement
PrSM.....Precision Strike Missile
PSD.....Prevention of Significant Deterioration (Clean Air Act)
PW .....Public Works
PWS.....Public Water System

Qtr.....Quarter (e.g., 3rd Qtr of FY)

RAM .....Rocket, Artillery, and Mortar
RCMP .....Range Complex Master Plan
RCS.....Radar Control Station
RCW .....Red-cockaded woodpecker
RD.....Range Day
RDP .....Range Development Plan

RDT&E ..... Research, Development, Test, and Evaluation
ReARMM ..... Regionally Aligned Readiness and Modernization Model
REC..... Record of Environmental Consideration
REEO ..... Regional Environmental & Energy Office
REPI..... Readiness and Environmental Protection Integration
RFMSS..... Range Facility Management Support System
RL ..... Readiness Level
RMPA ..... Resource Management Plan Amendment
ROD ..... Record of Decision
ROI..... region of influence
RONA ..... Record of Non-Applicability (Clean Air Act)
ROW ..... Right of Way
RPLANS ..... Real Property Planning and Analysis System
RPMP..... Real Property Master Plan
RTLP..... Range and Training Land Program

SA ..... Secretary of the Army
SAR..... Species at Risk
s/b..... should be
SC..... Senior Commander
SDS ..... Safety Data Sheet
SDWA..... Safe Drinking Water Act
SDZ..... surface danger zone
SECDEF..... Secretary of Defense
SEIS ..... Supplemental Environmental Impact Statement
SHPO ..... State Historic Preservation Officer (or Office)
SIP..... State Implementation Plan (re: CAA)
SJA..... Staff Judge Advocate
SLRC ..... Strategic Long Range Cannon
SME ..... subject matter expert
SOAR..... Special Operations Air Regiment
SOC..... Species of Concern
SOH ..... Safety and Occupational Health
SOP ..... standard operating procedure
SOW..... Scope of Work
SPCCP .....Spill Prevention Control and Countermeasures Plan
SPEA .....Supplemental Programmatic Environmental Assessment
SR .....Standard Range
SRM.....Sustainment, Restoration, and Modernization (e.g., real property maintenance); *or*
.....Sustainable Readiness Model
SRP .....Sustainable Range Program
SSA.....sole source aquifer
SUA .....Special-Use Airspace
SWMP .....Stormwater Management Plan
SWPPP .....Stormwater Pollution Prevention Plan

T&E .....threatened and endangered
TA.....Training Area
TADSS .....Training Aids, Devices, Simulators, and Simulation (e.g., warfighting training)
TBD .....to be determined
TC.....Training Circular
TCP.....Traditional Cultural Property
TEMF .....Tactical Equipment Maintenance Facility
THPO.....Tribal Historic Preservation Officer (or Office)
TMDL.....Total Maximum Daily Load
TNEPPC .....Tennessee Exotic Pest Plant Council
TPDES.....Texas Pollutant Discharge Elimination System
TRADOC.....U.S. Army Training and Doctrine Command
TRI.....Toxic Release Inventory
TSCA.....Toxic Substances Control Act
TSS .....Total Suspended Solids
TWRA .....Tennessee Wildlife Resources Agency

UAS .....Unmanned Aerial System
UAV .....Unmanned Aerial Vehicle
UDC.....Unit Deployment Cycle
UFC .....Unified Facilities Criteria
UGS .....Unmanned Ground System
UIC .....Underground Injection Control
URC.....Unit Readiness Cycle

URO ..... Unit Readiness Objective
U.S. ..... United States
USACE ..... U.S. Army Corps of Engineers
USAEC ..... U.S. Army Environmental Command
USAEUR ..... U.S. Army, Europe
USAG..... U.S. Army Garrison
USASOCOM .... U.S. Army Special Operations Command
U.S.C..... United States Code
USDA..... U.S. Department of Agriculture
USFS..... U.S. Forest Service
USFWS ..... U.S. Fish and Wildlife Service
USGS ..... U.S. Geological Survey
USMC ..... U.S. Marine Corps
UXO..... unexploded ordnance

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w/ ..... with
w/o ..... without
WFH..... West Fort Hood
WOUS..... Waters of the United States
WPA..... Works Progress Administration
WSA..... Wilderness Study Area
WWTP ..... Waste Water Treatment Plant

SECTION 5. APPENDIX B LITERATURE CITED

Abbott, J. T., R. Mauldin, P. E. Patterson, W. N. Trierweiler, R. J. Hard, C. R. Lintz, and C. L. Tennis. 1996. Significance Standards for Prehistoric Archaeological Sites at Fort Bliss: A Design for Further Research and the Management of Cultural Resources. TRC Mariah Associates, Inc., Austin, Texas.

Air National Guard Readiness Center (ANGRC). 2005. Integrated Cultural Resources Management Plan for Smoky Hill Air National Guard Range. Final, June.

Almarez, F. A., and J. D. Leach. 1997. The Hueco Mountain Cave and Rock Shelter Survey: A Phase I Baseline Inventory in Maneuver Area 2D on Fort Bliss, Texas. Archaeological Technical Reports No. 10, Anthropology Research Center, University of Texas at El Paso, El Paso.

Armstrong, D.M., R.A. Adams and J. Freeman. 1994. Distribution and Ecology of Bats of Colorado. University of Colorado, Boulder.

Bailey, R.G. 1995. Descriptions of the ecoregions of the United States. 2d ed. Rev and expanded. Misc. Publ. No. 1391. U.S. Department of Agriculture, Forest Service, Washington, D.C.

Baugh, Timothy G. and Mark T. Sechrist. 2001 *Protohistoric Apachean Adaptations within the Basin and Range Province of South-Central New Mexico and West Texas: A Perspective from the Fort Bliss Reservation*. Fort Bliss Cultural Resource Investigations, TRC Mariah Associates, Inc., El Paso

Belfour Beatty Communities. 2020. [Web Site] Located at http://www.ftblissfamilyhousing.com/. Accessed March 12, 2020.

Brune, G. 1981. *Springs of Texas: Volume I*. Branch-Smith, Inc., Fort Worth, Texas.

Buffington, L. C. and C.H. Herbel. 1965. Vegetational Changes on a Semidesert Grassland Range from 1858 to 1963. *Ecological Monographs.* Vol. 35, No. 2 (Spring 1965), pp. 139-164.

Busby, W.H., J.R. Parmelee, C.M. Dwyer, E.D. Hooper, and K.J. Irwin. 1994. *A Survey of the Herptofauna on the Fort Riley Military Reservation.* Kansas Biological Survey Report No. 58. 79 pp.

Colorado Department of Public Health and Environment (CDPHE). 2016. Regulation #93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List. Accessed December 4, 2017 at https://www.colorado.gov/pacific/sites/default/files/93_2016%2811%29.pdf

Colorado Department of Public Health and the Environment (CDPHE). 2010. Air Quality Standards, Designations and Emission Budgets. 5 CCR 1001-14. 30 March.

Corral, R., and C.J. Bill 2000. Species of Special Concern Management Plan for the Alamo Beardtongue (Penstemon alamosensis). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

Corral, R., C.J. Bill, and D. Howell 2000b. Species of Special Concern Management Plan for the Organ Mountain Evening Primrose (Oenothera organanensis). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

Corral, R., A.W. Leary, and B. Locke. 2000c. Endangered Species Management Plan for the Bald Eagle (Haliaeetus leucocephalus). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

Corral, R., C.J. Bill, and D. Howell 2000d. Species of Special Concern Management Plan for the Hueco Rock Daisy (Perityle huecoensis). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

Corral, R., C.J. Bill, and D. Howell 2000e. Species of Special Concern Management Plan for the Desert Night-Blooming Cereus (Peniocereus greggii var. greggii). Fort Bliss Directorate of Environment. Fort Bliss, Texas and New Mexico.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. Publ. No. USFWS/OBS-79/31. 107 pp.

Dames and Moore. 1980. Fort Sill, Oklahoma Terrain Analysis. U.S. Army Engineer Topographic Laboratories.

Delisle, J.M., C.C. Freeman, and D.L. Peterson. 2012. Vegetation Survey and Mapping of the Fort Riley Military Reservation, Kansas. Open-file Report 174. Kansas Biological Survey. Lawrence, KS. 78 pp.

Department of the Army. 2017. Letter to Ms. Debra Bills, Field Supervisor, USFWS Arlington Field Office, Ecological Services, Arlington, TX from David P. Giffin, Chief, Environmental Division, U.S. Army Installation Management Command, Joint Base San Antonio Fort Sam Houston, TX. September 20. 2 pp.

Department of the Army. 2011. CAB Stationing PEIS. https://www.carson.army.mil/assets/docs/dpw/NEPA/2011-cab-programmatic-eis.pdf

Dick-Peddie, W.A. (1993) New Mexico Vegetation: Past, Present and Future. University of New Mexico Press, Albuquerque, New Mexico.

Directorate of Engineering and Housing (DEH). 1993. *Fort Stewart/Hunter Army Airfield Land Management Plan*. Department of Army, 24th Infantry Division (Mech) & Fort Stewart, GA. 3 pp + appendices.

Drago, J.W. and Honeycutt, R.L. 1981. Systematics of Mustedlid-like Carnivores. Journal of Mammalogy. Vol 78: 426-433.

Federal Interagency Committee on Urban Noise (FICUN). 1980. Guidelines for Considering Noise in Land Use Planning and Control. June.

Fleming, G. 2008. *Postwide Traffic Engineering and Safety Study*. Prepared for Fort Hood by Gannett Fleming.

Fort Bliss. 2017. Integrated Cultural Resources Management Plan (ICRMP) 2017-2021, Fort Bliss. Fort Bliss, Texas.

Fort Bliss. 2010. Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement. Fort Bliss Directorate of Environment. Fort Bliss, Texas. March.

Fort Bliss. 2007. SEIS: Fort Bliss, Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement. U. S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas. March.

Fort Bliss. 2006. Impacts by Alternative VEC Alternatives. Fort Bliss Directorate of Environment, Fort Bliss, Texas. September.

Fort Bliss. 2005. Standard Operating Procedures for Weapons Firing and Training Area Use at Fort Bliss Training Complex. U.S. Army Combined Arms Support Battalion and Fort Bliss. Fort Bliss, Texas and New Mexico.

Fort Bliss. 2002. Waste Analysis Plan, Hazardous Waste Storage Facility Building 2 11614 Area, Fort Bliss, Texas. Fort Bliss Directorate of Environment. Fort Bliss, Texas. May.

Fort Bliss. 2001. Integrated Natural Resource Management Plan (INRMP). Fort Bliss, Texas.

Fort Bliss. 2000. MMP PEIS: Fort Bliss, Texas and New Mexico Mission and Master Plan Programmatic Environmental Impact Statement. U.S. Army Air Defense Artillery Center and Fort Bliss. Fort Bliss, Texas.

Fort Bliss. 1999. McGregor Range Land Withdrawal Legislative Environmental Impact Statement. [Web Page] Located at: http://www.globalsecurity.org/military/library/report/enviro/. Accessed on 9/24/2009.

Fort Carson Directorate of Public Works – Conservation Branch. 2020. Fort Carson and Piñon Canyon Maneuver Site Fuels Management Plan, FYs 2020-2025. Fort Carson, Colorado.

Fort Carson. 2017. Integrated Cultural Resources Management Plan. Fort Carson, CO.

Fort Carson. 2016. Mexican Spotted Owl Management Plan. Fort Carson Directorate of Public Works, Environmental Division.

Fort Carson. 2015. Piñon Canyon Maneuver Site Training and Operations Environmental Impact Statement. Fort Carson, CO https://www.carson.army.mil/assets/docs/dpw/NEPA/2014-pcms-training-and-operations-final-eis.pdf

Fort Carson. 2014. Fort Carson and the Piñon Canyon Maneuver Site Integrated Natural Resources Management Plan, 2013-2017. Updated May 2015.

Fort Carson. 2014a. *Programmatic Agreement among U.S. Army Garrison Fort Carson, Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding Military Training and Operational Support Activities Down Range Fort Carson, Colorado*. https://www.carson.army.mil/assets/docs/dpw/Cultural/first_amendment_fc_downrage_pa.pdf

Fort Carson. 2013. *Programmatic Agreement Among the U.S. Army Garrison Fort Carson, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Construction, Maintenance, and Operations Activities for Areas of Fort Carson, Colorado.* https://www.carson.army.mil/assets/docs/dpw/Cultural/first_amendment_built_environment_pa.pdf

Fort Carson. 2012. Fort Carson Combat Aviation Brigade Stationing Implementation Environmental Assessment. Fort Carson, CO.

Fort Carson. 2009. Grow the Army Environmental Impact Statement. https://www.carson.army.mil/assets/docs/dpw/Cultural/first_amendment_fc_downrage_pa.pdf

Fort Hood. 2019. Integrated Natural Resource Management Plan. Natural Resources Branch, Environmental Division, Directorate of Public Works, Fort Hood, Texas.

Fort Hood. 2015. Integrated Cultural Resource Management Plan (ICRMP) and Historic Properties Component (HPC) for U.S. Army Garrison Fort Hood. Fort Hood, Texas.

Fort Hood. 2008c. Environmental Assessment for the Increase of Airspace at Fort Hood, TX. Prepared by Kimberly Wood, Environmental Management Division, Fort Hood. On file, Fort Hood, Texas.

Fort Hood. 2006. Integrated Natural Resource Management Plan. Natural Resources Branch, Environmental Division, Directorate of Public Works, Fort Hood, Texas.

Fort Hood, 2004a. Environmental Assessment for the Transformation to Modular Brigades and Construction of Support Facilities at Fort Hood, TX. Prepared by Tetra Tech, Fairfax, VA.

Fort Hood. 2002. Fort Hood Pest Management Plan. 2002. Fort Hood, Texas.

Fort Hood. 2000. Environmental Assessment for Robert Gray Army Airfield/Killeen Joint Use Facility. Prepared by Carter-Burgess, February 24, 2000.

Fort Hood. 1999. Management Plan for Treatment of National Register-Eligible Prehistoric Sites on Fort Hood. Review Draft. Prepared by Prewitt and Associates, Inc., Boyd, D.K., G. Mehalchick, and A.M. Scott for Fort Hood, Texas.

Fort Riley. 2016. Integrated Natural Resource Management Plan. Fort Riley, Kansas.

Fort Riley. 2008. Environmental Assessment Qualification Training Range and Shoothouse. Fort Riley Army Garrison, Kansas.

Fort Sill. 2019a. Integrated Natural Resource Management Plan (INRMP) and Environmental Assessment 2019-2023. Fort Sill, Oklahoma.

Fort Sill. 2019b. Environmental Assessment for Renewable Energy and Energy Resiliency at Fort Sill, Oklahoma

Fort Sill. 2018. Final Environmental Assessment for Conducting Brigade-Level Training Operations at Fort Sill, Oklahoma.

Fort Sill 2015a. Range Operation Information. Personnel Trained Report by Facility and Vehicle Report. Provided by Mr. Dave McGowen.

Fort Sill 2015b. Environmental Quality. Recreational Use, Management, Harvest, and Protection of Natural Resources. Fort Sill Regulation 200-1. Department of the Army, Headquarters, U.S. Army Garrison, Fort Sill, Oklahoma. 31 July.

Fort Sill 2015c. U.S. Army Fort Sill Installation Compatible Use Zone Study. Operational Noise Program, Army Institute of Public Health, U.S. Army Public Health Command. June 2015.

Fort Sill. 2014. Integrated Natural Resource Management Plan (INRMP). Fort Sill, Oklahoma.

Fort Sill. 2013a. Integrated Cultural Resource Management Plan (ICRMP). Fort Sill, Oklahoma.

Fort Sill. 2013b. U.S. Army Fires Center of Excellence and Fort Sill Hazardous Material and Waste Management Plan. Fort Sill, Oklahoma. September.

Fort Sill 2013c. Programmatic Environmental Assessment for the Fort Sill Mission; Cantonment Area and Range and Training Land Construction, Modernization, and Maintenance; and Environmental Stewardship. Fort Sill, Oklahoma.

Fort Sill. 2011a. Fort Sill Military Reservation Installation Spill Contingency Plan. November.

Fort Sill. 2011b. Fort Sill Military Reservation Spill Prevention, Control, and Countermeasure Plan. November.

Fort Stewart. 2012. Final Environmental Assessment and Finding of No Significant Impact for Footprint Alterations at the Wright Army Airfield Gray Eagle Unmanned Aerial System Project Site, Fort Stewart, Georgia. https://home.army.mil/stewart/application/files/2515/2051/7391/Final_Supplemental_EA__FNSI__FNPA_for_Mofications_to_Gray_Eagle_UAS_Action_at_WAAF-Fort_Stewart_GA.pdf#:~:text=Fort%20Stewart%20is%20comprised%20of%20approximately%20120%2C000%20acres%20of%20floodplain. Accessed on 9Sep20.

Fort Stewart. 2010. Final EIS for Garrison Projects Volume I+II. June 2010. Fort Stewart, Georgia.

Fort Stewart. 2007. Memorandum For Record: Review of Integrated Natural Resource Management Plan (INRMP) as to Operation and Effect. Fort Stewart Directorate of Public Works. July 15, 2007.

Fort Stewart. 2001. Integrated Natural Resource Management Plan 2001-2005. Fort Stewart, Georgia.

Freeman, C. C. and J. M. Delisle. 2004. Vegetation of the Fort Riley Military Reservation, Kansas. Open-file Report No. 119. Kansas Biological Survey. Lawrence, KS. 110 pp.

Gene Stout and Associates. 2002. Mexican Spotted Owl Management Plan. Fort Carson Directorate of Public Works, Environmental Division.

Graves, T. B., S. A. Hall, J. Arias, J. Sirianni, and S. Mbutu. 1997. The McGregor Guided Missile Range Survey Project, New Mexico Vol. II - Otero Mesa Escarpment Survey. Archaeological Technical Report No. 14. Anthropology Research Center. El Paso: University of Texas at El Paso.

Hatton, K.S., J.M. Barker, M. Mansell, D. Sizils, K. Glesener, and L. Memenway. 1995. Mines, Mills, and Quarries in New Mexico. Socorro, New Mexico: NMBMMR.

Havens, J.S. 1977. *Reconnaissance of the Water Resources of the Lawton Quadrangle, Southwestern Oklahoma*. Hydrologic Atlas 6, OK Geol. Survey, Univ. of OK, Norman, OK.

Hoyt, C. A. 2002. The Chihuahuan Desert: Diversity at Risk. *Endangered Species Bulletin.* March/June 2002. Vol XXVII No. 2

Jantz, D.R., R.F. Horner, H.T. Rowland, and D.A. Gier. 1975. *Soil Survey of Riley County and Part of Geary County, Kansas.* Bulletin No. 39. University of Kansas Geological Survey, University of Kansas, Lawrence.

Kansas Air National Guard (KSANG). 2007. *Integrated Natural Resources Management Plan.* Smoky Hill Air National Guard Range, Salina, Kansas.

Kansas Air National Guard (KSANG). 2003. Environmental Assessment Proposed Airspace Modifications, Smoky Hill Air National Guard Range. Air National Guard Environmental Division. September.

Kansas Air National Guard (KSANG). 2001. Integrated Natural Resources Management Plan, Smoky Hill Air National Guard Range, Salina, Kansas. Prepared by Engineering-Environmental Management, Inc., Bala Cynwyd, Pennsylvania. November.

Kansas Air National Guard (KSANG). 2000. Smoky Hill Range 184 ARW, DET1 Storm Water Pollution Prevention Plan. November 2000. Salina, Kansas. November.

Kansas Biological Survey (KBS). 2006. A Natural Features Inventory of the Smoky Hill Air National Guard Range Progress Report. June 3.

Kansas Department of Health and Environment (KDHE). 2007a. Memorandum from Travis Daneke/KDHE to Donna Fisher/KDHE. January 18.

Kansas Department of Health and Environment (KDHE). 2007b. Memorandum from Ryan Weiser/KDHE to Donna Fisher/KDHE. January 18.

Kenmotsu, N. A., and M. R. Miller. 2008. Re-evaluation of Cerro Rojo: A Response to Seymour. *Plains Anthropologist* 53(206):223-240.

Kludt, T. 2007. Landform and Settlement. Part II, Vacant Catchments. Directorate of Environment Historic and Natural Resources Reports No. 06-31 and 06-30. U.S. Army Air Defense Artillery Center and Fort Bliss, Texas.

Knight, B. and M. Miller. 2003. Archaeological Survey and National Register of Historic Places Evaluation of Sites Identified in the Proposed Timberon Fire Break, McGregor Range, Fort Bliss Military Reservation, Otero County, New Mexico. Directorate of Environment Historic and Natural Resources Report No. 02-15. U.S. Army Air Defense Artillery Center Fort Bliss, Texas.

Kozma, J.M., and N.E. Mathews. 1997, September. Breeding Bird Communities and Nest Plant Selection in Chihuahuan Desert Habitats in South-Central New Mexico. The Wilson Bulletin 109(3): 424-436. Wilson Ornithological Society. Ann Arbor, Michigan.

Kuchler, A.W. 1974. *A New Vegetation Map of Kansas.* Ecology, Vol. 55, No. 3, pp. 586-604.

Larkin, R.P. 1996. Effects of Military Noise on Wildlife: a literature review. Center for Wildlife Ecology, Illinois Natural History Survey. Champaign, IL.

Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. Conserving Biodiversity on Military Lands: A Handbook for Natural Resources Managers. The Nature Conservancy, Arlington, VA.

Lightfoot, D. C. 1997. The fauna of El Malpais National Monument. In: K. Mabery, editor. Natural history of El Malpais National Monument. New Mexico Bureau of Mines and Mineral Resources, Bulletin 156:139-154.

Lowry, C. 2004. National Register of Historic Places Eligibility Evaluation of 150 Prehistoric Sites for Fort Bliss Project 9202 in the Tularosa Basin and Otero Mesa, Otero County, New Mexico. Geo- Marine Inc. El Paso.

Mackay, W.P., S.J. Loring, T. M. Frost, and W.G. Whitford. 1990. Population Dynamics of a Playa Community in the Chihuahuan Desert. *The Southwestern Naturalist* Vol. 35, No. 4 (Dec., 1990), pp. 393-402

Malcolm Pirnie Inc. 2006a. *Operational Range Phase I Qualitative Assessment Report [Draft] Fort Stewart.* King of Prussia, Pennsylvania.

Malcolm Pirnie Inc. 2006b. *Operational Range Phase I Qualitative Assessment Report [Draft] Hunter Army Airfield.* King of Prussia, Pennsylvania.

Miller, M. R., N. A. Kenmotsu, M. Landreth. 2009. Significance and Research Standards for Prehistoric Archaeological Sites at Fort Bliss: A Design for the Evaluation, Management, and Treatment of Cultural Resources. Geo-Marine Inc., El Paso.

National Geospatial-Intelligence Agency (NGA). 2008. Digital Aeronautical Flight Information Files.

New Mexico Cooperative Fish and Wildlife Research Unit. 2001. Application and Assessment of Species at Risk Conservation Approaches at Fort Bliss Military Reservation and White Sands Missile Range, New Mexico and Texas. U.S. Geological Survey, Biological Resources Division, New Mexico Department of Game and Fish, New Mexico State University, and Wildlife Management Institute. March 2001.

(NRCS) Natural Resource Conservation Service. 2017. Soil Data Access, Data for Bell and Coryell Counties, Texas. Internet Website: https://sdmdataaccess.nrcs.usda.gov/. Accessed November 2017.

Noss, R.F. and A. Cooperrider. 1994. Saving Nature's Legacy: Protecting And Restoring Biodiversity. Island Press. Washington D.C.

Okin, D.S., D.A. Gilette, and J.E. Herrick. 2006. Multi-scale controls on and consequences of Aeolian processes in landscape change in arid and semi-arid environments. Journal of Range Management 65(2). Society for Range Management. Wheat Ridge, Colorado.

Omernik, J.M. 1987. Ecoregions of the Conterminous United States. *Annals of the Association of American Geographers.* Vol. 77, Issue 1. March 1987. Pgs. 1-156.

Perry, C.A. 2005. Summary of Significant Floods in the United States and Puerto Rico, 1994 Through 1998 Water Years. USGS Scientific Investigations Report 2005–5194. Lawrence, Kansas.

Peterson, J., J. Cathey, K. Wagner, and L Redmon. 2012. Lone Star Healthy Streams, Feral Hog Manual. Publication B-6256 produced by Texas AgriLife Extension Service, Department of Soil and Crop Sciences and AgriLife Communications, The Texas A&M System. 40 pp.

Peterson, R.S., and C.S. Boyd. 1998. Ecology and Management of Sand Shinnery Communities: A Literature Review. Ge. Tech. Rep. RMS-GTR-16. Fort Collins, Colorado. USDA Forest Service, Rocky Mountain Res. Station.

Pidgeon, A., and N. Mathews. 1996. Avian Productivity and Diversity in Seven Habitats Within the Northern Chihuahuan Desert, New Mexico; Baseline and Predictions for the McGregor Range and Surrounding Area. A Year-End Report for the 1996 Field Season. Fort Bliss Directorate of Environment. Fort Bliss, Texas.

Prichard, D. 1993. Riparian Area Management: Process for Assessing Proper Functioning Condition. U.S. Department of the Interior, Bureau of Land Management, Denver, CO.

Quigg, M., M. Sechrist, and G. Smith. 2002. Testing and Data Recovery of Burned Rock Features in Sites on Otero Mesa, New Mexico. Directorate of Environment Historic and Natural Resources Report. U.S. Army Air Defense Artillery Center and Fort Bliss, Texas.

Reagan, Jerry A., Charles A. Grant. 1977. Special Report: Highway Construction Noise: Measurement, Prediction, and Mitigation. Federal Highway Administration Bulletin: May 2.

Russell, W. 2008. A Cultural Resource Survey of 1,200 Acres South of Timberon For Proposed Forest Thinning, Fort Bliss Military Reservation, Otero County, New Mexico (In Prep). Prepared by Geo-Marine, Inc for Directorate of Public Works Environmental Division Fort Bliss Garrison Command, El Paso, Texas

Sanford, A. R., Lin, K. W., Tsai, I., and Jaksha, L. H., 2002, Earthquake catalogs for New Mexico and bordering areas: 1869–1998: New Mexico Bureau of Geology and Mineral Resources, Circular 210, 104 pp

Satterwhite, M.E., Ehlen, J., 1982. Landform–vegetation relationships in the northern Chihuahuan Desert. In: Yaalon, D.H. (Ed.), Aridic Soils and Geomorphic Processes. Catena Supplement, Vol. 1. Catena Verlag, Cremlingen, Germany, pp. 195– 209.

Schomer, Paul. 2001. A White Paper: Assessment of Noise Annoyance. Champaign, Illinois: Schomer and Associates, Inc.

Seager, W.R. 1981. Geology of the Organ Mountains and Southern San Andreas Mountains, New Mexico. NMBMMR, Memoir 36.

Seymour, D. J. 2008. Surfing Behind the Wave: A Counterpoint Discussion Relating to "A Ranchería in the Gran Apacheria." *Plains Anthropologist* 53(206):241-262.

Seymour, D. J. 2004. A Rancheria in the Gran Apacheria: Evidence of Intercultural Interaction at the Cerro Rojo Site. *Plains Anthropology* 49:153-191.

Seymour, D. J. 2002. *Conquest and Concealment: After the El Paso Phase on Fort Bliss Am Archaeological Study of the Manso, Suma, and Early Apache*. Lone Mountain Report 525/528, Historic and Natural Resources Report No. 01-06, Conservation Division, Directorate of Environment, United States Army Air Defense Artillery Center, Fort Bliss, Texas.

Seymour, D. J., and T. Church, 2007. *Apache, Spanish, and Protohistoric Archaeology on Fort Bliss.* Lone Mountain Report 560-005, Historic and Natural Resources Report No. 03-05, Conservation Division, Directorate of Environment, United States Army Air Defense Artillery Center, Fort Bliss, Texas.

Smith, R.L., B.R. Council, N. Honerkamp, and L.E. Babits.1984. *Archaeological Survey and Testing at Hunter Army Airfield, Savannah, Georgia.* Jeffrey L. Brown Institute of Archaeology, University of Tennessee at Chattanooga.

Soil Conservation Service. 1970. Conservation Plan for Fort Sill. 282 pp.

Stewart, J.H. 1978. Basin-Range Structure in Western North America, a review in Cenozoic Tectonics and Regional Geographysics of the Western Cordillera. Geological Society of America, Memoir 152, p. 1-32.

Stowe, M., C. Norred, and A. Hoiness, 2009. *An Archaeological Survey of 9,872 Acres in Training Areas 13, 14, 15, and 16 on McGregor Range, Fort Bliss Military Reservation, Otero County, New Mexico.* Geo-Marine Inc. Report 761EP, Cultural Resources Report No. 08-25, Directorate of Public Works, Environmental Division, Fort Bliss Garrison Command, Fort Bliss, Texas.

The Nature Conservancy (TNC). 1995. Fort Stewart Inventory Final Report.

USACE U.S. Army Corps of Engineers. 1999. Department of the Army Headquarters III Corps and Fort Hood Environmental Baseline, Fort Hood, Texas.

Thomas, Prentice M. Jr., L.J. Campbell and M. Cox. 1996. *Fort Stewart Military Reservation and Hunter Army Airfield Historic Preservation Plan [HPP]: Technical Synthesis of Cultural Resources Investigations at Fort Stewart and Hunter Army Airfield; Bryan, Chatham, Evans, Long, Liberty, and Tattnall Counties, Georgia.* Report of Investigations No. 261. Prentice Thomas and Associates, Inc. Fort Walton Beach, Florida.

USACHPPM. 2007. "Training Range Site Characterization and Risk Evaluation Regional Range Study." Fort Hood, Texas, *USACHPPM Project No. 38-EH-6872-042.*

U.S. Air Force. 2006. Draft Environmental Assessment for Transforming the 49th Fighter Wing's Combat Capability. Air Combat Command, Holloman AFB, New Mexico.

U.S. Army. 2019. Advanced Assessment Report for FY18-22 Operational Range Assessments Fort Hood, Texas. July 2019.

U.S. Army. 2018. Programmatic Environmental Assessment for Infantry Brigade Combat Team (IBCT) Conversion to an Armored Brigade Combat Team (ABCT) and Stationing.

U.S. Army. 2010a. Final Environmental Assessment of Army Mechanized Maneuver Training on Kansas Air National Guard's Smoky Hill Bombing Range & the Kansas Army National Guard's Kansas Training Center. Prepared for Kansas Air National Guard, Environmental Division & US Army, Fort Riley, KS by U.S. Army Environmental Command.

U.S. Army. 2008. FEIS for the 225th Stryker BCT Stationing. Vol 1. Aberdeen Proving Ground, Maryland.

U.S. Army. 2007c. Final Programmatic Environmental Impact Statement for Army Growth and Force Structure Realignment. Army Environmental Command. Aberdeen Proving Grounds, MD. October 2007.

U.S. Army Corps of Engineers (USACE). 2007. Fort Bliss, Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement. Fort Worth, Texas.

U.S. Army Corps of Engineers (USACE). 2005a. Long Range Component for Fort Bliss. Fort Bliss, Texas. August.

U.S. Army Corps of Engineers (USACE). 2005b. Pollution Prevention Plan and Opportunity Assessment, Fort Bliss, Texas. Tulsa District. Tulsa, Oklahoma. July.

U.S. Army Corps of Engineers (USACE). 2003. *Grazing Outlease at Fort Hood Texas, Supplemental Environmental Assessment*. Prepared for Fort Hood by USACE Fort Worth District, Fort Worth, Texas.

U.S. Army Corps of Engineers (USACE). 1999. Department of the Army Headquarters III Corps and Fort Hood Environmental Baseline, Fort Hood, Texas.

U.S. Army Corps of Engineers. 1984. Environmental Assessment for Potential Impact Area Relocation. September 1984.

U.S. Department of Agriculture. 2004. Soil Survey Geographic Database for Fort Bliss Military Reservation, New Mexico and Texas. Natural Resources Conservation Service. Fort Worth, Texas. July.

U.S. Department of Agriculture. 2003. Soil Survey of Fort Bliss Military Reservation, New Mexico and Texas. Natural Resources Conservation Service. Washington, D.C. February.

USDA-NRCS (United States Department of Agriculture-Natural Resources Conservation Service). 2005. State Soil Geographic (SSURGO) Data for Bell and Coryell Counties, Texas. USDA-NRCS, Gatesville, Texas.

U.S. Department of the Army. 2020. Army Stationing and Installation Plan Common Operating Picture (ASIP) Report. FY 2020.

U.S. Department of the Army. 2016a. Sustainability Report.

U.S. Department of the Army. 2009. Army Regulation 385-63 Range Safety. Headquarters, Department of the Army. Washington, D.C. August.

U.S. Environmental Protection Agency (EPA). 2017a. U.S. Environmental Protection Agency. 13 February 2017. Criteria Pollutant Nonattainment Summary Report. Retrieved 19 April 2017 from EPA Green Book: https://www3.epa.gov/airquality/greenbook/ancl3.html.

U.S. Environmental Protection Agency (EPA). 2017b. Overview of Greenhouse Gases. 14 April. Accessed at: https://www.epa.gov/ghgemissions/overview-greenhouse-gases.

U.S. Environmental Protection Agency (EPA). 2016a. NAAQS Table. 20 December. Accessed at: https://www.epa.gov/criteria-airpollutants/naaqs-table.

U.S. Environmental Protection Agency (EPA). 2014. National Emissions Inventory (NEI) Data. Retrieved 19 April 2017 from EPA Air Emissions Inventories: https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-neidata

U.S. Environmental Protection Agency (EPA). 2013. Colorado Springs Revised Carbon Monoxide Maintenance Plan Notice of Final Rule. Published in Federal Register on August, 1, 2013. https://www.federalregister.gov/documents/2013/08/01/2013-18438/approval-and-promulgation-of-air-quality-implementation-plans-state-of-colorado-second-10-year

U.S. Environmental Protection Agency (EPA). 2007. List of 156 Mandatory Class I Federal Areas, Code of Federal Regulations Reference (40 CFR Part 81). http://www.epa.gov/air/visibility/class1.html. Accessed January 16, 2007.

U.S. Environmental Protection Agency (EPA). 2006. AirData Emissions by Category Report – Criteria Air Pollutants, Saline and McPherson Counties, Kansas. Data extracted from EPA air pollution database December 4, 2006. http://iaspub.epa.gov/airsdata/adnet. Accessed January 16, 2007.

U.S. Fish and Wildlife Service (USFWS). 2020. Endangered Species Act, Overview. https://www.fws.gov/endangered/laws-policies/ Accessed on 5 February 2020.

USFWS. 2008. *Birds of Conservation Concern.* https://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf Accessed April 2, 2020.

Whitford, W.G. 2002. Ecology of Desert Systems. Academic Press. San Diego, California.

Whitford, W.G. 1997, December. Desertification and Animal Biodiversity in the Desert Grasslands of North America. Journal of Arid Environments v. 37, no. 4, pp. 709-720. Academic Press. Universidad de Buenos Aires. Buenos Aires, Argentina.

Young, K.E., B.C. Thompson, R. Valdez, W.R. Gould, and A.L. Terrazas. 2005. Assessment of Predictive Values from the Aplomado Falcon Habitat Suitability Model: Validation Information for Conservation Planning in the Northern Chihuahuan Desert. New Mexico Cooperative Fish and Wildlife Research Unit. Las Cruces, New Mexico. 2005.

SECTION 6. APPENDIX C DOCUMENT REVIEWERS

The USAEC would like to thank the following personnel for their assistance providing information, reviewing, or providing comments to ensure a complete and accurate document.

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	Mr Richard McDaniel

SECTION 7. APPENDIX D RECORD OF ENVIRONMENTAL CONSIDERATION CHECKLIST AND PRELIMINARY EVALUATION

This checklist is intended to provide a framework for identifying any NEPA requirements beyond this PEA for anticipated impacts associated with the fielding of the M-SHORAD battalion at an Army installation in the United States. This checklist would certify that both the installation staff and proponent understand and support the requirements and discussions in this PEA, particularly the site conditions, the Proposed Action and its effects, and any required mitigations. The considerations in this PEA and the Record of Environmental Consideration (REC) checklist are comprehensive, but may not be sufficiently exhaustive to address site-specific conditions at every installation. For this reason, the installation's environmental staff must review this PEA, evaluate the checklist conditions and requirements, and determine the appropriate course of action.

CATEGORY I: For the six installations addressed in the PEA, if after reviewing the PEA and completing the REC checklist and all conditions described in the analysis are met, then they may adopt this PEA, complete a REC, and implement the Proposed Action.

CATEGORY II: If all conditions are not met after completing the REC checklist, or if impacts change, any of the six installations may adopt the PEA, prepare a supplemental EA and FONSI before implementing the Proposed Action. If impacts are significant, then the installation would prepare a NOI announcing the preparation of a EIS before fielding the M-SHORAD can proceed.

CATEGORY III: If an installation not covered under this PEA wishes to implement the Proposed Action, they may complete the REC checklist, adopt this PEA, and produce a tiered EA that describes the effected environment and impacts of the Proposed Action, prepares a FONSI, and fielding of the M-SHORAD battalion can proceed. If impacts are significant, then the installation would prepare a NOI announcing the preparation of a EIS before fielding the M-SHORAD can proceed.

To use the attached checklist to evaluate the Proposed Action, the following format is recommended:

- "Yes" implies an issue may require further NEPA analysis.
- "No" on the REC checklist implies applicability of this PEA
- "N/A" implies the question does not apply

The "Response Documentation" column may be used for any comments pertaining to the Proposed Action or identify existing programs or BMPs, regulations, or policies that mitigate an issue identified in the questionnaire.

Any questions regarding the completion of this checklist should be directed to the installation's environmental staff. This checklist references portions of Title 32, CFR Part 651, "Environmental Analysis of Army Actions."

Appendix D Record of Environmental Consideration Checklist and Preliminary Evaluation

MEMORANDUM FOR RECORD DATE:

SUBJECT: Evaluation, Under the National Environmental Policy Act (NEPA) of Fielding the M-SHORAD Battalion at (*installation name*).

1. Brief description: (Provide details of facility locations, live-fire and maneuver range dimensions and locations, and any differences in the Affected Environment that are described in the PEA.)

2. It has been determined that fielding the M-SHORAD battalion as described above (choose a. b. or c.):

a. Is adequately addressed in a completed: EA____ EIS____

Title and date:

b. Qualifies for Categorical Exclusion under provisions of 32 CFR Part 651, Appendix B, Paragraph _____ and no extraordinary circumstances apply.

c. Qualifies for a Record of Environmental Consideration, based on the evaluation of the criteria in the checklist below because the issues requiring consideration under NEPA are addressed in the Programmatic Environmental Assessment entitled, “Programmatic Environmental Assessment for the Fielding of the Maneuver - Short Range Air Defense Capability” dated May 2021.

The following signatories certify their understanding of the Programmatic Environmental Assessment and the analyses therein and certify compliance with the provisions and mitigations that are presented. This includes compliance with the procedures (Best Management Practices and Standard Operating Procedures) that are specified and the funding necessary to ensure that the required mitigations will be implemented.

_____	_____
Proponent signature	Environmental Officer signature
_____	_____
Proponent, printed name	Environmental Officer, printed name
_____	_____
e-mail	e-mail
_____	_____
Phone number	Phone number

	CATEGORY	Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
	General NEPA		
1	Is the training of the M-SHORAD battalion at the installation consistent with the description in the PEA		If no, a REC may not be sufficient; further analysis may be required. If yes, continue to question #2.
2	Will construction be less than 5 acres?		If no, a REC may not be sufficient; further analysis may be required. If yes, continue to question #3.
	Air Quality		
3	Using M-SHORAD battalion vehicles at this installation will contribute to a change in the air quality compliance status (e.g., from attainment to nonattainment) in the region.		If yes, further analysis and coordination with air quality permitting authority may be required. If no, continue to question #4.
	Airspace		
4	Expansion of existing special use airspace or designation of new special use airspace is required to accommodate M-SHORAD training.		If yes, further analysis and coordination with the FAA will be required. If no, continue to question #5.
	Biological Resources		
5	Construction of the M-SHORAD battalion facilities is likely to affect one or more threatened or endangered species not addressed in the PEA and not addressed in a Biological Opinion covering same or similar actions.		If yes, further analysis and coordination and/or informal or formal consultation with the USFWS, NOAA Fisheries, and/or state wildlife agency will be required. If no, continue to question #6.
6	Training the M-SHORAD battalion is likely to affect one or more threatened or endangered species not addressed in the PEA and not addressed in a Biological Opinion covering same or similar actions.		If yes, further analysis and coordination and/or informal or formal consultation with the USFWS, NOAA Fisheries, and/or state wildlife agency will be required. If no, continue to question #7.

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	CATEGORY	Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
	Cultural Resources		
7	Construction of the M-SHORAD battalion facilities would affect one or more cultural resources not addressed in the PEA.		If yes, and there is no PA or Program Comment addressing the actions, then further analysis and coordination and/or consultation with the SHPO and/or THPO will be required. If no, continue to question #8.
8	Training the M-SHORAD battalion would affect one or more cultural resources not addressed in the PEA.		If yes, and there is no PA or Program Comment addressing the actions, then further analysis and coordination and/or consultation with the SHPO and/or THPO will be required. If no, continue to question #9.
	Soils		
9	Construction of the M-SHORAD battalion facilities would adversely affect one or more soil types or lead to excess soil losses not addressed in the PEA.		If yes, further analysis will be required. If no, continue to question #10.
10	Training the M-SHORAD battalion would adversely affect one or more soil types or lead to excess soil losses not addressed in the PEA.		If yes, further analysis will be required. If no, continue to question #11.
	Land Use and Compatibility		
11	Construction or training of the M-SHORAD battalion would change a land use designation, create incompatible land use, or adversely affect prime farmland.		If yes, further analysis will be required. If no, continue to question #12.
	Socioeconomics		
12	Fielding the M-SHORAD battalion would adversely affect income, employment, sales volume, or population.		If yes, further analysis will be required. If no, continue to question #13.
13	Fielding the M-SHORAD battalion would adversely affect children or disadvantaged populations.		If yes, further analysis will be required. If no, continue to question #14.

	CATEGORY	Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
	Traffic and Transportation		
14	Fielding the M-SHORAD battalion would adversely affect traffic patterns, points of entry into the installation, or other transportation modes.		If yes, further analysis will be required. If no, continue to question #15.
	Facilities		
15	Fielding the M-SHORAD battalion would require the construction of facilities not addressed in the PEA or at locations different from what is addressed in the PEA.		If yes, further analysis will be required. If no, continue to question #16.
	Water Resources		
16	Construction of the M-SHORAD battalion facilities would adversely affect one or more water resources not addressed in the PEA.		If yes, further analysis will be required and appropriate permits may be required. If no, continue to question #17.
17	Training the M-SHORAD battalion would adversely affect one or more water resources not addressed in the PEA.		If yes, further analysis will be required, and appropriate permits may be required. If no, continue to question #18.
	Cumulative Effects		
18	Other actions are underway, or proposed, that when combined with the potential effects of fielding the M-SHORAD battalion could significantly affect human health or the environment.		If yes, coordinate with the proponents of the other action(s); conduct further analysis as needed. If no, and all 18 questions have been answered “no” or “n/a,” proceed as described on page 1 of this document for Category I, II, or III.

SECTION 8. APPENDIX E ALTERNATE RANGE TYPES

Effective live-fire training is the cornerstone of readiness. The United States Army is committed to providing the highest quality live-fire training ranges to support individual, team, squad, crew, platoon, and company live-fire training to include collective and Air-Ground Operations venues.

This appendix identifies primary and alternate ranges and ranges that may be locally modified that are used for training and qualification with specific weapons and weapon systems, based on applicable Training Circulars and the expected annual live-fire range requirements for the M-SHORAD battalion. The training requirements of the M-SHORAD battalion were derived from a review of the requirements of the Divisional supported units and an existing ADA battalion that provides capabilities similar to the M-SHORAD battalion.

The table below shows the primary ranges that the M-SHORAD battalion would use to complete the required training events in the left column. The right column lists the alternate ranges or locally modifiable ranges that can support all or portions of the required training that would occur on the primary range. In determining the impacts of live-fire training in the PEA, the use of all alternate range types available at each installation was considered to accommodate the required training.

8.1 TABLE OF ALTERNATE RANGES

Table 8-1. Alternate Range Types

Designated Range Type	Alternate Range Types That Can Support Required Training
CONVOY LIVE FIRE RANGE/ENTRY CONTROL POINT (CLF/ECP)	NO ALTERNATE RANGE TYPE DESIGNATED
BASIC 10M-25M FIRING RANGE (ZERO)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	CONVOY LIVE FIRE RANGE/ENTRY CONTROL POINT (CLF/ECP)
	AUTOMATED FIELD FIRE RANGE (AFF)
	AUTOMATED RECORD FIRE RANGE (ARF)
	MODIFIED RECORD FIRE (MRF)
	AUTOMATED QUALIFICATION TRAINING RANGE (QTR)
	KNOWN DISTANCE RANGE (KD)
	AUTOMATED SNIPER FIELD FIRE RANGE (SFF)

Designated Range Type	Alternate Range Types That Can Support Required Training
	AUTOMATED COMBAT PISTOL/MP FIREARMS QUALIFICATION COURSE (CPQC/MPFQC)
	AUTOMATED MULTIPURPOSE MACHINE GUN RANGE (MPMG)
	SCOUT/RECCE GUNNERY COMPLEX (SRGC)
	DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)
	DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)
	BATTLE AREA COMPLEX (BAX)
	URBAN ASSAULT COURSE (UAC)
	AUTOMATED INFANTRYSQUAD BATTLE COURSE (ISBC)
	AUTOMATED INFANTRY PLATOON BATTLE COURSE (IPBC)
AUTOMATED RECORD FIRE RANGE (ARF)	MODIFIED RECORD FIRE RANGE (MRF)
AUTOMATED MULTIPURPOSE MACHINE GUN RANGE (MPMG)	BASIC 10M-25M FIRING RANGE (ZERO)
	AUTOMATED QUALIFICATION TRAINING RANGE (QTR)
	SCOUT/RECCE GUNNERY COMPLEX (SRGC)
SCOUT/RECCE GUNNERY COMPLEX (SRGC)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)
	DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)
	BATTLE AREA COMPLEX (BAX)
DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	SCOUT/RECCE GUNNERY COMPLEX (SRGC)
	DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)

Designated Range Type	Alternate Range Types That Can Support Required Training
	TANK/FIGHTING VEHICLE SCALED GUNNERY RANGE (1:5/1:10) (SCAGR)
	TANK/FIGHTING VEHICLE STATIONARY GUNNERY RANGE (STAGR)
	MULTIPURPOSE RANGE COMPLEX-HEAVY (MPRC-H), AUTOMATED
	BATTLE AREA COMPLEX (BAX)
DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	SCOUT/RECCE GUNNERY COMPLEX (SRGC)
	DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)
	AUTOMATED MULTIPURPOSE TRAINING RANGE (AMPTR)
	BATTLE AREA COMPLEX (BAX)
AUTOMATED MULTIPURPOSE TRAINING RANGE (AMPTR)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	SCOUT/RECCE GUNNERY COMPLEX (SRGC)
	DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)
	TANK/FIGHTING VEHICLE SCALED GUNNERY RANGE (1:5/1:10) (SCAGR)
	TANK/FIGHTING VEHICLE STATIONARY GUNNERY RANGE (STAGR)
	MULTIPURPOSE RANGE COMPLEX-HEAVY (MPRC-H), AUTOMATED
	BATTLE AREA COMPLEX (BAX)
MULTIPURPOSE RANGE COMPLEX-HEAVY (MPRC-H), AUTOMATED	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	SCOUT/RECCE GUNNERY COMPLEX (SRGC)

Designated Range Type	Alternate Range Types That Can Support Required Training
	DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)
	BATTLE AREA COMPLEX (BAX)
BATTLE AREA COMPLEX (BAX)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)
	MULTIPURPOSE RANGE COMPLEX-HEAVY (MPRC-H), AUTOMATED
AIR DEFENSE MISSILE FIRING RANGE (ADFR)	DIGITAL AIR GROUND INTEGRATION RANGE (DAGIR)
	DIGITAL MULTIPURPOSE TRAINING RANGE (DMPTR)
	DIGITAL MULTIPURPOSE RANGE COMPLEX (DMPRC)
	AERIAL GUNNERY RANGE (AGR)
HAND GRENADE QUALIFICATION COURSE (NONFIRING) (HGQC)	NO ALTERNATE RANGE TYPE DESIGNATED
HAND GRENADE FAMILIARIZATION RANGE (LIVE) (HGFR)	NO ALTERNATE RANGE TYPE DESIGNATED
GRENADE LAUNCHER RANGE (GLR)	NO ALTERNATE RANGE TYPE DESIGNATED
COMBINED ARMS COLLECTIVE TRAINING FACILITY (CACTF)	NO ALTERNATE RANGE TYPE DESIGNATED

SECTION 9. APPENDIX F COMMENTS RECEIVED AND RESPONSES

The number and characterization of the comments received per installation is:

- Fort Bliss: seven positive comments and three neutral comments.
- Fort Hood: seven positive comments and two neutral comments.
- Fort Riley: one neutral comment and one negative comment.
- Fort Stewart: two neutral comments.
- Fort Carson: two neutral comments and one negative comment.
- Fort Sill: three neutral comments.

The positive comments are addressed briefly in the FONSI. Comments received from Native American Tribes and other government agencies are mostly characterized as neutral and are also addressed briefly in the FONSI.

An extensive, neutral comment with recommendations was received from Region Four of the EPA regarding fielding M-SHORAD at Fort Stewart. Extensive, negative comments were received from two organizations. One was primarily concerned with impacts to the PCMS if M-SHORAD were fielded to Fort Carson. The other expressed concern that the Army was premature in the use of an EA and FONSI and expressed reservations about potential impacts to traditional cultural properties and sacred sites at Fort Riley. Excerpts comprising the essence of the extensive comments and the Army's responses are listed in the table below.

9.1 TABLE OF ARMY RESPONSES TO EXTENSIVE COMMENTS

Table 9-1. Army Responses to Extensive Comments

Row	Comment	Response
1	Region Four of the EPA provided a comment regarding fielding M-SHORAD at Fort Stewart. Their conclusion was: "EPA has not identified any significant environmental impacts to the proposed action that would require substantive changes to the draft PEA or require the Army's consideration of other alternatives for the location of the proposed fielding sites." The EPA included detailed comments and recommendations to consider if M-SHORAD is fielded to Fort Stewart.	The detailed comments are addressed in rows 2 through 8 of the table.
2	Air Quality and Climate Change – "implementing measures to reduce diesel emissions, such as switching to cleaner fuels where possible, retrofitting current construction equipment with emission reduction technologies, repowering older engines with newer cleaner engines, replacing older vehicles, and reducing idling through operator training and/or contracting policies. We also encourage controlling fugitive dust by watering or the application of other controlled materials. Analysis using computer-based air conformity modeling may provide further details on the extent of possible emissions resulting from the proposed activity."	This suggestion will be implemented to the maximum extent practicable. The Army's Climate Strategy (Feb. 22) has a service-wide plan to reduce emissions. For instance, a goal is switching to an all-electric non-tactical vehicle fleet by 2035.

3	Water Resources and Wetlands – "cooperating with the United States Army Corps of Engineers for possible Section 404 permitting and mitigation credit requirements. Additionally, the EPA recommends that water retention and detention structures be incorporated into project designs for the 6.5-acres of impervious surface due to new facility construction, in accordance with Section 438 of the Energy Independence and Security Act of 2007. Federal facilities should not alter preconstruction stormwater runoff profiles associated with 95% and lesser rainfall events."	This suggestion will be implemented to the maximum extent practicable. In particular, the Army adheres to the requirements of the Clean Water Act, Section 438 of the Energy Independence and Security Act, and Executive Orders 11988 and 11990.
4	Land Use and Range Operations – "incorporating the environmental contamination status and location data within the PEA, including Installation Restoration Program data. Proposed activities should avoid contaminated sites and monitoring wells. The EPA agrees with the Army's planned use of existing firing ranges and impact sites, where possible. Explosive residues and heavy metals associated with ranges can lead to long-term land use restrictions and costly cleanup requirements that restrict future land use."	Although not detailed in the PEA, the environmental contamination status and location data, including Installation Restoration Program data, were considered by installation staff as part of the real property management process prior to proposing facility locations to support M-SHORAD.
5	Biological Resources – "any additional conservation measures identified by the FWS during consultation be included in the Final EA	Each installation selected for fielding M-SHORAD would initiate coordination with the USFWS to ensure all required protective measures are observed when fielding the M-SHORAD.

	and/or Finding of No Significant Impact (FONSI)."	
6	Energy and Recycling – "divert recyclable materials such as concrete, steel, and asphalt away from landfills and repurpose the material instead. The appropriate NEPA document should also address potential environmental impacts to construction workers, to include the hazards of demolishing existing facilities, such as lead and asbestos latent materials. Please consider sustainable building practices that utilize variable forms of proven renewable energy and resource conserving technology."	This suggestion will be implemented to the maximum extent practicable.
7	Environmental Justice and Cultural Resources – "include correspondence with American Indian tribes within the final PEA. Consistent with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actionsaddress-environmental-justice), please ensure protected populations are not disproportionately or adversely impacted by the project. We also promote compliance with Executive Order 13166, *Improving Access to Services for Persons with Limited English Proficiency*, if applicable. Please	Project locations were reviewed using the EJSCREEN tool (https://www.epa.gov/ejscreen) as suggested. There would be no disproportionate negative impacts to children, economically disadvantaged populations, or minorities as a result of fielding M-SHORAD. Additional correspondence with affiliated Native American Tribes and State Historic Preservation Offices regarding Cultural Resources would be initiated at each installation selected for fielding M-SHORAD in compliance with current agreements.

	consider using the EJSCREEN tool (https://www.epa.gov/ejscreen) as part of the NEPA analysis process. EJSCREEN combines environmental and demographic data to help determine environmental justice concerns that are integral to the NEPA process."	
8	Alternatives Considered – "Please consider using the NEPAssist tool (https://www.epa.gov/nepa/nepassist), as part of the NEPA analysis process. NEPAssist combines multiple Geographic Information System (GIS) and internet databases to help screen for environmental concerns."	This suggestion will be implemented to the maximum extent practicable. Also note that Army installations maintain extensive GIS databases to screen proposed actions and prevent conflicts among competing installation requirements.
9	A generally negative comment was received for Fort Carson on behalf of a local organization of concerned citizens. The objections primarily related to use of the M-SHORAD at PCMS.	Specific objections are addressed in rows 10 through 20 of the table.
10	"PCMS does not meet the stated criteria for M-SHORAD stationing, necessary airspace and weapons training and should be immediately dismissed from further consideration."	The M-SHORAD would not field to PCMS as a stand-alone installation. Fielding M-SHORAD would place the permanent facilities, equipment, soldiers, and their families at Fort Carson. No new facilities to support M-SHORAD would be needed at PCMS. PCMS would be used as a training site with all training activities complying with any restrictions in place. If certain training activities, such as flight within restricted airspace above 10,000 feet, are precluded at PCMS they would be completed at Fort Carson. The combination of

		facilities at Fort Carson and PCMS would be used to complete the required training.
11	"The PEA does not adequately define the proposed action for PCMS individually, although significant, cumulative and irreparable impacts there are portended, and thus it is not a valid, meaningful NEPA document for PCMS activities."	Based on the restrictions in place at PCMS the training activities of the M-SHORAD battalion would be limited and would fall within those of the Stryker family of vehicles as assessed in the 2014 PCMS Training and Operations Environmental Impact Statement (2014 T&O EIS). Live fire would be limited to individual soldier weapons. The M-SHORAD could search for and track airborne targets with the radar but no firing of a missile or gun at the airborne target would be permitted. Fort Carson and PCMS, while separated geographically, are under a single command. The combination of the two sites allows the Army to meet the training requirements of the units and soldiers stationed at Fort Carson as well as Army Reserve, National Guard, and other service units in the geographic area. Training lands at Fort Carson and PCMS are controlled, scheduled, and maintained by the same entity, enhancing training opportunities. It must be noted that the Army "may" construct facilities to support the M-SHORAD; however, it is not a foregone conclusion. The M-SHORAD battalion is being fielded to Fort Carson, therefore any permanent battalion administrative and maintenance facilities would be constructed there, if required. No permanent facilities to support M-SHORAD would be constructed at PCMS since the battalion will execute training at PCMS but not field there. No funding has been appropriated for such facilities and no final plans have been made. Section 3.1.9.2 specifically states that tiered or supplemental analysis would be completed if required under any finalized construction plan. At

		that time the public would be able to review and comment on such actions in compliance with 32 CFR Part 651. Although figure 3.6-8 depicts an area designated an Impact Area along the western boundary of PCMS it is actually an aggregation of the multiple Surface Danger Zones associated with the existing Military Ranges One through Seven also depicted along the western edge of the location (2014 T&OEIS)[139] , Figure 2.2-9). The area depicted as an Impact Area allows for the use of ammunition up to .50 Caliber and 40 mm Training Practice grenades. Firing of missiles or rockets is not authorized within the depicted area. The increased use of maneuver lands by M-SHORAD at PCMS would be in alignment with the overall increase in maneuver training at the combined Fort Carson/PCMS facilities, estimated to be 4.84%, within the range of 3.07% to 5.76% stated in the PEA. Some of the M-SHORAD training will be required to take place at Fort Carson since it has the appropriate airspace required to take full advantage of the system capabilities. To alleviate scheduling conflicts at Fort Carson, as described by the commenter, the Army does have flexibility through the use of the Sustainable Readiness Model or the Regionally Aligned Readiness and Modernization Model, described in Section 2.2.1 of the PEA. Training at PCMS will not exceed 4.7 months per year (2014 T&O EIS, Table 2.2-1).
12	"The complete omission of consideration of PCMS environmental impacts is wholly	The 2014 T&O EIS provides the required 'hard look' at the potential impacts of the M-SHORAD at PCMS. The previous Council of

[139] The 2014 T&O EIS is referred to in the PEA as the 2015 PCMS EIS.

	unjustified in total reliance upon a 7-year-old EIS." "An EA requires a 'hard look' at environmental impacts." "A 'hard look' at PCMS must include recognition of the dark history of the Great Dust Bowl of the 1930s and the unique, senseless location taken by Army for PCMS."	Environmental Quality regulations which this PEA is being completed under allow incorporation of material by reference "to cut down on bulk without impeding agency or public review of the action" at §1502.21. Based on the restrictions in place at PCMS the training activities of the M-SHORAD battalion would be limited and would fall within those of the Stryker family of vehicles as assessed in the 2014 T&O EIS. Live fire would be limited to individual soldier weapons. The M-SHORAD could search for and track airborne targets with the radar but no firing of a missile or gun at the airborne target would be permitted. The Great Dust Bowl of the 1930's was an unfortunate combination of human and natural factors. Specific mitigation measures were adopted by the Army in the 2014 T&O EIS to eliminate or reduce the impacts to soils at PCMS. The Army has an ongoing Integrated Training Area Management (ITAM) program that manages, repairs, and mitigates the land disturbance that results from maneuver training. ITAM activities include, but are not limited to, repairing and revegetating maneuver damage, repairing ground hardening, implementing erosion control measures, and establishing temporary off-limits areas to allow ground stabilization. Also, as a wheeled vehicle, M-SHORAD training would occur predominately on established roads or trails, with small amounts in off-road areas designated for maneuver training throughout PCMS.
13	"The 2014 T&O EIS is wholly out of date." "16 U.S.C. §670a(b)(2); Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (March 23, 1981) (NEPA documents more than 5 years old must be	In 2018, we reviewed the impacts at PCMS, as required, and determined that the EIS was still valid and did not need to be supplemented. Furthermore, the passage in Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (March 23, 1981) cited by the commenter to support the assertion that the EIS is "out of date" is expanded upon in the next paragraph. "If an agency has made a substantial change in a proposed action that is

	re-examined to determine if supplementation is required due to passage of time and changed circumstances.)"	relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, a supplemental EIS must be prepared…" For this action there has not been a substantial change or significant new circumstances. This PEA analyzes the use of M-SHORAD Stryker vehicles and support equipment in a maneuver warfare scenario that would be part of the Armor Brigade Combat Team (ABCT) and Stryker Brigade Combat Team (SBCT) training analyzed in the 2014 T&O EIS, adding a small percentage of additional use that would not cause an exceedance of the current 4.7 months per year use limit at PCMS.
14	"Incorporating the 2014 EIS does not support a proposed Finding of No Significant Impact (FONSI) as it pertains to PCMS, because the EIS found impacts would be significant."	It is correct that the 2014 EIS[140] (ROD signed in 2015) finds that significant impacts would occur because of Army training at PCMS. Because training by the M-SHORAD unit would be within the parameters studied in the 2014 EIS, the significant impacts to which it would contribute were already analyzed. The M-SHORAD unit would not add any new significant impacts to PCMS. In order to eliminate or reduce the significant impacts noted in the 2014 T&O EIS the Army committed to specific mitigation measures. Those commitments remain in force and will be applicable during M-SHORAD training at PCMS. The Army has implemented the preferred alternative of the 2014 T&O EIS as documented in the May 2015 Record of Decision (ROD). In the

[140] Please note that the reference to the 2014 EIS here is the 2014 T&O EIS.

		intervening years the Army's mitigation measures have been effective in preventing significant impacts. There have been no reported violations of federal laws regarding soil loss, habitat loss at the landscape scale, ESA/BGEPA/MBTA unlawful take, or changes to the impairment status of surface or groundwater. Reports generated under the Range and Training Lands Assessment program show the mitigation measures implemented by the Army are effective. There has been an increase in native vegetation cover. Use of the M-SHORAD at PCMS would fall within the parameters stated in the 2014 T&O EIS and not negatively impact the required mitigation measures.
15	"Incorporating the old T&O EIS fails to recognize many changing circumstances since 2014." "Incorporating the stale T&O EIS results in Army's current PEA wholly failing to take into account the many changing circumstances at PCMS that are causing significant additional and ongoing impacts since that time."	This comment alludes to "many changing circumstances at PCMS that are causing significant additional and ongoing impacts…" without providing evidence of such changes. The Army has determined that the circumstances at PCMS remain as discussed in the 2014 T&O EIS and the 2018 REC. We reviewed the impacts at PCMS in 2018 and determined that the EIS was still valid and did not need to be supplemented. See discussion of the Record of Environmental Consideration (REC) of August 2018 in the response to comment 16, below.
16	"In 2014, plans to use PCMS as a regional training center were supposedly 'abandoned.' Then PCMS was secretly converted into a 'worldwide' training	PCMS is not—and never has been—a "regional training center." The addition of units and soldiers from other installations providing specific combat skills is standard Army practice when deploying and training. Adding subsets of soldiers and equipment from other installations to a

	center with increasingly frequent and intensified training nevertheless."	training event does not make PCMS a regional or worldwide training center. The primary focus of PCMS remains training of Fort Carson based units. The commenter specifically referred to the 2017 Operation Raider Focus. This exercise was conducted to prepare a Fort Carson based SBCT to deploy overseas. Units from Fort Hood, Fort Sill, and Fort Bragg were brought in to provide specific capabilities needed to complete training. As noted in the comment there were about 4,000 soldiers and 1,000 pieces of equipment at Raider Focus. This number is about the size of a SBCT listed in the in the 2014 T&O EIS (4,400 soldiers and 924 Strykers and other wheeled vehicles), in line with other SBCT training events, and consistent with the proposed action to train brigade-sized units adopted in the 2014 T&O EIS. The Army continues to use PCMS as described in the 2014 T&O EIS. The M-SHORAD at PCMS would maneuver with the ABCT or SBCT units as described in the 2014 T&O EIS. The M-SHORAD is a Stryker vehicle so, as stated in the 2014 T&O EIS, it would primarily stay on roads and trails. The conversion of an Infantry Brigade Combat Team (IBCT) to a SBCT at Fort Carson in 2019 was addressed in a Record of Environmental Consideration (REC) of August 2018. The REC reviewed the 2014 T&O EIS; the 2017 Integrated Cultural Resources Management Plan (ICRMP) and ICRMP Environmental Assessment (EA); after action reports for two SBCT exercises, Raider Focus (26 May to 19 June 2015) and Raider Focus II (11 April to 9 May 2017); and the 2018 Programmatic Agreement Amendment. The conclusion was - "training for a

		2SBCT/1ABCT configuration at PCMS is covered by existing NEPA documentation, specifically the 2015 EIS [141]. There are no substantial changes in the Army's proposed action that are relevant to environmental concerns, or that would produce a significant impact which has not already been considered by the 2015 EIS. The qualitative and quantitative intensity of training will remain within previously analyzed limits. Additionally, there are no significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts regarding the affected environment at PCMS." The commenter asserts that the Army promised to stay on existing roads and trails. The 2014 T&O EIS never "promised" to stay on existing roads and trails but stated in section 2.2.2.4 that "SBCT vehicles would primarily stay on roads and trails until they reach their objective and conduct dismounted training similar to IBCTs." M-SHORAD use at PCMS would primarily be in conjunction with an ABCT or SBCT exercise since the primary purpose of the M-SHORAD is to provide air defense to ABCT and SBCT units during maneuver.
17	"Experience shows that Army's promises to undertake environmental and cultural resource mitigation at PCMS were blithely blown off, resulting in regionally threatening damage, not disclosed to the public in the EIS and not since addressed."	Fort Carson Regulation 350-4 (FC Reg 350-4) requires Commanders and exercise participants at PCMS to maximize use of existing roads and trails but does not include an absolute prohibition on maneuvering off of existing roads and trails. FC Reg 350-4 guidelines seek to reduce damage to soils, when at all possible, by limiting training to trails, roads, and dismounted operations when soils are wet using a color code system.

[141] Please note that the reference to the 2015 EIS here is the 2014 T&O EIS.

		Before training when soils are wet the Commander must consider the following issues: 1) The necessity of training. 2) The criticality of the mission. 3) The current training status of the unit. 4) The relevance of the training to upcoming operational missions. As discussed in the 2018 REC; monitoring of cultural resources and historic properties is occurring, efforts are taken to resolve adverse effects, protective measures are being implemented, and Programmatic Agreements (PA) are being amended to reflect the current practice as agreed to by all parties to the PA.
18	"The PEA's suggestion that reasonably foreseeable developments, such as 'robot tanks' and hypersonic weapons testing, would be insignificant, when considered in association with M-SHORAD testing, has no bearing on PCMS, since the PEA did not consider current impacts to PCMS at all."	The PEA considered the impacts to PCMS through incorporation of the 2014 T&O EIS and the May 2015 ROD. Training and operations by the M-SHORAD battalion at PCMS would observe the same limits imposed by the 2014 T&O EIS and be subject to the same mitigation measures required in the ROD. Impacts from the M-SHORAD would be similar to those that have occurred so far as a result of Stryker maneuvering and training at PCMS. The reasonably foreseeable developments that are assessed in the PEA are either non-maneuvering systems or a one-for-one replacement for existing maneuvering systems. The 'robot tank' would be an optionally manned vehicle and replace systems such as the Bradley Fighting Vehicle or M113 Armored

		Personnel Carrier. Replacement equipment of similar size and capabilities fielded on a one-for-one basis is not expected to cause significant impacts. Such a replacement, however, would be subject to separate NEPA review. Systems like the hypersonic weapon train at fixed or semi-fixed sites and do not maneuver. If sent to PCMS for a training exercise, systems like the hypersonic weapon would set up at a location and not maneuver extensively. Also, due to the lack of an impact area such weapons would not complete live-fire training at PCMS. They are not expected to have significant impacts at PCMS since it is a maneuver training site.
19	"An old REC from 2018 or a follow-up REC now can't cure the deficiencies of no NEPA document exploring present-day impacts to PCMS."	The 2014 T&O EIS was assessed for the need for supplementation when the 2018 REC was completed. Fielding of the M-SHORAD battalion would not require exceeding the limits set in the 2014 T&O EIS or abandoning any mitigation measures and therefore is not a significant change. If a significant change were to occur to training and operations at PCMS the Army would assess the need to supplement the 2014 T&O EIS. However, to ensure the 2018 REC continues to account for all anticipated impacts—both between both 2014-2018 and 2018-present—we will conduct another review of the 2014 T&O EIS in 2023, prior to commencing any M-SHORAD training.
20	"Complete failure to consider mitigation shows the PEA is an atrociously inadequate NEPA document."	The PEA discusses mitigations and BMPs to minimize effects in Table 2.2-1. Table S-2 and Section 5 of the 2014 T&O EIS discusses the mitigations and BMPs that are being implemented to minimize effects of training at PCMS to less than significant.

		In this case, impacts from the proposed action, which incorporate current mitigations and BMPs, would not exceed impacts found in the 2014 T&O EIS.
21	A generally negative comment was received regarding Fort Riley on behalf of an affiliated Native American Tribe.	The commenters concerns are addressed in rows 22 through 25.
22	"I question the decision to determine a 'finding of no significant impact' (FONSI), for the proposed action. And to conduct only an environmental assessment (EA), rather than a full environmental impact statement (EIS)..." "The FONSI and EA are premature decisions."	The FONSI, at the time of review, is only a draft document. The Army is required to provide a draft of the FONSI for review by the public, other agencies, and affiliated Tribes. The Draft FONSI represents the initial findings of the Army and is not a final decision. The FONSI cannot be finalized and signed until all comments received are taken into account. If significant impacts to an installation were to be brought to the Army's attention during consultations and comments, the FONSI would be abandoned with respect to that installation and additional analysis could be undertaken. The two outcomes of an EA are a FONSI or a Notice of Intent to prepare an EIS if there are significant impacts. The FONSI is not a foregone conclusion of an EA, therefore, completing an EA is an appropriate first step for any major Federal action. The Army chose to prepare an EA because it did not anticipate that there would be unmitigable significant impacts from the proposed action.
23	"Section 106 Consultation Process instructs parties to consult, identify, evaluate, and determine effects, prior to the issuance of permits or expenditures of funds."	The PEA is not initiating the Section 106 Consultation Process. Additionally, there are no specific projects planned or funded in the PEA that might impact cultural resources, as the decision is related to which installation(s) the M-SHORAD would be fielded. If such actions were undertaken in the future, additional, site-specific analysis such as an

		assessment tiering from this PEA would occur. The NHPA Section 106 Consultation Process as well as compliance with all other required laws, EOs, and regulations would be part of the site-specific NEPA process.
24	"Has there ever been a traditional cultural property (TCP), survey/study of Fort Riley compounds?" "If a TCP study has not been conducted, it's impossible for me to inform you what our concerns or effects would be unless a Tribal TCP is conducted." "I suggest Fort Riley decision makers discuss this recommendation and offer us the opportunity to survey the facility."	Installations conduct the identification of historic properties, to include TCPs, under the NHPA Section 106 or 110. Therefore, the decision maker for the PEA cannot address this matter through the NEPA review process. Instead, the matter will be addressed directly by installation staff, separate from this PEA. Fort Riley is currently undertaking the initial steps to complete a TCP survey with their affiliated Tribes.
25	"Your President issued Executive Order 14008 addressing the "Climate Crisis" and how all federal agencies will contribute, with Tribal involvement. The meeting in December with Tribes and federal agencies, including ACHP, brought out the inclusion of sacred sites into the EO 14008. How will a premature FONSI and a simple EA comply with this order?"	Executive Order 14008 Tackling the Climate Crisis at Home and Abroad requires a broad array of considerations and actions by all Federal agencies including: Use of the Federal Government's Buying Power and Real Property and Asset Management; and Securing Environmental Justice and Spurring Economic Opportunity. The Army is committed to mitigating the effects of the "Climate Crisis." Implementing the Army Climate Strategy will utilize the Army's buying power and real property and asset management to improve our defense capabilities and become a more efficient force, while securing a better future.

		Fielding the M-SHORAD does not disproportionately affect environmental justice communities since there will be only negligible impacts on all communities. Fielding the M-SHORAD supports economic opportunity by providing employment opportunities to disadvantaged communities. Identification and assessment of impacts to sacred sites, to include all required consultation, would occur through compliance with Section 106 and 110 of the NHPA as well as government-to-government discussions if Fort Riley were selected for this unit.