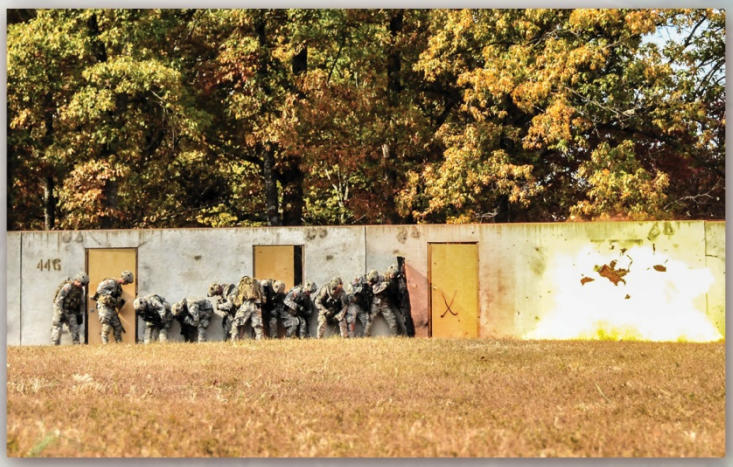
U.S. ARMY GARRISON FORT CAMPBELL, KENTUCKY

TRAINING MISSION AND MISSION SUPPORT ACTIVITIES FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

October 2015



Prepared for:

U.S. ARMY ENVIRONMENTAL COMMAND

and

U.S. ARMY GARRISON FORT CAMPBELL

Prepared by:

POTOMAC-HUDSON ENGINEERING, INC.
9801 Washingtonian Boulevard, Suite 350, Gaithersburg, Maryland 20878
Tel 301.907.9078 www.phe.com

PHE

This page intentionally left blank

S. SUMMARY

S.1 Introduction

Fort Campbell is preparing this programmatic environmental impact statement (PEIS) in compliance with their responsibilities under the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) to assess the potential direct, indirect, and cumulative impacts to environmental and socioeconomic resources resulting from the continued training mission and proposed mission support activities at Fort Campbell.

S.2 Installation Setting and Mission

Fort Campbell is comprised of 105,068 acres between Montgomery and Stewart counties in Tennessee, and Christian and Trigg counties in Kentucky. Approximately two-thirds of the installation's total land use is in Tennessee. Clarksville, Tennessee and Hopkinsville, Kentucky are the towns nearest to the installation, and the closest major urban area is Nashville, Tennessee, which is located approximately 50 miles to the southeast. Figure S-1 depicts Fort Campbell's physical setting and location. The four-county region surrounding Fort Campbell has a diversified economy with major sectors, including agriculture, manufacturing, government, and retail and wholesale trade.

Fort Campbell represents a community of over 40,000 people comprised of military and civilian personnel. Fort Campbell is an Installation Management Command (IMCOM) installation that is home to the 101st Airborne Division (Air Assault), the 5th Special Forces Group, 160th Special Operations Aviation Regiment (SOAR), and other tenant units. The mission of Fort Campbell is primarily to support and train the units stationed on the installation in preparation for a variety of assigned combat and combat-related missions. In addition, the installation supports the training of other Department of Defense (DoD) units, Reserve Component units, and governmental agencies.

Fort Campbell provides the following four major functions in its role of supporting the training of Soldiers and units:

- Fort Campbell supports all units that train on the installation and also supports various off-installation government agencies.
- Fort Campbell supports the Non-Commission Officers Academy.
- Fort Campbell coordinates activities for select U.S. Army Reserve and U.S. Army National Guard Commands.
- Fort Campbell is a major mobilization site for U.S. Army, U.S. Army Reserve, and U.S. Army National Guard units.

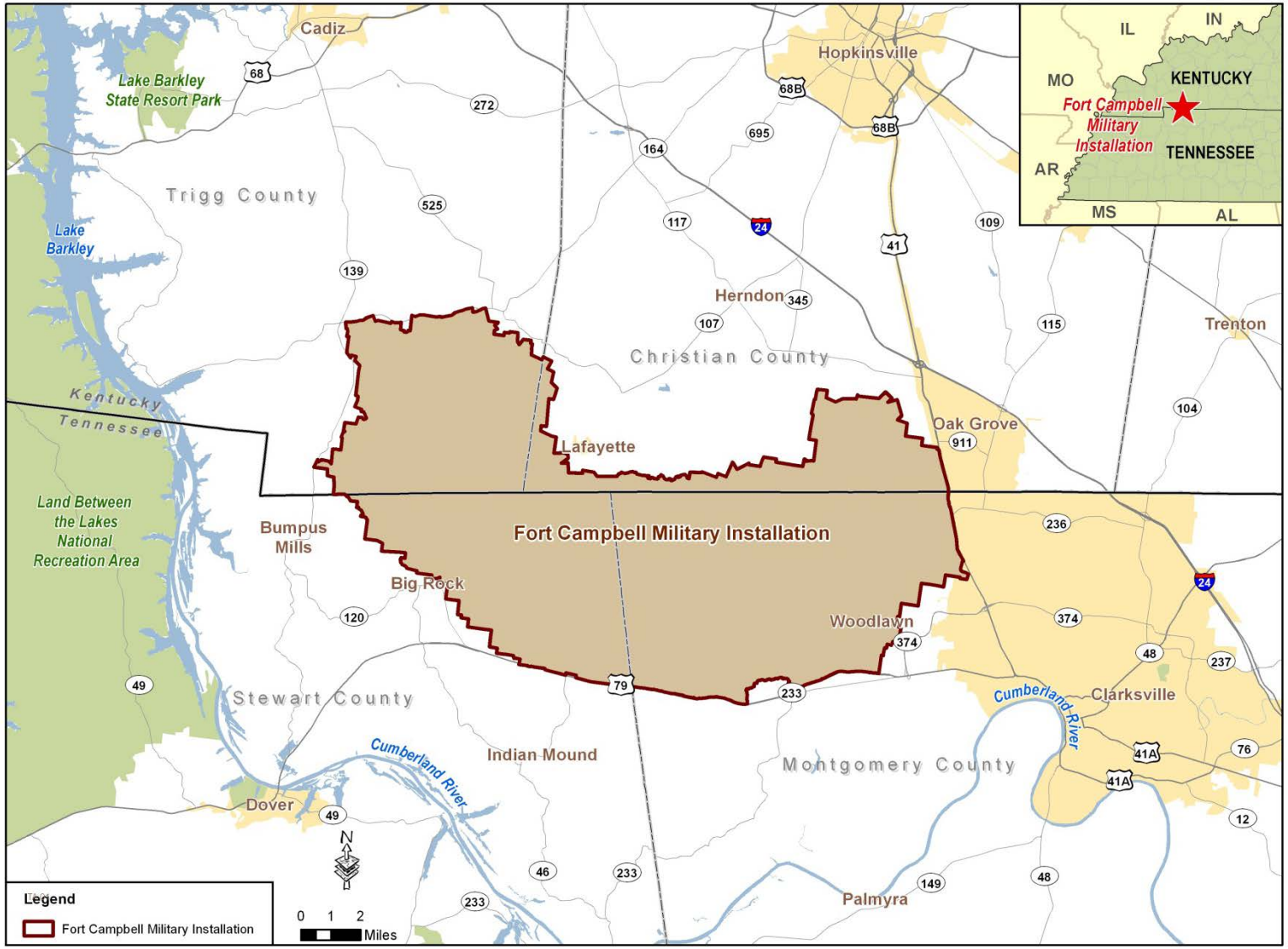


Figure S-1. Fort Campbell Physical Setting and Location

S.3 Purpose of and Need for the Proposed Action

The purpose of this document is to streamline the NEPA analysis process, to avoid the unnecessary and costly duplication of efforts, and to allow Fort Campbell to adapt to changing and continually evolving Soldier training requirements and equipment, while ensuring that a thorough NEPA analysis is conducted for each action. Under NEPA regulations, a broad, programmatic EIS (PEIS) that covers an entire program or policy, and in this specific instance, the continuation of Fort Campbell's ongoing mission, allows for the tiering of future NEPA documentation in cases where future decisions or unknown future conditions preclude complete NEPA analysis in one step (32 CFR 651.27).

A Fort Campbell installation-wide mission evaluation was last performed in 1981 and documented in the EIS. It was titled *101st Airborne Division (Air Assault) and Fort Campbell, Kentucky Final Environmental Impact Statement Installation Ongoing Mission* (Fort Campbell, 1981). Since then, there have been numerous advances to the type of Soldier training, equipment, and units that train at Fort Campbell. Recent Army-wide mission changes (i.e., Army Transformation, Modularity, Grow the Army) have occurred at Fort Campbell, which has resulted in various stationing actions (growth) since 2004. These specific actions have been analyzed in previous NEPA documentation.

Although these evolutions have occurred in compliance with federal regulations, statutes, and Executive Orders (EOs), Fort Campbell is conducting an update to the 1981 Installation Ongoing Mission EIS. This update looks at the environmental effects of continuing the ongoing mission of Fort Campbell, efforts to modernize and improve facilities, as well as proposed enhanced environmental procedures aimed at increasing efficiency. The following are Fort Campbell's five primary objectives:

1. Help meet the primary range complex objectives outlined within the RCMP through the creation of modern facilities or upgrades to existing training infrastructure.
2. Help meet the primary training land objectives outlined within the RCMP through the creation of training infrastructure or upgrades to existing training infrastructure.
3. Streamline the review of routine range and training land actions.
4. Provide the airspace necessary to train units at Fort Campbell and to reduce scheduling conflicts.
5. Meet requirements of the Sustainable Range Program (SRP) and foster environmental stewardship.

S.4 Decisions to be Made and Framework for Analysis

This PEIS evaluates the direct, indirect, and cumulative effects of the five Proposed Action Alternatives and the No Action Alternative. It was prepared in accordance with the NEPA of 1969 (42 United States Code [USC] 4321 et seq.), Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500-1508, *Protection of Environment*), the Army's own NEPA regulation (32 CFR Part 651, *Environmental Analysis of Army Actions*), and the NEPA Analysis Guidance Manual (USAEC, 2007).

This PEIS provides the decision-maker and public with an analysis of the potential environmental consequences of the No Action Alternative as well as each of the alternatives for the Proposed Action. The decision-maker will take into account economic, environmental, and social impacts, as well as each alternative of the Proposed Action's ability to meet the purpose and need and associated objectives. The decision-maker may choose to implement more than

one of the Proposed Action Alternatives, as each alternative would satisfy a specific need that would help meet Senior Commander training requirements.

The decision involves the selection of which alternatives, if any, would be implemented for the update to Fort Campbell's ongoing training mission. Alternatively, the decision-maker could decide to take no action. Thus, training would continue at Fort Campbell without the incorporation of the proposed updates to Fort Campbell's training infrastructure and activities.

The Proposed Action programmatically evaluates the reactivation of Fort Campbell controlled airspace; however, no formal request has been submitted to the Federal Aviation Administration (FAA). Any changes to airspace would require FAA approval per JO 7400.2J, *Procedures for Handling Airspace Matters*, a process that would require additional time, public comment, and review. During the formal request process, an additional NEPA document would be prepared, based on the official request for change of airspace designation with the FAA, and tiered off from this PEIS. The programmatic analysis in this PEIS would be part of the basis for Fort Campbell's formal request to the FAA for changes to airspace.

S.5 Proposed Action Alternatives

The Proposed Action proposes to take the necessary actions, including range construction, modernization, and maintenance, as well as land management activities, to support high quality training at an environmentally sustainable Fort Campbell. The Proposed Action involves four distinct and separate alternatives and one alternative combining two or more separate alternatives:

- Alternative 1 – Site-specific Projects in Support of Soldier Training
- Alternative 2 – Create Adaptable Use Zones (AUZs) to Facilitate Future Modernization and Range Facility Construction.
- Alternative 3 – Implement Routine Range and Training Land Actions and Environmental Stewardship Practices.
- Alternative 4 – Evaluate the Reactivation of Installation Controlled Airspace.
- Alternative 5 – Implement Two or More Proposed Action Alternatives.

S.6 No Action Alternative

Under the No Action Alternative, the decision-maker would elect not to implement any of the Proposed Action Alternatives described in this PEIS. Management of Fort Campbell ranges and training lands would continue under the existing conditions. Range maintenance, upgrades, and construction activities would occur in accordance with existing procedures. The training conducted at Fort Campbell by DoD units and other federal, state, and local agencies would continue.

S.7 Designation of the Army Preferred Alternative

The Army has identified Alternative 5 as its Preferred Alternative. This was based on information in this PEIS as well as factors relating to the Fort Campbell training mission and the purpose and need. Any of the alternatives, however, could ultimately be selected, including the No Action Alternative. All of the other action alternatives would meet a component of the purpose and need, but the No Action Alternative would not.

S.8 Alternatives Considered but Dismissed

The following alternatives were determined not to be viable or reasonable. These alternatives could not be implemented in a manner consistent with the intended purpose of the action, could not be implemented within the scope of Fort Campbell's legal authority, and/or would not be economically and technologically feasible.

- Total Closure of Fort Campbell.
- Mission Realignment or Modification (e.g., replacing the 101st Airborne Division with another DoD activity).
- Creation of New Small Arms Range Complexes Off Installation Lands.
- Use of Simulations Instead of Construction of Modernized Ranges.
- Travel to and Use of Other Installations' Ranges and Training Lands.

S.9 Stakeholder Outreach

The Army invites public participation in the proposed federal action through the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. All agencies, organizations, and members of the public with a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, and are urged to participate in the decision-making process. The FAA is participating as a cooperating agency in the preparation of this PEIS.

S.9.1 PUBLIC AND AGENCY COORDINATION

On January 18th, 2013, the Army issued a Notice of Intent (NOI) in the *Federal Register* to prepare a PEIS for the U.S. Army Garrison Fort Campbell, Kentucky for the Training Mission and Mission Support Activities and Supporting Studies. The NOI initiated the public scoping period (January 18th to March 1st, 2013), during which members of the public (including Federal, state, and local agencies, affected Federally-recognized Indian tribes, and other interested persons) were invited to comment on the proposed scope and content of the PEIS. The NOI was followed by two public scoping meetings, which took place on February 10th and 11th, 2013. Due to airspace concerns expressed by the public during public scoping meetings, an additional airspace meeting was held on March 4th, 2013, and the comment period on airspace concerns was extended to April 4th.

During the public scoping period, comments from all interested persons were considered in preparation of the Draft PEIS to promote open communication and enable better decision-making. Comments generally addressed potential effects regarding the proposed changes to airspace and detrimental effects to surrounding private airfields.

Following the scoping period, a Draft PEIS was prepared and filed with the U.S. Environmental Protection Agency (USEPA), and the Army published a Notice of Availability (NOA) in the *Federal Register* and in newspapers in the vicinity of the Proposed Action that announced the availability of the Draft PEIS. The announcement of the NOA in the *Federal Register* began the start of a 45-day comment period (January 16th to March 2nd, 2015). During the 45-day comment period, a public meeting was held on February 10th, 2015 at the Holiday Inn Express in Oak Grove, Kentucky to provide an opportunity for the public, organizations, and regulatory agencies to present comments and request information on the Draft PEIS.

The Army has considered all comments submitted by individuals, agencies, or organizations. Following review of comments and appropriate revisions, the Final PEIS was filed with the USEPA and made publically available through a NOA publication in the *Federal Register*. A final decision on the Proposed Action (documented in a Record of Decision [ROD]) may be made after a 30-day waiting period. A ROD is a public document that states the decision, alternatives and factors considered, and the proposed mitigation adopted. The NOA of the ROD is published in the *Federal Register*. Upon signature of the ROD, the Army can begin to implement the decision (32 CFR 651.45(j)(2)).

Fort Campbell has been available throughout the process to answer questions about the scope, status, and progress of the PEIS. Contact information is:

Mr. Gene Zirkle, Fort Campbell NEPA Program Manager
270-798-9854 or by email, Gene.a.zirkle.civ@mail.mil

S.10 Environmental Consequences

During preparation of the PEIS, and in compliance with CEQ regulations (40 CFR Part 1500.1(b) and 1500.4(b)), it was determined the following valued environmental components (VECs) would have negligible adverse environmental effects, and therefore, were dismissed from full analysis within the document: energy, facilities, land use, socio-economics and Environmental Justice, wetland resources, and wildfire management. Section 4.2.2 contains a brief analysis and justification for VEC dismissal from further analysis. Those VECs retained for further analysis within the PEIS and summarized within this section include airspace, noise, air quality and greenhouse gases (GHGs), soils, water resources, biological resources, cultural resources, traffic and transportation, and hazardous and toxic substances.

Table S–1 at the end of this section presents a summary of the overall environmental consequences of the five Proposed Action Alternatives (Alternatives 1 through 5) and the No Action Alternative. The characterizations of the effects presented in Table S-1 represent the greatest potential impacts expected for each resource area from the implementation of each alternative. The comparison of the potential impacts provides a tool to assess the overall impacts for each alternative. Implementation of either the No Action Alternative or the Proposed Action Alternatives would result in some degree of adverse effects on most environmental resources analyzed in the PEIS. As shown in Table S-1, cumulative impacts by resource vary; however, all are anticipated to be less than significant. A detailed analysis of cumulative effects is discussed in Chapter 5.

S.10.1 AIRSPACE

Less than significant impacts would occur from the No Action Alternative. Increased airspace usage is anticipated as units redeploy from the theater back to the home station, which would require adjustment and deconfliction planning by Fort Campbell airspace scheduling.

Alternative 1 would result in the use of Saunders Landing Zone (LZ) to support modified airspace operations. This would increase airspace use and require an approach departure control surface that would conflict with existing Fort Campbell airspace designations and operations in the vicinity of Saunders LZ. Moderate impacts to flight safety within Fort Campbell airspace would occur. Minor impacts would occur to private/civilian aircraft operations.

Alternative 2 would result in modernization and range facility construction, including establishment, construction, and improvement of air operation features (i.e., drop zones (DZs), LZs, runways). This could result in conflicts between Fort Campbell training operations and airspace use. Increased airspace use would have beneficial impacts (i.e., with Suckchon DZ) to moderate impacts. Minor interferences with commercial/private aviation and obstructions in

visibility would also occur, primarily with Veghel DZ and Training Area (TA) 52. Potential impacts to flight safety and conflicts with training activities could occur from the modification of use at Indian Mound LZ. The implementation of all AUZ options could result in conflicts between the use of each AUZ, should they be utilized simultaneously.

Alternative 3 would have no impacts to airspace.

Alternative 4 would have a beneficial impact on flight safety as it would result in the reactivation of restricted airspace, which would allow for expanded training opportunities.

Alternative 5 would result in the implementation of two or more alternatives, which, depending on the combination of alternatives implemented, could result in increased airspace conflicts among military aircraft training operations. Alternative 4 in combination with any other alternative would result in beneficial impacts.

S.10.2 NOISE

No changes would result to the noise environment from the No Action Alternative. Therefore, no adverse impacts are anticipated.

Noise from construction and Army training activities under the Proposed Action Alternatives may have short- and long-term minor effects on the noise environment. These effects would be similar, regardless of the alternative chosen. All proposed range construction and training projects would occur well within the installation boundary and would not contribute to appreciable noise off-post. Limited truck and worker traffic may be audible at some nearby on-post locations. Given the temporary nature of the proposed construction activities and the limited amount of noise that heavy equipment would generate at these distances, these impacts would be negligible.

Furthermore, none of the alternatives would result in changes to live fire training activities, use of weaponry, demolitions, or aircraft operations. Therefore, there would be no long-term changes to the existing training noise environment or noise contours associated with these activities. Traffic patterns and corresponding noise levels along on-post roadways and trails would change to accommodate incremental changes in training. Traffic volumes and vehicle speeds are low for these types of roadways, and noise increments attributable to changes in traffic would be barely perceptible. These effects would be minor.

At this time, the Army is uncertain as to the exact nature of training that would occur within the AUZs proposed under Alternatives 2 and 5. In general, the nature and the overall level of noise associated with these activities would be similar to those under existing operations. The training noise resulting from live fire activities or expanding fixed-wing operations could disturb communities along the perimeter of the installation, constituting significant adverse effects. Subsequent NEPA analysis and comprehensive noise modeling would be conducted, where necessary, to determine the effects of specific activities.

S.10.3 AIR QUALITY AND GREENHOUSE GASES

No changes would result to air quality or GHGs under the No Action Alternative or under Alternative 4; therefore, no adverse impacts are anticipated.

Airborne dust and other air pollutants from construction and Army training activities under Alternatives 1, 2, 3 and 5, may have short- and long-term minor effects on air quality and GHGs. Short-term effects would result from the generation of airborne dust and other pollutants during construction, and long-term effects would result from the introduction of new stationary sources of pollutants, such as generators. Air quality effects would be minor unless the emissions were to exceed the General Conformity Rule (GCR) *de minimis* (of minimal importance) threshold

values or the GHG threshold in the draft CEQ guidance, or were to contribute to a violation of any Federal, state, or local air regulation.

S.10.4 SOILS

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in the potential for adverse impacts to soil resources, primarily in the form of soil erosion. Existing Army management of soils at Fort Campbell would continue to reduce the adverse effects of military training.

Alternative 4 would not involve any ground disturbance; therefore, no impacts to soils are anticipated. Alternatives 1 and 5 would have the potential for moderate adverse impacts associated with site-specific construction in “at-risk” (highly erodible and sloped) soils. Due to both the small footprint size and lack of slope, however, soil erosion potential would be less than significant.

Construction and operational disturbance potential to “at-risk” (highly erodible and sloped) soils from construction and Army training activities under Alternatives 2, 3 and 5 has the potential for significant adverse impacts. Disturbance to at-risk soils could potentially cause considerable erosion, which may not be adequately addressed through common environmental stewardship guidelines or the Integrated Training Area Management (ITAM) program. The potential for significant adverse effects would be reduced through the implementation of the mitigation measures listed in Table S-2.

S.10.5 WATER RESOURCES

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in the potential for adverse impacts to water resources, primarily in the form of sedimentation into surface waters. Existing Army management of water resources, including the use of vegetated buffers along streams, would continue to reduce the adverse effects of military training.

Alternative 4 would not involve any ground disturbance; therefore, no impacts to water resources are anticipated. Alternatives 1 and 5 would have the potential for moderate adverse impacts to water quality during construction, associated with the proposed Gravel Foot March Trail, which is located partly in the Dry Fork Creek (East) watershed and partly in the Noah’s Spring Branch watershed. Both streams are listed on the Kentucky Division of Water’s impaired waters list. Additionally, the proposed glide slope vegetation clearing associated with Saunders Runway would increase the potential for sedimentation as the site is cleared and revegetated. The erosive nature of the soil at this site and the close proximity of the project to Saline Creek tributaries could cause moderate impacts to the stream due to sedimentation.

Construction and operational disturbance potential to “at-risk” (highly erodible and sloped) soils from construction and Army training activities under the Alternatives 2, 3 and 5 has the potential for significant adverse impacts. Disturbance to at-risk soils could potentially cause considerable erosion, as well as sedimentation into surface waters, which may not be adequately addressed through common environmental stewardship guidelines or the ITAM program. The potential for significant adverse effects would be reduced through the implementation of the mitigation measures listed in Table S-2.

S.10.6 BIOLOGICAL RESOURCES

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in the potential for adverse impacts to biological resources. Existing Army management of biological resources, including measures

outlined in the Integrated Natural Resources Management Plan (INRMP), would continue to reduce the adverse effects of military training.

Alternative 4 would not involve any ground disturbance. Thus, air activities are not anticipated to adversely affect bird or bat populations. No adverse impacts to biological resources are anticipated.

Construction disturbances would adversely impact (reduce) vegetation and wildlife habitat and could temporarily impair water quality (aquatic habitat) under Alternatives 2, 3 and 5. Additionally, vegetation clearing could adversely impact migratory bird nests if conducted during the nesting season. Tree clearing activities could also result in the incidental take of Indiana bats if conducted during the roosting season. Preliminary findings of a Biological Assessment being prepared as part of this PEIS indicate “no effect” anticipated for the Indiana and gray bats. Overall adverse impacts, however, would be reduced to less than significant through implementation of mitigation measures listed in Table S-2.

Alternatives 2 and 5 assume a worst-case scenario, in which all areas within the proposed AUZ are impacted by future Fort Campbell range development activities. Full development of each of these AUZs would likely result in significant adverse impacts to biological resources due to the extensive loss of habitat, including interior forest, natural barrens and grasslands, and riparian zones. The potential for significant adverse effects would be reduced through the implementation of the mitigation measures listed in Table S-2.

S.10.7 CULTURAL RESOURCES

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in the potential for adverse impacts to cultural resources. Existing Army management of cultural resources, including measures outlined in the Integrated Cultural Resources Management Plan (ICRMP), would continue to reduce the potential for adverse effects from military training.

Alternative 4 would not involve any ground disturbance; therefore, no impacts to cultural resources are anticipated.

With the exception of the Saunders Drop Zone (DZ) project, all other site-specific projects associated with Alternatives 1 and 5 would have no impacts, as these locations have been surveyed and no cultural resources are located within the proposed project footprints. Ground-disturbing activities related to the construction (vegetation clearing) of the glide slopes at the Saunders DZ have the potential to cause adverse effects to two National Register of Historic Places (NRHP) eligible archaeological sites (40SW0496 and 40SW0503/0504) through potential soil disturbances from logging equipment.

Ground-disturbing activities within five AUZs under Alternative 2 and 5 (TA 11, TA 20, TA 52, Suckchon DZ, and Veghel DZ) have the potential to cause adverse effects to cultural resources. All five contain NRHP-eligible archaeological sites. Cemeteries are also located in four of the areas (all except Veghel DZ).

Routine activities proposed under Alternative 3 and 5 have the potential to cause adverse effects to cultural resources, especially those activities that are conducted in areas that have not been previously surveyed for cultural resources.

Overall adverse impacts from the implementation of any alternative would be reduced to minor through the implementation of the mitigation measures listed in Table S-2.

S.10.8 TRAFFIC AND TRANSPORTATION

No changes would result to traffic and transportation under the No Action Alternative or under Alternative 4; therefore, no adverse impacts are anticipated.

Alternatives 1, 2, 3 and 5 would have short- and long-term minor adverse effects. Short-term effects would occur due to increases in construction-related traffic. Long-term effects would occur due to small changes in on-post traffic leading to the training areas where the site-specific projects would occur. There would be no effects to air, rail, barge, or public transportation.

S.10.9 HAZARDOUS AND TOXIC SUBSTANCES AND WASTE

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. There would be no change to the type and quantity of hazardous materials and toxic substances used and generated at Fort Campbell. Fort Campbell would continue programs to reduce wastestreams at the installation and would continue to manage hazardous materials and hazardous waste in accordance with all applicable Federal, state and Army regulations. Adverse impacts would be minor.

Alternative 4 would involve modification to airspace; no hazardous and toxic materials or waste would be produced. As a result, no adverse impacts would be anticipated.

Alternatives 1, 2, 3, and 5 all have the potential for significant adverse impacts. Each involves a component within the impact areas where spent ammunition and unexploded ordnance (UXO) may exist, or where depleted uranium (DU) could be present, as Davey Crockett rounds were once tested at Fort Campbell. Overall adverse impacts, however, from the implementation of any alternative would be reduced to minor through the implementation of the mitigation measures listed in Table S-2.

S.10.10 Summary of Environmental Effects

Table S-1 presents a summary of the environmental consequences of the alternatives analyzed in this PEIS. The shaded cells within the table indicate the overall intensity of impact anticipated with the implementation of each alternative. The arrows in the table indicate the reduction of impacts through the implementation of mitigation measures (see Table S-2).

Table S-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Airspace				
No Action		■		
Alternative 1	■ →	■		
Alternative 2[1]	■ →	■		
Alternative 3				■
Alternative 4			■	
Alternative 5[1]	■ →	■		
Cumulative		■		

[1] Significant airspace impact to military operations would only be associated with the Indian Mound Landing Zone (LZ) AUZ; see Table S-2 regarding mitigation measures. The other AUZs would be anticipated to have no greater than moderate adverse impacts.

Table S-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Noise				
No Action				■
Alternative 1			■	
Alternative 2			■	
Alternative 3			■	
Alternative 4			■	
Alternative 5			■	
Cumulative			■	
Air Quality and GHG				
No Action				■
Alternative 1			■	
Alternative 2			■	
Alternative 3			■	
Alternative 4				■
Alternative 5			■	
Cumulative			■	
Soils				
No Action			■	
Alternative 1		■		
Alternative 2[2]	■ →	■		
Alternative 3	■ →	■		
Alternative 4				■
Alternative 5	■ →	■		
Cumulative		■		
Water Resources (Surface Waters and Floodplains)				
No Action			■	
Alternative 1		■		
Alternative 2[3]	■ →	■		
Alternative 3		■		
Alternative 4				■
Alternative 5	■ →	■		
Cumulative		■		

[2] Impacts to soils would be reduced to less than significant levels; see Table S-2 regarding mitigation measures.
[3] Impacts to surface water quality would be reduced to less than significant levels; see Table S-2 regarding mitigation measures.

Table S-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Biological Resources (Vegetation)				
No Action			■	
Alternative 1		■		
Alternative 2[4]	■ →	■		
Alternative 3		■		
Alternative 4				■
Alternative 5[4]	■ →	■		
Cumulative		■		
Biological Resources (Wildlife and Aquatic Life)				
No Action			■	
Alternative 1		■		
Alternative 2[4]	■ →	■		
Alternative 3		■		
Alternative 4				■
Alternative 5[4]	■ →	■		
Cumulative		■		
Biological Resources (Threatened and Endangered Species)				
No Action			■	
Alternative 1[5]	■ →		■	
Alternative 2[5]	■ →		■	
Alternative 3[5]	■ →		■	
Alternative 4				■
Alternative 5[5]	■ →		■	
Cumulative			■	
Cultural Resources				
No Action			■	
Alternative 1[6]	■ →		■	
Alternative 2[6]	■ →		■	
Alternative 3[6]	■ →		■	
Alternative 4				■
Alternative 5[6]	■ →		■	
Cumulative			■	

[4] Impacts to vegetation and wildlife associated with AUZ development would be reduced to less than significant levels; see Table S-2 regarding mitigation measures.
[5] Impacts to Indiana and gray bats would be avoided; see Table S-2 regarding mitigation measures.
[6] Impacts to archaeological sites and cemeteries would be avoided; see Table S-2 regarding mitigation measures.

Table S-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Traffic and Transportation				
No Action				■
Alternative 1			■	
Alternative 2			■	
Alternative 3			■	
Alternative 4				■
Alternative 5			■	
Cumulative			■	
Hazardous and Toxic Substances				
No Action			■	
Alternative 1[7]	■ →	→	■	
Alternative 2[7]	■ →	→	■	
Alternative 3[7]	■ →	→	■	
Alternative 4				■
Alternative 5[7]	■ →	→	■	
Cumulative			■	

S.11 Proposed Mitigation

Table S-2 identifies proposed mitigation measures to address uncertainties regarding the level of effects of the Proposed Action.

Table S-2. Proposed Mitigation

Airspace	Alternative
• Close Air Support training operations at the Military Operation in Urban Terrain site and operations of the proposed Saunders LZ would be deconflicted by Eagle Radio Airspace Information Center.	1, 5
• Careful scheduling, aircraft control or limitation of usage of the AUZ training assets would be performed to reduce military airspace congestion.	2, 5
• The placement and orientation of future facilities within the AUZs would be given careful consideration to reduce the creation of airspace and ground training conflicts.	2, 5
While selection of Alternative 4 would enable Fort Campbell to submit a formal request to FAA regarding airspace changes, all modifications to airspace and subsequent mitigation measures would be determined during the formal request process and would be subject to FAA approval.	4

[7] Impacts to potentially-contaminated sites would be avoided; see Table S-2 regarding mitigation measures.

Table S-2. Proposed Mitigation

Noise	Alternative
• As training activities, infrastructure, and facilities are proposed in the future, subsequent NEPA analysis and comprehensive noise modeling would be conducted, where necessary, to determine the specific impacts of those activities. Mitigation measures, if required, would be determined at that time.	2, 4, 5
• Firing points in TAs 06, 07, 08A and 08B would be located at least 3,500 feet (1,067 meters) from the installation boundary. At this distance, the firing points would not appreciably affect the overall noise environment outside of Fort Campbell, and the effects would be less than significant under NEPA. If firing points in TAs 06, 07, 08A and 08B were established within 3,500 feet (1,067 meters) of the installation boundary, subsequent NEPA analysis and comprehensive noise modeling would be conducted.	4
Air Quality	**Alternative**
• No mitigation measures for air quality would be required under the current alternatives. Compliance with existing regulations, permits, and plans would be required for activities associated with training activities, infrastructure, and facilities proposed in the future, which would reduce the level of effect to less than significant.	All
Soils	**Alternative**
• No mitigation measures for soils would be required. Compliance with existing regulations, permits, and plans (e.g., stormwater pollution prevention plans [SWPPPs], ITAM Program) would be required for construction and training activities.	No Action, 1, 4
• Land-disturbing activities within the proposed AUZs, when possible, would be limited to the least erodible soil types (e.g., non-highly erodible land, lower sloping soils) to avoid at-risk soils. In particular, construction of maneuver trails would be avoided in these areas.	2, 3, 5
Water Resources	**Alternative**
• No mitigation measures for water resources would be required. Projects would be conducted in compliance with Federal and state regulations including, as necessary, the preparation of site-specific SWPPPs and National Pollution Discharge Elimination System (NPDES) permits prior to construction.	No Action, 1, 3, 4
• Low impact development measures (vegetated buffers, biorentention, dry wells, infiltration trenches) would be incorporated into project design as necessary to reduce stormwater runoff velocities and sedimentation into adjacent waterways.	2, 5
Biological Resources	**Alternative**
• Vegetation clearing would be conducted outside of the migratory bird season (April 1 – July 15 for forest clearing and April 15 – August 31 for brush or grassland clearing) to avoid impacts to nesting birds.	No Action, 1, 2, 3, 5
• Removal of trees would be restricted to the west of Indian Mound and Grant roads to times of the year when the Indiana bat is not roosting (15 March to 15 November), to avoid harm to roosting Indiana bats. In addition, Fort Campbell could follow its single tree removal procedures for Indiana bat roosting habitat protection.	No Action, 1, 2, 3, 5

Table S-2. Proposed Mitigation

• Northern long-eared bat roosts would be protected in accordance with the Programmatic Informal Consultation on the northern long-eared bat with the USFWS under Section 7 of the Endangered Species Act. Fort Campbell would use the Army's Programmatic Informal Consultation for the northern long-eared bat when screening each upcoming construction project, and would conduct local Section 7 Consultation for any project that does not meet the criteria for "Not Likely to Adversely Affect".	No Action, 1, 2, 3, 5
• Other than clearcuts prescribed for the management of forest pests or sanitation cuts, clearcuts in the Casey Creek, Saline Creek, Fletcher's Fork, Jordan, and Piney Fork Creek subwatersheds would be minimized to blocks no larger than 20 acres to preserve foraging areas and roost caves used by gray bats.	No Action, 1, 2, 3, 5
• During design, overall disturbance to biological resources would be limited to maintain ecological functions. Reduction of overall footprints of disturbance and maintaining ecological functions would reduce the potential for invasive species establishment. In addition, where feasible, Fort Campbell would focus development within lower quality habitat areas (degraded habitat due to military training, on-going maintenance, and agricultural lease activities) and preserve higher functioning habitat (e.g., natural barrens and grasslands, mature forest, and riparian zones).	2
• Vegetation loss within the AUZs would occur over time. As areas within the proposed AUZs become developed, range planners would avoid and minimize removal of vegetation on a project-by-project basis, and employ the necessary environmental stewardship guidelines (Appendix F) to minimize the possibility of vegetation loss on a regional basis and prevent the elimination of local populations of rare or sensitive plant species (if found present), implement invasive species control measures, and avoid segmentation of vegetation (habitat), which could cause a significant adverse impact to wildlife.	2
Cultural Resources	**Alternative**
• Impacts to the two potentially eligible archaeological sites at Saunders DZ would be avoided during clearing activities through manual hand-clearing techniques.	1
• Known archaeological sites and cemeteries would be avoided during the siting of future facilities and training areas.	2, 3
• Known cultural sites would be protected and managed according to the ICRMP.	All
• If unavoidable, mitigation of adverse effects to archaeological sites and/or historic structures would be conducted compliant with state and Federal regulations. This could include archaeological data recovery to mitigate the effects on eligible archaeological sites, or Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation to mitigate adverse effects to historic buildings. Mitigation of adverse effects to historic cemeteries would require relocation in accordance with the applicable state standards, and may also require archaeological mitigation efforts and analysis if the cemetery is eligible for the National Register of Historic Places under Criterion D.	All
• Inadvertent discoveries would be handled according to Fort Campbell procedures contained within the ICRMP.	All

Table S-2. Proposed Mitigation

Traffic and Transportation	Alternative
• No mitigation measures would be required.	All
Hazardous and Toxic Substances	**Alternative**
• All military units and contractors using the sites would be required to possess and have available appropriate spill response materials for the types and quantities of hazardous materials they may transport and use within proximity to any work area. All spills or releases would be reported and all appropriate remediation measures would be accomplished.	1, 2, 3, 5
• For projects located within impact areas, a UXO site survey would be conducted, as necessary, to determine if project areas are contaminated with ordnance and to determine the correct ordnance response actions.	1, 3, 5
• If unidentified contaminated soils, drums, or unusual debris (i.e., UXO, discarded military munitions, or munitions debris) are encountered at any time on or around the work site, the contractor shall stop work immediately and notify the Public Works Environmental Office.	1, 2, 3, 5
• Any project that involves excavation or movement of soils must include field screening for petroleum (plus any other suspected contaminants). Soils registering less than field screening levels indicated in Army policy are considered clean and may be reused on site or transported to the post landfill. Soils exceeding regulatory levels would be remediated in accordance with state regulations.	1, 2, 3, 5
• If determined necessary, a field investigation would be performed to determine if DU is present before commencing construction activities in those areas where historical use of Davy Crocket training is likely to have occurred. If DU is detected, the Army would be required to comply with Nuclear Regulatory Commission regulations and standards for protecting the public and the environment from exposure to radiation.	1, 2, 3, 5

U.S. ARMY GARRISON
FORT CAMPBELL, KENTUCKY
TRAINING MISSION AND
MISSION SUPPORT ACTIVITIES

Final Programmatic
Environmental Impact Statement

October 2015

Approved by:

COL James R. Salome
Garrison Commander, Fort Campbell

TABLE OF CONTENTS

1 PURPOSE AND NEED FOR THE PROPOSED ACTION 1-1
1.1 INTRODUCTION 1-1
1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION 1-3
1.2.1 Need 1-3
1.2.1.1 Site-specific Construction, Modernization, and Operations in Support of Soldier Training Identified within the RCMP 1-4
1.2.1.2 Implement the Use of Adaptable Use Zones to Facilitate Future Modernization and Range Facility Construction 1-4
1.2.1.3 Implementation of Routine Range and Training Land Actions 1-5
1.2.1.4 Evaluate the Reactivation of Installation Controlled Airspace 1-6
1.2.2 Purpose 1-6
1.2.2.1 Objectives 1-6
1.3 DECISIONS TO BE MADE 1-7
1.4 SCOPE OF ANALYSIS 1-8
1.5 RELATED ENVIRONMENTAL DOCUMENTATION 1-9
1.5.1 Related Transformation and Growth Environmental Documentation 1-9
1.5.2 Other Relevant Related Documents 1-9
1.6 PUBLIC AND AGENCY INVOLVEMENT 1-11
1.6.1 Scoping Period Summary 1-12
1.6.2 Draft PEIS Public Comment Period 1-12
1.7 REGULATORY FRAMEWORK 1-12

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES 2-1
2.1 NO ACTION ALTERNATIVE 2-1
2.2 DESCRIPTION OF THE PROPOSED ACTION 2-2
2.2.1 Alternative 1 – Site-specific Projects in Support of Soldier Training 2-2
2.2.2 Alternative 2 – Implement the Use of Adaptable Use Zones (AUZs) to Facilitate Future Modernization and Range Facility Construction. 2-5
2.2.3 Alternative 3 – Streamline Review of Routine Range and Training Land Actions 2-10
2.2.4 Alternative 4 – Evaluate the Reactivation of Installation Controlled Airspace 2-11
2.2.5 Alternative 5 – Implement Proposed Action Alternatives 1-4 2-13
2.3 ENVIRONMENTAL CONSIDERATIONS 2-13
2.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD FOR ANALYSIS 2-13
2.4.1 Construction of Proposed Projects off Installation Lands 2-13
2.4.2 Use of Simulations Instead of Construction of Modernized Ranges 2-14
2.4.3 Travel to and Use of Other Installations' Ranges and Training Lands 2-14
2.5 PREFERRED ALTERNATIVE 2-14

3 FORT CAMPBELL TRAINING 3-1
3.1 INSTALLATION MISSION 3-1
3.2 MAJOR UNITS AND ORGANIZATIONS TRAINING ON FORT CAMPBELL 3-2
3.3 TRAINING 3-2
3.3.1 Army Training 3-3
3.3.2 Mission Essential Task Lists (METL) 3-3

3.3.3 Fort Campbell Range Use 3-7
3.3.3.1 Description of Current Range Capabilities 3-7
3.3.3.2 Range Utilization Rates 3-8
3.3.3.3 Description of Current Range Instructions 3-8
3.3.4 Fort Campbell Training Area Use 3-8
3.3.4.1 Description of Current Training Area Capabilities 3-8
3.3.4.2 Training Area Utilization Rates 3-9
3.3.4.3 Description of Current Training Area Instructions 3-9
3.3.5 Off-Post Military Training Activities 3-9
3.3.6 Range Complex Master Plan 3-10

4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 4.1-1

4.1 IMPACT ASSESSMENT METHODOLOGY 4.1-1
4.1.1 Approach for Analyzing Impacts 4.1-1
4.1.2 Level of VEC Analysis 4.1-2
4.1.3 Alternative-specific Impact Analysis Approach 4.1-16
4.2 AIRSPACE 4.2-1
4.2.1 Affected Environment 4.2-1
4.2.1.1 Overview 4.2-1
4.2.1.2 Airspace Components 4.2-5
4.2.1.3 Airspace Use and Management 4.2-29
4.2.2 Environmental Consequences 4.2-31
4.2.2.1 No Action Alternative 4.2-31
4.2.2.2 Alternative 1 ....4.2-32
4.2.2.3 Alternative 2 ....4.2-34
4.2.2.4 Alternative 3 ....4.2-41
4.2.2.5 Alternative 4 ....4.2-42
4.2.2.6 Alternative 5 ....4.2-44
4.3 NOISE 4.3-1
4.3.1 Affected Environment 4.3-1
4.3.1.1 Existing Conditions 4.3-1
4.3.1.2 The Military Noise Environment at Fort Campbell 4.3-2
4.3.2 Environmental Consequences 4.3-3
4.3.2.1 No Action Alternative 4.3-3
4.3.2.2 Alternative 1 ....4.3-3
4.3.2.3 Alternative 2 ....4.3-5
4.3.2.4 Alternative 3 ....4.3-9
4.3.2.5 Alternative 4 ....4.3-10
4.3.2.6 Alternative 5 ....4.3-10
4.4 AIR QUALITY AND GREENHOUSE GASES 4.4-1
4.4.1 Affected Environment 4.4-1
4.4.1.1 National Ambient Air Quality Standards and Attainment Status 4.4-1
4.4.1.2 Installation-Wide Emissions 4.4-1
4.4.1.3 Permitting Requirements 4.4-3
4.4.1.4 Climate and Greenhouse Gases 4.4-5
4.4.2 Environmental Consequences 4.4-6
4.4.2.1 No Action Alternative 4.4-6

4.4.2.2 Alternative 1 ....4.4-6
4.4.2.3 Alternative 2 ....4.4-8
4.4.2.4 Alternative 3 ....4.4-11
4.4.2.5 Alternative 4 ....4.4-14
4.4.2.6 Alternative 5 ....4.4-14
4.5 SOILS....4.5-1
4.5.1 Affected Environment....4.5-1
4.5.1.1 Soils....4.5-1
4.5.1.2 Erosion and Erosion Management 4.5-11
4.5.2 Environmental Consequences 4.5-14
4.5.2.1 No Action Alternative....4.5-15
4.5.2.2 Alternative 1 ....4.5-15
4.5.2.3 Alternative 2 ....4.5-16
4.5.2.4 Alternative 3 ....4.5-21
4.5.2.5 Alternative 4 ....4.5-22
4.5.2.6 Alternative 5 ....4.5-23
4.6 WATER RESOURCES 4.6-1
4.6.1 Affected Environment....4.6-1
4.6.1.1 Surface Water (Watersheds) and Floodplains....4.6-1
4.6.1.2 Surface Water Quality 4.6-3
4.6.1.3 Fort Campbell Water Resource Management....4.6-6
4.6.2 Environmental Consequences 4.6-9
4.6.2.1 No Action Alternative....4.6-9
4.6.2.2 Alternative 1 ....4.6-10
4.6.2.3 Alternative 2 ....4.6-11
4.6.2.4 Alternative 3 ....4.6-15
4.6.2.5 Alternative 4 ....4.6-16
4.6.2.6 Alternative 5 ....4.6-16
4.7 BIOLOGICAL RESOURCES....4.7-1
4.7.1 Affected Environment....4.7-1
4.7.1.1 Vegetation 4.7-1
4.7.1.2 Wildlife and Aquatic Life 4.7-5
4.7.1.3 Protected Species 4.7-7
4.7.1.4 Fort Campbell Natural Resources Management Program 4.7-15
4.7.2 Environmental Consequences 4.7-20
4.7.2.1 No Action Alternative....4.7-21
4.7.2.2 Alternative 1 ....4.7-22
4.7.2.3 Alternative 2 ....4.7-24
4.7.2.4 Alternative 3 ....4.7-28
4.7.2.5 Alternative 4 ....4.7-29
4.7.2.6 Alternative 5 ....4.7-30
4.8 CULTURAL RESOURCES 4.8-1
4.8.1 Affected Environment....4.8-1
4.8.1.1 Cultural Context....4.8-1
4.8.1.2 Archaeological Sites....4.8-7
4.8.1.3 Architectural Resources 4.8-11
4.8.1.4 Cemeteries 4.8-11

4.8.1.5 Native American Sacred Sites and Properties of Traditional and Religious Cultural Importance 4.8-12
4.8.1.6 Fort Campbell Cultural Resources Management Program....4.8-12
4.8.1.7 Process for Identification of Resources 4.8-13
4.8.2 Environmental Consequences 4.8-13
4.8.2.1 No Action Alternative 4.8-14
4.8.2.2 Alternative 1 ....4.8-14
4.8.2.3 Alternative 2 ....4.8-15
4.8.2.4 Alternative 3 ....4.8-16
4.8.2.5 Alternative 4 ....4.8-18
4.8.2.6 Alternative 5 ....4.8-18
4.9 TRAFFIC AND TRANSPORTATION 4.9-1
4.9.1 Affected Environment....4.9-1
4.9.1.1 Roadway Network Surrounding Fort Campbell 4.9-1
4.9.1.2 Fort Campbell Roadway Network....4.9-1
4.9.1.3 Air, Rail, Barge, and Public Transportation 4.9-5
4.9.2 Environmental Consequences 4.9-5
4.9.2.1 No Action Alternative 4.9-5
4.9.2.2 Alternative 1 ....4.9-5
4.9.2.3 Alternative 2 ....4.9-7
4.9.2.4 Alternative 3 ....4.9-8
4.9.2.5 Alternative 4 ....4.9-9
4.9.2.6 Alternative 5 ....4.9-9
4.10 HAZARDOUS AND TOXIC SUBSTANCES....4.10-1
4.10.1 Affected Environment....4.10-1
4.10.1.1 Regulatory Background and Definitions 4.10-1
4.10.1.2 Hazardous Material Use 4.10-1
4.10.1.3 Hazardous Waste Management 4.10-2
4.10.1.4 Other Toxic Substances 4.10-2
4.10.1.5 Chemical Constituents in Soil....4.10-2
4.10.2 Environmental Consequences 4.10-5
4.10.2.1 No Action Alternative 4.10-5
4.10.2.2 Alternative 1 ....4.10-5
4.10.2.3 Alternative 2 ....4.10-7
4.10.2.4 Alternative 3 ....4.10-12
4.10.2.5 Alternative 4 ....4.10-13
4.10.2.6 Alternative 5 ....4.10-13

5 CUMULATIVE EFFECTS 5-1

5.1 IMPACTS METHODOLOGY 5-1
5.2 FORT CAMPBELL LOCATION AND CUMULATIVE IMPACTS SETTING....5-1
5.2.1 Future Actions 5-6
5.2.2 Four-County Region of Influence 5-6
5.2.3 Potential Cumulative Effects by VECs 5-9
5.2.3.1 Airspace 5-9
5.2.3.2 Noise 5-9
5.2.3.3 Air Quality 5-10

5.2.3.4 Soil Erosion 5-10
5.2.3.5 Water Resources 5-11
5.2.3.6 Biological Resources 5-12
5.2.3.7 Cultural Resources 5-13
5.2.3.8 Traffic and Transportation 5-13
5.2.3.9 Hazardous and Toxic Substances 5-14

6 SUMMARY OF ENVIRONMENTAL CONSEQUENCES 6-1

6.1 ENVIRONMENTAL EFFECTS SUMMARY 6-1
6.2 SPECIFIC FORT CAMPBELL POLICIES AND PRACTICES RELEVANT TO THE PROPOSED ACTION ALTERNATIVES 6-4

7 ACRONYMS 7-1

8 REFERENCES 8-1

9 LIST OF PREPARERS 9-1

LIST OF TABLES

Table 2-1. Site-Specific Range Construction Projects 2-3
Table 2-2. Proposed Fort Campbell AUZs 2-5
Table 2-3. Routine Range and Training Land Actions 2-11
Table 3-1. Fort Campbell METLs 3-4
Table 4.1-1. VEC Assessment Criteria and Level of Assessment 4.1-3
Table 4.2-1. Summary of Site-specific Projects Airspace Impacts 4.2-34
Table 4.2-2. Summary of Potential Airspace Impacts per AUZ 4.2-41
Table 4.2-3. Summary of Impacts Caused by Reactivation of R3703-A, B & C 4.2-44
Table 4.3-1. Common Sounds and Their Levels 4.3-1
Table 4.3-2. Estimated Background Noise Levels at Nearby Communities 4.3-2
Table 4.3-3. Summary of Noise Impacts from Site-specific Projects 4.3-4
Table 4.3-4. Noise Levels Associated With Outdoor Construction 4.3-4
Table 4.3-5. Distance to Closest NSA from Site-Specific Projects 4.3-5
Table 4.3-6. Summary of Potential Construction Impacts by AUZ 4.3-6
Table 4.3-7. Maximum Sound Level in dBA from Helicopters and UASs 4.3-7
Table 4.3-8. Percentage of Population Highly Annoyed from Aircraft Noise 4.3-7
Table 4.3-9. Maximum Sound Levels for Army Tactical Vehicles 4.3-8
Table 4.3-10. Summary of Routine Action Impacts on the Noise Environment 4.3-9
Table 4.4-1. Air Quality Standards and Monitored Data 4.4-3
Table 4.4-2. Annual Air Emissions for Stationary Sources at Fort Campbell 4.4-3
Table 4.4-3. Major Modification Thresholds of Criteria Pollutants at Fort Campbell 4.4-4
Table 4.4-4. Summary of Site-specific Projects Air Quality and GHG Impacts 4.4-7
Table 4.4-5. Site-specific Projects - Attainment Status and Summary of Effects 4.4-7
Table 4.4-6. Air Emissions Compared to *De Minimis* Thresholds - Alternative 1 ....4.4-8
Table 4.4-7. Summary of Impacts on Air Quality from Actions at AUZs 4.4-9
Table 4.4-8. Attainment Status and Summary of Effects by AUZ 4.4-10
Table 4.4-9. Air Emissions Compared to *De Minimis* Thresholds - Alternative 2 ....4.4-10
Table 4.4-10. Summary of Impacts on Air Quality from Routine Actions 4.4-11
Table 4.4-11. Routine Range and Training Land Actions 4.4-12
Table 4.4-12. Air Emissions Compared to De Minimis Thresholds - Alternative 3 ....4.4-13
Table 4.4-13. Estimated Air Emissions Compared to *De Minimis* Thresholds 4.4-14

Table 4.5-1. Fort Campbell Soils 4.5-3
Table 4.5-2. Soils at Proposed Site-Specific Projects....4.5-7
Table 4.5-3. Soils at Proposed AUZs....4.5-8
Table 4.5-4. Summary of Site-specific Projects Soils Impacts....4.5-15
Table 4.5-5. Summary of Potential Construction Impacts by AUZ....4.5-17
Table 4.5-6. Summary of Routine Action Impacts on Soils....4.5-22
Table 4.6-1. Designated Uses and Water Quality Status of Fort Campbell Streams....4.6-4
Table 4.6-2. List of Impaired Waters (Cause and Source)....4.6-4
Table 4.6-3. Summary of Site-specific Projects Water Resources Impacts....4.6-10
Table 4.6-4. Summary of Potential Construction Impacts by AUZ....4.6-12
Table 4.6-5. Summary of Routine Action Impacts on Water Resources....4.6-15
Table 4.7-1. Rare, Threatened, and Endangered Animal Species Observed on Fort Campbell....4.7-8
Table 4.7-2. Rare, Threatened, and Endangered Plant Species Observed on Fort Campbell....4.7-15
Table 4.7-3. Summary of Site-specific Projects Biological Resources Impacts....4.7-22
Table 4.7-4. Summary of Potential Construction Impacts by AUZ....4.7-25
Table 4.7-5. Summary of Routine Action Impacts on Biological Resources....4.7-29
Table 4.8.1. Prehistoric Cultural Periods 4.8-1
Table 4.8-2. Summary of Archaeological Sites in Alternative 1 ....4.8-8
Table 4.8-3. Location of Archaeological Sites - Alternative 1 ....4.8-8
Table 4.8-4. Summary of Archaeological Sites - Alternative 2....4.8-9
Table 4.8-5. Location of Archaeological Sites - Alternative 2 ....4.8-10
Table 4.8-6. Summary of Architectural Resources - Alternative 2 ....4.8-11
Table 4.8-7. Summary of Historic Cemeteries - Alternative 1 ....4.8-12
Table 4.8-8. Summary of Site-specific Projects Cultural Resources Impacts....4.8-14
Table 4.8-9. Summary of Potential Construction Impacts by AUZ....4.8-15
Table 4.8-10. Summary of Routine Action Impacts on Cultural Resources....4.8-17
Table 4.9-1. Fort Campbell Cantonment Access Gates 4.9-1
Table 4.9-2. Fort Campbell Training Area Gates 4.9-2
Table 4.9-3. Fort Campbell Existing AADT and LOS on Nearby Roadways 4.9-4
Table 4.9-4. Load Restrictions on Roadways Accessing Training Areas....4.9-4
Table 4.9-5. Summary of Site-specific Projects Traffic and Transportation Impacts 4.9-7
Table 4.9-6. Summary of Potential Construction Impacts by AUZ....4.9-8
Table 4.9-7. Summary of Routine Action Impacts on Traffic and Transportation 4.9-9
Table 4.10-1. Summary of Site-specific Projects Hazardous and Toxic Substances and Waste Impacts 4.10-6
Table 4.10-2. Summary of Potential Hazardous and Toxic Substance Impacts by AUZ....4.10-7
Table 4.10-3. Summary of Routine Action Impacts on Hazardous and Toxic Substances 4.10-12
Table 5-1. Major Ongoing Actions at Fort Campbell....5-3
Table 5-2. Future Foreseeable Major Training and Training Support Related Construction Projects (FY 13 – 17)....5-6
Table 5-3. Past, Present, and Foreseeable Actions within the ROI....5-8
Table 5-4. Other Transportation Projects Near Fort Campbell 5-14
Table 6-1. Summary of Adverse Environmental Effects 6-1
Table 6-2. Proposed Mitigation 6-4

LIST OF FIGURES

Figure 1-1. Fort Campbell Physical Setting and Location 1-2
Figure 2-1. Site-Specific Range Construction and Maintenance Projects 2-4
Figure 2-2a. Proposed AUZs A, B, E and G 2-7
Figure 2-2b. Proposed AUZs D and F 2-8
Figure 2-2c. Proposed AUZs C and H 2-9
Figure 2-3. Proposed R3703 Airspace 2-12
Figure 4.2-1. Airspace Classification Diagram 4.2-3
Figure 4.2-2. Fort Campbell - Airspace Vertical Diagram of the ROI 4.2-4
Figure 4.2-3. Fort Campbell - Sectional of the ROI Showing Proposed Controlled Airspace Areas 4.2-5
Figure 4.2-4. Fort Campbell Air Use Generators and Imaginary Surfaces 4.2-7
Figure 4.2-5. CAAF with Imaginary Surfaces 4.2-10
Figure 4.2-6. SAHP with Imaginary Surfaces 4.2-12
Figure 4.2-7. Golden Eagle FLS with Imaginary Surfaces 4.2-13
Figure 4.2-8. TUAS Automated Approach Patterns in R-3702 ..... 4.2-20
Figure 4.2-9. TUAS Airfields with Imaginary Surfaces 4.2-21
Figure 4.2-10. TUAS-19 with Imaginary Surfaces 4.2-22
Figure 4.2-11. TUAS-Indian Mound with Imaginary Surfaces 4.2-23
Figure 4.2-12. TUAS-Suckchon with Imaginary Surfaces 4.2-23
Figure 4.2-13. Proposed Saunders LZ as FLS with Imaginary Surfaces 4.2-33
Figure 4.2-14. Training Area 52 MOUT 4.2-36
Figure 4.2-15. Golden Eagle FLS Additional Runway with Imaginary Surfaces 4.2-36
Figure 4.2-16. Indian Mound Runway Improvements with Imaginary Surfaces 4.2-38
Figure 4.2-17. Indian Mound Runway Improvements with Imaginary Surfaces 4.2-39
Figure 4.2-18. Veghel DZ Runway Addition with Imaginary Surfaces 4.2-40
Figure 4.4-1. Ozone Maintenance Areas within Fort Campbell and Adjacent Areas 4.4-2
Figure 4.5-1. Fort Campbell Soil Series 4.5-2
Figure 4.5-2. Fort Campbell Highly Erodible Land 4.5-13
Figure 4.6-1. Fort Campbell Watersheds and Streams 4.6-2
Figure 4.7-1. Fort Campbell Training Areas Terrestrial Habitat Types 4.7-2
Figure 4.9-1. Fort Campbell Road Network and Access Control Points 4.9-3
Figure 4.10-1. Infantry personnel of the 101st Airborne Division preparing to fire a Davy Crockett during a training exercise at Fort Campbell, Kentucky, May 14, 1962. ..... 4.10-4

APPENDICES

APPENDIX A **PUBLIC INVOLVEMENT**
APPENDIX B **PROJECT CHECKLIST**
APPENDIX C **SITE SPECIFIC PROJECTS**
APPENDIX D **AUZ PROJECTS**
APPENDIX E **ROUTINE TRAINING AND RANGE PROJECTS**
APPENDIX F **ENVIRONMENTAL STEWARDSHIP**
APPENDIX G **AIR SUPPORTING DOCUMENTATION**

This page intentionally left blank

1 Purpose and Need for the Proposed Action

1.1 Introduction

Fort Campbell covers 105,068 acres of land between Montgomery and Stewart counties in Tennessee, and Christian and Trigg counties in Kentucky (see Figure 1-1). Approximately two-thirds of the installation's total land area is in Tennessee. Clarksville, Tennessee and Hopkinsville, Kentucky are the towns nearest to the installation, and the closest major urban area is Nashville, Tennessee, which is located approximately 50 miles to the southeast. The four-county region surrounding Fort Campbell has a diversified economy with major sectors, including agriculture, manufacturing, government, and retail and wholesale trade.

Fort Campbell represents a community of over 40,000 people, comprised of military and civilian personnel. Fort Campbell is an Installation Management Command (IMCOM) installation that is home to the 101st Airborne Division (Air Assault (101ABN DIV (AASLT))), the 5th Special Forces Group, 160th Special Operations Aviation Regiment (SOAR), and other tenant units. The mission of Fort Campbell is primarily to support and train the units stationed on the installation in preparation for a variety of assigned combat and combat-related missions:

- Support tenant U.S. Army Forces Command (FORSCOM) and U.S. Army Special Operations Command (USASOCOM) units.
- Support the training of off-post units that train on the installation to ensure that the units are prepared to accomplish assigned missions.
- Enable the operation, safety, security, administration, training, services, communication, information, management, maintenance, and supply of all individuals, units, and activities that are tenants on the installation.
- Provide base operations and other support to Army, Department of Defense (DoD), Department of Homeland Security (DHS), Federal Bureau of Investigations (FBI), and other government agencies involved in national security actions.
- Plan, program, allocate, and supervise the use of resources and facilities for continuing the installation mission.

In addition, the installation supports the training of other DoD units, Reserve Component units, and governmental agencies.

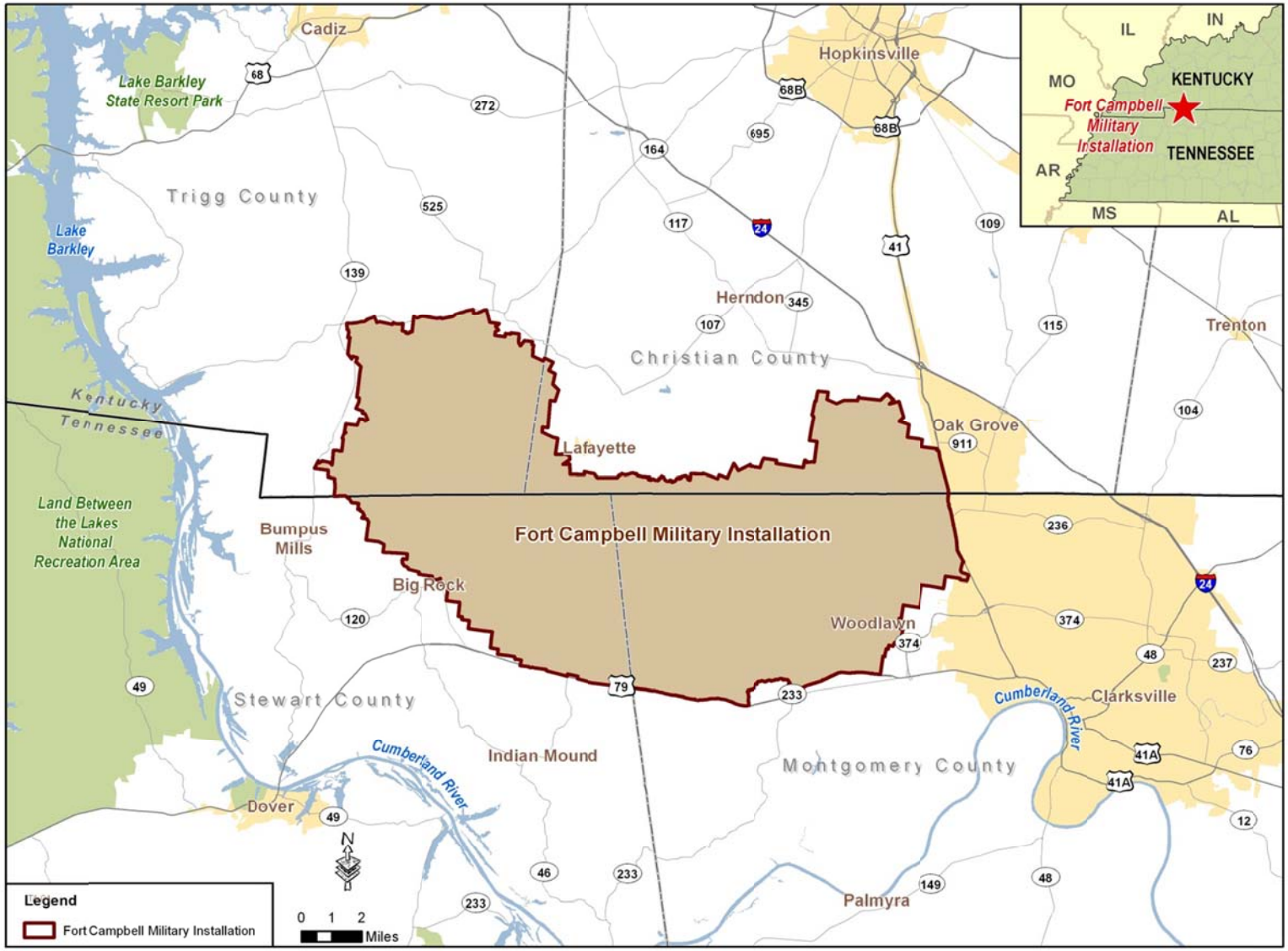


Figure 1-1. Fort Campbell Physical Setting and Location

1.2 Purpose and Need for the Proposed Action

Fort Campbell prepared a mission Environmental Impact Statement (EIS) in 1981, the *101st Airborne Division (Air Assault) and Fort Campbell, Kentucky Final Environmental Impact Statement Installation Ongoing Mission* (Fort Campbell, 1981). That EIS no longer sufficiently addresses Fort Campbell's training mission requirements. This EIS will describe the current affected environment and analyze the projects' need to meet the mission of Fort Campbell and its assigned units.

1.2.1 NEED

The Army needs to build, update, and operate military training ranges and other facilities on Fort Campbell to ensure that its Soldiers are proficiently trained across the full spectrum of military operations. Fort Campbell is committed to providing Soldiers with a high quality training environment (see Objective 1, Section 1.3). To do so, Fort Campbell must provide modernized live fire ranges, quality maneuver training areas (TAs), the airspace necessary for the training of Army aviation units and unmanned aerial systems (UAS), and modern training facilities. The requirement to provide quality training support to Soldiers and units will continue into the future as mission requirements, military preparedness, and Soldier/unit training requirements change. Fort Campbell must be prepared to meet these unknown future training requirements with modern training facilities and ranges.

The Fort Campbell Range Complex Master Plan (RCMP) establishes the range and maneuver land requirements at Fort Campbell to support the installation training missions. The RCMP is revised every year. It reflects new projects that have been identified, including those in Section 1.2.1.1. It does not include routine TA maintenance projects such as those described below in Section 1.2.1.3. Any changes approved for controlled airspace (Section 1.2.1.4) would be incorporated in the RCMP. The adaptable use zones (AUZs) (Section 1.2.1.2) would not necessarily be incorporated into the RCMP, but new projects identified through the master plan process could be designated to occur in AUZs. The plan is designed to be a road map for the future development of the range/training complex to ensure that Fort Campbell can meet training missions and requirements. The RCMP currently identifies the following general training needs for Fort Campbell (Fort Campbell, 2013):

- Training Circular (TC) 25-8, *Training Ranges* provides configuration guidance on small arms and crew served weapon qualification ranges, and supports the required training throughput.
- TC 25-8 provides configuration guidance on squad, platoon, and company live fire maneuver ranges.
- The Fort Campbell Command requires challenging driver training courses for all categories of wheeled vehicles.
- Observation posts and target arrays need to be maintained in the impact area that supports artillery live fire training.
- Maintenance of un-improved dirt C130 airfield is needed to support sustainment war fighting functions.
- Ongoing activities to support maneuver training are needed, including repair of training damage to the maneuver corridors and an increase in gravel maneuver trails to open new TAs for maneuver training.
- Maintenance of drop zones and named landing zones to support airborne and air assault training.

- Continue to support fire training for the brigade combat teams (BCTs) of the 101st ABN DIV (AASLT) by remediating training damage to the artillery firing points and firing point maneuver trails, and removing woody growth from firing points.

1.2.1.1 Site-specific Construction, Modernization, and Operations in Support of Soldier Training Identified within the RCMP

Specific projects identified within the RCMP include:

- A driving skid pad is needed for the Special Forces Group, which is required to conduct offensive driving techniques. Currently, this training is performed as temporary duty (TDY) outside of Fort Campbell, as no facility currently exists on Fort Campbell.
- A gravel march trail is needed to allow units to march from cantonment to ranges off of main roadways. This project would allow safe march access and training flexibility with a shortened route, instead of using the existing 17-mile loop.
- An alternative runway with glide slopes is needed for the 160th SOAR, 5th SFG, and special customers to support training and special missions. This alternative runway would also provide flexibility in conducting training missions by creating more options for ground- and air-based training requirements.

1.2.1.2 Implement the Use of Adaptable Use Zones to Facilitate Future Modernization and Range Facility Construction

As technology changes, new weapons, weapons systems, and unmanned systems are incorporated into tactical units. These technological advances dictate changes to how the Army trains, the space needed for maneuver training (including airspace), and new ranges to accommodate the live fire training on these new systems. Fort Campbell needs to adapt to these changes through the efficient construction of facilities and the training of Soldiers on these new facilities, while also considering the sustainability of range and training lands. Along with flexibility, Fort Campbell also has the need to expedite the National Environmental Policy Act (NEPA) process to quickly implement projects in order to meet evolving training requirements.

A need for future facilities has been identified for Fort Campbell that extends beyond those specific projects contained within the RCMP, including:

- Fixed training sites, including range support buildings (e.g., classroom, storage, latrine and parking areas), used to conduct and assess live virtual training requirements tied to fiber optics linked ranges within Fort Campbell, which include support for the Home Station Instrumented Training System (HITS[1]).
- Additional ground maneuver area strips to provide flexibility for ground-based training requirements.
- Additional landing and drop facilities (e.g., drop zones, landing strips, operations/ maintenance hangars). There is an ongoing need for alternate drop zones and landing strips to provide flexibility for air-based training requirements (e.g., Sherpa aircraft and UAS). There is also a need for permanent operations/maintenance facilities for conducting aircraft maintenance (primarily UAS) in an interior, dust-free environment with lighting adjacent to existing landing facilities.

[1] HITS is an automated information system which collects training performance evidence. HITS tracks whether Soldiers fire their weapons or not, whether targets were shot or not, and records audio to compare how orders were followed. This is then combined with video in an on-site After Action Report for the commander to grade the end effect of the Soldiers' ability for that particular field exercise. HITS provides preparedness for future deployments by improving Soldiers' skill sets, specifically by improving their ability to fight and survive downrange.

The AUZ concept has been used at other installations to designate locations for future facility construction. This concept expedites the environmental review of projects by focusing range development and training activities within established boundaries that have been screened for environmental constraints (e.g., cultural sites, wetlands, contaminated sites, protected species and their habitat). The AUZs provide installation planners with information that can be used to make environmentally sound training, project, and operational decisions during the earliest stages of the ongoing master planning process. Section 2.2.2 further explains the proposed AUZs being considered by Fort Campbell.

1.2.1.3 Implementation of Routine Range and Training Land Actions

Certain routine maintenance and repair activities have categorical exclusions (CXs)[2] as listed in Appendix B of the Army's NEPA regulations (32 Code of Federal Regulations (CFR) Part 651, *Environmental Analysis of Army Actions*). In addition, various Army-wide and Fort Campbell specific documents cover a variety of routine actions. The *Programmatic Environmental Assessment for Modernizing and Operating Training Ranges on Previous or Existing Range Sites for Army Training Areas* (USAEC, 2012) covers the construction of range support facilities (e.g., range operations control areas [ROCAs], firing lane and line creation, hardstand creation, development of small arms ranges on previous ranges). The *Fort Campbell Integrated Natural Resources Management Plan* (Fort Campbell, 2012) covers vegetation controls (i.e., aerial herbicide application, land vegetation clearing, open field maintenance, and prescribed burning). Implementation of these projects typically requires only a brief Record of Environmental Consideration and, therefore, can be expedited for implementation.

Other routine and reoccurring actions at Fort Campbell have yet to receive standardized and streamlined analysis under NEPA or are not covered under an existing program. Fort Campbell has identified a list of routine range and training land actions that have not been previously reviewed, but are routine in nature and often require rapid implementation. Thus, a need exists to streamline the environmental review for these additional routine projects at Fort Campbell that support the training mission and range and training land sustainability. If the review shows that no extraordinary circumstances or cumulative impacts would occur, additional analysis would not be necessary. These additional routine and reoccurring actions include:

- Maneuver trail construction, hardening, and maintenance that are needed to maintain accessibility to TAs and prevent loss of accessibility due to ground maneuver exercises.
- Low water crossing site creation and maintenance within training lands that is needed where existing bridges lack weight classification codes to handle vehicular traffic and to provide established stream crossings to prevent environmental damage to streambanks and streambeds.
- Culvert installation and maintenance that is necessary to avoid tactical vehicle wear.
- Contracting ordnance and explosives (O&E) target and residue removal that is needed to refresh/replace hard targets within the impact area.
- Maneuver damage repair that is needed to correct rutting due to heavy vehicles traversing TA, especially during wet periods.
- Observation point creation that is needed occasionally to observe firing effects in the TAs.

[2] CXs are categories of actions that normally do not require an environmental assessment (EA) or an EIS. The Army has determined that these actions do not individually or cumulatively have a significant effect on the human environment.

- Drop/landing zone (DZ/LZ) maintenance that is needed to prevent woody encroachment from entering DZ/LZs as woody encroachment is hazardous to helicopter landing and parachute operations.

1.2.1.4 Evaluate the Reactivation of Installation Controlled Airspace

A reasonably foreseeable need exists for additional restricted airspace (re-activate R3703) to reduce normal day-to-day airspace training conflicts at Fort Campbell. Numerous airspace users compete for resources and those resources must be scheduled by day and time to enable all the units stationed at any installation to meet their mission training requirements. Many assigned Army and Reserve units must schedule numerous days, times and range complex areas to ensure that they maintain combat readiness. This need is further supported by anticipated UAS training (e.g., Gray Eagle) within northwestern Fort Campbell airspace (R3702), along with the continued need for live fire training into the North/South impact area. Both types of training compete for scheduling and currently cannot be performed simultaneously. Establishment of artillery firing points within training lands beneath a reactivated R3703 would allow UAS training and live fire to occur simultaneously.

1.2.2 PURPOSE

The purpose of the action is to meet Senior Commander training requirements and provide the forces that train on Fort Campbell with state-of-the-art and modernized equipment. The action would also implement site-specific and future needs contained within the RCMP that establish a baseline of the infrastructure needs for range modernization.

The action would also streamline the NEPA analysis process for routine range and training land actions occurring at Fort Campbell that are currently not covered under a previous NEPA document or program/plan (i.e., Integrated Training Area Management (ITAM), Integrated Natural Resources Management Plan (INRMP)). This action would also allow Fort Campbell to adapt to continually evolving Soldier training requirements and equipment while ensuring that NEPA analysis is conducted for each action. Under NEPA regulations, a broad, programmatic EIS (PEIS) that covers an entire program or policy, and in this specific instance, the continuation of Fort Campbell's ongoing mission, allows for the tiering of future NEPA documentation in cases where future decisions or unknown future conditions preclude complete NEPA analysis in one step (32 CFR 651.27; 40 CFR 1508.28). The subsequent tiered NEPA documentation need only summarize issues discussed in the broader statement and concentrate on the issues specific to the subsequent action (32 CFR 651.14(c)).

Where activities are similar in nature, broad in scope, or at the planning level, applicable NEPA regulations authorize programmatic environmental review as a means to eliminate repetitive discussions of the same issues (32 CFR 651.5(d)(3)). Due to their broad scope, programmatic reviews may also offer advantages in terms of examining the cumulative effects of various activities over time and space. Overall, this PEIS will provide a foundation for the NEPA assessment related to training missions and mission support activities within the range and training lands at Fort Campbell.

1.2.2.1 Objectives

The objectives for the Proposed Action are listed below. These are also the criterion used to determine which alternatives were carried forward for detailed analysis in Section 4, Affected Environment and Environmental Consequences.

Objective 1: Help meet the primary range complex objectives outlined within the RCMP through creation of modern facilities or upgrades to existing training infrastructure (see Section 1.2.1).

Objective 2: Help meet the primary training land objectives outlined within the RCMP through creation of training infrastructure or upgrades to existing training infrastructure (see Section 1.2.1).

Objective 3: Streamline review of routine range and training land actions. Fort Campbell must undertake routine maintenance, upgrade, and construction activities within its existing range complex and on its training lands. Fort Campbell must also construct new small arms ranges and training facilities as new weapons and systems are fielded. Section 1.5.2 provides a list of Army Regulations (ARs) and guidance documents that outline mandatory range design, use, and safety requirements, as well as prescriptive requirements for range upgrades (modernization) and construction projects to support Soldiers during combat training.

Objective 4: Provide the airspace necessary to train units at Fort Campbell and to reduce scheduling conflicts. Fort Campbell must provide adequate airspace in which Army aviation units (e.g., aircraft associated with the 101st Airborne Division (Air Assault), the 5th Special Forces Group, 160th SOAR, other tenant units, and Fort Campbell stationed units) and UASs (including fielding of the Gray Eagle) can be trained in service and joint training tasks (also refer to Chapter 3 and Section 4.2.1).

Objective 5: Meet requirements of the Sustainable Range Program (SRP) and foster environmental stewardship. AR 350-19, *The Army Sustainable Range Program,* defines the Army's responsibilities and prescribes policies for implementing the SRP on Army-controlled training ranges and training lands. The SRP goal is to maximize the capability, availability, and accessibility of ranges and training lands to support doctrinal training requirements, mobilization, and deployments under normal and surge conditions. Specific objectives for meeting SRP goals include:

- Modernize training range facilities to sustain live training execution in accordance with operational tempo, Flying Hour Program, Standards in Training Commission (STRAC), combined arms training strategies, and other training strategy requirements through military construction (MILCON) investments.
- Resource sustainable range and training land operations.
- Sustain range and training facilities.
- Maximize the accessibility of ranges and training land by minimizing restrictions brought about by encroachment factors.
- Focus the capability of the environmental program to fully support force readiness by sustaining the availability of ranges and training land.
- Develop and implement the Sustainable Range Outreach Program to improve public and stakeholder understanding of the Army's live training requirements and clearly articulate and underscore activities supporting national security.

1.3 Decisions to be Made

This PEIS evaluates the direct, indirect, and cumulative effects of the Proposed Action and the No Action Alternative. It was prepared in accordance with the NEPA of 1969 (42 United States Code [USC] 4321 et seq.), Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500-1508, *Protection of Environment*) the Army's own NEPA regulation (32 CFR 651, *Environmental Analysis of Army Actions*), and the Army's NEPA Analysis Guidance Manual (USAEC, 2007).

This PEIS provides the decision-maker and public with an analysis of the potential environmental consequences of the No Action Alternative as well as each of the alternatives for the Proposed Action. The decision-maker will take into account economic, environmental, and

social impacts, as well as the ability of each alternative to meet the purpose and need. As part of the decision to be made, the decision-maker may choose to implement more than one of the Proposed Action Alternatives, as each alternative serves to satisfy a specific need for meeting Senior Commander training requirements.

The decision involves which of the alternatives, if any, would be implemented for the evolving Fort Campbell training mission. Alternatively, the decision-maker could decide to take no action, which would result in continued training at Fort Campbell without the incorporation of the proposed updates to Fort Campbell's training infrastructure and activities. The Proposed Action programmatically evaluates the reactivation of Fort Campbell controlled airspace; however, no formal request has been submitted to the Federal Aviation Administration (FAA). Any changes to airspace would require FAA approval per JO 7400.2J - *Procedures for Handling Airspace Matters*, a process that would require additional time, public comment, and review. During the formal request process, an additional NEPA document would be prepared, based on the official request for the change of airspace designation with the FAA. It would be tiered off from this PEIS. The programmatic analysis in this PEIS would be part of Fort Campbell's formal request to the FAA for changes to airspace.

1.4 Scope of Analysis

This PEIS identifies and evaluates the direct, indirect, and cumulative impacts associated with training activities on the environmental and socio-economic resources of Fort Campbell and the surrounding region. NEPA regulations require that Federal agencies consider the environmental effects of Proposed Actions and alternatives during the decision-making process. Preparation of an environmental document (this PEIS) must precede final decisions regarding the Proposed Action and must be available to inform decision makers and the public of potential environmental consequences or impacts. The development of this PEIS allows for public consideration and input concerning the potential environmental effects of the Proposed Action at Fort Campbell. This PEIS evaluates the potential environmental effects of continuing training and training support activities and the potential effects of implementing projects in the Fort Campbell RCMP. It also provides an evaluation tool to assist in the assessment of future actions that are comparable to those projects and activities that are currently identified and evaluated herein. This document also provides installation planners with information that can be used to make environmentally sound training, project, and operational decisions during the earliest stages of the ongoing master planning process.

Descriptions of the affected environment and analyses of the potential impacts (direct, indirect, and cumulative) to physical and biological resources are provided in Section 4. Impacts to the following valued environmental components (VECs) were identified as potential issues of concern during the internal Army scoping process and will be analyzed in regards to each alternative as well as for the No Action Alternative:

- Airspace
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Facilities
- Hazardous Materials/Waste
- Land Use
- Noise
- Socioeconomics
- Soils
- Traffic and Transportation
- Water Resources
- Wetland Resources

1.5 Related Environmental Documentation

1.5.1 RELATED TRANSFORMATION AND GROWTH ENVIRONMENTAL DOCUMENTATION

This PEIS draws from and references several related prior environmental analyses completed in support of increased troop strength, range development projects, and the fielding of new equipment at Fort Campbell. Conclusions from these analyses are included within this document to provide a clear cumulative effect analysis. A list of documents is below:

- *Programmatic Environmental Assessment for Army 2020 Force Structure Realignment* (2013)
- *Programmatic Environmental Assessment for Modernizing and Operating Training Ranges on Previous or Existing Range Sites for Army Training Areas* (2012)
- *Environmental Assessment for the Construction and Operation of Unmanned Aerial System Complexes and Rotary Aircraft Maintenance Hangars at Sabre Army Heliport, Fort Campbell, Kentucky* (2011)
- *Range Complex Master Plan (RCMP) Environmental Assessment* (2012)
- *Programmatic Environmental Assessment for Fielding and Use of Mine Resistant Ambush Protected Vehicles at Army Installations in the United States* (2009)
- *Range and Training Land Program-Development Plan Supplemental Environmental Assessment* (2012)
- *Programmatic Environmental Assessment for Use of the M1117 Armored Security Vehicle at Army Installations in the United States* (2008)
- *Final Environmental Impact Analysis for Army Growth and Force Structure Realignment* (2007)
- *Programmatic Environment Assessment for Standard Targetry Replacement (2006)*
- *Final Environmental Assessment: Aerial Refueling Training Routes, 160th Special Operations Aviation Regiment, Fort Campbell, Kentucky* (2006)
- *Environmental Assessment to Analyze Standard Practices for Construction Projects in the Cantonment Area, Fort Campbell, Kentucky* (2004)
- *Environmental Assessment: Force Structure Modularity Transformation, Fort Campbell, Kentucky* (2004)
- *Final Environmental Impact Statement: Stationing of a New Army Light Infantry Division* (1984)
- *Final Environment Impact Statement: 101st Airborne Division (Air Assault) and Fort Campbell, Kentucky Installation Ongoing Mission* (1981)

1.5.2 OTHER RELEVANT RELATED DOCUMENTS

Resource Management

- *The Integrated Natural Resource Management Plan (INRMP), 2013.* This document describes standard policies and procedures for managing natural resources to ensure the sustainability of Fort Campbell's lands.
- *The Integrated Cultural Resource Management Plan (ICRMP), 2012*. This document outlines the management of Fort Campbell's cultural resources, including Native American resources.

- *Installation Operational Noise Management Plan (IONMP) for Fort Campbell*. This document establishes the installation noise management program and a strategy for noise management at Fort Campbell.

Sustainable Range Program

- *Fort Campbell Range Complex Master Plan* (RCMP), *2012*. The RCMP, like the installation master plan, is the master plan for the development, modernization, and upgrade to the ranges and training lands on the installation. This plan is updated annually.
- Fort Campbell Regulation 385-5*, Sustainable Range Program, Safety, and Integrated Training Area Management, 2007*. This regulation focuses on managing the sustainable use of TAs and provides recommended measures to achieve sustainability and rehabilitation of lands impacted by training.
- *United States Army Sustainable Range Program (SRP) Land Rehabilitation and Maintenance (LRAM) Best Management Practices (BMPs), 2006*. These BMPs provide a common set of BMPs for use in LRAM projects on all Army installations. This document is located in the technical reference library on the U.S. Army SRP website.
- *Army Small Arms Training Range Environmental Best Management Practices*, 2005. This document provides a listing of BMPs used on Small Arms Training Ranges to maintain the long-term sustainability of operational small arms ranges and range areas. This document is located on the U.S. Army SRP website.

Range Planning

- AR 385-10: *The Army Safety Program, 2011*. This regulation implements requirements of the Occupational Safety and Health Act of 1970. It provides new policy on Army safety management procedures with special emphasis on responsibilities and organizational concepts. It sets safety standards to protect Soldiers, civilian employees, Family members, contractors, the general public, and the environment.
- AR 350-19: *The Army Sustainable Range Program, 2005.* This regulation assigns responsibilities and provides policy and guidance for managing and operating U.S. Army ranges and training lands to support their long-term viability and utility to meet the National defense mission; planning, programming, funding, and executing the core programs comprising the Army's SRP and Range and Training Land Program (RTLP), and the ITAM program.
- AR 385-63: *Range Safety, 2012.* This regulation prescribes Department of the Army Headquarters range safety policies and responsibilities for firing ammunition, lasers, guided missiles, and rockets, and provides guidance for the application of risk management in range operations.
- Department of Army Pamphlet (PAM) 350-38: *Standards in Training Commission, 2012.* This pamphlet establishes Army policy and responsibilities for the use and maintenance of training aids, devices, simulators, and simulations including: tactical engagement simulations, targets, targetry, combat training center and range instrumentation, and training-unique ammunition. In addition, this pamphlet sets forth the policies and procedures for the identification, approval, prioritization, development, and fielding of graphic training aids to support Army-wide requirements.
- PAM 385-63: *Range Safety, 2012.* This pamphlet provides implementation guidance for the Army Range Safety Program prescribed in AR 385–63. It provides standards and procedures for the safe firing of ammunition, demolitions, lasers, guided missiles, and

rockets for training, target practice, and, to the extent practicable, during combat operations.

- PAM 385-64: *Ammunition and Explosives Safety Standards, 2011*. This pamphlet explains the Army's safety criteria and standards for operations involving ammunition and explosives prescribed by AR 385–64, for the Army and contractor operations on Government property.
- Army Training Circular 25-8: *Training, 2011*. This circular provides guidance for developing and operating Army ranges. It is a working guide for trainers, range and mobilization planners, engineers, coordinators, and range project review boards at all levels of the Active Army, Army National Guard, and Army Reserve. It is the primary guide for installation range development plans and for developing the Army Master Range Plan.
- Fort Campbell Regulation 95-1, *Fort Campbell Flight Regulation*, *2010*. This regulation prescribes aviation policies and procedures for personnel assigned or attached to units at Fort Campbell. It also provides flight procedures for all personnel who utilize Fort Campbell's airspace and related aviation facilities.
- Fort Campbell Regulation 385-5, *Sustainable Range Program, Safety, and Integrated Training Area Management Program*, *2010*. This regulation provides procedures for planning, requesting, and operating ranges and TAs. It mandates specific safety policies for munitions use as required by Army regulations. Highlights include the range safety certification program, environmental considerations, and guidelines for medical support, demolition training, and laser operations. Specific chapters provide procedures for scheduling, ammunition handling, direct fire, indirect fire, special ranges, airspace, non-firing ranges, and TAs.

1.6 Public and Agency Involvement

The Army invites public participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process. Initial agency scoping letters were submitted to the FAA, Kentucky Department of Environmental Protection (KDEP), Kentucky Department of Fish and Wildlife Resources (KDFWR), Tennessee Department of Environment and Conservation (TDEC), Tennessee Wildlife Resource Agency (TWRA), and the U.S. Fish and Wildlife Service (USFWS). No response has been received from these agencies regarding scoping.

Public participation opportunities with respect to the PEIS and decision-making on the Proposed Action are guided by 32 CFR Part 651. Early on in the preparation of the Draft PEIS, two scoping sessions were conducted in which the public was able to provide input to the Proposed Action. The Draft EIS was made available for a 45-day public comment period. At the end of the 45-day period, the Army considered all comments submitted by individuals, agencies, or organizations in the preparation of this Final EIS. The Final EIS is made available to the public for 30 days, after which time the Army will make and document its decision in a Record of Decision (ROD) and notify the public of the ROD availability. Throughout this process, the public has been able to obtain information on the status and progress of the Proposed Action and the PEIS through Mr. Gene Zirkle, Fort Campbell NEPA Program Manager, at 270-798-9854 or by email, Gene.a.zirkle.civ@mail.mil.

1.6.1 SCOPING PERIOD SUMMARY

On January 18th, 2013, the Army issued a Notice of Intent (NOI) in the *Federal Register* to prepare a PEIS for the U.S. Army Garrison Fort Campbell, Kentucky for the Training Mission and Mission Support Activities and Supporting Studies (see Appendix A). The NOI initiated the public scoping period (January 18th to March 1st, 2013) where members of the public (including Federal, state, and local agencies, affected federally-recognized Indian tribes, and other interested persons) were invited to comment on the proposed scope and content of the PEIS. The NOI was followed by two public scoping meetings, which took place on February 10th and 11th, 2013. Due to airspace concerns expressed by the public during public scoping meetings, an additional airspace meeting was held on March 4th, 2013, and the comment period regarding airspace concerns was extended to April 4th, 2013.

During the public scoping period, comments from all interested persons were considered in preparation of the Draft PEIS to promote open communication and enable better decision-making. Comments generally addressed potential effects regarding the proposed changes to airspace and detrimental effects to surrounding private airfields. Specifically, the airspace community expressed concerns about an additional Military Operations Area (MOA) (MOA 3) being considered as part of this action and the potential for significant adverse effects on commercial and private aviation within the region. On further review, this additional MOA has been dropped from further consideration.

1.6.2 DRAFT PEIS PUBLIC COMMENT PERIOD

The Draft EIS was filed with the U.S. Environmental Protection Agency (USEPA), and the Army published a Notice of Availability (NOA) in the *Federal Register* and in newspapers in the vicinity of the Proposed Action on January 16th, 2015 that announced the availability of the Draft EIS. Publication of the NOA in the *Federal Register* began the start of a 45-day comment period (January 16th to March 2nd, 2015). During the 45-day comment period, a public meeting was held on February 10th, 2015 at the Holiday Inn Express in Oak Grove, Kentucky to provide an opportunity for the public, organizations, and regulatory agencies to present comments and information. At the end of the 45-day period, the Army considered all comments submitted (see Appendix A.2 for agency comments and Appendix A.3 for public comments). When the review of comments and any appropriate revisions were complete, this Final EIS was filed with the USEPA and made available to the public through a NOA publication in the *Federal Register*. A final decision on the Proposed Action, which is documented in a ROD, may be made after a 30-day waiting period. A ROD is a public document that states the decision, alternatives and factors considered, and the proposed mitigation adopted. The NOA of the ROD is published in the *Federal Register*. Once the ROD has been signed, the Army can begin to implement the decision (32 CFR 651.45(j)(2)).

1.7 Regulatory Framework

A decision on whether to proceed with the Proposed Action depends on factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, Fort Campbell is guided by 32 CFR 651 and relevant statutes (and their implementing regulations), as well as Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resources management and planning. These include the following:

Federal Statutes

- NEPA (42 USC 4321–4370h)
- Endangered Species Act of 1973 (ESA) (16 USC 1531–1543)
- Fish and Wildlife Coordination Act (16 USC 661, et seq.)
- Migratory Bird Treaty Act (16 USC 701, et seq.)
- Clean Water Act of 1977 (CWA) and the Water Quality Act of 1987 (WQA) (33 USC 1251 et seq., as amended)
- Farmland Protection Act of 1981 (7 USC 4201 et seq., as amended)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (as amended by the Superfund Amendments and Reauthorization Act of 1986)
- Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901)
- Toxic Substances Control Act (TSCA) (15 USC 2601 et seq., as amended)
- National Historic Preservation Act of 1966 (NHPA) (16 USC 470 et seq., as amended)
- Archeological Resources Protection Act of 1979 (16 USC 470)
- Clean Air Act (CAA) (42 USC 7401 et seq., as amended)
- Noise Control Act of 1972 (42 USC 4901–4918)

Regulations

- CEQ Regulations for Implementing NEPA (40 CFR 1500–1518)
- Environmental Effects of Army Actions (32 CFR 651)
- AR 200-1 Environmental Protection and Enhancement
- AR 405-70 Utilization of Real Property
- Protection of Historic Properties (36 CFR 800)

Executive Orders

- EO 11514, Protection and Enhancement of Environmental Quality (as amended by EO 11991)
- EO 11988, Floodplain Management (amended by EO 13690, January 30, 2015)
- EO 11990, Protection of Wetlands
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12372, Intergovernmental Review of Federal Programs
- EO 12580, Superfund Implementation
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13327, Federal Real Property Asset Management (amended by EO 13423)
- EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management (revoked March 19, 2015 by EO 13693)
- EO 13175, Consultation and Coordination with Indian Tribal Governments

EO 13423 revoked previous EOs pertaining to sustainability and greening (EO 13423 itself was revoked on March 19, 2015 by EO 13693). CEQ guidance, however, instructs agencies to

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

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

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

2 Description of the Proposed Action and Alternatives

The following sections describe the No Action Alternative and the five Proposed Action Alternatives that would accomplish the Purpose and Need, as stated in Section 1.2. Section 2.1 discusses the No Action Alternative, continuation of the training mission of Fort Campbell, which analyzes the continuation of the existing conditions at Fort Campbell and the ramifications of that decision. The alternatives under the Proposed Action were developed in accordance with Fort Campbell's training mission requirements and criteria objectives listed in Section 1. Sections 2.2.1 through 2.2.5 provide a description of the alternatives, and include: site specific range construction projects (Section 2.2.1), a description of the proposed AUZs (Section 2.2.2), summary of routine land and range actions (Section 2.2.3), the proposed re-activation of R3703 at Fort Campbell (Section 2.2.4), and the combinations of any two or more of these four alternatives (Section 2.2.5). Section 2.3 outlines the environmental safety precautions that Fort Campbell follows regarding training mission activities. Section 2.4 addresses alternatives considered and eliminated from detailed study. The preferred alternative is identified in Section 2.5.

All actions (including the No Action Alternative) conducted on Fort Campbell's range and training lands will continue to comply with all Federal and state environmental laws and regulations. The execution of any project associated with the Proposed Action would be subject to the measures stipulated in Section 6, Summary of Environmental Consequences. Prior to commencing any project, Fort Campbell's Environmental staff will conduct appropriate analysis in accordance with NEPA in order to assess whether any changed circumstances or alterations to the project's scope or the method of execution warrant additional NEPA analysis and documentation.

2.1 No Action Alternative

The No Action Alternative serves as the baseline for the analysis of the Proposed Action. Under the No Action Alternative, the decision-maker would not implement any of the Proposed Action Alternatives described in this PEIS. This alternative involves continuing existing training missions and environmental programs, and maintaining the existing environmental conditions through the current operational controls. Management of Fort Campbell ranges and training lands would operate without change. Range maintenance, upgrades, and construction activities would occur in accordance with existing procedures. Fort Campbell would continue to support mission-related changes, utilizing the same environmental management approaches as were used in the past. This would ensure no net loss of natural resources due to mission training actions, and would ensure that the desired conditions supporting training are met. This would be an ad hoc approach and would not necessarily be a coordinated, programmatic process. The training conducted at Fort Campbell by DoD units and other Federal, state, and local agencies would continue. Section 3 provides a detailed discussion of the training mission at Fort Campbell, the training conducted at Fort Campbell, and the units that train on the installation.

NEPA evaluation would be conducted for each individual project without a holistic review of site-specific projects, long-range training needs and routine actions. Nevertheless, cumulative impacts analyses would be prepared as required. Maintaining the status quo (No Action Alternative) would not allow Fort Campbell to meet the stated Purpose and Need listed in Section 1.2.

Although this alternative does not meet criteria that would satisfy the purpose and need for the Proposed Action, the No Action Alternative is presented to depict the baseline conditions. The CEQ and Army NEPA regulations require the presentation and analysis of a No Action

Alternative to provide the decision-maker and the public a benchmark against which the impacts of the Proposed Action may be compared. This is the environmentally preferred alternative.

2.2 Description of the Proposed Action

The Proposed Action involves four distinct and separate alternatives and one alternative combining two or more separate alternatives (Sections 2.2.1 through 2.2.5).

2.2.1 ALTERNATIVE 1 – SITE-SPECIFIC PROJECTS IN SUPPORT OF SOLDIER TRAINING

Alternative 1 consists of, on a site-specific basis, construction and modernization projects that are currently funded or are otherwise foreseeable (see Table 2-1). These projects would be constructed as they are funded, and would not all occur within the same construction season.

Table 2-1 provides a brief description of the site-specific construction projects, including the anticipated project acreage. Each of the projects addresses a specific range or training deficiency or need, and therefore, supports Soldier training and military readiness through new construction or modernization. Figure 2-1 depicts the locations proposed for these projects.

None of the projects listed in Table 2-1 are connected, and each serves an independent action; therefore, selection of this alternative does not commit the decision-maker to go forward with every project. Rather, the decision-maker could elect all or a combination of projects. This PEIS provides the NEPA analysis required for each of these projects. These projects are in the planning stages, and therefore, the exact footprint and limits of disturbance for the site-specific projects as shown in Figure 2-1 may change during the final design. Alterations to the scope, design, and techniques, or further refinement of the project footprint, may require more substantive NEPA review. Additional NEPA analysis would be conducted as appropriate and applicable after completion of a checklist (see Appendix B, Project Checklist). This analysis would be performed during project design, once an actual footprint of disturbance has been determined. Depending upon the checklist findings, a decision would be made by the Fort Campbell NEPA Program Manager on whether or not the project can tier off of this PEIS and the appropriate level of NEPA for the specific project.

Table 2-1. Site-Specific Range Construction Projects[1]

Project Name	Location	Project Components	Acres	Plate No[1].
Project 1 – Construct a Driving Skid Pad	Range 51E	Development of a Skid Pad with a wet track for Range 51 5th Special Forces Group. The pad will be a 750-foot by 200-foot paved area and will be used by military vehicles that are practicing maneuvers under simulated engine failure and other emergency situations and environmental conditions. The project is located within TA 47. Time frame of Fiscal Year (FY) 14-18.	7.2	Plate 1
Project 2 – Construct a Gravel Foot March Trail	On the Line Road	Foot March Trail will be developed along On The Line Road connecting Angels Road and Mabry Road sections of the existing Foot March Trail within TA 14. The trail is needed for road march operations and training and removes military personnel from the main roads, reducing traffic hazards. Time frame of FY 15-18.	1.4	Plate 2
Project 3 – Construct a Runway with Glide Slopes	Saunders LZ	Improvements include development of a 2000-foot asphalt Flight Landing Strip (FLS) runway (60m by 1200m) on the site of an existing dirt road, including both East/West Glide Slopes, taxiway, and associated access along Turner Road within TA 49. The runway will support all rotary wing airframes and fixed wing aircraft (i.e., Sherpa) for Special Operations, and Loading/Unloading for parachute training for personnel and equipment. This site could also potentially support a Forward Arming and Refueling Point (FARP) or UAS launch and recovery zone. Construct large warehouse for packing parachutes. Time frame of FY 14-18.	57.9	Plate 3

[1] The overall locations of site-specific projects within Fort Campbell can be found on Figure 2-1 using the corresponding project reference number. Additional information on the individual site-specific projects can be found on the corresponding Plate Numbers in Appendix C. See Section 4.2 regarding more detail on the airspace components of these activities.

FLS = flight landing strip; FY = Fiscal Year; LZ = landing zone; TA = training area; UAS = unmanned aerial system

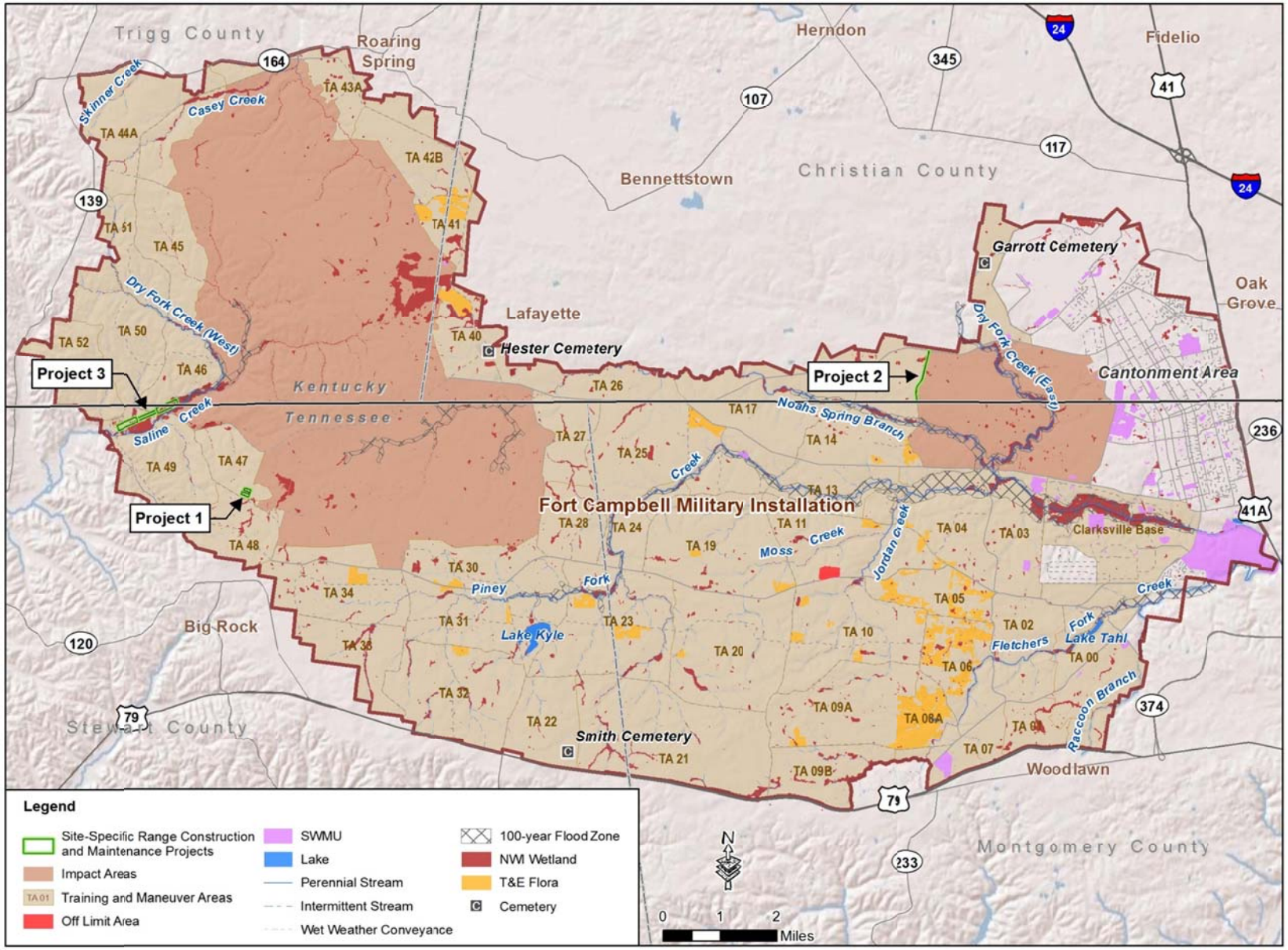


Figure 2-1. Site-Specific Range Construction and Maintenance Projects

2.2.2 ALTERNATIVE 2 – IMPLEMENT THE USE OF ADAPTABLE USE ZONES (AUZS) TO FACILITATE FUTURE MODERNIZATION AND RANGE FACILITY CONSTRUCTION.

This alternative would implement the use of AUZs associated with Fort Campbell's training facilities and TAs for siting future facilities. Each AUZ considered within this alternative was uniquely delineated to maximize the use of existing TAs and the need to provide flexibility for future projects. The locations proposed for AUZs were pre-screened to meet typical range project siting criteria, which include: proximity to existing assets and infrastructure (e.g., airstrip, drop zones, roads, and fiber optics), topography (high and level ground with good drainage), lack of forest, avoidance of cultural sites and protected species, and no impedance to airspace operations. For the larger AUZs (i.e., TAs 11, 20, 52, and Suckchon DZ), the availability of space to develop new training facilities that would not compete with existing training activities was also a factor. Each AUZ would contain environmental constraints mapping (e.g., wetlands, protected habitat, areas of cultural potential, contaminated sites) to guide in the siting for future, unforeseen construction and modernization requirements. The AUZs would provide installation planners with information that can be used to make environmentally sound training, project, and operational decisions during the earliest stages of the ongoing master planning process, taking the criteria mentioned above into consideration. There are a total of eight distinct AUZs (see Figures 2-2a through 2-2c). Table 2-2 provides information regarding each AUZ and suitable future activities for each AUZ.

Table 2-2. Proposed Fort Campbell AUZs

Proposed AUZ[1]	Total Acres	Current Use	Suitable Types of Activities	Activity Acres[2]
TA 11	1,769.1	Maneuver Training	• Construct range support buildings (e.g., classroom; storage facility; latrine; parking area)	1 to 2
			• Construct maneuver trails	variable[3]
			• Tree harvesting to open areas for maneuver	variable[3]
TA 20	2,557.1	Maneuver Training; Helicopter Operations	• Construct range support buildings (e.g., classroom; storage facility; latrine; parking area)	1 to 2
			• Construct maneuver trails	variable[3]
			• Tree harvesting to open areas for maneuver	variable[3]
TA 52	1,095.4	Maneuver Training	• Construct range support buildings (e.g., classroom; storage facility; latrine; parking area) • Range Support Building (classroom) with parking area	1 to 2
			• Maneuver trails	variable[3]
			• Tree harvesting to open the area	variable[3]
			• Develop a drop zone	200 acres
Aardvark LZ (TA 31)	56.2	Landing Strip	• Construct range support buildings (e.g., classroom; storage facility; latrine; parking area)	1 to 2

Table 2-2. Proposed Fort Campbell AUZs

Proposed AUZ[1]	Total Acres	Current Use	Suitable Types of Activities	Activity Acres[2]
			• Construct a gravel maneuver trail with parking area for unit vehicles	1
Golden Eagle Flight Landing Strip (TA 8A)	45.5	C-130 Training/Air Land Missions	• Add additional buildings to the urban training site	2 to 3
			• Range Support Building (classroom) with parking area and a separate large warehouse building (for packing parachutes)	2.8
Indian Mound LZ (TA 28)	50.2	Sherpa Planes/ Alternate UAS Training Site	• Construct range support buildings (e.g., classroom; storage facility/warehouse for packing parachutes; latrine; parking area)	1 to 2
			• Reconfigure former gravel taxiway into a 2,000' asphalt runway for small fixed wing aircraft (e.g., Sherpa)[4]	11.1
Suckchon DZ (TA 21)	1,430.6	Air Land Missions	• Construct range support buildings (e.g., classroom; storage facility; latrine; parking area)	1 to 2
			• Replace temporary maintenance tent with three UAS operations/maintenance hangers.	3.2
Veghel DZ (TA 44A)	327.2	Air Land Missions	• Reconfigure historic runway area into a 2,000' grass runway for small fixed wing aircraft (e.g., Sherpa)[4]	57.9

[1] The time frame for the proposed AUZ projects is FY 14 – 19.
[2]Activity acres represent the likely construction footprint acreage required for each activity.
[3]The corresponding activity acres cannot be estimated as the activity footprint of disturbance is variable based on length of trails and clearing requirements.
[4]See Section 4.2 regarding more detail on the airspace components of these activities.
AVN = aviation; DZ = drop zone; LZ = landing zone; TA = training area; UAS = unmanned aerial system

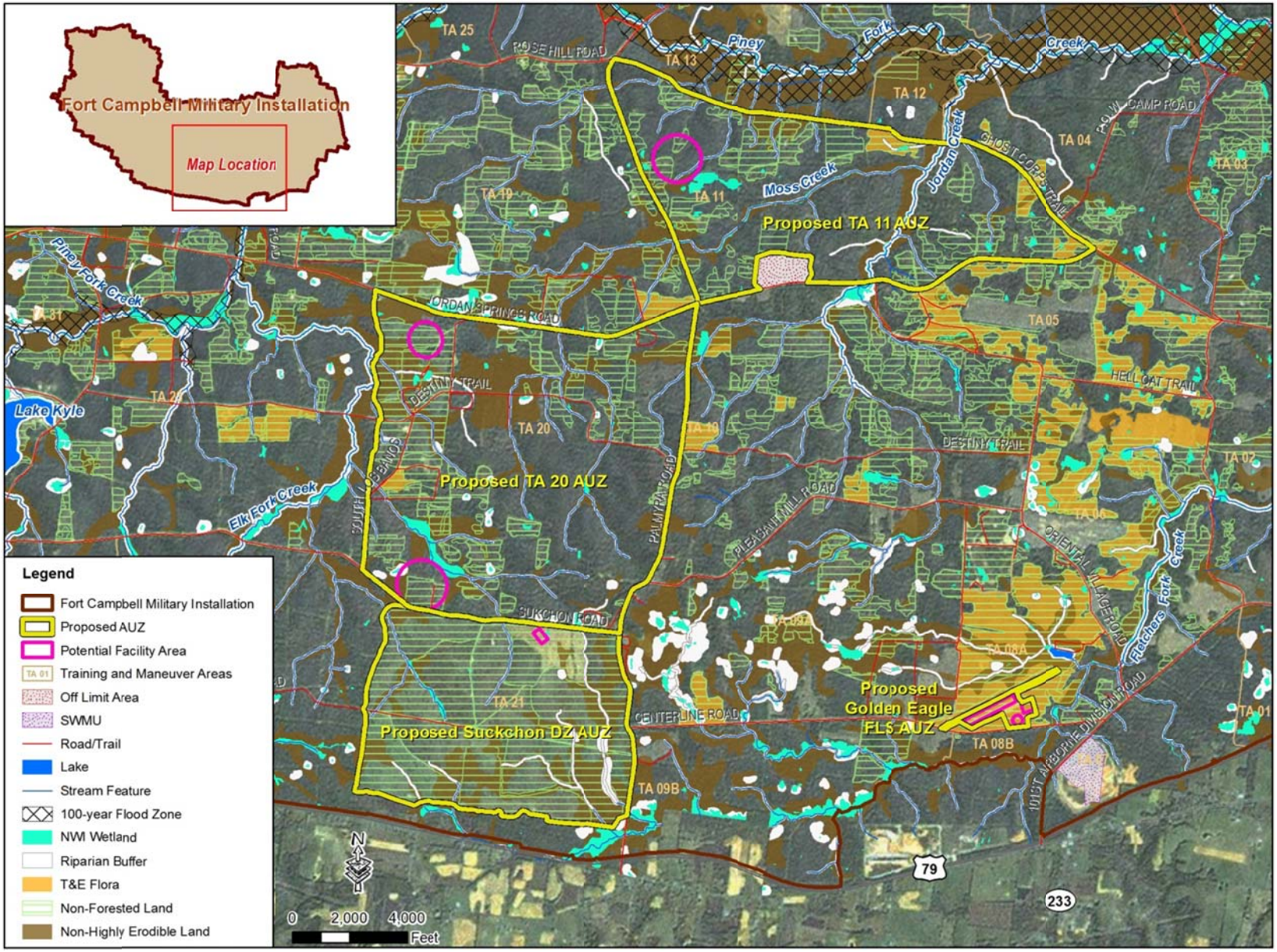


Figure 2-2a. Proposed AUZs A, B, E and G

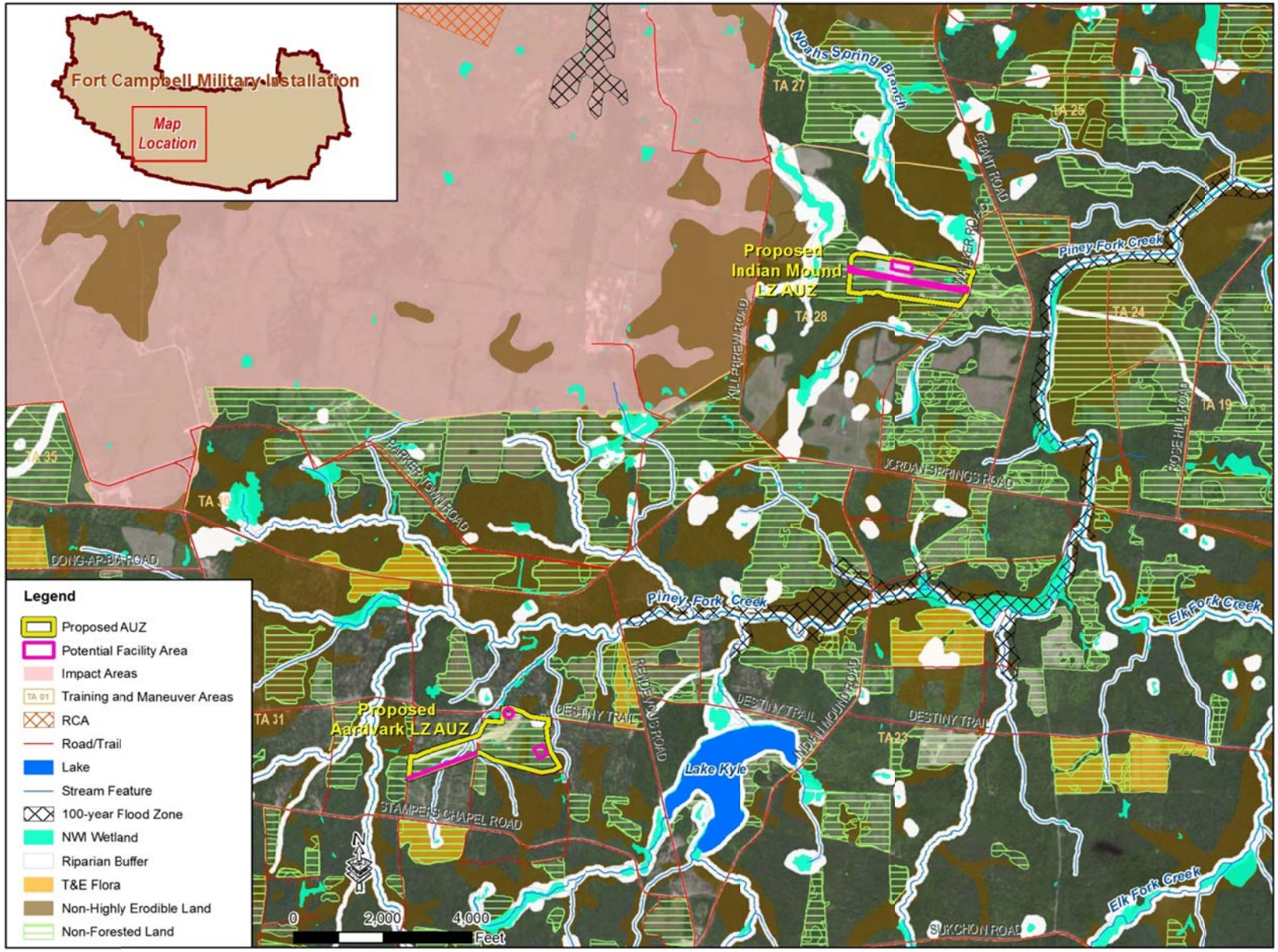


Figure 2-2b. Proposed AUZs D and F

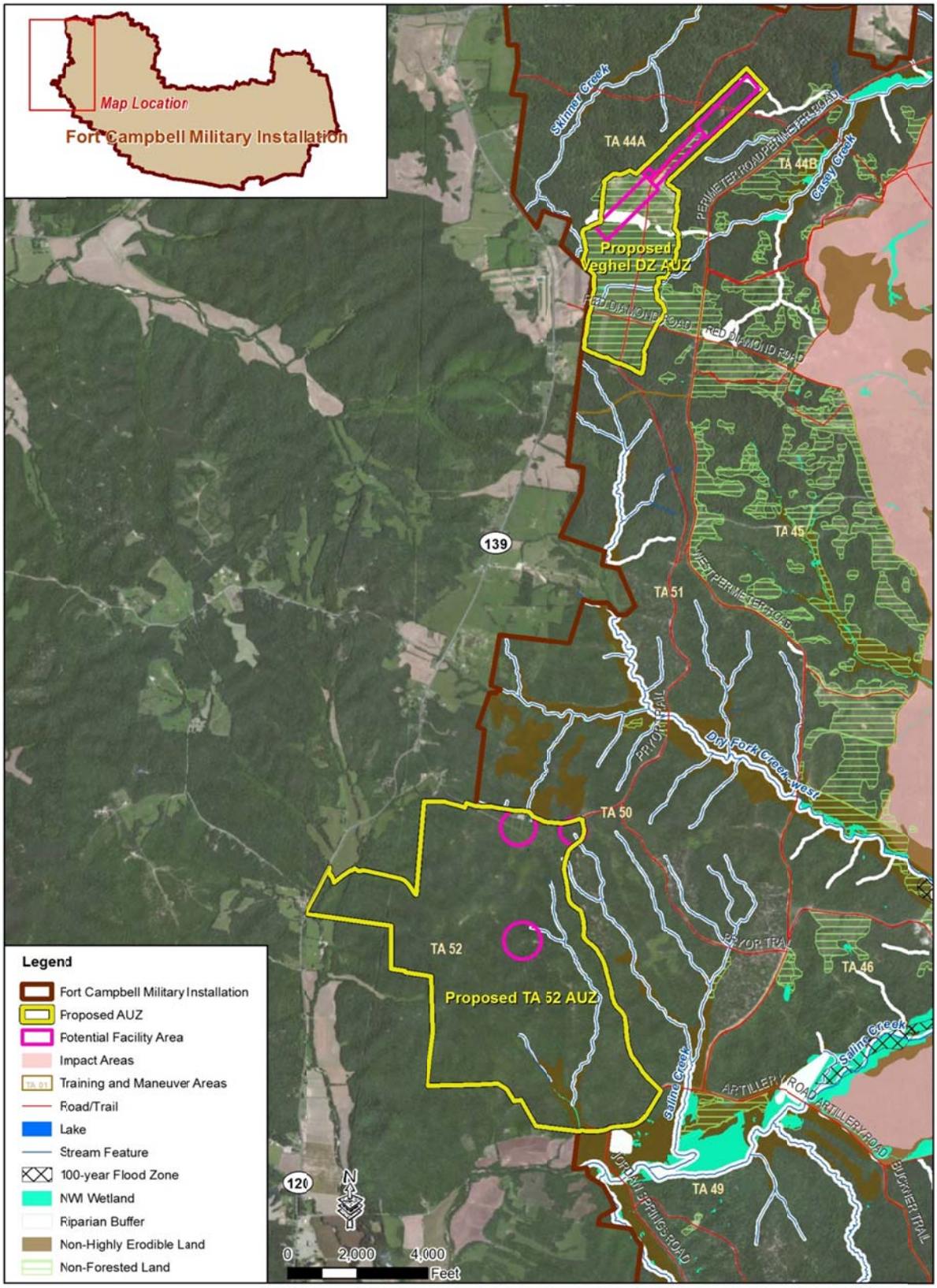


Figure 2-2c. Proposed AUZs C and H

The AUZ concept within Alternative 2 constitutes a planning tool intended to enable a more timely response, provide a larger training need perspective (space availability in relation to existing assets), and provide an environmentally-sensitive response to these changing training mandates. By examining the proposed AUZ areas associated with existing ranges and training facilities, and reviewing suitable future projects within these AUZs, Alternative 2 reduces the time and cost of analysis in the future. Alternative 2 would streamline the environmental review process for the future projects sited in these proposed AUZs due to the identification of environmental constraints. In turn, the availability of a more efficient review process would simplify the siting of new projects within these designated zones.

If Alternative 2 were selected for implementation, proponents would review site selection criteria and utilize a checklist developed by Fort Campbell (Appendix B) in order satisfy NEPA requirements. Development of the AUZs would utilize existing terrain features and vegetation to the maximum extent possible without alteration to the natural environment.

Additional factors considered when siting a range facility construction project include:

- **Typical Footprint**: Is the project a linear action (e.g., utility line, trail, firing lane), which has the potential to traverse numerous ecosystems? What is the typical footprint of disturbance for the action?
- **Probable Location**: Is the project tied to a specific location (e.g., upgrade to existing range infrastructure, culvert tied to a stream)?
- **Probable Activity**: Does the project involve an activity tied to a specific resource (e.g., bridge/stream crossing; land clearing/vegetation removal; prescribed burn/wildfire management; unexploded ordinance (UXO) survey/Human Health and Safety)?
- **Environmental Constraints**: Is the project properly sited or has construction been timed to avoid impacts to environmental (e.g., streams and stream buffers, wetlands, conforms to tree harvesting restrictions, avoids highly erodible soils and steep slopes) and cultural resources?

Appendix D contains sample projects which may be adopted by Fort Campbell for implementation in the respective AUZs determined by potential future training needs. The "potential facility area" contained within the AUZs on the mapping represents areas that meet overall environmental constraints screening criteria in which these projects may be constructed.

The analysis from each project would be supplied by the proponent and reviewed by Fort Campbell environmental NEPA staff. Based on this analysis and any other details regarding the scope and location of the project, the Garrison Environmental staff would determine the appropriate level of NEPA analysis to tier off this PEIS. After approval by the Garrison Environmental staff, NEPA analysis of the project would be complete. This flexibility of siting projects in environmentally pre-screened AUZs would increase Fort Campbell's ability to meet training objectives, particularly when changing circumstances require a more rapid response than current environmental review procedures can accommodate through PEIS tiering of projects within AUZs that have been previously screened for environmental constraints. Those projects not able to tier off this PEIS would require additional NEPA analysis.

2.2.3 ALTERNATIVE 3 – STREAMLINE REVIEW OF ROUTINE RANGE AND TRAINING LAND ACTIONS

This alternative includes evaluation of routine range and training land actions designed to maintain and sustain range and training lands. Fort Campbell identified a list of routine range and training land actions to carry forward for analysis (Table 2-3). This list is a compilation of small projects that have recurred in recent years that, in the professional judgment of Fort

Campbell range planners, are likely to be necessary in the future. These projects are in addition to those routine actions such as construction of range support facilities (i.e., ROCAs, firing lane and line creation, hardstand creation, development of small arms ranges on previous ranges) and vegetation controls (i.e., aerial herbicide application, land vegetation clearing, open field maintenance, and prescribed burning), which have been covered in previous Army NEPA and Fort Campbell management documents (USAEC, 2012; Fort Campbell, 2012c). A detailed discussion of each routine action in Table 2-3 is included in Appendix E.

Table 2-3. Routine Range and Training Land Actions

Culvert Installation/Maintenance E.1.1	Low Water Crossing Site Creation & Maintenance E.1.2
Maneuver Damage Repair E.1.3	Maneuver Trail Construction , Hardening, & Maintenance E.1.4
Contract O&E Target and Residue Removal E.1.5	Observation Point Creation E.1.7
Drop Zone/Landing Zone Maintenance E.1.6	

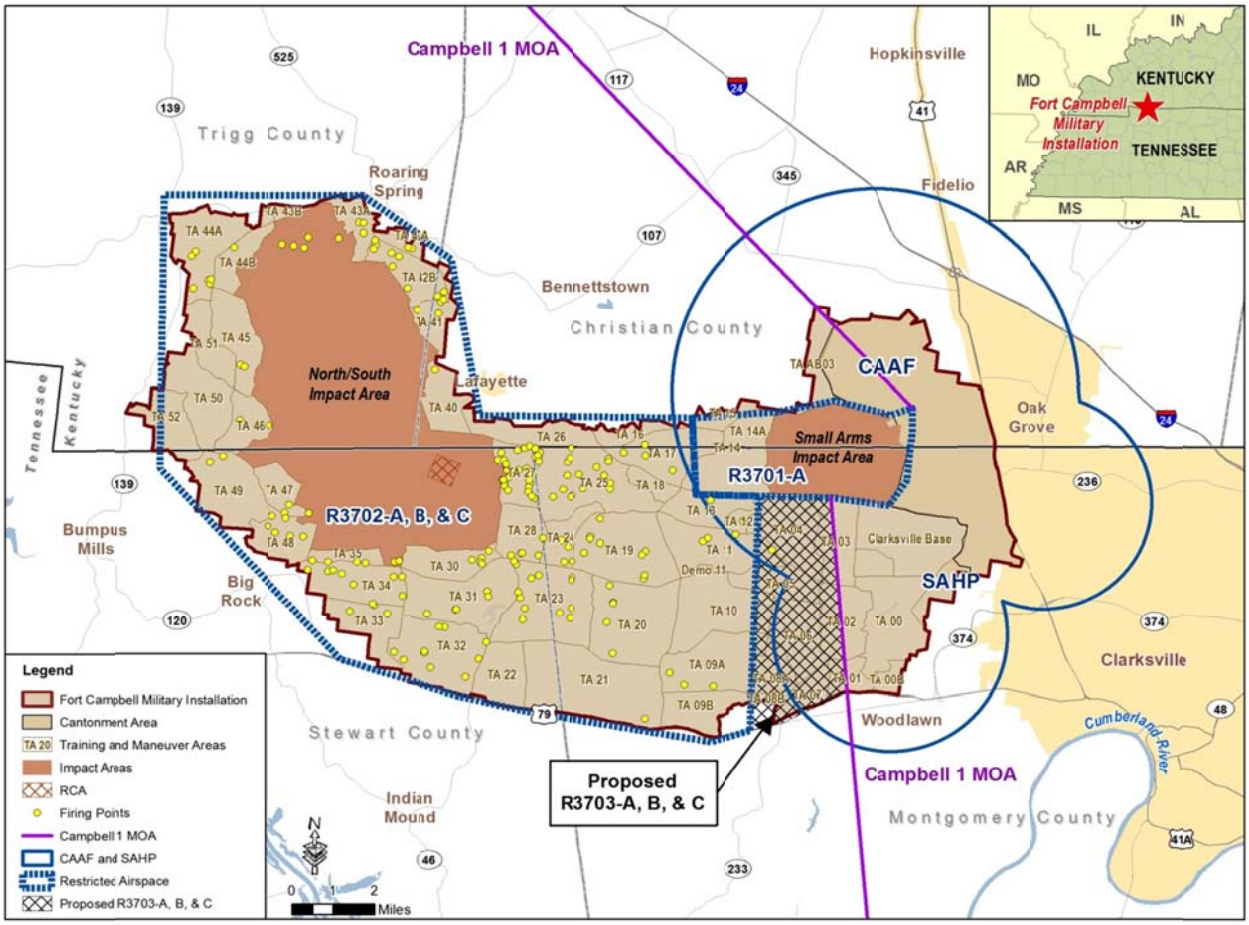
Note: The E with a number refers to the paragraph in Appendix E where a description of the action can be found.

Once a location has been selected for a proposed routine action, the proponent would be required to complete an analysis of the project using the checklist in Appendix B to assess the scope and potential impacts of the project. The checklist screening process includes consideration of sensitive resources (e.g., wetlands, surface waters, protected species and cultural sites), environmental constraints (e.g., contaminated sites), and whether the action would involve an increase of pollutants (e.g., air, noise, discharges). Potential impacts to resources would be coordinated through Garrison Environmental staff. The proponent would also employ the applicable environmental stewardship guidelines listed in Appendix F for each project, thereby reducing or avoiding adverse impacts to environmental resources. Where necessary, appropriate NEPA documentation, normally in the form of a Record of Environmental Consideration (REC), would be completed for these routine actions.

2.2.4 ALTERNATIVE 4 – EVALUATE THE REACTIVATION OF INSTALLATION CONTROLLED AIRSPACE

Although Fort Campbell is not ready to submit a specific proposal to the FAA initiating a formal request, as stated in Section 1.2.1.4., a foreseeable need exists. The proposed reactivation of installation-controlled airspace is based on current needs and is discussed programmatically within this PEIS. Under Alternative 4, Fort Campbell would pursue reactivation of the airspace previously designated as the R3703 A, B, and C restricted airspace (see Figure 2-3). R3703 A, B and C were revoked with an effective date of June 6, 1985 under FAA revocation final rule date, April 11, 1985. Deactivation occurred when R3702C was established.

Due to the close proximity of R3703 to existing restricted airspace, selection of this alternative would not change existing airspace use at or surrounding Fort Campbell. If this alternative were selected, Fort Campbell would initiate a formal request to the FAA for the reactivation of Fort Campbell controlled airspace as presented within this PEIS. Any changes to airspace would require FAA approval per JO 7400.2J - *Procedures for Handling Airspace Matters*, a process that would require additional time, public comment, and review. During the formal request process, an additional NEPA document would be prepared, based on the official request for change of airspace designation with the FAA, and tiered off from this PEIS.



Note: CAAF = Campbell Army Airfield; MOA = Military Operations Areas; RCA = Radiation Control Area (see Section 4.10); SAHP = Sabre Army Heliport; TA = Training Area

Figure 2-3. Proposed R3703 Airspace

The restricted area airspace at Fort Campbell is used for numerous activities that are hazardous to aviation. The assigned helicopters, low altitude UAS, mortars, artillery, air assault missions, parachute personnel drops, parachute container drops, helicopter/fixed wing aerial gunnery, close air support, bombing runs, and airborne aerial targets that compete for airspace use create an operational density and complexity level that requires constant vigilant control actions to ensure safety. Future fielding of the Gray Eagle UAS (described in Section 4.2.2.5) will impact artillery, mortar fire, and fixed-wing close air support aerial gunnery attack once the Gray Eagle UAS is at its operating altitude of 15,000 feet mean sea level (MSL) to 25,000 feet MSL.

Reactivating Restricted Area R3703 would permit Fort Campbell to reduce normal day-to-day airspace training conflicts. Firing artillery into the South Impact Area, from new firing points within TAs 06, 07, 08A, and 08B, and firing artillery from these newly established firing points within R3703 would permit aviation units to train more frequently with limited scheduling conflicts at the modernized digital ranges that encompass the North Impact Area. Several large exercises that require aviation support occur in the northern and western areas of Fort Campbell each year. Reducing conflicting day-to-day artillery training from impacting close air support gunnery and bombing run routes would increase training realism, permitting the ground and aviation commanders to view the battlefield via unmanned aerial systems intelligence data that allows their implementation of real time battlefield strategy adjustments at the pace necessary to defeat enemy forces.

2.2.5 ALTERNATIVE 5 – IMPLEMENT PROPOSED ACTION ALTERNATIVES 1-4

This alternative would entail implementing Proposed Action Alternatives 1-4. For the purpose of discussion, future reference to this alternative will be titled Multiple Alternatives. Selection of this alternative would be considered to satisfy the combination-specific needs for meeting Senior Commander training requirements as each Alternative 1 through 4 serves to satisfy a specific and unique need.

2.3 Environmental Considerations

As previously stated, a checklist (Appendix B) is being developed in conjunction with this PEIS to assist Fort Campbell in identifying potential environmental, cultural, and human health and safety impacts of projects tiered off this PEIS during the project planning and siting process. The checklist will be used to ensure that future projects tiered from this PEIS receive appropriate NEPA analysis, to determine if further analysis is required, and to identify required surveys or permitting.

If necessary, surveys would be performed to determine the extent of natural resources, cultural resources and hazardous materials/waste within a specific project location for those projects tiered off this PEIS. Formal wetland delineations would be conducted in any areas where activities could result in fill, extensive areas of ground disturbance, or impacts to streams. These findings would be coordinated with the U.S. Army Corps of Engineers (USACE) Nashville District regulatory branch and any required Section 404 permitting would be obtained. Necessary archaeological surveys would be required prior to construction activities (or establishment of associated staging areas) within locations that have not already been determined to have low archaeological potential. As necessary, surveys for surface munitions constituents would be conducted by qualified Explosive Ordnance Disposal personnel within the project areas that have not previously undergone such surveys.

If any of the above surveys indicate that contamination, wetlands, or other siting constraints are present within a proposed range activity project area, additional sampling or surveys would be conducted to determine the extent of the constraint, and the results would be used to make a determination on whether the proposed facilities could be reconfigured to avoid such areas or if the siting constraints should be addressed (e.g., avoidance of wetlands or archeological sites). Execution of projects would be consistent with all applicable regulatory and permitting requirements.

For range upgrade and construction activities using construction equipment, a Spill Pollution Prevention and Countermeasure Plan (SPPCP) would be employed to prevent spills and effectively address cleanup strategies before potential spill contaminants from construction equipment could reach surface water or groundwater resources. In addition, during range construction activities, Fort Campbell would follow existing standard operating procedures (SOPs) for the handling and transfer of hazardous material, and would adhere to relevant and applicable occupational health and safety standards listed under 29 CFR Parts 1910 and 1920.

Projects involving construction sites that disturb 1 acre or more of land would be subject to National Pollutant Discharge Elimination System (NPDES) permitting requirements.

2.4 Alternatives Considered but not Carried Forward for Analysis

2.4.1 CONSTRUCTION OF PROPOSED PROJECTS OFF INSTALLATION LANDS

This alternative would require the Army to acquire land near Fort Campbell for TAs and ranges. Training improvements such as runways and trails would be constructed on entirely new TAs. Range improvements, such as urban training sites and range support facilities, would be built on

newly acquired land. This alternative would require several years to acquire land and construct new, state-of-the-art facilities, thus delaying Soldier training. Land acquisition would also be very expensive, and funding for military training is already scarce. For these reasons, this alternative is not a viable alternative and will not be carried forward for further analysis.

2.4.2 USE OF SIMULATIONS INSTEAD OF CONSTRUCTION OF MODERNIZED RANGES

This alternative would involve the use of simulations instead of live fire weapons and maneuver training. The Army's training strategy already includes the use of a mix of live fire and maneuver training, virtual (simulations) training, constructive training, and gaming to meet the Soldier and unit training requirements. Simulation training involves the development of virtual simulations, which are substitutes for live fire or maneuver training. Although the Army does use simulations for some weapons training, simulations do not replace the need for live fire training and live maneuver. Submunitions and non-explosive or lower-caliber munitions intended for training use are sometimes utilized by the Army as a training alternative, but these munitions lack the training value of firing the same munitions Soldiers utilize in combat.

This alternative is not a viable alternative and will not be carried forward for further analysis.

2.4.3 TRAVEL TO AND USE OF OTHER INSTALLATIONS' RANGES AND TRAINING LANDS

Fort Campbell units travel to other installations to conduct training, such as Brigade Combat Team level training at the Joint Readiness Training Center at Fort Polk, Louisiana. Once construction of the Digital Air to Ground Integration Range is complete, the combat aviation brigade will travel to Fort Knox, Kentucky, to train. The transportation of Soldiers, weapons, and equipment to another installation for daily, routine training significantly increases the cost and time required to conduct training. These costs vary depending on the distance traveled, number of Soldiers involved, the weapons and equipment being used, and other factors, such as weather conditions. The live fire range complexes on most major installations are used 242 days a year. Such a heavy training load placed on another installation is not sustainable for the host installation. In addition, because the number and types of ranges on an installation are based on the training load and the requirements of units stationed on the installation, another installation would not be able to support both its assigned units and additional units from Fort Campbell. Lastly, given the costs of transportation per diem, loss of training time, and additional logistics associated with the movement of a large number of troops and their equipment, this alternative is prohibitively expensive, unsustainable, and time-consuming.

This is not a viable alternative and will not be carried forward for further analysis.

2.5 Preferred Alternative

The Army's preferred alternative is Alternative 5, to implement Proposed Action Alternatives 1-4.

3 Fort Campbell Training

3.1 Installation Mission

Fort Campbell provides training, readiness, and deployment support for the active component combat tenant units, mobilizes and deploys active and reserve component units, and provides effective support for Soldiers and their families during peacetime and war.

The primary mission at Fort Campbell is the training, housing, and support of military forces for deployment in support of contingency operations. In addition, the installation supports various non-divisional and tenant organizations such as the U.S. Army Reserve (USAR) and the Army National Guard (ARNG). The mission of Fort Campbell as described in Fort Campbell Regulation 385-5 and FORSCOM Reg.10-42 includes the following:

- Organize, train, and equip all assigned units and individuals to perform assigned missions;
- Provide the operation, safety, security, administration, education and training, procurement support, service, maintenance, and supply of all individuals, units, and activities assigned, attached, or under the command of the installation;
- Provide base operations and other support to Army, DoD, and other government activities that are tenants of, supported by, or satellited on the installation;
- Plan, program, allocate, and supervise the use of resources and facilities for accomplishing FORSCOM basic support missions, functions, and responsibilities, and program, budget, and fund as specified in the AR 37 series, Financial Administration;
- Exercise command of all FORSCOM units, Special Mission, and General Support Force (GSF) units other than designated tenant units/activities; and
- Support within capability the Commanding General, Fifth U.S. Army for planning and supervising all the Reserve Component units' activities to include their support.

As outlined in the *Fort Campbell Organization and Functions Manual, Campbell Regulation 10-8*, the mission of the Commanding General is to:

- Command and support assigned and attached FORSCOM activities, units, and sub-installations;
- Organize, train and equip all units and individuals to perform assigned missions;
- Assure that assigned and attached units are prepared to accomplish assigned missions;
- Provide the operation, safety, security, administration, training, service, communication, information management, maintenance, and supply of all individuals, units, tenants, and activities under the command of the installation;
- Provide base operations and other support to the Department of the Army (DA), DoD, and other government activities, which are tenants of, supported by, or satellited on the installation; and
- Plan, program, allocate, and supervise the use of resources and facilities for accomplishing FORSCOM basic and support missions, functions, and responsibilities, as well as program, budget, and fund as specified in the AR 37 series, Financial Administration.

Additional missions include: training noncommissioned officers and specialists in the fundamentals of leadership; providing medical and dental care for active military, dependents,

and retired personnel; and providing, operating, and maintaining a communications/electronics system at Fort Campbell.

The support of Soldier and unit training requires the use of modern, specifically designed ranges, TAs, and training facilities. Fort Campbell has developed a RCMP to provide a comprehensive method for identifying and developing the required facilities to meet its training mission support requirements. The potential environmental effects of implementing range construction projects associated with that plan are considered as part of Alternatives 1 and 2 in this PEIS.

3.2 Major Units and Organizations Training on Fort Campbell

Fort Campbell supports the third largest military population in the U.S. Army and the seventh largest in the DoD. The 101st Airborne Division (Air Assault) stationed at Fort Campbell prepares and provides trained, disciplined, and fit FORSCOM forces to the combatant commander to fight and win in Afghanistan or as directed. The 101st Airborne Division (Air Assault) is formed of four infantry brigade combat teams (IBCT), a Sustainment Brigade, and the 101st Combat Aviation Brigade (CAB).

Other major tenant units at Fort Campbell include the 5th Special Forces Group (Airborne)(SFG(A)), 160th SOAR (Airborne), 31st Military Police Detachment, 52nd Ordnance Group (EOD), the Blanchfield Army Community Hospital, and the 86th Combat Support Hospital. Campbell Army Airfield (CAAF) is the home of three U.S. Air Force tenant units. They are the 19th Air Support Operation Squadron, 2nd Detachment, 10th Combat Weather Squadron, and the 4th Detachment, 18th Weather Squadron.

Other units not assigned to Fort Campbell that use the training facilities include the ARNG, USAR units, other DoD services, Department of Justice (DOJ) organizations, Reserve Offices' Training Corps (ROTC) organizations, Boy Scouts, civilian marksmanship, and other civilian activities. Recently, the DHS and the FBI have conducted operations jointly with the 52nd Explosive Ordnance (EOD) Group.

3.3 Training

Fort Campbell provides training support to airborne, armored, mounted, and dismounted infantry missions. The primary training objective is to ensure that all individuals and units are fully prepared to perform their assigned missions in a contingency situation. Emphasis is on crew, squad, platoon, company, and battalion collective training, individual- and crew-served weapons firing on ranges, and live fire exercises.

Fort Campbell's training facilities include maneuver/exercise areas, firing ranges, artillery firing points, impact areas, DZs, landing/pick-up zones (LZ/PZ), auxiliary field landing strips, demolition areas, and designated TAs. All of these facilities are used with varying degrees of intensity in performing the overall mission requirements of the installation.

The mix of forested and open areas on Fort Campbell makes the installation favorable for infantry maneuvers. The forest cover provides concealment for units while the open areas allow space for helicopter training exercises. The rapid deployment combat mission of the 101st requires the highly mobile force to maintain constant, wartime levels of readiness and proficiency. Being able to respond to a threat anywhere in the world requires realistic and intense training that places increasing demands on the environment. Such readiness results only from receiving high-quality training that incorporates all mission elements and tasks. Maintaining the integrity of the natural resources on the training lands is essential to ensure that Fort Campbell can continue to provide high quality, realistic training to the individuals and units that train there. An INRMP has been completed, which outlines management actions required to

support the multi-use capabilities of Fort Campbell's available training land while minimizing impacts to the natural environment.

3.3.1 ARMY TRAINING

Army units must be prepared to operate in a Full Spectrum Operational environment. In order to do this, units must train on the following operational tasks:

- Offensive operations
- Defensive operations
- Stability operations
- Civil support operations

Army training doctrine dictates how units train. It is based on Army war fighting doctrine to ensure that units train at the home station as they would fight on the battlefield. Training doctrine is contained in field manuals (FMs), TCs, and in published tactics, techniques, and procedures (TTP). The doctrine states that Fort Campbell must provide the capability for units to train in combat-like conditions. Training tasks are repeated until proficiency is obtained, with continual assessment and feedback being provided to the training unit. An emphasis is placed on the conduct of live fire maneuver tasks from the squad to battalion level.

Many of the units stationed at Fort Campbell, as well as transient units that come to train on the range, operate a variety of UASs. The UAS serves as a unique tool for the commander. It broadens battlefield situational awareness and the ability to see, target, and destroy the enemy by providing actionable intelligence to the lowest tactical levels. Unmanned platforms are the emerging lethal and non-lethal weapons of choice that will continue to transform how the Army executes future operations and ultimately saves lives. UASs significantly augment mission accomplishments by reducing the Soldiers' workload and their exposure to direct enemy contact. Section 4.2 contains further information on airspace training requirements, including those for UASs.

3.3.2 MISSION ESSENTIAL TASK LISTS (METL)

Mission essential tasks are the tasks a unit must be able to conduct to Army standards in order for the units to be Combat Ready and capable of operating in the full spectrum operations (FSO) environment. Mission Essential Task Lists (METLs) are developed at battalion-level and at higher organizational levels. Core and Doctrinal Missions include deployment, full spectrum operations as part of a Joint Task Force, and on order redeployment. Tasks are derived from the following doctrinal FMs, higher headquarters direction and training guidance, and guidance from Combatant Commanders prior to a unit deploying into a Theater of Operations:

- Conduct Command and Control (Army Tactical Task [ART] 5.0)
    - 71-8-5100 Trainer's Guide (TG): Execute the Operations Process (Battalion - Corps)
    - 71-8-5300 TG: Integrate Information Engagement Capabilities (Brigade - Corps)
    - 71-8-3000 TG: Provide Fire Support (Battalion - Corps)
- Conduct Offensive Operations (ART 7.1)
    - 71-8-7110 TG: Conduct a Movement to Contact (Division - Corps)
    - 71-8-7120 TG: Conduct an Attack (Division - Corps)
    - 71-8-7140 TG: Conduct a Pursuit (Division - Corps)
- Conduct Forcible Entry Operations (ART 1.2.1.1) (Corps/ABN & Air Assault DIV's only)

  - 71-8-1340 TG: Conduct Entry Operations (Division - Corps)
- Conduct Defensive Operations (ART 7.2)
  - 71-8-7220 TG: Conduct an Area Defense (Division - Corps)
- Conduct Stability Operations (ART 7.3)
  - 71-8-7321 TG: Plan Restoration of Public Safety (Brigade - Corps)
  - 71-8-7331 TG: Coordinate Essential Services (Brigade - Corps)

Each of the major tenant and non-tenant units that train at Fort Campbell has established organizational METLs. These METLs dictate the tasks the unit must complete in order to be combat proficient. Table 3-1 depicts the types of missions conducted at Fort Campbell.

Table 3-1. Fort Campbell METLs

Missions	Types of Training Activities
1. Deploy. Deployment is the movement of forces and their support bases from one location to an area of operation in response to a military need or crisis. Deployment includes rail loading of heavy equipment and vehicles, convoy operations to the port of embarkation (POE), the loading of equipment onto Air Force aircraft, and loading ships for deployment overseas.	• Rail load training • Convoy training • Load U.S. Air Force (USAF) aircraft • Weapons qualification
2. Offensive Operations. Offensive operations aim at destroying or defeating an enemy. Their purpose is to impose U.S. will on the enemy and achieve decisive victory.	• Movement to contact • Vehicles operated off-road • Weapons live fire • Use of demolitions • Fire and maneuver • Employ Joint Army Air Force Training (JAAT) • Mortar and artillery fire • Use of smoke
3. Defensive Operations. Defensive operations defeat an enemy attack, buy time, economize forces, or develop conditions favorable for offensive operations. Defensive operations alone normally cannot achieve a decision. Their purpose is to create conditions for a counteroffensive that allows Army forces to regain the initiative.	• Vehicles operated off-road • Weapons live fire • Use of demolitions • Fire and maneuver • Mortar and artillery fire • Use of smoke
4. Force Protection. Force protection is a security program designed to protect Soldiers, civilian employees, Family members, facilities, and equipment, in all locations and situations, accomplished through the planned and integrated application of combating terrorism, physical security, operations security, personal protective services, and supported by intelligence, counterintelligence, and other security programs. It is one of the four primary elements that combine to create combat power. The four components of force protection are: operational security and deception operations, the Soldier's health and morale, safety, and the avoidance of fratricide.	• Vehicles operated off-road • Construction of foxholes and survivability positions • Occupy assembly areas • Weapons live fire training • Helicopter landings/takeoffs • Vehicles operated on gravel roads • Refueling and fuel storage operations

Table 3-1. Fort Campbell METLs

Missions	Types of Training Activities
5. Security Operations. Security operations are designed to provide reaction time, maneuver space, and protection to the main body. Security operations are characterized by aggressive reconnaissance to reduce terrain and enemy unknowns, to gain and maintain contact with the enemy to ensure continuous information, and to provide early and accurate reporting of information to the protected force. Forms of security operations include screen, guard, cover, and area security. Area security operations normally are associated with rear operations. Security operations forces orient on the main body and may be oriented in any direction from a stationary or moving force.	• Vehicles operated off-road • Construction of foxholes and survivability positions • Employment of UASs • Field maneuvers, Field Training Exercises (FTXs), and Situational Training Exercises (STXs) • Weapons live fire training • Helicopter landings/takeoffs • Vehicles operated on gravel roads • Refueling and fuel storage operations
6. Establish and Defend a Support Area. A support area is a designated area in which elements store logistics to support units. Support areas require relatively large areas for the storage of materials and good traffic flow. Support areas include the logistical, medical, maintenance, transportation, and ordnance units that provide logistical support tactical units. Like other units, they must provide for their security both in the support area and for convoys moving supplies from point to point on the battlefield. The various training events are completed during both day-light and night-time periods, in order ensure that all personnel achieve and maintain proficiency when completing required operations during low-light and limited visibility periods. This METL can also involve clearing fields of fire (or defensive positions); controlling entry to and exit from a restricted area; reporting intelligence information; implementing operations security (OPSEC) measures; direct construction of non-explosive obstacles; controlling organic fires; implementation of air defense measures; and conducting a defense of the support area.	• Vehicles operated off-road, including driving with night vision goggles (NVG) on roadways and across variable terrain • Construction of foxholes and survivability positions • Occupy Assembly areas • Establish large assembly areas (Brigade and Division Support Areas) and field mess operations (dining areas) • Field maneuvers, FTXs, and STXs • Weapons live fire training • Helicopter landings/takeoffs • Vehicles operated on and off gravel roads • Refueling and fuel storage operations • Decontamination training
7. Air Assault Operations, Including Aerial Reconnaissance. Air assault operations are one of the main training missions conducted at Fort Campbell. Air assaults and raids over the hostile front help secure and attack objectives in the enemy's rear, cutting lines of communication and escape routes.	• Helicopter flights/landings/ takeoffs • UAV flights/landings/takeoffs • Weapons live fire training • Weapons live fire training (aerial gunnery) • Refuel and rearm operations

Table 3-1. Fort Campbell METLs

Missions	Types of Training Activities
8. Fire Support Including Field Artillery Operations. Fire support is the collective and coordinated use of artillery and mortar fire, attack helicopters, close air support, and when available, naval gunfire, against ground targets to support land operations at both the operational and tactical levels. These assets must provide responsive fires during all phases of the operation. The Division fire support plan is synchronized with and integrated into the scheme of a maneuver. These training events are completed during both day-light and night-time periods, in order ensure that all personnel achieve and maintain proficiency when completing required operations during low-light and limited visibility periods.	• Vehicles operated off-road • JAAT live fire operations • Employment of UAS • Artillery and mortar live fire • Construction of foxholes and survivability positions • Field maneuvers, FTXs, and STXs • Weapons live fire training • Helicopter landings/takeoffs • Vehicles operated on and off gravel roads • Refueling and fuel storage operations
9. Sustain Combat Operations. The primary mission of the sustainment units is to logistically sustain units in combat. Sustainment planners analyze force requirements for all phases of the Division's operation. During offensive operations, sustainment units maintain the momentum of the attack. Support emphasizes material resupply, maintenance of weapon systems, and medical evacuation, casualty, and replacement operations.	• Vehicles operated off-road • Convoy operations • Resupply activities • Force protection activities • Construction of foxholes and survivability positions • Assembly area operations • Field maneuvers, FTXs, and STXs • Weapons live fire training • Helicopter landings/takeoffs • Vehicles operated on gravel roads • Refueling and fuel storage operations

Table 3-1. Fort Campbell METLs

Missions	Types of Training Activities
10. Defend. Defense is a temporary state that permits a unit to survive an enemy attack, halt the enemy, and create conditions for offensive operations. Defensive operations are normally conducted with the immediate purpose of causing an enemy attack to fail. There are two general forms of defensive operations, mobile defense and area defense. The mobile defense combines fire and maneuver, offense, defense, and delay to defeat the enemy attack and destroy the enemy force. The area defense focuses on denying the enemy access to designated terrain or facilities for a specified time, rather than on destroying the enemy. Units normally conduct an area defense in depth.	• Vehicles operated off-road • Assembly area operations • Construction of foxholes and survivability positions • Employment of UASs • Construction of obstacles • Use of smoke • Field maneuvers, FTXs, and STXs • Weapons live fire training • Helicopter landings/takeoffs • Vehicles operated on and off gravel roads • Refueling and fuel storage operations
11. Redeploy. This includes two major functions: deployment back to the continental U.S. or to another theater; and reconstitution of Division units, as appropriate. The activities conducted in redeployment are the same as those conducted during deployment.	• Rail load training • Convoy training • Loading of USAF aircraft

FTX = Field Training Exercises; JAAT = Joint Army Air Force Training; METL = Mission Essential Task List; POE = port of embarkation; STX = Situational Training Exercises; UAS = unmanned aerial system; USAF = U.S. Air Force;

3.3.3 FORT CAMPBELL RANGE USE

3.3.3.1 Description of Current Range Capabilities

To be effective, individual and collective training must provide Soldiers and leaders with the opportunity to practice battle-focused tasks in live firing and field training environments. Fort Campbell has 29 basic weapons marksmanship ranges, 12 collective live fire ranges, 39 indirect firing facilities, and 6 special and other live fire ranges. In general, Fort Campbell's ranges are within or adjacent to the boundaries of an impact area, which provides a restricted area where spent ammunition and UXO may occur. Direct and indirect fire ranges support weapons qualification, artillery and mortar firing, weapons firing and bombing from Army aircraft and aircraft from other DoD services, and other live fire training requirements. The types of ranges are described below.

- **Basic Weapons Marksmanship Ranges.** Ranges used to qualify or train with rifles, sniper rifles, shotguns, pistols, grenade launchers, machine guns (MGs), grenade MGs, and sub-caliber light anti-armor weapons (LAWs).
- **Collective Live Fire Ranges.** Ranges used for collective training events, such as Infantry squad battle courses (ISBC) and Infantry platoon battle courses (IPBC), multipurpose range complexes-heavy and -light (MPRC-H, -L), military operations in urbanized terrain (MOUT) complexes, and aerial gunnery ranges.
- **Indirect Firing Facilities.** Ranges used for the qualification and training with mortars, field artillery, or air defense artillery and observation posts.

- **Special Live Fire Ranges.** Ranges used for qualification and training demolitions, live hand grenades, employment of claymore mines, and mine countermeasure procedures used in the identification and removal of mines.

3.3.3.2 Range Utilization Rates

The Army's goal is to schedule ranges for at least 80 percent of the available training days. The utilization goal for ranges and training land is 90 percent of scheduled days.

3.3.3.3 Description of Current Range Instructions

U.S. Army safety activities are organized to protect the force and enhance war-fighting capabilities through a systematic and progressive process of hazard identification and risk management. These activities support commanders by early identification of safety problems that could degrade readiness or mission accomplishment. When safety problems are identified, actions to address them are initiated and implemented through command channels. The following policies, along with other general DoD Instructions and Directives, apply to Fort Campbell's Ranges (DoD Instruction 6055.1, "*DoD Safety and Occupational Health (SOH) Program*" and Directive 4715.11, *"Environmental and Explosives Safety Management on Department of Defense Active and Inactive Ranges within the U.S*."

Specific regulations for range and training land use have been developed for Fort Campbell. The use of Fort Campbell ranges and TAs requires coordination and scheduling with the installation's Range Division. The Range Division operates a range control center 24 hours a day, 7 days a week. It enforces range safety regulations, eliminates conflicts in training, checks Surface Danger Zone Diagram's, operates the range safety FM radio nets, conducts entrance and exit inspections, and monitors training.

Detailed range regulations and safety guidelines for Fort Campbell are covered in the installation's Range Regulation manual (CAM Reg. 385-5). The manual provides guidance for maximum realistic combat readiness training through the proper utilization of available terrain and facilities at Fort Campbell. These guidelines are consistent with the DA and FORSCOM safety goals of providing tough, realistic training while preventing injury to personnel or damage to property.

The Range Regulation manual governs all units that train at Fort Campbell. It states the procedures that must be followed by all active and reserve component units operating within the reservation. It is used to supplement all pertinent U.S. Army regulations and applicable manuals.

3.3.4 FORT CAMPBELL TRAINING AREA USE

3.3.4.1 Description of Current Training Area Capabilities

To be effective, individual and collective training provides Soldiers and leaders with the opportunity to practice battle-focused tasks in field training environments. The major portion of Soldier training and all collective training takes place in units. In units, Soldiers build on basic tasks to attain skills not taught in initial entry training. Unit collective training develops effective combined arms teams consisting of fully integrated combat, combat support, combat service support, and joint elements. Units conduct combined arms training in maneuver TAs. Unlike the ranges, maneuver TAs are not located within an impact area and are considered safe for the free movement of troops and equipment.

Fort Campbell has 22 non-live fire facilities and 52 maneuver TAs.

- **Non-Live fire Facilities.** Used to train Soldiers without the use of weapons, e.g., rappelling towers, DZs, LZs, UAS landing strips, obstacle courses, and gas simulation chambers.
- **Maneuver TAs.** Fort Campbell has approximately 63,523 acres that are designated as light maneuver areas. This land is used for force-on-force maneuver training and STXs. Force-on-force training and STXs within the maneuver TAs include a combination of off-road driving, helicopter landings and takeoffs, digging or excavating of trenches or fox holes, firing of blank ammunition and some live ammunition from designated firing points, ground troop movements, and various other essential exercises required to prepare for combat. Training may include the use of obscurants, such as fog oil and graphite flakes. Effects of the use of these obscurants on biological resources at Fort Campbell have been assessed under a separate Biological Assessment (BA).

Armor and Mechanized Infantry formations also train within the Fort Campbell Training Complex. Training involves armor maneuver from the various open fields around the Training Complex to other open fields. This is achieved through the use of the extensive road network. Armor formations require large open spaces to achieve the desired distances between vehicles that are routinely used in combat operations. Thus, an Avenue of Attack, or corridor, is established during training mission planning for specific training exercises. Maneuver within that corridor includes several open fields and roads to get from field to field. An agreed-upon recovery plan would be required/established between the unit (e.g., ARNG) and Range prior to training at Fort Campbell. The recovery conditions within the plan are dependent upon the type of training activity and vary based on the type of land repair required. The recovery goal is to ensure the armor tread/track ruts are land smoothed and recovered to a state in which they can be used by the next unit without impacting the training mission. Armor formations utilize the Fort Campbell Training Complex at a minimum of once a month for 2-3 days, totaling 24-36 times per year. There are infrequent occasions during the year in which the armor unit conducts Annual Training at Fort Campbell. This typically occurs once within a 4-year time period, usually lasting 14-17 days depending on the unit training plans, during which 6-8 days involve maneuver exercises across the training complex.

3.3.4.2 Training Area Utilization Rates

The TA utilization rates are subject to substantial changes between the preparation of a unit for deployment to an operational area and post-deployment.

3.3.4.3 Description of Current Training Area Instructions

TA instructions and safety regulations are similar to those for the ranges discussed in Section 3.3.3.3. As with use of Fort Campbell Ranges, the use of TAs requires coordination with the Range Control Division.

3.3.5 OFF-POST MILITARY TRAINING ACTIVITIES

Military training activities at Fort Campbell are not always confined to the boundaries of the installation. Military aircraft often fly beyond the boundaries of Fort Campbell for both training and logistical purposes. Off-post flights by rotary- and fixed-wing aircraft for training or training support purposes that originate at Fort Campbell are considered to be within the scope of this analysis until they land at the other end of the flight. Flights are commonly taken to Fort Knox, Kentucky; Redstone Arsenal, Alabama; Camp Atterbury, Indiana; Wendell H. Ford Regional Training Center, Greenville, Kentucky; and the Land Between the Lakes Recreational Area, Kentucky and Tennessee.

The Army maintains a barge facility located at Lock C on the Cumberland River, approximately 20 miles from Fort Campbell. The barge can transport rolling stock, containers, and aircraft, primarily for training deployments.

3.3.6 RANGE COMPLEX MASTER PLAN

The RCMP depicts an installation's current range and training land assets, general siting of future range complex project requirements, and an installation's requirements and constraints that may impact ranges or training lands. The RCMP includes: both contiguous and noncontiguous land parcels that an installation will try to acquire; consideration of the footprint for any non-Army ranges required by other services or agencies to address their training requirement and the constrained requirement; and an opportunity for trainers and other staff to view current range and training land assets and the doctrinal requirements for ranges and training lands. The plan is updated annually and if future adjustments must be made, the plan is adjusted as necessary. Numerous other Military Construction projects identified within the plan have already undergone NEPA review. These projects include a Live Fire Shoot House (FY13), an Automated Infantry Platoon Battle Course (FY18), a Scout Reconnaissance Range (under construction), two Multipurpose Machine Gun Ranges (un-programmed), two Infantry Squad Battle Courses (un-programmed), and an Aerial Gunnery Range (un-programmed). The goal of the plan is to maximize existing assets, sustain natural resources, and provide the maximum training flexibility possible in support of the military mission.

4 Affected Environment and Environmental Consequences

This chapter describes the impact assessment methodology, the affected environment (existing conditions), and the environmental consequences for the No Action and Proposed Action Alternatives. The descriptions of baseline data sources and impact assessment methodologies are discussed in Sections 4.1.1 and 4.1.2, respectively.

It was determined that several resources would not to be affected by the Proposed Action Alternatives; therefore, a detailed analysis of these topics is not presented in this chapter. A discussion of the VECs carried through for further analysis within the PEIS and the justification for the dismissal of certain VECs from further analysis are presented in Section 4.1.2.

Description of Baseline and Data Sources

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

- Geographical Information System (GIS), including land cover, vegetation, hydrology, wetlands, sensitive species, and cemeteries.
- Detailed vegetation data obtained from Fort Campbell.
- Aerial photography: 2010 (Kentucky portions of installation) and 2012 (Tennessee portions of installation), National Agriculture Imagery Program.
- Regional and local reports, including Natural Resources Conservation Service (NRCS) Soil Surveys.
- Previous NEPA documentation.
- Fort Campbell management plans, including the ICRMP and the INRMP.
- Interviews with subject matter experts (SMEs), including the Cultural Resources Program Manager, Wildlife Program Manager, Range Control and ITAM Staff, and the Airspace Manager.
- Agency consultation.

4.1 Impact Assessment Methodology

4.1.1 APPROACH FOR ANALYZING IMPACTS

Context and intensity are taken into consideration in determining the significance of a potential impact, as defined in 40 CFR Part 1508.27. The intensity of a potential impact refers to the impact's severity and includes a consideration of the beneficial and adverse impacts, the level of controversy associated with a project's impacts on human health, whether the action establishes a precedent for future actions with significant effects, the level of uncertainty about project impacts, or whether the action threatens to violate Federal, state, or local law requirements imposed for the protection of the environment. The severity of environmental impacts is characterized as negligible, minor, moderate, major or beneficial:

- **None/Negligible** – No measurable impacts are expected to occur. A negligible impact may locally alter the resource, but would not measurably change its function or character.
- **Minor** – A minor impact would either be isolated and localized or not measurable on a wider scale.

- **Moderate** – Moderate impacts to a resource would be measurable on a wide scale (e.g., outside the footprint of disturbance or on a landscape level). If moderate impacts are adverse, they would not exceed limits of applicable local, state, or Federal regulations.
- **Significant** – A significant impact may exceed limits of applicable local, state, or Federal regulations or would untenably alter the function or character of the resource. The threshold of significance would be a significant impact. These impacts would be considered significant unless mitigable to a less-than-significant level.
- **Beneficial** – Impacts would benefit the resource/issue.

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

To maintain a consistent evaluation of impacts in the PEIS and in accordance with the Army NEPA Regulations, significance thresholds were established for each resource (see Table 4.1-1). Although some thresholds have been designated based on legal or regulatory limits or requirements, others reflect discretionary judgment on the part of the Army in accomplishing its primary mission of military readiness, while also fulfilling its conservation stewardship responsibilities.

Quantitative and qualitative analyses have been used, as appropriate, in determining whether, and the extent to which, a threshold would be exceeded. Based on the results of these analyses, this PEIS identifies whether a particular potential impact would be adverse or beneficial, and to what extent.

A region of influence (ROI) was determined for each resource area and was based on the potential impacts to the affected resource. For example, the ROI may focus on the specific location of an alternative, the installation and surrounding area, or may include the entire watershed. Table 4.1-1 presents resource-specific ROIs and the relevant factors in evaluating the context and intensity of a potential impact to determine if the impacts may be significant. The ROI was generally limited to the installation for the following VECs: biological resources, wetlands, soils, land use and hazardous and solid wastes, as these VECs are directly connected to specific existing conditions within the installation and proposed future construction activities. For the remaining VECs, the ROI was generally expanded to include larger geographic areas (e.g., airsheds for air quality, watersheds for surface waters, noise zones for characterization and assessment of the noise environment, off-post transportation networks for on-post and off-post convoys, and regional airspace use for airspace).

4.1.2 LEVEL OF VEC ANALYSIS

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

Table 4.1-1 presents each VEC and its corresponding ROIs and thresholds of significance. The table also identifies those VECs that are dismissed from further analysis or are fully analyzed in this PEIS, and the rationale for dismissing or analyzing each VEC. In conducting this analysis, a qualified SME reviewed the potential direct and indirect effects of the No Action Alternative and the Proposed Action Alternatives relative to each VEC. The SME carefully analyzed and considered the existing conditions of each VEC within the Proposed Action's ROI. Through this analysis, it was determined that for several VECs, negligible adverse effects would occur.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Air Quality	Airshed Quality Control Region 47 and 72; and installation boundary.	An impact to air quality would be considered significant if were to affect the achievement or maintenance of National Ambient Air Quality Standards (NAAQS) or if it were to lead to a violation of the Title V operating permit.	No	Proposed Action Alternatives 1, 2, 3 and 5 would result in the potential for an increase of emissions during construction and operations. The potential exists, therefore, for violation of the existing Title V operating permit and for adverse effects to regional air quality concentrations and attainment status related to NAAQS. As a result, this VEC is further discussed in Section 4.4.
Airspace	Airspace components above and within the vicinity of the Fort Campbell installation boundary relevant to training and operational purposes and related to the proposed reactivation of installation-controlled airspace.	An impact to airspace would be considered significant if it were to lead to a violation of FAA regulations in a way that would affect aviation safety, or if it were to result in the substantial infringement of private or commercial flight activity.	No	If Proposed Action Alternative 4 were selected, Fort Campbell could subsequently pursue a formal request with the FAA for reactivation of installation-controlled airspace. The potential exists for infringement of private or commercial flight activity. As previously stated in Section 1.3, a detailed analysis of airspace impacts in a subsequent NEPA document would be required for FAA review and approval. As a result, this VEC is further discussed in Section 4.2.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Biological Resources	Biological resources throughout the installation (see Section 4.7.1.3 regarding habitats of specific protected species).	Significant impacts would include: • Substantial permanent conversion or net loss of habitat at the landscape scale. • Long-term loss or impairment of a substantial portion of local habitat (species-dependent). • Unpermitted "take" of threatened and endangered species or species protected under the Migratory Bird Treaty Act (MBTA).	No	Construction activities associated with Proposed Action Alternatives 1, 2, 3, and 5 would have the potential to result in adverse impacts to biological resources. A potential exists, therefore, to exceed the thresholds of significance established for biological resources. As a result, this VEC is further discussed in Section 4.7.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Cultural Resources	Cultural Resources within Fort Campbell installation boundaries.	Impacts to cultural resources would be considered significant if Army actions were to: • Generate substantial concerns raised by Indian Tribes regarding potential impacts to properties of religious and cultural significance to those tribes or organizations; • Cause direct or indirect alteration of the characteristics that qualify a property for inclusion in the National Register of Historic Places (may include physical destruction, damage, alteration, removal, change in use or character within setting, neglect causing deterioration, transfer, lease, sale) without appropriate mitigation. • Adversely impact cemeteries.	No	Construction activities associated with Proposed Action Alternatives 1, 2, 3 and 5 would involve in-ground-disturbing activities. A potential exists, therefore, to exceed thresholds of significance established for cultural resources. As a result, this VEC is further discussed in Section 4.8.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Energy	Fort Campbell installation and energy providers.	Significant impacts would occur if the energy demands of the Proposed Action were to exceed the capacity of the existing transmission infrastructure or the generating capacity of the energy provider.	Yes	Electric power is supplied to Fort Campbell by the Tennessee Valley Authority (TVA) (Edgoten substation) via two 69 kilovolt (kV) transmission lines, each with a capacity of 83 kV amperes. Each individual line has sufficient capacity to power Fort Campbell during peak demand periods. Fort Campbell is contractually limited by the TVA to a peak demand of 62 megawatts (MW). The TVA also supplies the City of Clarksville via the Clarksville Department of Electricity and the Cumberland Electric Membership. Natural gas is supplied to Fort Campbell and the City of Clarksville primarily by Tennessee Gas Pipeline and distributed by the Clarksville Gas Department. There is an installation-wide gas distribution system throughout Fort Campbell. Implementation of Proposed Action Alternatives 1, 2 and 5 would likely require minor amounts of electricity during operation for those projects involving construction of new buildings, if electrical supply were not provided by a generator. Due to the size and scope of these buildings, however, exceedance of existing electrical transmission agreements would not likely occur. No gas would be required for the projects. The checklist (located in Appendix B) would be used for those projects that are programmatic in nature to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for energy would be enacted (see Appendix F) pending selection of Alternative 3.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Facilities	Built-up areas include the cantonment area, the former Clarksville Base, range and training facilities, solid waste management units, and regional landfills.	Significant impacts would occur if the capacity of current infrastructure or available space were unable to support the Proposed Action Alternatives and installation mission.	Yes	Domestic and industrial wastewater are collected and treated at a sewage treatment plant on the former Clarksville Base, which provides both primary and secondary treatment. Fort Campbell's potable water is derived from the Boiling Spring aquifer, which is south of Mabry Road at Little West Fork Creek. Sanitary waste is collected by a refuse contractor and transported to the Bi-County Regional Landfill for disposal. Proposed Action Alternatives 1, 2, 3 and 5 involve the construction and maintenance of facilities. The analysis of these facilities and associated actions are carried through each VEC analysis within this PEIS as part of the Proposed Action Alternatives. Proposed Action Alternatives 1, 2, 3 and 5 would require minimal needs for sewer hook-up or running water, and electricity would be supplied by generator or by connecting into the existing electrical grid, as described in Energy. Stormwater management features would be created as necessary (see Section 4.6, Water Resources). In addition, construction and maintenance projects are anticipated to generate minor amounts of solid waste. A majority of materials would be recycled or re-purposed onsite or within the installation. Any remaining amounts of solid waste requiring disposal would be accommodated by the Bi-County Regional Landfill or other local landfills. Facility and associated infrastructure requirements are not anticipated to adversely impact the installation's overall training mission; therefore, additional analysis is not required. The checklist (located in Appendix B) would be used for those projects that are programmatic in nature to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for facilities would be enacted (see Appendix F) pending selection of Alternative 3.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Hazardous Materials/ Hazardous Waste	Fort Campbell installation boundaries.	Significant impacts would occur if substantial additional risk to human health or safety were attributable to Army actions, including direct human exposure, substantial increase in environmental contamination or violation of applicable Federal, state, DoD, and local regulations.	No	Proposed Action Alternatives 1, 2, 3 and 5 involve the construction and operation of facilities. A potential exists, therefore, to disturb contaminated sites or to spill hazardous materials during construction and maintenance activities. Furthermore, operations of range facilities would have the potential to generate hazardous waste. As a result, this VEC is further discussed in Section 4.10.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Land Use	Land use within Fort Campbell installation boundaries and on adjacent properties.	Impacts to land use would be considered significant if the land use were incompatible with existing military land uses and land use designations; if there were major conflicts with Army land use plans, policies, or regulations; or if there were substantial conflicts between on- and off-post land use.	Yes	No significant impacts to existing land uses on or around the installation are anticipated as a result of the Proposed Action Alternatives. Proposed Action Alternatives 1, 2, and 3 are located within existing compatible range and training land uses within Fort Campbell. The proposed facility construction projects would be sited so that existing land use designations (e.g., surface danger zones [SDZs]) would accommodate the land use requirements needed to support training and construction and operation of the proposed facilities. The reactivation of installation-controlled airspace under Proposed Action Alternatives 4 and 5 would not directly adversely affect land use below the airspace (see Section 4.3 for potential impacts to noise and sensitive receptors). The 2009 Fort Campbell Joint Land Use Study identified an Area of Concern for land use impacts that includes off-post rural development and the community of Lafayette. These lands extend beyond the approximately 3,400 acres around the periphery of the installation designated as Army Compatible Use Buffer (ACUB) lands. Although there are periodic noise complaints from off-post residents regarding training and overflight, there is relatively limited concern in the region regarding existing land use incompatibility. The Proposed Action Alternatives would not result in a substantial change in existing land use and would not result in significant off-post land use impacts. No incompatible land use or conflict with Army land use planning would occur; therefore, no impact to land use would be anticipated. As a result, additional analysis is not required. The checklist (located in Appendix B) would be used for those projects that are programmatic in nature to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for land use would be enacted (see Appendix F).

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Noise	Areas adjacent to and within Fort Campbell installation boundaries.	Impacts to the noise environment would be considered significant if they were to cause reclassification of noise zones (NZs) to NZ II or III around sensitive receptors (e.g., residences, schools, hospitals, churches or daycares).	No	Proposed Action Alternatives 1, 2, 3 and 5 involve the construction and operation of facilities. A potential exists, therefore, to generate noise during both construction and operational phases. In addition, Proposed Action Alternatives 4 and 5 would increase the potential for noise generation beneath the restructured and expanded airspace. Each Proposed Action Alternative, therefore, has the potential to significantly affect the noise environment of sensitive receptors. As a result, this VEC is further discussed in Section 4.3.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Socioeconomics and Environmental Justice	Socioeconomic factors on Fort Campbell and the surrounding communities, including Christian and Trigg counties, KY, and Montgomery and Stewart counties, TN.	Socioeconomic impacts would be considered significant if the Proposed Action were to result in any of the following conditions: • Substantial change to the sales volume, income, employment, or population of the surrounding ROI. • Disproportionate adverse environmental economic, social, or health impacts on minority or low-income populations. • Long-term substantial loss or displacement of recreational opportunities and resources relative to the baseline. • Substantial disproportionate environmental health or safety risk to children. • Substantial increased public safety hazard from military operations. • Substantial increase in demand for public services (e.g., fire protection, police enforcement, education, etc.)	Yes	Short-term negligible beneficial economic impacts would occur as a result of a temporary increase in construction workers hired and the local purchasing of construction materials under Proposed Action Alternatives 1, 2, 3, and 5. Long-term negligible economic benefits could occur due to potential contractual support needs for the operation and maintenance of the proposed new facilities and existing training and range infrastructure. The Proposed Action would not significantly impact sales volume, income, employment, or the local tax base. Additionally, no impacts to public services or low income, minority, or children populations would occur. Overall impacts to Socioeconomics and Environmental Justice would be negligible and further analysis has been dismissed from this PEIS. The checklist (located in Appendix B) would be used for those projects that are programmatic in nature to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for socioeconomics and Environmental Justice would be enacted (see Appendix F).

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Soil Erosion	Soils within Fort Campbell installation boundaries.	Impacts from soil erosion would be considered significant if: • The landscape were not sustained for military training; • Excessive soil loss were to impair plant growth; or • Federal, state, or local laws pertaining to this resource were violated.	No	Proposed Action Alternatives 1, 2, 3 and 5 would involve ground-disturbing activities that could result in bare/exposed soils. The Proposed Action, therefore, has the potential to exceed thresholds of significance established for soil resources. As a result, this resource area is further discussed in Section 4.5.
Traffic and Transportation	Public roadways and key access points within and near the installation; roadways within the Fort Campbell installation boundaries.	Significant impacts would occur if a reduction by more than two Levels of Service (LOS) at roads and intersections within the ROI were to occur.	No	Proposed Action Alternatives 1, 2, 3 and 5 would involve construction activities and training operations that could impact installation roadways and LOS on these roadways. As a result, this resource area is further discussed in Section 4.9.
Water Resources	Watersheds or state-designated stream segments associated with Fort Campbell.	Significant impacts would occur if the total maximum daily load for sediments were to cause a change in surface water impairment status or an unpermitted direct impact to a water of the U.S.	No – Surface Waters and Floodplains Yes - Groundwater	Proposed Action Alternatives 1, 2, 3 and 5 would involve construction activities and training operations that could directly or indirectly cause adverse impacts to surface water quality and existing sediment-impaired streams within Fort Campbell. As a result, this resource area is further discussed in Section 4.6. Fort Campbell overlies the Boiling Spring bedrock aquifer, a deep basin that supplies potable water to the Cantonment area. The aquifer covers approximately 30 square miles, and underlies much of the sub-watershed of Piney Fork Creek. The checklist (located in Appendix B) would be used for construction projects during the design process to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for groundwater protection would be enacted (see Appendix F).

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Wetland Resources	U.S. Army Corps of Engineers (USACE) jurisdictional "waters of the U.S."	Significant impacts would include non-compliance with policies, regulations, and permits related to wetlands conservation and protection.	Yes	Fort Campbell typically uses National Wetland Inventory (NWI) mapping for initial site planning, followed by actual delineations during site-specific design. During the design process, planners will attempt to avoid wetland impacts. Furthermore, wetlands within Fort Campbell are designated as non-TAs, and Soldiers are provided instruction on authorized activities around wetland areas through the Directorate of Plans, Training, Mobilization, and Security, Range Division, ITAM program. Fort Campbell proactively monitors wetland areas and ensures that required training does not impact wetlands areas. Any unavoidable impacts would be permitted through the USACE and any required mitigation would offset significant adverse impacts; therefore, further analysis of this VEC has been dismissed from this PEIS. The checklist (located in Appendix B) would be used for construction projects during the design process to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for wetlands would be enacted (see Appendix F).

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
Wildland Fire Management	Areas adjacent to and within Fort Campbell.	The threshold for significance for wildland fire management is based on the potential of the action to increase wildfire risk or adversely impact the ability of Fort Campbell to manage wildfires.	Yes	Fort Campbell has developed an Integrated Wildland Fire Management Plan (IWFMP) to meet the requirements set forth in the Army Wildland Fire Policy Guidance dated August 2002 (Fort Campbell, 2007). The plan's objectives are to enhance military training maneuvers, facilitate uninterrupted live fire exercises, reduce hazardous fuels, and create sustainable ecosystem management. Prescribed burning is used extensively on Fort Campbell to accomplish these objectives. Prescribed burns are conducted every 3 to 5 years on most TAs. Most burning is conducted in barrens and other open areas and in the pine plantations. Training range impact areas are intentionally burned on an annual basis to reduce fuel loads and maintain open areas, and occasionally unintentionally due to wildfires started during weapons training on the ranges. Proposed Action Alternatives 1, 2, 3 and 5 involve the construction and operation of facilities. Construction activities are not expected to increase the fire start potential beyond a short-term and negligible impact. Construction would temporarily increase personnel presence, vehicle and equipment use, and activity at the construction sites. The increase in construction activities could have the potential to ignite fires due to engines (e.g., hot engines, ignitable engine leaks, etc.) near flammable vegetation. Risks would be reduced by placing construction equipment in designated storage and parking areas away from flammable sources. During operations, fire start potential could increase within certain areas due to the presence of certain training activities (potentially in the AUZs) and increased human activity. Wildland fire risk assessment and management measures, specified in the IWFMP, would be used to reduce fire start potential and the impact on vegetation to negligible levels. These required mitigation measures would offset significant adverse impacts; therefore, further analysis of this VEC has been dismissed from this PEIS.

Table 4.1-1. VEC Assessment Criteria and Level of Assessment

VEC	ROI	Thresholds of Significance	Dismissed from Further Analysis?	Rationale for Level of Assessment
				Should a wildfire incident expand where additional resources or further capabilities beyond those of the Forestry Program are required, then involvement by the military may occur. As of the 2007 IWFMP, there were no Memorandums of Understanding (MOUs) with any outside county, state, or Federal agencies for fighting wildfires occurring on Fort Campbell or for fires that escape installation boundaries onto private lands. Following a 2010 fire that escaped the installation boundary, however, many changes have taken place, including coordination with emergency managers and fire departments of surrounding areas and Fort Campbell. The checklist (located in Appendix B) would be used for construction projects during the design process to review consistency with the no significant adverse impact determination within this PEIS. In addition, environmental stewardship guidelines for wildland fire management would be enacted (see Appendix F).

4.1.3 ALTERNATIVE-SPECIFIC IMPACT ANALYSIS APPROACH

The following methodology was used to determine the impact intensity of each Proposed Action Alternative:

Alternative 1 –*Site-specific Construction, Modernization, and Operations in Support of Soldier Training.* GIS mapping was used to determine the proximity of sensitive resources and human-disturbed areas to the proposed project locations (Figure 2-1). Based on the proposed project components, anticipated acreage of disturbance (Table 2-1), and proximity to resources, a tabular assessment was made regarding the type and intensity of adverse impact, by VEC, resulting from each proposed project. As these projects advance into final design, the checklist (Appendix B) will be referred to for tiering off this PEIS. Existing Fort Campbell environmental stewardship guidelines (summarized in Appendix F) were also considered for reducing the intensity of impact.

Alternative 2 – *Implement the Use of AUZs to Facilitate Future Modernization and Range Facility Construction*. GIS mapping was used to characterize resources within proposed AUZs. Sensitive resources within these boundaries were quantified and any sensitive resources directly adjacent to these boundaries were identified for development and training planning purposes and for future predicted range planning activities. As AUZ development projects are programmatic in nature, the type and intensity of impact was programmatically analyzed based on the future predicted range planning activities and characteristics of the VEC present. The benefits to concentrating range development activities and related training within these boundaries compared to available range lands was also considered. Similar to Proposed Action Alternative 1, Fort Campbell would still be bound to existing environmental stewardship guidelines for reduction and avoidance of impacts from future actions within the proposed AUZs.

This Proposed Action Alternative provides Directorate of Plans, Training, Mobilization and Security (DPTMS) with the flexibility to develop areas within the proposed AUZ, as required, to meet Soldier training objectives. Full AUZ development, however, would be extremely unlikely as Soldier training requires varying degrees of natural overhead protection and concealment (trees/bushes) for maneuvers. This would inherently require the retention/protection of some resources within the proposed AUZ. It is not the intent of the Army to construct ranges barren of vegetation. Nor is it the intent of the Army to wantonly destroy natural resources such as wetlands. Fort Campbell's intent is to ensure the retention/protection of natural resources within the proposed AUZs.

Alternative 3 – *Streamline Review of Routine Range and Training Land Actions*. In order to evaluate the potential for adverse effects from the implementation of routine range actions, an assessment of the potential type and intensity of adverse impact, by VEC, was determined using routine range actions. Factors of these routine range actions evaluated under this alternative include:

- Typical Footprint: Is the routine action a linear action (i.e., utility line, trail, firing lane) that has the potential to traverse numerous ecosystems? What is the typical footprint of disturbance for the routine action?
- Probable Location: Is the routine action fixed to a specific location (i.e., upgrade to existing range infrastructure, culvert tied to a stream)?
- Probable Activity: Does the routine action contain an activity tied to a specific resource (i.e., bridge/stream crossing; land clearing/vegetation removal; prescribed burn/wildfire management; UXO survey/Human Health and Safety)?

Existing environmental stewardship guidelines (summarized in Appendix F) were then considered for reducing intensity of impacts from these routine range actions.

Alternative 4 – *Evaluate the Reactivation of Installation Controlled Airspace.* In order to evaluate the potential for impacts to airspace use, both Fort Campbell airspace managers and surrounding airfield managers were interviewed. Existing and projected airspace needs, along with airspace concerns, were incorporated into Section 4.2.

Alternative 5 – *Implement Proposed Action Alternatives 1-4.* In order to reduce repetition among this "collective" alternative and Proposed Action Alternatives 1 through 4, the discussion of potential adverse impacts under Proposed Action Alternative 5 was limited to include only those adverse impacts that would be greater under collective implementation than those impacts discussed under each alternative individually.

This page intentionally left blank

4.2 Airspace

4.2.1 AFFECTED ENVIRONMENT

This section provides an overview of airspace in the study area (Section 4.2.1.1) and existing airspace components at Fort Campbell (Section 4.2.1.2) that could be affected by the proposed range improvements and controlled airspace modifications at Fort Campbell. This discussion is followed by a description of the current level of airspace use and management within the study area (Section 4.2.1.3).

4.2.1.1 Overview

Airspace Management is defined as the direction, control, and handling of flight operations in the navigable airspace that overlies the geopolitical borders of the U.S. and its territories.

Airspace is that four-dimensional area (space and time) that overlies a nation and which comes under its jurisdiction. Airspace consists of both controlled and uncontrolled areas. Controlled airspace and the constructs created to help manage it are known as the National Airspace System (NAS). This system is "…a common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures; technical information; and manpower and material" (FAA, 2002). Navigable airspace is that above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in aircraft launch, recovery and transit of the NAS (49 USC § 40102). Congress has charged the FAA with responsibility for developing plans and policies for the use of navigable airspace and assigning, by regulation or order, the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103(b); FAA Order 7400.2, 2004). The FAA also regulates military operations in the NAS through the implementation of FAA Order JO 7400.2J, *Procedures for Handling Airspace Matters* and FAA Handbook 7610.4J, *Special Military Operations*. The latter was jointly developed by the DoD and FAA to establish policy, criteria and specific procedures for air traffic control (ATC) planning, coordination and services during defense activities and special military operations. The use of airspace and airfields by Army organizations is also strictly regulated in AR 95-2 *Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids.*

Different classifications of airspace are defined by different types of altitude measurements. These are commonly referred to throughout this section and include the following:

- **Above Ground Level (AGL).** This type of measurement is the distance above the earth and is used at lower elevations in Class-G airspace (defined later within this section), approach/departure situations or any condition that typically resides in the area between surface and 1,200 feet AGL or occasionally higher.
- **Mean Sea Level (MSL).** This measurement is defined as the altitude of the aircraft above MSL as defined by altimeter instrumentation.
- **Flight Level (FL).** FL is for airspace higher than 18,000 feet above MSL up to and including FL600. To obtain FL, the altimeter is set at the International Standard Atmosphere (ISA) and described by dropping the last two digits. FL600 is comparable to 60,000 feet MSL at the ISA setting.

Controlled airspace is defined as a limited section of airspace of defined dimensions within which ATC is provided to Instrument Flight Rules (IFR) and to Visual Flight Rules (VFR) traffic. IFR and VFR are the two modes of flying that can generally be described as follows:

- IFR refers to a method of air travel that relies on instrumentation rather than visual reference, and which is always under the direction of ATC to provide proper separation of aircraft. As aircraft traverse the sky from launch at one airport to recovery at another, every movement is directed by the ATC with authority for each given area. Control is transferred from one ATC to another as aircraft cross jurisdictional lines defined on Sectional Maps prepared by the FAA (see Figure 4.2-3 for the Sectional of this ROI).

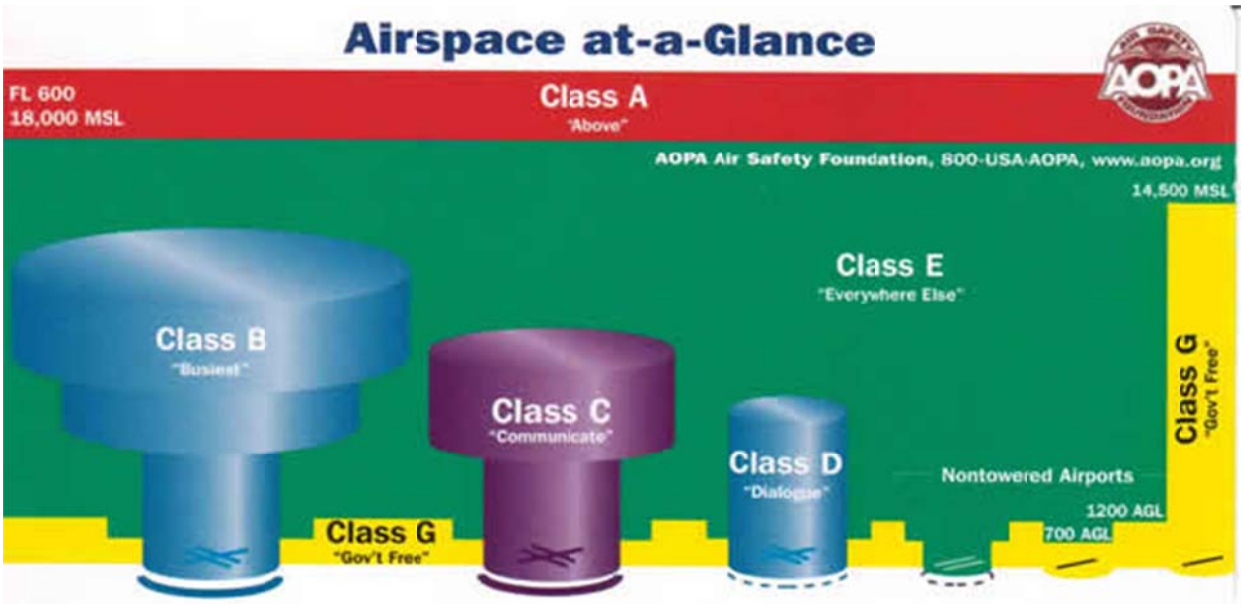
> **Sectional Maps** represent airspace features and conditions relative to ground features as a mechanism to control the private, public and commercial use of that airspace as a means to reduce the likelihood of accidents (see Figure 4.2-3).

- VFR refers to a method of air travel that relies primarily on visual reference (dead reckoning) for location and safe separation of aircraft while in Class-G or Class-E Airspace or as granted by ATC within their defined areas of control. VFR flying is inherently subject to weather conditions.

Controlled airspace has a set of classifications indicated on Sectional Maps to include classes A through E and G (there is no Class-F in the United States) as listed below (see Figure 4.2-1):

- **Class-A airspace** refers to the region between above 18,000 feet MSL and FL600 over the contiguous U.S. All traffic in this airspace follows instrument flight rules (IFR). The airspace is dominated by commercial traffic using jet routes between above 18,000 feet MSL and FL450.
- **Class-B airspace** is typically associated with larger airports as a control mechanism for the large number of sorties and types of aircraft. It is typically configured in multiple layers resembling an upside down wedding cake. The first layer (inner circle) is typically from surface to 10,000 feet MSL. This circle could be in the range of 10 nautical miles (NM) to 20 NM in diameter. The next circle might be 30 NM and extend from 1,200 feet AGL to 10,000 feet MSL. The outer circle lies outside of the second and may extend from 2,500 feet AGL to 10,000 feet MSL. Each airport is potentially different with the area coverage and elevations defined on Sectional Maps. Aircraft must be equipped with specialized electronics that allow ATC to accurately track their altitude, heading and speed. They are also required to maintain radio communication while in the airspace and are given direction as to altitude, heading and speed at all times.
- **Class-C airspace** is associated with medium sized airports and is the most common class for airports with control towers, radar approach control and a certain number of IFR operations. While each is specifically tailored to the needs of the airport, a typical Class-C configuration consists of an inner circle of 5 NM extending from surface to 4,000 feet above ground level (AGL) and an outer circle of 10 NM extending from 1,200 feet AGL to 4,000 feet AGL. Again, each airport is potentially different with the area coverage and elevations defined on Sectional Maps. Aircraft must have an operable radar beacon transponder with automatic altitude reporting equipment and are required to maintain radio communication while in the airspace. They are given direction as to altitude, heading and speed at all times.
- **Class-D airspace** is associated with smaller airports that have an operational control tower. They typically have a single circle of 5 to 10 NM that extends from surface to 2,500 feet AGL. Aircraft may not operate below 2,500 feet AGL within 4 NM of Class-D airspace at an indicated airspeed of more than 200 knots. Pilots must establish and maintain two-way radio communication with ATC for separation services. It is not uncommon for these airfields to have set hours of operation for ATC. Outside of these times, the area reverts to uncontrolled airfield status requiring pilots to fly VFR using “see and avoid” techniques and make radio addresses for all actions.

- **Class-E airspace** is any controlled airspace which is not Class A, B, C or D. It extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Class-E airspace is also that used by transiting aircraft to and from the terminal or an en route environment normally beginning at 1,200 feet AGL to above 18,000 feet MSL. Class-E airspace ensures that IFR traffic remains in controlled airspace when approaching aircraft within otherwise classified airspace or when flying on Victor airways (see Section 4.2.1.2.5 regarding definition of Victor airways). Federal airways have a width of 4 statute miles on either side of the airway centerline and occur between 700 feet AGL and above 18,000 feet MSL.
- **Class-G airspace** is otherwise uncontrolled airspace that has not been designated as Class A, B, C, D or E. IFR aircraft do not operate in Class-G airspace with the possible exception of aligning an approach or departure on an IFR Flight Plan. This is done at their own risk, as ATC has no knowledge of VFR activity in these areas.



Source: AOPA, 2009.

Figure 4.2-1. Airspace Classification Diagram

There are also Special Use Areas (SUAs) designed to ensure the separation of non-participating aircraft from potentially hazardous operations or conflict with military operations in general. These include Restricted Areas (RAs) and MOAs. RAs are four-dimensional sections of airspace that are to be restricted from commercial or private traffic while activated, thereby allowing unfettered execution of military operations. Different sections and stratifications can be activated or deactivated depending on training requirements. Pilots are informed of status by Notices to Airmen (NOTAMs). MOAs are three-dimensional sections of airspace defined as having a high level of military use, in order to advise commercial and private traffic to either stay clear of this area or be vigilantly aware of that type of traffic when activated. Figure 4.2-2 shows a vertical diagram of airspace classification within the ROI.

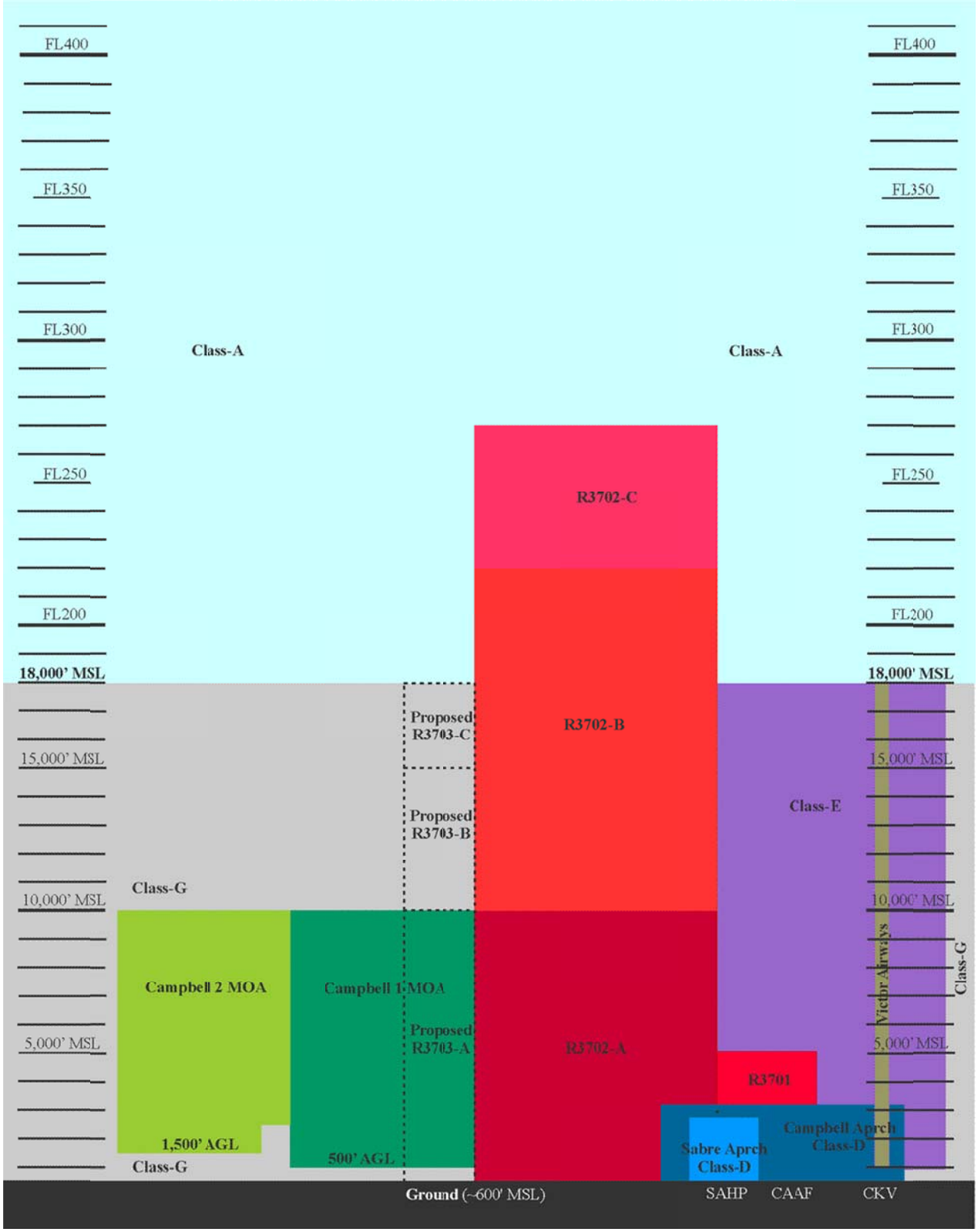


Figure 4.2-2. Fort Campbell - Airspace Vertical Diagram of the ROI

4.2.1.2 Airspace Components

Figure 4.2-3 shows the Sectional Map for the ROI with the proposed airspace modifications associated with Alternative 4.

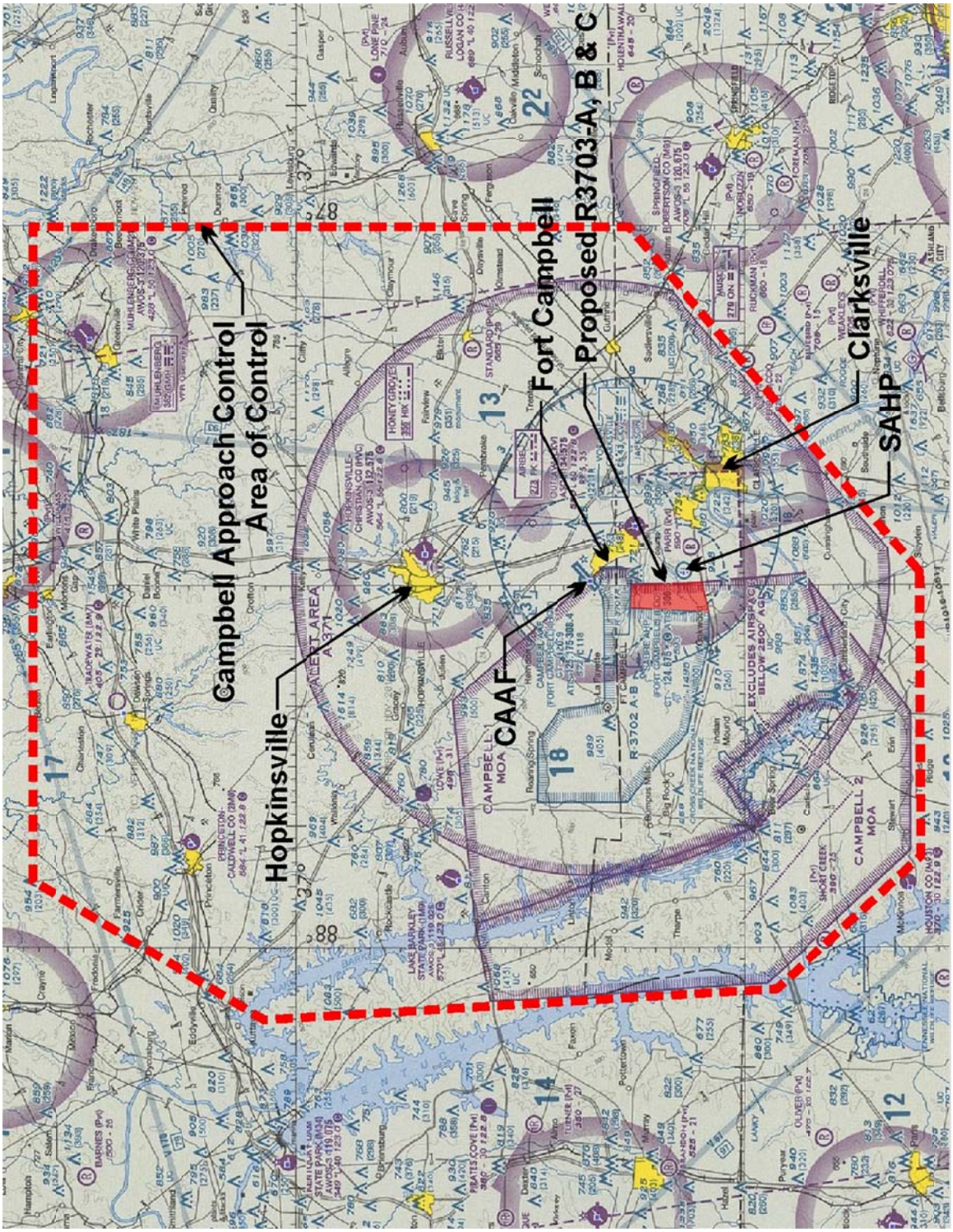


Figure 4.2-3. Fort Campbell - Sectional of the ROI Showing Proposed Controlled Airspace Areas

The components of the airspace ROI for this PEIS include CAAF, Sabre Army Heliport (SAHP), Golden Eagle FLS, the Fort Campbell Range, which contains several UAS launch and recovery sites, LZs, DZs, the R3701, stratifications A-C of the R3702 over the range, and the Campbell 1 & 2 MOA (see Figure 4.2-3 for the Sectional depicting the airspace components and Figure 4.2-4 depicting Fort Campbell airspace use generators). There are also several commercial and small private airports (see Section 4.2.1.2.6 for further descriptions) in this area that may have an effect on airspace and air traffic within the ROI, including: Outlaw Field Airport, Hopkinsville-Christian County Airport, Parr Field Airport-private use, Standard Field Airport-private use, Lowe Airport-private use, Lake Barkley State Park Airport, Kentucky Dam State Park Airport, Turner Field Airport-private use, Pirates Cove Airport-private use, J&C Antique Airfield-private use, West Kentucky Airpark-private use, Princeton-Caldwell County Airport, Caldwell County Hospital Heliport (6KY5), Mayfield Graves County Airport, Kyle-Oakley Field Airport, Brandon Airdrome-private use, Barkley Regional Airport, Short Creek Airport-private use, Houston County Airport, Big Sandy Airpark-private use, Ferraraccio Field Airport-private use, and Ruckman Field Airport-private use.

Other airports in the area are outside of the ROI. These airports could possibly have an indirect effect on air traffic; they include Terry Field Airport-private use, Metropolis Municipal Airport, Barnes Farm Airport-private use, Marion-Crittenden County Airport, Oliver Landing Airport-private use, Henry County Airport, Carroll County Airport, Benton County Airport, Humphreys County Airport, Dickson Municipal Airport, Weakleys Field Airport-private use, Whifferdill Airport-private use, Springfield Robertson County Airport, Russelville-Logan County Airport, Lone Pine Aerodrome-private use, Nobuzzn Airport-private use, Foreman Field Airport-private use, Williams Farm Airport-private use, Tradewater Airport, Madisonville Municipal Airport, Muhlenberg County Airport and further away but the largest airport in the area, Nashville International Airport.

The ROI contains several Federal airways as this location is near many major airline hubs including St. Louis International Airport, Memphis International Airport and Atlanta's Hartsfield-Jackson International Airport. Four Victor Routes encompass the ROI centered on several Very High Frequency Omni-Directional Range/Tactical Aircraft Control (VORTAC) beacons located near Bowling Green, Kentucky, Central City, Kentucky, Barkley Regional Airport, Graham, Tennessee, and Jack's Creek, Tennessee including: V-52, V-178, V-67, and V-94. One Victor Route traverses the ROI (V-7) which is centered on two VORTAC located at Central City, KY and Graham, Tennessee. These Federal Airways will be less important in the near future as the FAA progresses towards full implementation of the Next Generation Air Transportation System (NextGen) utilizing the Performance Based Navigation (PBN) methodology of air traffic control (also see Section 4.2.1.2.5). The PBN methodology is basically a system of point-to-point flying rather than using these established air routes.

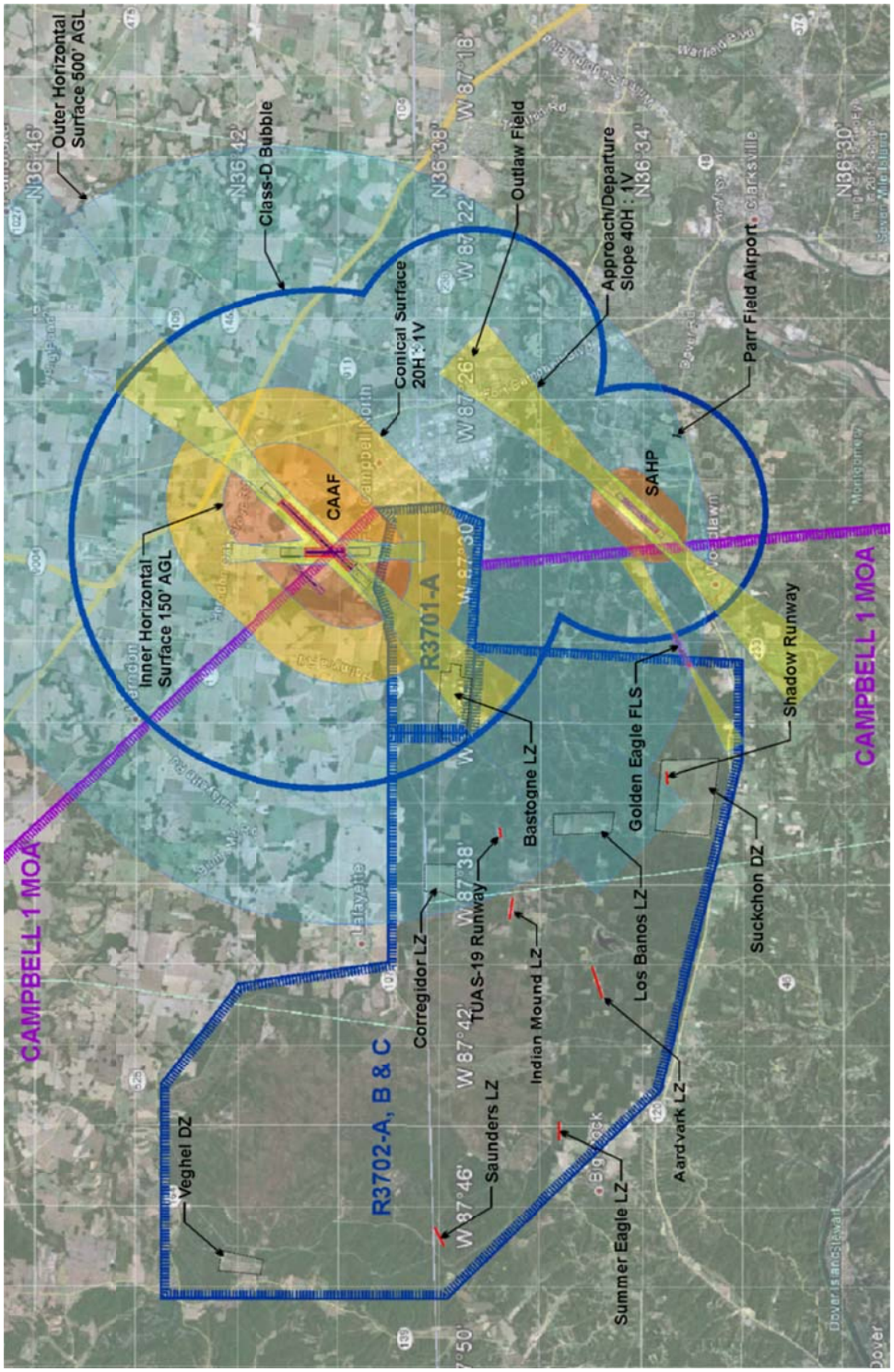


Figure 4.2-4. Fort Campbell Air Use Generators and Imaginary Surfaces

Imaginary surfaces are three-dimensional planes established in airspace surrounding airports for the protection of flight paths associated with launch/recovery (L/R). They exist primarily to prevent existing or proposed manmade objects, objects of natural growth or terrain, from extending upward into navigable airspace. An object is an "Obstruction to Air Navigation" if it is of greater height than any imaginary surface established under the regulation. The size and configuration of each imaginary surface is based on the classification of each runway. There are basically six imaginary surfaces surrounding runways on all sides which the FAA and DoD have specified for the purposes of determining obstructions to air navigation. They include a Primary Surface, Transitional Slope, approach departure control surface (ADCS) Slope, Inner Horizontal, Outer Horizontal and the Conical Surface connecting the two.

4.2.1.2.1 Military Airfields

Campbell Army Airfield (CAAF). CAAF is the hub for most military operations in and around Fort Campbell to include Joint Air Force and Army Training (JAAT) in the R3702 and Campbell MOAs (refer to Figure 4.2-5 for CAAF imaginary surfaces). This is a military use only airfield with two diagonally intersecting runways (05-23 and 18-36) and other smaller runways and landing pads for helicopter flight training. The primary runway 05-23 is an asphalt surface of 200 feet wide by 11,826 feet in length capable of fully loaded C-5 or 747-400 launch and recovery. Runway 23 is fitted with an Instrument Landing System (ILS) approach. Runway 05 currently has a displaced threshold of 896 feet. The secondary runway 18-36 is an asphalt surface of 150 feet wide by 4,498 feet in length. The Destiny Runway is also orientation 05-23 and resides off the edge of the Destiny Ramp. It is an asphalt surface of approximately 90 feet wide by 2,500 feet in length. This runway is used specifically for helicopter flight training, primarily touch-and-go launch/recovery and hover operations. There is also an area of high use as a runway referred to as Skid Row. It is located off the end of Runway 18 (beginning of Runway 36) on Taxiway Mike supporting Runway 05-23. It is used specifically for touch-and-go flight training of helicopters with skid type landing gear as opposed to wheeled. It is a concrete surface of approximately 75 feet wide by 1,500 feet in length. This airfield supports one of the installation's two CABs: the 101st CAB is a full spectrum air assault CAB with 116 assault, attack, support and reconnaissance helicopters. The airfield is also home to the 160th SOAR Airborne with 184 utility, attack and medium lift helicopters. In addition to these permanent stationed aircraft, the airfield has facilities to support transient, deployment and airborne training requirements.

CAAF is part of a three airport complex within a three-lobed Class-D bubble along with SAHP and Outlaw Field, the Clarksville Airport. This Class-D construct extends from surface up to and including 3,100 feet above MSL. The portion centered on CAAF is approximately 11 NM in diameter. Air traffic control within this area is complex and coordinated between many different but interrelated agencies. The portion of the Class-D bubble surrounding CAAF is managed by Campbell Control Tower located in the CAAF control tower. It generally extends to the edge of the Class-D bubble that would encircle this airfield. This boundary changes to follow the edges of the RAs when activated from the point of intersection with the edge of the Class-D circle. That area then goes to the responsibility of Eagle Radio Airspace Information Center (AIC).

Campbell Approach also manages IFR traffic at Outlaw Field and within their portion of the Class-D bubble. VFR aircraft at Outlaw Field are left to operate independently if they intend on remaining within the closed pattern of that airfield according to a Letter of Agreement with Campbell Radar Approach Control. This Agreement requires pilots to Squawk 1200 on their transponders while operating in this airspace. If they intend on leaving this pattern, they are required to contact Campbell Approach for launch and recovery and remain in contact while within the Class-D airspace. This is because Outlaw Field has no ATC or control tower of their own and must rely on Campbell Approach for safe operations. The gap in this system is due to

the lack of knowledge by Campbell Approach of ground traffic at Outlaw Field if VFR traffic does not contact Campbell Approach and before a transponder signal is picked up on radar. Conflicts could arise if Campbell Approach were to land IFR traffic while unknown VFR aircraft were on the runway or immediately after launch.

Sabre Control Tower manages the SAHP portion of the Class-D bubble with established transfer protocol between the other two airfields with Campbell Approach. Although their airspace also extends from surface up to 3,100 feet above MSL, they only provide control up to 1,700 feet above MSL through a Letter of Agreement with Campbell Approach, which manages the remaining 1,400 feet. This is done to allow single agency control for Outlaw Field approach and departure over-flights of SAHP.

The three airport Class-D construct is within a larger Class-E bubble configuration that also includes the Hopkinsville-Christian County Airport and by default Parr Field Airport. This controlled airspace begins at 700 feet AGL and extends up to 18,000 feet above MSL with effective hours announced through Notices to Airmen (NOTAMS). This airspace and more is under the control of Campbell Approach Control. Their total area of control (AOC) extends north to a line between Madisonville Municipal Airport and Muhlenberg County Airport, west to an extension of the western edge of the Campbell 2 MOA, east to the 87 degree longitude line, south to an extension of the southern edge of the Campbell 2 MOA and a southeast boundary that follows the southeast edge of the A-371 Alert Area (refer to Figure 4.2-3 for a depiction of the Campbell Approach Control AOC). This AOC is not identified on Sectional maps but is depicted on all ATC radars. It extends from 700 feet AGL up to 10,000 feet above MSL. Most air traffic outside of these defined areas is managed by the Memphis Air Route Traffic Control Center (ARTCC) or the Indianapolis ARTCC. A cross-section of these three dimensional envelopes is depicted in Figure 4.2-2.

The CAAF runways have specific imaginary surfaces that traverse the airspace acting in conjunction with controlled airspace of the Class-D and Class-E bubbles in support of safe launch and recovery operations. Imaginary surfaces establish maximum height limitations for fixed or mobile ground obstacles surrounding airfields. For military airfields these are dictated by Unified Facilities Criteria (UFC) 3-260-01, Airfield and Heliport Planning and Design. Runway 05-23 is classified as a Class-B runway under Army criteria (AR 95-2), which requires a Primary Surface centered over the runway of 1,000 feet wide extending the length of the runway plus 200 feet on both ends. A Transitional Slope rises at a rate of seven horizontal to one vertical off the sides of the Primary Surface to a height of 150 feet AGL. From the upper edge of the Transitional Surface begins the Inner Horizontal Surface that extends on a level plane out from the edge of the Transitional Slope a distance of 7,500 feet from runway centerline. The Conical Surface slopes upward from the outer edge of the Inner Horizontal Surface at a rate of 20 horizontal to one vertical to a height of 500 feet AGL. This slope then levels off into what is referred to as the Outer Horizontal Surface, which extends on a level plane at 500 feet AGL for a distance of 30,000 feet from its starting point. The ADCS slope begins at a point 200 feet from the end of the runway and extends out a distance of 25,000 feet. It rises at a rate of 50 horizontal to one vertical. The ADCS is a trapezoid with a beginning width of 1,000 feet (consistent with the Primary Surface) centered on the runway and an end width of 9,000 feet. The end elevation is at 500 feet AGL aligned with the Outer Horizontal Surface. These imaginary surfaces are established to limit the construction or placement of objects below this plane allowing clear airspace for free flight above them. Objects might include such things as radio towers, smoke stacks, buildings or even the tails of taxiing or parked aircraft closer to the surface.

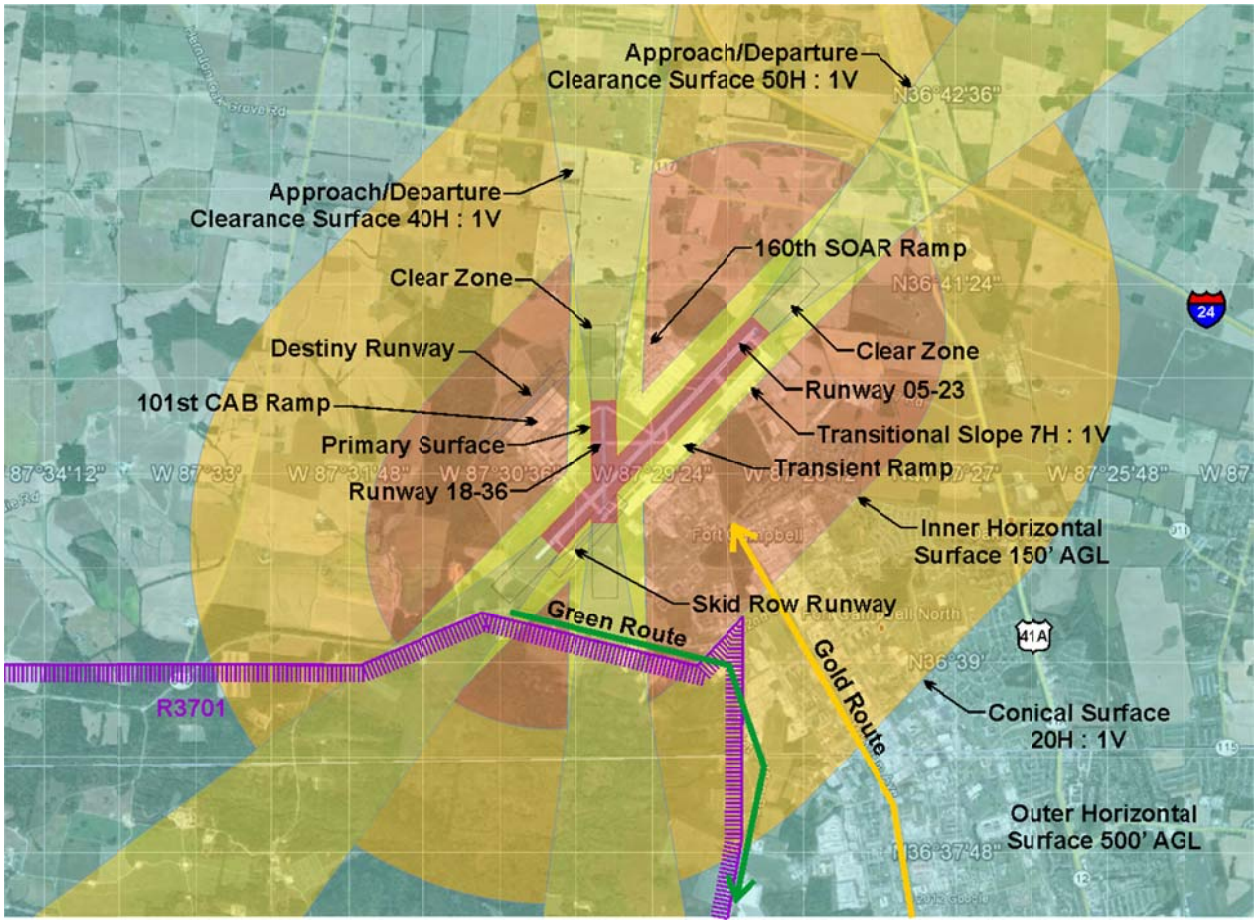


Figure 4.2-5. CAAF with Imaginary Surfaces

Runway 18-36 is a Class-A runway under Army criteria (AR 95-2), which requires a Primary Surface centered over the runway of 1,000 feet wide extending the length of the runway plus 200 feet on both ends. The ADCS slope begins at the end of the Primary Surface and extends out a distance of 10,000 feet for VFR traffic. It rises at a rate of 40 horizontal to one vertical. The ADCS slope is a trapezoid with a beginning width of 1,000 feet (consistent with the Primary Surface) centered on the runway and an end width of 7,000 feet for IFR traffic. All other imaginary surfaces are consistent with (tie into) those described for Runway 05-23 above.

Destiny Runway and Skid Row (when utilized as a runway) are considered Army helicopter VFR runways. These require a Primary Surface centered over the runway of 300 feet wide extending the length of the runway plus 75 feet on both ends. A Transitional Slope rises at a rate of two horizontal to one vertical off the sides of the Primary Surface to a height of 150 feet AGL. The ADCS begins at the end of the Primary Surface and extends out a distance of 1,200 feet. It rises at a rate of eight horizontal to one vertical. The ADCS is a trapezoid with a beginning width of 300 feet (consistent with the Primary Surface) centered on the runway and an end width of 600 feet. All other imaginary surfaces are consistent with (tie into) those described for Runway 05-23 above.

Sabre Army Heliport (SAHP). SAHP is a secondary location for military air operations at Fort Campbell (refer to Figure 4.2-6 for SAHP imaginary surfaces). SAHP has a single concrete runway of 100 feet wide by 4,450 feet in length with no overruns. Plans call for an extension of approximately 500 feet with a paved overrun of 200 feet making the effective length for this analysis 4,950 feet. This expansion is a result of the airfield recently having been designated as

the future location for three companies of UASs including two companies of the 160th SOAR and one company of the 101st CAB. New hangars, operations and support facilities will be constructed in the coming year on the southeast side of the runway along with a necessary extension of the runway and associated taxiway to accommodate the launch and recovery requirements of the MQ-1C Gray Eagle UAS.

SAHP is part of the same three airport complex mentioned previously within a three-lobed Class-D bubble along with CAAF and the Clarksville Airport Outlaw Field. This controlled airspace extends from surface up to and including 3,100 feet above MSL. The portion centered on SAHP is approximately 7.5 NM in diameter. Sabre Control Tower manages air traffic within their portion of the Class-D airspace but only from surface up to 1,700 feet above MSL. The remainder up to 3,100 feet above MSL is managed by Campbell Approach as previously mentioned. Parr Field Airport lies within SAHP's portion of the Class-D bubble at approximately two miles to the southeast. Federal Aviation Regulation 91.129 – *General Operating and Flight Rules, Operations in Class-D Airspace* require two-way radio communication with the controlling entity of the airspace. Sabre Control Tower is the FAA-recognized controlling entity of this airspace.

Traffic between SAHP and CAAF follows two one-way routes. Traffic from SAHP to CAAF is via the Gold Route, which follows the railroad track parallel to Wickham Avenue with control transfers at Checkpoint Water Plant. Traffic from CAAF to SAHP is via the Green Route, which follows Garden Market Road with control transfers at Checkpoint Loach. This is also the same location for transfer to Eagle Radio if aircraft are heading into the range. Traffic from SAHP to the range travels along the White Route. Transfer of control along this route happens at Reporting Point Cobra prior to exiting the Class-D airspace.

This three airport Class-D construct is within a larger Class-E bubble configuration that also includes the Hopkinsville-Christian County Airport. This controlled airspace begins at 700 feet AGL and extends up to 18,000 feet above MSL effective 24 hours/7 days a week. This airspace is under the control of Campbell Approach Control. A cross-section of these three dimensional envelopes is depicted in Figure 4.2-2.

Although this airfield is designated an Army Heliport, on-going plans call for the addition of as many as 36 permanently stationed Tier II UAS. This results in a change in the airfield's clearance areas and should change the airfield status from heliport, to airfield. Therefore, a combination of both criteria will be used for the purposes of this evaluation. MQ-1C Gray Eagle Army aircraft have a specific set of criteria defined in Technical Letter (TL) 1110-3-506 *Aviation Complex Planning and Design Criteria for Army Unmanned Aircraft Systems*. The more restrictive of each (MQ-1C versus rotary wing IFR runway) will take precedence. Criterion requires a Primary Surface centered over the runway of 750 feet wide extending the length of the runway plus 200 feet on both ends. This would include the proposed runway extension being constructed as part of the MQ-1C beddown for a total length of 5,350 feet. There are two different ADCS. The MQ-1C requires a slope that begins at the end of the Primary Surface and extends out a distance of 10,000 feet at a rate of 40 horizontal to one vertical. This slope is a trapezoid with a beginning width of 500 feet centered on the runway and an end width of 3,500 feet ending at an elevation of 250 feet AGL.

The ADCS for rotary wing IFR traffic begins at the end of the Primary Surface at a width of 750 feet (consistent with the Primary Surface). It extends out 25,000 feet with an end width of 8,000 feet. This slope rises more dramatically than the MQ-1C ADCS at 34 horizontal to 1 vertical to an end elevation of 735 feet. Because these two slopes rise at different rates, there is a slight jump at the end of the MQ-1C ADCS up 44 feet to the rotary wing ADCS. There are also two different Transitional Slopes of which the more restrictive MQ-1C will be used. This rises at a rate of 4 horizontal to 1 vertical off the sides of the Primary Surface to a height of 150 feet AGL.

From the upper edge of the Transitional Surface begins the Inner Horizontal Surface, which extends on a level plane out from the edge of the Transitional Slope a distance of 5,100 feet from runway centerline. Neither airframe requires a Conical Surface or Outer Horizontal Surface. This airfield, however, is beneath and enveloped by the outer horizontal surface of CAAF, established at 500 feet AGL.

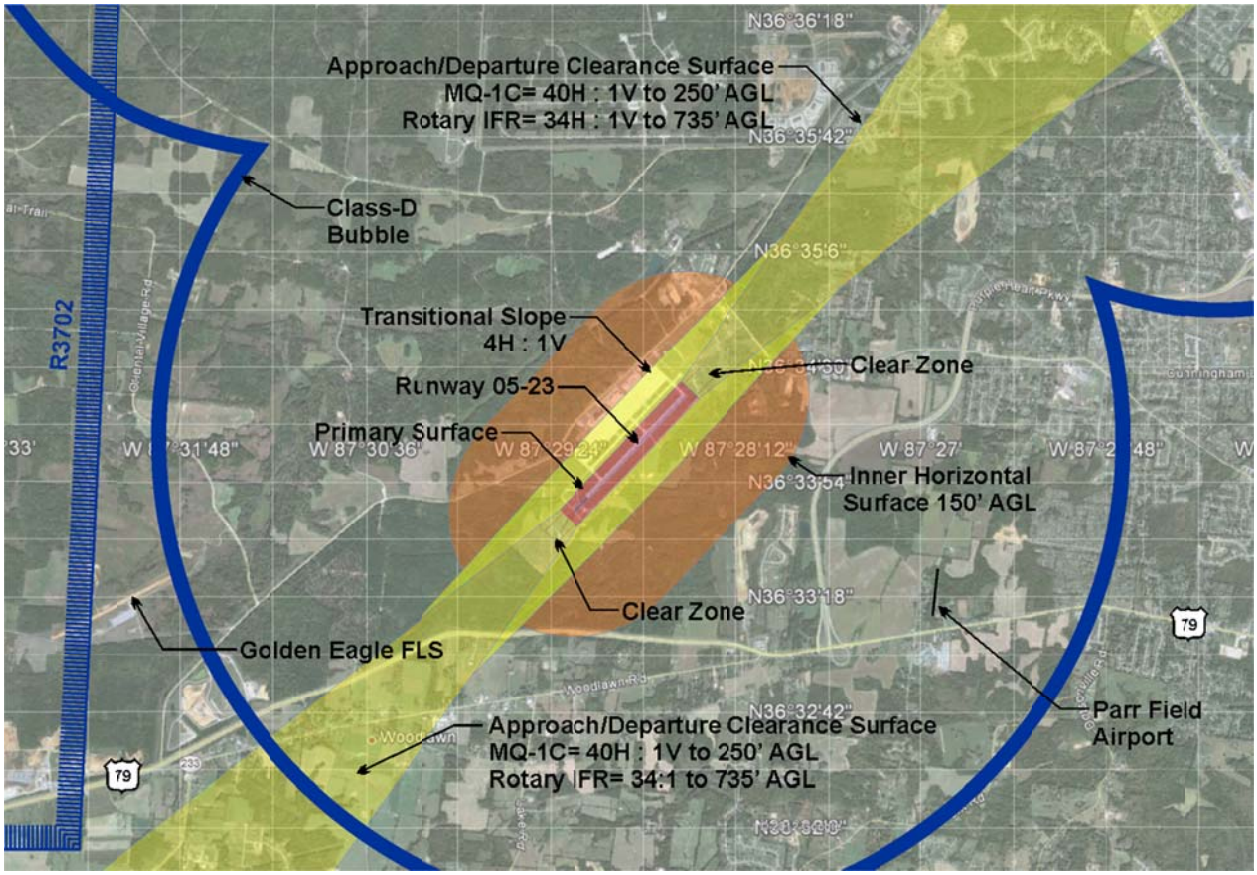


Figure 4.2-6. SAHP with Imaginary Surfaces

Golden Eagle FLS. This airfield is located on the eastern edge of the R3702 partially within but mostly outside of the controlled airspace (refer to Figure 4.2-7 for Golden Eagle FLS imaginary surfaces). It would lie within the R3703 identified in Alternative 4 if that alternative were selected. It has a single, semi-prepared runway (06-24) with stabilized soil condition of approximately 80 feet wide and 4,372 feet in length. The runway is of hammerhead configuration with aircraft turnarounds at either end. It is also supported by a short gravel parallel taxiway and parking apron to provide some amount of maneuverability for multiple aircraft training operations. This taxiway does not extend to the ends of the runway. There is no control tower, no service facilities or other support facilities, no lighting, no wind direction indicator, and no beacon.

This airfield is more akin to an assault strip than a FLS as per the level of development. As an assault strip, this size of facility with a runway condition rating (RCR) of 20 (dry) is rated for fully loaded C-130 airframes. It is not rated for an RCR of 10 (wet) and cannot handle C-17 airframes. The eastern end of the runway drops off dramatically towards a lake with no protective graded area as required. The other end of the runway is bisected by a public road (Centerline Road). Concrete barriers were emplaced there to keep vehicles from driving on (and destroying) the runway surface. This is in violation of regulations (AR 95-2) and unsafe

particularly for short-field launch and recovery. There are also no protocols in place for securing the roadway prior to launch or recovery operations, which has the potential (however slight) to conflict with those operations.

There are no surface markings for this airfield making it difficult to ascertain the appropriate clear areas. If one, however, assumes a centered, symmetrical placement over the prepared surface, the required 3,000 foot runway would leave approximately 686 feet of additional runway on either end of the effective runway surface. A 300-foot overrun is recommended allowing 386 additional feet for required clear zones. Since the airfield is not marked, aircraft will naturally utilize more of the runway effectively reducing or eliminating required clearances.

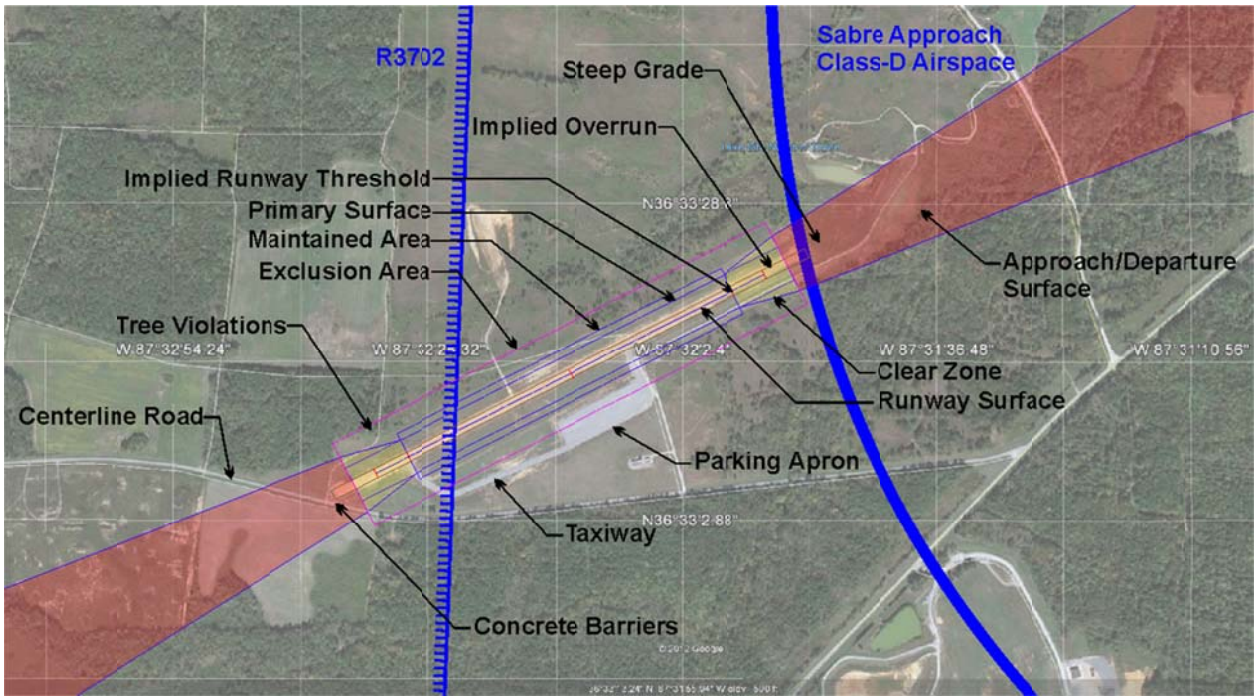


Figure 4.2-7. Golden Eagle FLS with Imaginary Surfaces

An assault strip, also referred to as a LZ, requires a Primary Surface centered over the runway of 150 feet wide extending the length of the runway and overruns plus 200 feet on both ends. There is also a Maintained Area outside of the Primary Surface of an additional 60 feet on either side running the length of the runway and aligning with the beginning of the Clear Zone. This area is to be free of obstructions of any kind and must be graded to within +10 to -20 percent slope. Encompassing this whole area is an Exclusion Area that is 700 feet wide, centered on the runway and extending 500 feet beyond the runway end, which aligns with the end of the Primary Surface (300 foot overrun plus 200 feet). The Exclusion Area should be free of all buildings, trees or obstacles not directly associated with the airfield. Only features required to operate the airfield are allowed in the Exclusion Area such as aprons, taxiways, navigational aids (NAVAIDS), aircraft, support equipment, etc. There is no transitional slope associated with an LZ. Clear Zones and ADCSs at the runway ends are required. The Clear Zone is a trapezoidal area beginning at the end of the Maintained Area at 270 feet wide, centered over the runway. It extends outward 500 feet and is 500 feet wide at the outer end. The ADCS is an imaginary plane that extends upward from the end of the Clear Zone and is also a trapezoidal configuration. It is 500 feet wide at the beginning and 2,500 feet at the minimal outer edge distance of 10,500 feet. It is preferred but not required that this surface extend out at the same width (2,500 feet) for another 21,500 feet (32,000 feet total). This surface rises at a rate of 35

horizontal to 1 vertical. No object fixed or mobile may penetrate this surface, such as trees, buildings, towers, vehicles, etc. The area where Centerline Road crosses the runway end would put vehicles into this surface. It is at ground level on the low end, 17 feet at the high end, and 8 feet high at runway centerline. These measurements assume a 3,000 foot runway centered on the existing strip with all appropriate surfaces and clear areas, which cannot adequately be adhered to without markings. Associated taxiways and parking aprons must be set off of the runway centerline by at least 250 feet. Those elements at Golden Eagle FLS are within these requirements.

4.2.1.2.2 Restricted Airspace

Fort Campbell's training range is supported by two laterally contiguous segments of restricted airspace; the R3701 and R3702 (also see Figure 4.2-3). These RAs are necessary for controlled use of the airspace to support a variety of air-to-ground training activities such as launch and recovery, touch-and-go, air drop, parachute, bombing and aerial gunnery training, and ground-to-air activities such as live ground fire into the impact areas and aerial flight activities such as UAS training and close air support (CAS). The installation previously held a R3703-A, B & C that was revoked in June of 1985 with the establishment of the R3702-C

The R3701 is a single stratification over a small geographic area of the upper northeast corner of the range including the majority of TAs 14, TA 14A, TA- 5 and the small arms impact area. It extends from surface up to and including 5,000 feet above MSL. This area includes the Bastogne DZ and the Cassidy MOUT. It is within the ADCS slope of Runway 05-23 of CAAF and completely enveloped within the Class-D bubble of that airfield. Control of air activities between Campbell Control Tower and Eagle Radio AIC are by origin of the activity; ergo ADCS from CAAF are managed by Campbell Control Tower and range over-flights or ground fire are managed by Eagle Radio AIC.

This RA is active Monday through Friday except for recognized holidays. The RA can be activated or deactivated by Range Control as necessary for scheduled range uses, which are posted via NOTAMs. Range scheduling occurs a minimum of 10 days prior to the use and is forwarded from Range Control to Campbell Approach with a minimum of 24 hours advanced notice. Range Control typically provides 72 hours advanced notification as a SOP. Campbell Approach requests activation or deactivation from the Memphis ARTCC. Occasionally, heavy lift aircraft departing from CAAF are unable to climb at a rate sufficient to avoid the R3701. In these situations, Campbell Control Tower will call for a cease fire on the small arms range until the aircraft has cleared the area.

The R3702 is a much larger geographic area covering the remainder of the range. It is composed of three stratifications of differing elevation (see Figure 4.2-2 for a cross section of these three dimensional envelopes):

- R3702-A: A geographic division of the range extending from surface up to and including 10,000 feet above MSL.
- R3702-B: The same geographic division of the range as R3702-A extending from 10,000 feet above MSL up to and including FL220.
- R3702-C: The same geographic area as the R3702-A and B extending from FL220 up to and including FL270.

These areas are activated and deactivated as required following the same methodology described for the R3701 except that the different stratifications may be activated at different times due to the specific training activities being conducted. These include things such as ground fire, helicopter and fixed-wing aircraft movements, parachute training, including High Altitude Low Open (HALO) and High Altitude High Open (HAHO), air drop, aerial gunnery, CAS,

aerial observation, intelligence, surveillance and reconnaissance (ISR), aerial refueling, and UAS training flights. Ground fire includes everything from small arms and mortar direct fire up to 155mm artillery indirect fire.

One or more stratifications are typically activated Monday through Friday and occasionally on weekends as well. The majority of training activities (85 percent) require activation up to R3702-B. The R3702-C airspace is reserved for high angle fire of the 155mm Howitzer and aerial refueling. When a stratification is activated, no commercial or private aircraft can enter that specific three-dimensional area. All military aircraft using the RA are controlled by Eagle Radio AIC with control transfers to other agencies typically occurring at designated reporting points, including Campbell Control Tower if going to CAAF, Sabre Control Tower if going towards SAHP, or Campbell Approach Control if going outside the RA in any other direction. Going up into the Class-A Airspace above the RA would be via the Memphis ARTCC. The R3702-B and C extend well into Class-A airspace, which requires the Memphis ARTCC to route IFR flights around or over the RA when active.

The Fort Campbell range is an 'L' shaped configuration with two primary impact areas (see Figure 2-3), duded and non-duded. The smaller non-duded impact area is over the small arms range in the northeast corner of the lower section of the range. A variety of firing ranges surrounds its perimeter and are used daily throughout the work week. The larger duded impact area is for direct and indirect ground fire as well as aerial gunnery and bombing. It is located in the upper leg of the 'L' and consumes roughly a third of the entire range area. They are generally described as the North Impact Area and the South Impact Area. It contains two duded areas and an improved conventional munitions (ICM) impact area. The larger ICM Impact Area North consumes four sections (Latitude 56-58 and Longitude 34-36) and resides in the center of the duded impact area near the lower end of what would be considered the North Impact Area. The ICM Impact Area South is an amorphous shape consuming approximately one section near the eastern edge of the South Impact Area.

Air Corridors. The range is divided into numbered TAs for easy location identification. Different types of training activities occur in different TAs. These are numbered from 00 to 52 and are of different sizes and configurations typically demarcated by roads or natural features that are easily identifiable from the ground or air. For convenience, there are also airspace sectors that are made up of multiple TAs. These are identified by letter codes from Alpha to Golf working in clockwise rotation from the northeast corner around the range. The installation has devised a system of VFR air routes for rotary wing traffic throughout the range to help deconflict general air traffic with training activities. These are referred to by color including the following routes and general descriptions:

- Green Route – This is a one-directional air corridor providing access from CAAF to SAHP and to the range. It splits at Reporting Point Loach in two directions. The leg leading to the range ends at Checkpoint Ghost and the beginning of the White Route and the other leg continues to SAHP. This route is established at 50 feet above highest object (AHO) up to 900 feet above MSL or approximately 300 feet AGL.
- Gold Route – This route provides one-directional traffic from SAHP to CAAF and is established 1,300 feet above MSL.
- White Route – This is a one-directional air corridor providing access through the center of the range from Checkpoint Ghost (end of the Green Route) to Checkpoint Summer (near Summer Eagle LZ) on the far western edge of the range. It generally follows Jordan Springs Road and is established from 50 feet AHO up to 900 feet above MSL. The segment of this route between Checkpoint Grant (corner of Grant Road and Jordan Springs Road) and Checkpoint Summer is often modified by high altitude restrictions

due to gunnery and UAS training missions. Alternate White Corridor, when placed in effect by local NOTAM, changes the geographical routing used by White Corridor and adds additional dimensional restrictions to accommodate Hellfire missile gunnery conducted at Range 28. Modified White Corridor, when placed in effect by local NOTAM, uses additional dimensional restrictions to accommodate gunnery other than Hellfire. Hybrid White Corridor uses additional dimensional restrictions to accommodate UAS L/R and LZ Indian Mound. Although Alternate White Corridor takes traffic out over public land, it is necessary to remain clear of designated Hellfire missile range safety danger zones.

- Blue Route – This is one of two routes (north or south) providing one-directional traffic back to the cantonment. This route provides one-directional traffic back to CAAF by traversing the western boundary up and around the upper leg of the 'L' then along the northern edge of the range towards CAAF. It generally follows Patton Road and Angels Road. It is established at 50 feet AHO up to 900 feet above MSL to Checkpoint Hester at the corner of the 'L' near the town of La Fayette. The remaining stretch along Angels Road holds that elevation during the daytime then shifts up to between 900 and 1,300 feet above MSL at night. This is to allow lower elevations clear for NVG flight training in the Corregidor DZ area.
- Red Route – This is the southern return route and is also a one-directional air corridor between Checkpoint Summer back to SAHP. It generally follows State Highway 79 at an established altitude of 1,300 feet above MSL during the daytime then shifts between 900 and 1,300 feet above MSL for NVG flight training.

There are also two north-south air corridors that provide two-directional traffic through the middle of the range. They include the following:

- Charlie Route – This route generally follows Palmyra Road from the north edge of the range near the Bastogne LZ down to the southern boundary to Checkpoint Oakwood near the Suckchon DZ. This route is generally flown at 50 AHO to 900 feet above MSL using north/south right-of-way rules unless restricted to 1,100 feet above MSL by specific airspace sector missions.
- Delta Route – This route generally follows Grant Road from the northern boundary of the range down to Checkpoint Grant at Jordan Springs Road. At this point it jogs west and then follows Indian Mound Road towards the southern boundary and Checkpoint Tower. It has the same operational characteristics as Charlie Route.

Landing Zones (LZs). The range has six identified LZs located throughout that are used for a variety of training activities with a wide variety of built and natural features to support them:

- LZ Bastogne – This LZ is located in the upper northeast corner of the range in TA-14 near the small arms firing range impact area. It is a basic unimproved open field LZ with several MOUT mock villages constructed throughout. It is used for rotary wing aerial assault (non-live fire), CAS, pick-up/drop off, aerial observation and reconnaissance type training. All facilities are in good condition with good maintenance of obstructions. This LZ includes a Raven Operational Zone (ROZ) over a portion of the area centered on the Cassidy MOUT. See the ROZ subsection below for details.
- LZ Indian Mound – This facility is much more developed having once been used for fixed wing launch and recovery. It has a 1,000-foot long by 50-foot wide asphalt paved runway and a small attached paved parking apron. Runway orientation is roughly 10-28 and it is located adjacent to the eastern edge of the Duded Impact Area in TA-28. There are remnants of a much longer gravel runway off either end of this facility and a much

larger attached gravel parking apron. It currently supports Shadow and Raven UAS landing/recovery (L/R) operations and all manner of rotary wing L/R and CAS operations. Paved surfaces are in good condition while gravel and supporting roadways are in fair to operable condition showing some wear and weathering. The LZ obstructions have been well maintained for safe air operations.

- LZ Los Banos – "Los Baños (Banyos)", this LZ is an unimproved area characterized by rolling hills, trees, creek beds and even a farmed field. This LZ is located in the middle of the lower leg of the 'L' along Jordan Springs Road in TA-20. It supports rotary wing training in natural surroundings. There are no constructed facilities of any kind outside of roadways that traverse the site. For these reasons it is one of the least utilized of the LZs.
- LZ Aardvark – This is one of the most substantially improved LZs on the Fort Campbell Range. It is a large open area supporting a compacted earth runway approximately 100 feet wide by 2,300 feet in length. It has an orientation of 07-25. It can be accessed by roadway on either end of the dirt strip. There are several constructed features for rotary wing flight training including two concrete helipads, a raised concrete helipad to simulate rooftop single wheel drop-off and a sloped surface alighting area. The site has a wrecked fixed wing aircraft for various operational training exercises and ample room for bivouac encampments or a Forward Area Arming and Refueling Point (FAARP) although no permanent facilities for these activities currently exist. Because of these many amenities, this site is frequently used and consequently has congested airspace. It is located south of the Duded Impact Area in TA-31. The west end of the area has not been as well maintained as the east end. The terrain is bumpy, muddy and difficult to access. The eastern end is very well maintained, flat and accessible. Obstructions near the airfield have not been well maintained for safety clearance requirements although the heliport areas are well maintained and free of obstructions.
- LZ Summer Eagle – This LZ is located at the far end of Jordan Springs Road nearly touching the western boundary of the range land. It consists of an open and mostly unimproved grass clearing that is approximately 330 feet wide by 2,600 feet in length although some portions are better cleared than others due to lack of regular obstruction maintenance. In the center of the clearing is a gravel runway that is approximately 90 feet wide by 500 feet in length with a small angled parking apron or turn-around at one end. This runway is at orientation 09-27. This part of the field is well maintained and includes the entrance road and two small support structures. This part of the range, being so near the boundary line, is near the town of Big Rock, which has an associated no-fly-zone that sits just 1 NM off of the Runway 09 end. This condition limits the air activities that can be conducted here and constrains the patterns for approach and departure.
- LZ Saunders – This LZ is northwest of LZ Summer Eagle in TA-49. It consists of a mostly unimproved clearing with visible remnants of an old grass strip down the middle. The clearing is approximately 200 feet wide by 2,500 feet in length. It includes a large open area off to one side, mid-way on the field, for bivouac encampments or possibly as an aircraft apron although the terrain is presently too bumpy to support such an activity. What remains of the grass strip appears to have been approximately 60 feet wide by the same 2,500 feet long and sits at orientation 07-25. There are no structures or improvements. The trees are very near the runway surface and would need to be maintained if this facility were to be used in that capacity.

Drop Zones (DZs). The range has three DZs at various locations all with differing conditions that provide a variety of training opportunities. These are described in the following:

- DZ Corregidor – This DZ consists of nothing more than an open clearing of rolling grassland. It is located along the northern boundary of the lower leg of the range near the eastern edge of the Duded Impact Area in TA 25. Parachute and cargo air drops typically follow a north-south pattern coming from or departing into the Campbell 1 MOA north of the RA. This requires aircraft to navigate between two no-fly-zones (NFZs) over the towns of La Fayette and Silo. These NFZs extend from surface up to 2,000 feet AGL. Fixed wing air drops are always conducted by transient aircraft as there are no fixed wing assets stationed at Fort Campbell. This means that they typically originate from other airfields, although multiple drops require landing at either CAAF or SAHP for parachute packing and reloading. These activities are primarily conducted from C-130 Hercules or more commonly from C-23 Sherpa aircraft.
- DZ Suckchon – Suckchon is the largest of the DZs at more than double the size of Corregidor or Veghel and is located in TA 21. It is primarily a wide open area of rolling grassland but with bisecting roadways providing access through the DZ. The lower half has a few drainage features that emphasize the hilly terrain and support larger vegetative growth including a few trees. Recently, an unmanned aerial system training area (TUAS) was constructed here. It includes a runway and support facilities located in the upper northeast quadrant of the site. Refer to the TUAS subsection below for more information.
- DZ Veghel – The Veghel DZ is another large open rectangular area located in TA 44A in the far northwest corner of the range separated from most other flying activities by the large Duded Impact Area. Its terrain is rolling hills of unimproved grassland and some farmed fields. The site is bisected by crossing roadways providing access to all parts of the site as well as access to public lands west of the range and State Road 139. The upper northern half is bisected by a creek bed that serves to increase terrain change and introduces larger vegetation including a few trees. At the north end of the DZ lies an old abandoned air strip that parallels the roadway providing access to the site from the north. This strip was originally approximately 80 feet wide by 2,800 feet in length with hammerhead turn-arounds at either end. It is placed at orientation 04-22. It is not clear why this airstrip was abandoned but the installation made efforts to recover the natural environment there through re-vegetation of the forest some years back. Adjacent to the southwest corner of the DZ, just outside of installation property, resides a local horse rancher who has lodged several complaints about noise and disruption from air traffic and use of this DZ as well as the Blue Route, which traverses this area on a line between the Veghel DZ and this property. This has resulted in a small NFZ being designated immediately over the property in efforts to reduce operational noise in this area.

Raven Operational Zones (ROZs). These are designated areas for the purpose of providing protected airspace for the training and operation of RQ-11 Raven UAS. This allows unfettered flight operations within the zone and unobstructed airspace outside the zone so as to prevent disruption of other range activities. There are six ROZs of varying size and configuration located throughout the range to provide ample opportunity for multiple units with a variety of training objectives. Each of these areas extend from surface up to 2,000 feet above MSL. These aircraft have no transponders and therefore are invisible to air traffic controllers. It is, therefore, left up to operators to follow flight protocol and remain with the designated three-dimensional airspace and to notify Range Control and Eagle Radio AIC when the ROZ is in use. The following describe each of these six areas:

- ROZ-1 – This ROZ is a circular area of approximately 0.6 NM diameter centered over the Cassidy MOUT within the R3701. A portion of this area extends over the Bastogne LZ presenting potential conflicts with other air operations relative to that facility. This area supports training ISR techniques in urban settings. Although this site provides unique training opportunities because of the MOUT facilities, it is considered too small and limiting considering that this aircraft has a range exceeding 6 NM and can operate at 15,000 feet above MSL.
- ROZ-2 – This ROZ sits near the Craig Village MOUT, again providing similar opportunities for ISR training. It is a circular area of approximately 0.5 NM in diameter centered over the MOUT. The Craig Village MOUT is located just west of the Bastogne LZ on a line between TA-25 and TA-19. The remoteness of this site is beneficial to these operations.
- ROZ-3 – This ROZ is a relatively large rectangle located over the TUAS-19 air strip. It measures approximately 0.8 NM by 1.1 NM. While this is an excellent site for Raven training operations, it is in conflict with the RQ-7B Shadow UAS training operations that are also conducted at the airstrip and in this airspace. Only one or the other of these operations can be conducted at a time in the same designated airspace. This site is used for training basic flying skills.
- ROZ-4 – This ROZ is a kite shaped geographic area located over the western edge of the Duded Impact Area encompassing Ranges R44A through R44F. Corner to corner dimensions are approximately 1 NM by 11.1 NM. The narrowest point of the kite is located at Indian Mound LZ, which provides an excellent ground facility for launch and recovery operations. The shape of the ROZ, however, constrains these operations to a very narrow corridor making multiple operations difficult. This ROZ provides ISR training opportunities over a part of the range that can be used for live fire observation and targeting.
- ROZ-5 – This ROZ is the largest of all of those on Fort Campbell. It is located directly over Range 28 in the South Impact Area. Range 28 is one of the most active in the range complex. This site provides excellent ISR and targeting training because of its position and size. It is a large rectangle of approximately 0.6 NM by 2.6 NM. This ROZ is also the only one that allows operators to practice long-range (out of visual sight) flights, which is akin to IFR flying as they must rely on instrument readings.
- ROZ-6 – This ROZ is also located over a portion of the South Impact Area just west of ROZ-5. It also covers a portion of TA-47. It covers an area that is roughly four sections at approximately 1 NM square. This ROZ is not as large as ROZ-5, but provides some of the same training opportunities because of its position over the range. It encompasses ranges R51D & R51E.

Unmanned Aerial System Training Area (TUAS). There are three TUAS sites on the range, which are specifically designed for RQ-7B Shadow UAS launch and recovery. Consequently, this is also where flight operations are conducted within the Ground Control Station (GCS) vehicles parked here. These include TUAS-19, Indian Mound LZ and Suckchon DZ. Prior to the construction of the Suckchon TUAS landing strip, all L/R was conducted at the other two sites causing considerable congestion in and around those areas, primarily with indirect ground fire into the Duded Impact Area due to the proximity of these facilities. During Shadow operations, there were many cease fires that called for L/R creating a serious disruption of ground fire training activities. This prompted the creation of policies regarding Shadow L/R. They are now restricted to a 0.5 hour window for L/R every even hour of the day. This allows for uninterrupted ground fire exercises for 1.5-hour duration segments with 0.5 hour breaks.

Once Shadows are airborne, they immediately climb to altitude and are allowed to operate freely throughout the range within an established stratification of the R3702-A referred to as 4,000 Block 6,000 or between the elevations of 4,000 feet above MSL to 6,000 feet above MSL. Shadows are equipped with transponders allowing Eagle Radio AIC to direct ground fire below or over them, as necessary. Recovery of these aircraft requires considerable more time and airspace than launches. They follow automated landing sequences that require a spiral elevation establishment and then approach and recovery on a runway equipped with Tactical Automatic Landing Systems (TALS). Missed approaches send the aircraft into other patterns that return it to the same initial sequence. These patterns are depicted in Figure 4.2-8 for both approach ends of each of the three runways. The time and space allotment of these patterns requires significant airspace usage, having an adverse effect on other range training, particularly as UAS training activities increase.

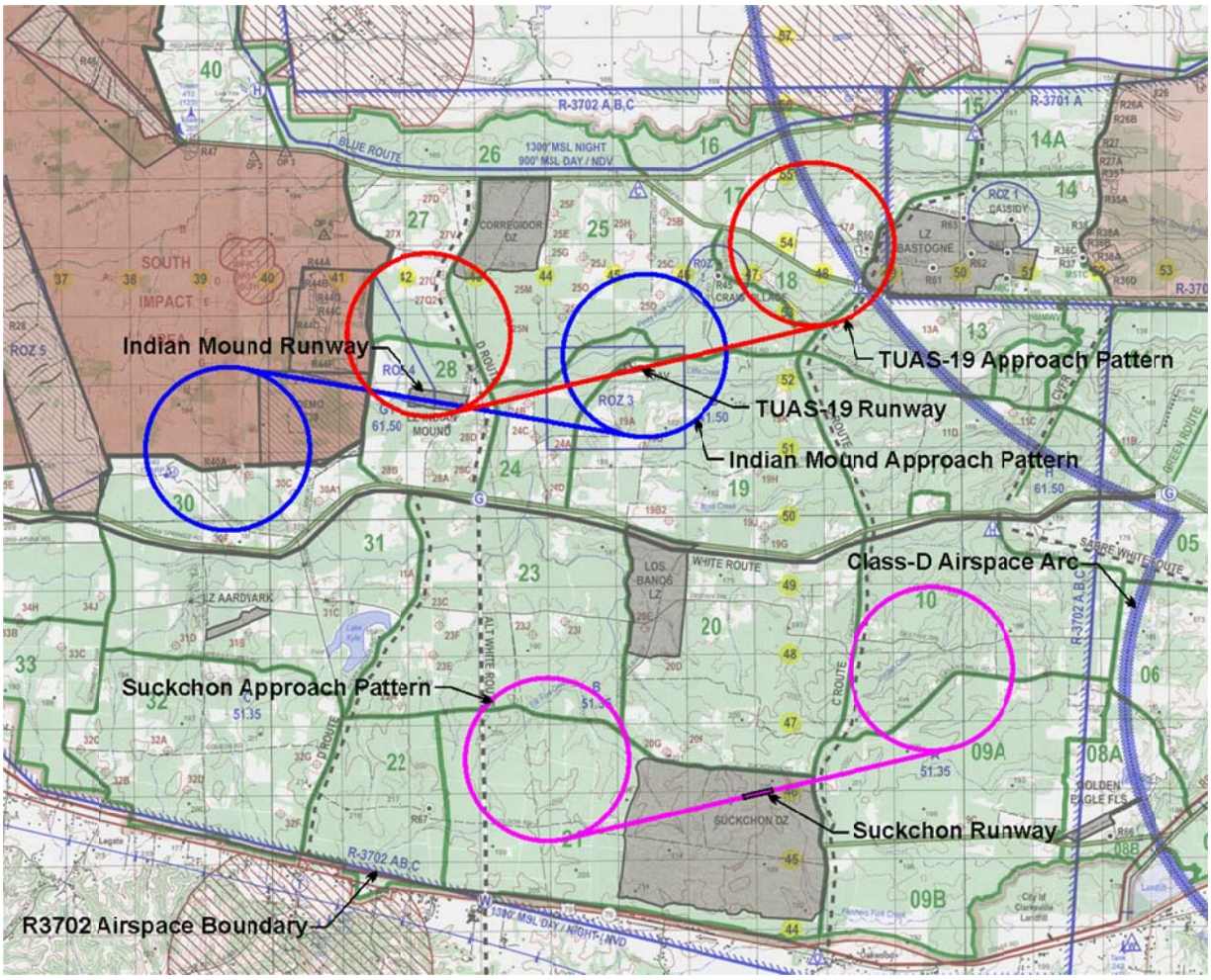


Figure 4.2-8. TUAS Automated Approach Patterns in R-3702

Airfield criteria requires a Primary Surface of 120 feet wide running the length of the runway plus 100 feet on either end. The Clear Zone begins at the runway end and extends out 360 feet with a width equal to the Primary Surface. The ADCS begins at the end of the Primary Surface and extends out 10,000 feet. It rises at a rate of 40 horizontal to 1 vertical. The inner width is equal to the Primary Surface and the outer width is 3,240 feet. The upper edge is at an elevation of 250 feet AGL. A transitional slope rises from the side of the Primary Surface at a rate of 4 horizontal to 1 vertical until it reaches a height of 150 feet AGL. This is equivalent to 600 lateral

feet from the edge of the Primary Surface. All three launch and recovery locations must meet this criteria as well as any temporary runways established for expeditionary training activities. Figure 4.2-9 depicts considerable congestion between TUAS-19, Indian Mound, ROZ-3, ROZ-4, Delta Route and the Duded Impact Area.

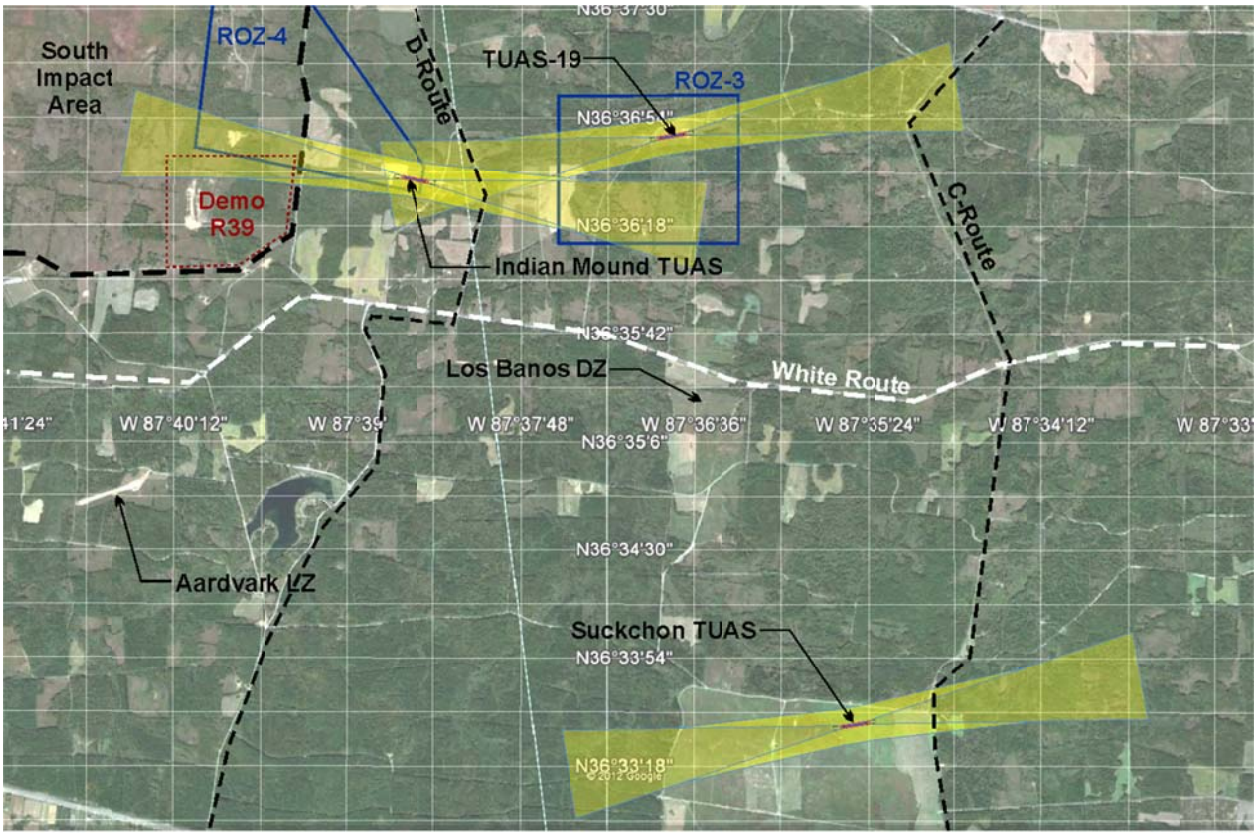


Figure 4.2-9. TUAS Airfields with Imaginary Surfaces

Each of the airfields is discussed below:

- TUAS-19 – This relatively new UAS operational site is located in TA-19 and is the first to be constructed specifically for that purpose. The runway is 80 feet wide by 850 feet in length at orientation 08-26. The airfield is typically set up for aircraft recovery in both directions with touchdown points located at the center of the runway extending out to each end. That way the TALS can be located together and near the GCS while the aircraft arresting system and capture nets are placed at the runway ends. There is a classroom/operations facility with a fenced compound for vehicles and equipment. GCS vehicles are parked along the flightline side of this compound with antennae extending above the fence line. There is a ROZ (ROZ-3) located at this same site that cannot be utilized simultaneous to Shadow Operations because of airspace conflicts during launch and recovery of Shadows. Ravens operate between surface and 2,000 feet above MSL. The field is primarily utilized for basic Shadow training operations. The ADCS extends over the Indian Mound TUAS site and a portion of ROZ-4. At this location the slope is at 250 feet AGL, which presents a conflict with Raven operations flying between surface and 2,000 feet above MSL or approximately 1,400 feet AGL at this location. Eagle Radio AIC is supposed to deconflict these potential conflicts but they are not always advised of Raven operations and have no instrumentation to verify Raven aircraft in flight (see Figure 4.2-10).

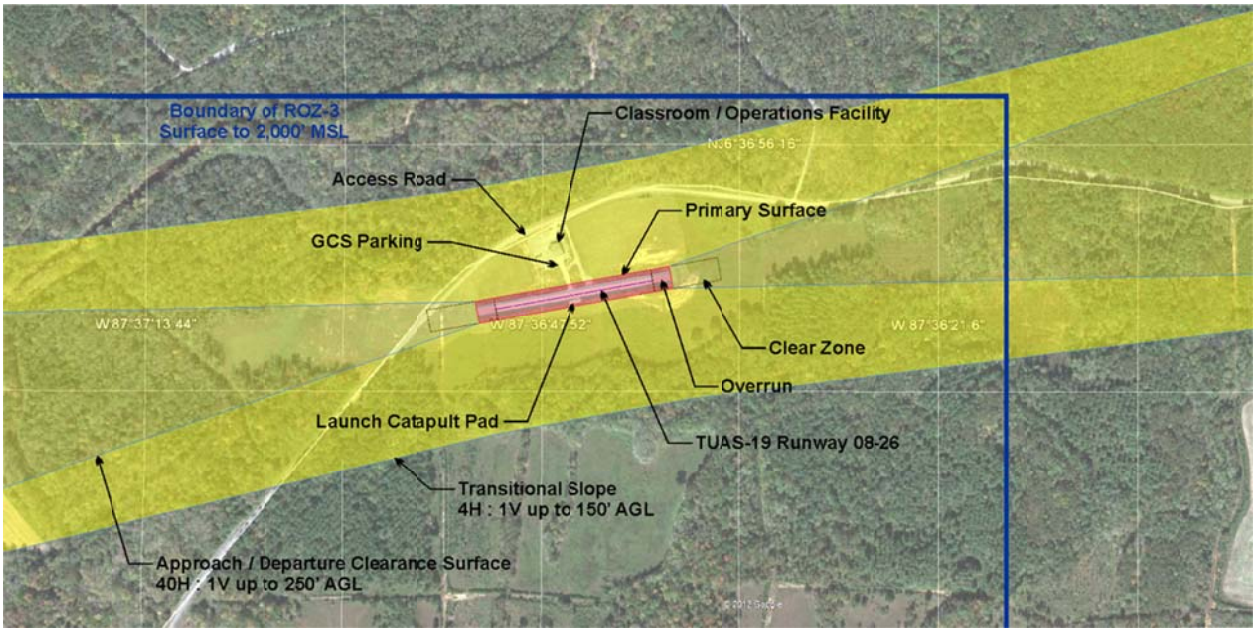


Figure 4.2-10. TUAS-19 with Imaginary Surfaces

- Indian Mound LZ – This area is a multifunction flight zone supporting Raven and Shadow UAS operations as well as rotary wing LZ and fixed wing DZ. The asphalt runway is 100 feet wide by approximately 1,000 feet in length at orientation 10-28. This allows for an 800-foot UAS runway with paved overruns on both ends (see Figure 4.2-11 for airfield configuration with imaginary surfaces). There are also gravel extensions on either side in poor condition. Access roads run up to the runway ends creating a potential hazard if they are not secured during aircraft recovery. This airfield is very close to the edge of the Duded Impact Area and particularly Range 44F and the Demolition Area R39. This is good for Raven operations training ISR techniques over those areas but bad for Shadow operations as live fire must be stopped during L/R. Raven operations and Shadow operations cannot be run simultaneously at this site due to airspace conflicts. With the completion of Suckchon TUAS airfield, this site will be downgraded to a secondary Shadow operations area (see Figure 4.2-11).

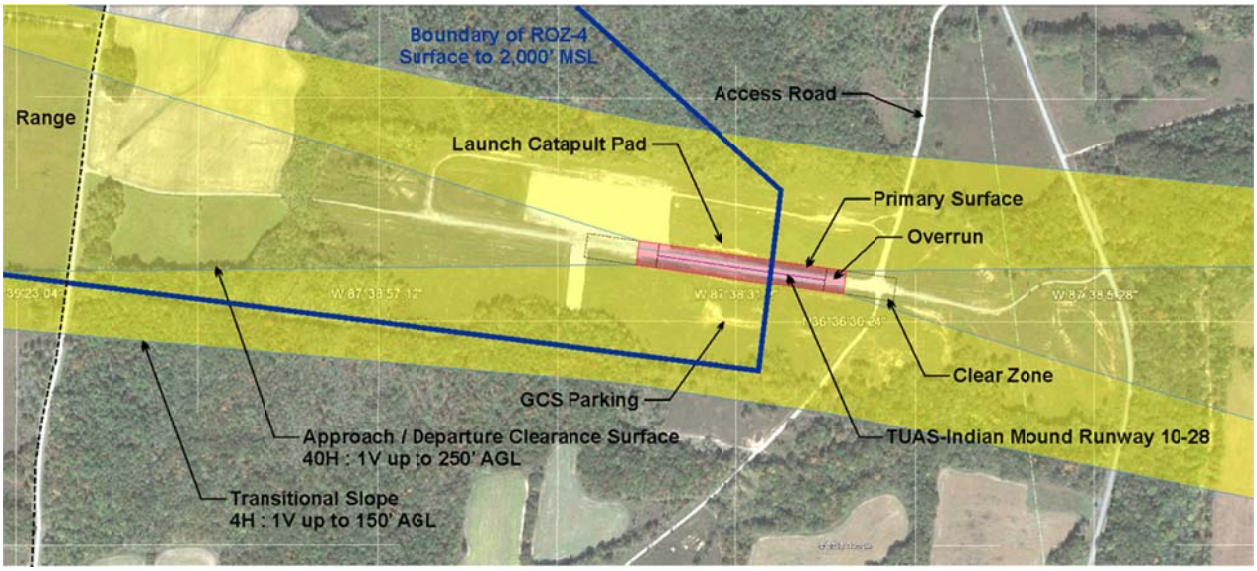


Figure 4.2-11. TUAS-Indian Mound with Imaginary Surfaces

- Suckchon TUAS – The runway for this TUAS was recently constructed and is not yet operational. It is located in the upper east corner of the Suckchon DZ. All imaginary surfaces meet the criteria but the grade within the runway lateral clearance surface does not (see Figure 4.2-12 for airfield configuration with imaginary surfaces). The fenced compound has a temporary hangar facility and would be the site for up to three permanent classroom/hangar facilities. The distance between this facility and other range training activities makes this site more beneficial for uninterrupted L/R activities (see Figure 4.2-12).

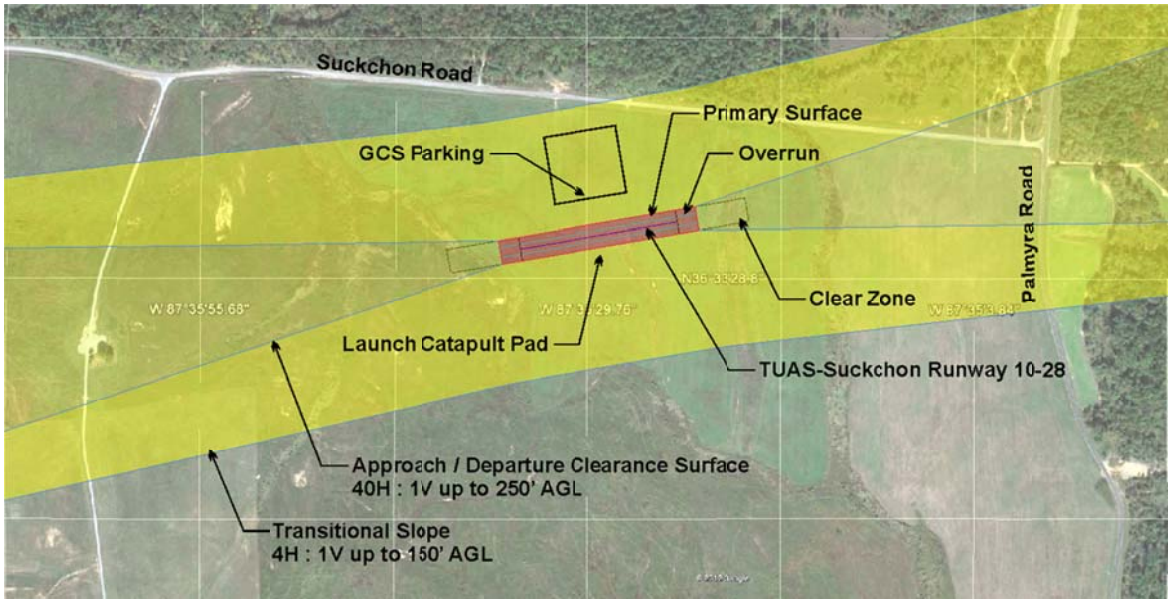


Figure 4.2-12. TUAS-Suckchon with Imaginary Surfaces

4.2.1.2.3 Military Operations Areas

There are two contiguous MOAs supporting the Fort Campbell range. They are Campbell 1 MOA and Campbell 2 MOA. These MOAs exists to help reduce the likelihood of interaction between military aircraft and public, private or commercial aircraft by identifying to VFR traffic that the area is highly used by military aircraft and by redirecting IFR traffic safely through or away from that area. The Campbell 1 MOA surrounds the R3701 & R3702 on the north, west, and south (see Figures 4.2-2 and 4.2-3 for depictions of horizontal and vertical definitions of this space). It extends from 500 feet above MSL up to and including 10,000 feet above MSL. Operational times are 0700 until 2000 daily unless otherwise identified via NOTAMs.

The Campbell 2 MOA is contiguous with the western and southern boundaries of the Campbell 1 MOA and extends from 1,500 feet AGL up to and including 10,000 feet above MSL. The most current Sectional identifies a small area of the Campbell 2 MOA located over the Cross Creeks National Wildlife Refuge as "excluding airspace below 2,500 feet AGL". This is also a no-fly-zone for military aircraft to help protect and preserve the natural habitats found therein. Operational times for this MOA are 0700 to 2000 daily. These areas are under the control of the Campbell Approach Control, with handoffs to Eagle Radio AIC upon entering the range, to Campbell Control Tower or Sabre Control Tower upon entering their Class-D airspace, or to the Memphis ARTCC if departing the MOAs to the west, south or up into Class-E or Class-G airspace. Primary users include the USAF as loiter area for bombing and aerial gunnery runs while awaiting clearance on the range or for refueling activities at higher altitudes. The Army also uses these MOAs at lower elevations for a variety of rotary wing training exercises.

4.2.1.2.4 Alert Areas

An Alert Area is a designated geographic area where high levels of unusual flight activity occur, typically involving student flight training. There are no restrictions to IFR or VFR traffic, just a warning to pilots to be vigilant and extra cautious in these areas. The A-371 Alert Area is approximately 45 NM across and extends from surface up to 2,000 feet above MSL. This area encompasses all four airports (Hopkinsville-Christian County Airport, Outlaw Field-Clarksville Airport, CAAF and SAHP), the R3701, R3702 and most of the Campbell 1 MOA. It is segmented approximately 5 NM from Victor (V)-94 but envelopes V-7.

4.2.1.2.5 Federal Air Corridors

Victor airways are Federal air corridors that are established for IFR traffic by VORTAC beacons strategically located throughout the U.S. They provide established traffic routes between 700 feet AGL and 18,000 feet above MSL in what is considered Class-E airspace. They have an established width of four miles either side of the airway centerline. It should be noted that these systems will be phased out over the next 20 years as the FAA begins to implement its "Next Gen" air traffic control system. The following are Victor airways which traverse the ROI:

V-178. The Victor-178 Federal Air Corridor runs at a heading of 70 and 255 degrees. It stretches between the VORTACs located near Barkley Regional Airport and Central City. This route runs well north of the Campbell 1 and 2 MOAs. There is little or no conflict with on-going operations and this corridor.

V-67. The Victor-67 route runs at a heading of 133 and 314 degrees and stretches between the Barkley Regional Airport VORTAC and the Centerville Airport (GHM) VORTAC. This corridor runs parallel to the western edge of the Campbell 2 MOA at a distance of approximately 6 NM. There are no conflicts with Fort Campbell air operations so long as pilots stay within the MOA boundaries.

V-94. The Victor-94 route runs at a heading of 47 and 228 degrees and stretches between the Jacks Creek VORTAC and the Bowling Green – Warren County Regional Airport VORTAC. It

runs parallel to the southeast boundary of the Campbell 2 MOA at a distance of approximately 13 NM. There are no conflicts between Fort Campbell and commercial air operations on this corridor.

V-7. The Victor-7 route runs at a heading of 3 and 187 degrees and stretches between the Centerville (GHM) VORTAC and the Central City VORTAC. While this corridor does not conflict with Fort Campbell airspace it does traverse the Class-D and Class-E bubbles associated with Outlaw Field, the Clarksville airport. It is approximately 7 miles east of SAHP and 8 miles east of CAAF. There are no known conflicts with Fort Campbell air operations and this corridor.

VR-1016-1051. This is a military training route (MTR) surrounding and associated with Columbus Air Force Base, MS. It is located just south of the Campbell 1 and 2 MOAs and the A-371. It functions in a counterclockwise rotation and is typically used for VFR visual route (VR) pilot training. There is no conflict with this route and any Fort Campbell related air activities.

IR-67. This is a parallel route of the same character and use as VR-1016-1051 with the exception that it is used for IFR instrument route (IR) pilot training.

4.2.1.2.6 Commercial Airports

The following contains information regarding commercial airports that are located within the ROI:

Outlaw Field Airport (KCKV). Outlaw Field Airport is the primary commercial hub for the Clarksville, Tennessee area serving Fort Campbell. There is no control tower or ATC. IFR Approach/Departure (A/D) air traffic is managed by Campbell Approach, while VFR A/D and traffic in the Class-D airspace is unmanaged. Through a Letter of Agreement with the installation, aircraft flying VFR and remaining in the closed traffic pattern within 1 mile of the airport do not have contact requirements with Campbell Approach. They are supposed to squawk 1200 on the transponder so as to be identified as VFR traffic in pattern.

The airfield has two relatively short, paved and diagonally juxtaposed runways (17-35 and 05-23). Runway 35 is fitted with a localizer instrument approach. This airport is within a segmented Class-D bubble together with CAAF and SAHP that extends from surface up to and including 3,100 feet above MSL. The portion surrounding Outlaw Field is approximately 3 NM radius, being enveloped into the arcs of the other airfields. This is surrounded by a segmented Class-E bubble together with Hopkinsville-Christian County Airport, CAAF and SAHP. The portion surrounding Outlaw Field is approximately 9 NM radius with an ADCS extension for Runway 35. This feature is approximately 6 NM wide extending out approximately 7 NM. This airfield resides within the A-371 Alert Area.

Hopkinsville-Christian County Airport (KHVC). The Hopkinsville Airport is a small public airfield with a single paved runway (08-26). There is no control tower or ATC. IFR traffic is managed by Campbell Approach Control while VFR traffic is unmanaged. This airfield is within a Class-E bubble that extends approximately 16 NM across and is interconnected with Class-E bubbles around CAAF, SAHP and Outlaw Field, the Clarksville Airport. This controlled airspace is managed by Campbell Approach Control and extends from 700 feet AGL up to 18,000 feet above MSL. This airfield is primarily used for recreational fliers and occasionally for military parachute drop and training flights. This airfield also resides within the A-371 Alert Area.

Parr Field Airport (TN53). Parr Field Airport is a small private grass strip near SAHP, approximately 2 NM east-north-east. It supports one single engine airplane for a private individual; Mr. Robert Parr. The runway is approximately 1,700 feet long in a north-south orientation. All traffic is VFR. There is no tower or ATC, however, this airfield lies within the Class-D bubble operated by Sabre Approach Control. Sabre Control Tower should have L/R management responsibilities for this airfield because it resides within their Class-D airspace.

Because this is a satellite airport, aircraft operations associated with this airfield must maintain two-way radio contact with Sabre Control Tower while in the Class-D airspace.

Standard Field Airport (5KY4). Standard Field is a small publicly-owned but private-use airfield near Elkton, Kentucky. It has a single turf runway (13-31) of approximately 3,000 feet in length. It has 13 aircraft based there including nine single engine and four ultralight aircraft. Operational activity has been identified to include 36 percent transient and 3 percent military according to public sources (Airnav, 2013). There is no tower or ATC. All traffic is VFR. This airfield resides within but near the outer boundary of the A-371 Alert Area. There are no known conflicts with CAAF or SAHP air operations.

Princeton-Caldwell County Airport (2M0). The Princeton-Caldwell County Airport is a small municipal owned and operated field near the town of Princeton, Kentucky that is open to the public. The airport has a single asphalt runway (05-23) that is approximately 4,000 feet in length. There is no control tower or ATC. All air traffic is VFR or under control of Campbell Approach Control. There are nine single engine aircraft stationed at the airfield. The airport handles approximately 114 air operations per week, two percent of which are military related.

Caldwell County Hospital Heliport (6KY5). This ground-based heliport exists to support medical evacuation activities associated with the hospital in Princeton, Kentucky. There are no aircraft stationed here permanently. There is no control tower or ATC. All air traffic is VFR or under control of Campbell Approach Control. This facility is located approximately 3 miles west of the Princeton-Caldwell County Airport and therefore would be seen to have the same general impacts as that facility.

Lowe Airport (5KY5). The Lowe Airport is a small private use airfield located near Cadiz, Kentucky used by a single individual; Mr. Clifton Lowe. It has a single asphalt runway (18-36) of approximately 3,100 feet in length. There are two aircraft based at the airfield including a single engine Beechcraft flown on flight plan and an old Stearman biplane flown VFR to 5,000 feet above MSL maximum altitude. The airfield is approximately 2 NM north of the northern boundary of the Campbell 1 MOA. It also resides within but near the outer boundary of the A-371 Alert Area. There is no tower or ATC. Sorties on flight plan are under control of Campbell Approach Control. There are no known conflicts with air operations at CAAF.

Lake Barkley State Park Airport (1M9). This airfield is small state-run airport open to the public. It is also located near Cadiz, Kentucky a little closer to Barkley Lake. It has a single asphalt runway (02-20), 4,800 feet in length. There are no aircraft based at the airfield but it sees approximately 38 operations per day, 52 percent of which are identified as military related. There is no tower or ATC. All traffic is VFR or under the control of Campbell Approach Control. This airfield lies very close to the Campbell 1 MOA northern boundary, less than 1 NM from the 02 Runway end and just outside of the A-371 Alert Area. Considering the orientation of the runway for approaches on Runway 02 and departures on Runway 20, it seems unlikely that A/D can occur without penetration of the MOA unless low altitude approaches are utilized. Half of its traffic, however, is military related due to its close proximity with the Fort Campbell range and associated MOAs, making this interaction virtually unavoidable. There are no known conflicts with air activities associated with the installation.

Kentucky Dam State Park Airport (M34). The Kentucky Dam State Park Airport is a small state-run airport open to the public and under the same management as Lake Barkley Airport. It has a single asphalt runway (09-27) that is approximately 4,000 feet in length. This airfield has three single engine aircraft based on the airfield and sees approximately 40 air operations per day, 15 percent of which are identified as military. It is located well northwest of the installation at the northern tip of Kentucky Lake near Gilbertsville, Kentucky. There is no tower or ATC. All traffic is VFR or under the control of the Memphis ARTCC.

West Kentucky Airpark (5KY3). The West Kentucky Airpark is a well-established private use airfield near Paducah, Kentucky. It has a single asphalt runway (04-22) that is approximately 3,000 feet in length. A second unimproved turf runway parallels the primary runway and is utilized for ultralights that prefer turf to paved surfaces. There are a total of 24 aircraft based at the airfield, including 17 single engine aircraft, 1 twin engine aircraft and 6 ultralights. There is no tower or ATC. All traffic is VFR or under the control of the Memphis ARTCC.

Barkley Regional Airport (KPAH). The Barkley Regional Airport is a moderately sized public airfield located near Paducah, Kentucky. It has two runways oriented at 90 degrees from each other. The primary runway (04-22) is asphalt and approximately 6,500 feet in length with ILS approach on Runway 04. The secondary runway (14-32) is an asphalt surface of approximately 5,500 feet in length. The airport has a control tower but all A/D is managed by the Memphis ARTCC. This airfield has a Class-D bubble of approximately 10 NM in diameter, which extends from surface up to and including 2,900 feet above MSL. Effective hours of operation are issued via NOTAM. There also exists a Class-E bubble surrounding the Class-D bubble that is approximately 17 NM in diameter and slightly off center allowing greater distance on the 04 runway end. This is emphasized by an A/D extension of approximately 6 NM in width by 5 NM in length. The Cunningham VORTAC is located near this airport bringing several Victor routes near this hub. There is no known conflict with Fort Campbell air operations.

Pirates Cove Airport (42KY). Pirates Cove is a small privately owned and used airport located near a branch of Kentucky Lake by Benton, Kentucky. It has a single asphalt runway (18-36) of approximately 3,000 feet in length for use by members of the Owner's Association of the airport. There are nine single engine aircraft based at the airfield. There is no tower or ATC. All traffic is VFR or under the control of the Memphis ARTCC.

Turner Field Airport (54KY). Turner Field Airport is a small private airfield near Murray, Kentucky. It has a single turf runway (10-28) of approximately 2,750 feet in length. There are a total of nine aircraft based on the airfield including three single engine aircraft, one twin engine aircraft and five helicopters. This would suggest that there are multiple users of this privately owned airport. The airfield is located 4 NM south-southwest of Pirates Cove Airport. There is no control tower or ATC. All traffic is VFR or under the control of the Memphis ARTCC. This airfield resides on the edge of the Class-E bubble and A/D extension associated with the Kyle-Oakley Field Airport (see Subsection below). Given the orientation of this runway, it is possible to launch and recover aircraft while remaining outside of the Class-E Bubble, although it is more likely that contact is made with the Memphis ARTCC that provides A/D services to this and the adjacent Mayfield Graves County Airport (see Subsection below).

J & C Antique (4KY0). This airfield is a small private use grass strip for a single owner; Mr. John Ferrero. This airfield has a single turf runway (18-36) that is approximately 1,300 feet in length. There is no tower or ATC. All traffic is conducted VFR. It is located near Hardin, Kentucky and is on the northern edge of the Class-E bubble of the Kyle-Oakley Field Airport (see Subsection below). All A/D would need to be cleared by the Memphis ARTCC, which manages air activities within the Class-E bubble.

Mayfield Graves County Airport (M25). The Mayfield Graves County Airport is a small county operated airfield open for public use located near Mayfield, Kentucky. It has a single asphalt runway (18-36) that is approximately 5,000 feet in length. There is no tower or ATC and all traffic is VFR or controlled by the Memphis ARTCC. This airfield sees approximately 39 operations per day, including 4 percent military due to its proximity to the Campbell 2 MOA, which lies approximately 30 NM to the east. There are a total of 12 aircraft based out of this airport, including 11 single-engine and one multi-engine aircraft. This airfield resides within a Class-E bubble that is conjoined with the adjacent Kyle-Oakley Field Airport to the southeast. This bubble is approximately 16 NM in diameter around this airfield and extends from 700 feet

AGL up to 18,000 feet above MSL. The Federal Air Corridor V-67 traverses this airspace at less than 1 NM northeast of the airfield.

Kyle-Oakley Field Airport (KCEY). This is a co-opted city and county-operated airfield for public use located near the city of Murray, Kentucky in Calloway County. It has a single asphalt runway (05-23) that is approximately 6,200 feet in length. There is no control tower and no ATC. All air traffic is VFR or under the control of the Memphis ARTCC. This airport is slightly larger and busier than its next door neighbor (Mayfield-Graves County Airport) with approximately 44 air operations per day. There are 29 aircraft based at this airport, including 26 single engine aircraft, 1 twin engine aircraft and 1 ultralight. This airfield resides within a Class-E bubble that is conjoined with the adjacent Mayfield-Graves County Airport to the northwest. This bubble is approximately 16 NM in diameter around this airfield and extends from 700 feet AGL up to 18,000 feet above MSL There is an A/D extension off of Runway 23 that is approximately 5 NM wide by 1 NM in length. The Federal Air Corridor V-67 traverses this airspace at less than 2 NM southwest of the airfield.

Brandon Airdrome (28KY). The Brandon Airdrome is a small privately owned airport for multiple recreational users located near Murray, Kentucky approximately 6 NM southeast of the Kyle-Oakley Field Airport. It has a single turf runway (01-19) that is approximately 2,500 feet in length. This airfield supports 10 single engine aircraft based on-field. There is no control tower or ATC. All traffic is VFR or under the control of the Memphis ARTCC. This airfield resides within the Class-E bubble of the Kyle-Oakley Field Airport suggesting that IFR A/D would be under control of the Memphis ARTCC. It is less than 1 NM from the Federal Air Corridor V-67 located to the southwest.

Short Creek Airport (8TN7). The Short Creek Airport is a small privately owned and operated field for the owner; Mr. William Holder. It has a single turf runway (07-25) that is approximately 2,600 feet in length. There is no control tower and no ATC. All traffic is VFR or controlled by the Memphis ARTCC. There are two aircraft based out of this airport including one single engine and one twin engine aircraft. The airport is located near Dover, Tennessee and resides immediately adjacent to the Campbell 2 MOA. Considering the orientation of the runway, it seems unlikely that A/D can occur without penetration of the airspace unless low altitude approaches are utilized (below the 1,500 foot AGL floor of the MOA).

Houston County Airport (M93). Houston County Airport is a county owned and operated asset open to the public. It is located near McKinnon, Tennessee approximately 1 NM southwest of the Campbell 2 MOA boundary. They operate from a single asphalt runway (08-26) that is approximately 3,000 feet in length. There is no control tower and no ATC. All traffic is VFR or controlled by the Memphis ARTCC. There are only four single engine aircraft based on-station and they typically run 34 air operations per week on average. Fourteen percent of those are military due to its close proximity to Fort Campbell.

Big Sandy Airpark (39TN). This airport is identified on sectional charts as “Objectionable,” which means that the landing facilities have received objectionable airspace determinations by the FAA and are therefore not considered safe for launch and recovery operations. It is a privately owned and operated field near Big Sandy, Tennessee. There is a single turf/dirt runway (03-21) that is approximately 3,000 feet in length. There is no control tower and no ATC. All traffic is VFR or controlled by the Memphis ARTCC. The airfield is located approximately 9 NM southwest of the Campbell 2 MOA boundary. There are no known issues regarding airspace use conflicts.

Ferraraccio Field Airport (19TN). This airfield is a small private grass strip for use by a single individual, Mr. Chris Ferraraccio. The airfield is located in Pleasantview, Tennessee, less than 1 NM southeast of the segmented section of the A-371 Alert Area. It has a single turf runway (08-

26) that is approximately 2,200 feet in length. There is one single engine aircraft based out of this airport for private use. There is no control tower and no ATC. All traffic is VFR or under control of the Memphis ARTCC. There are no known conflicts with air traffic associated with Fort Campbell.

Ruckman Field Airport (36TN). Ruckman Field is a small privately owned and operated airfield located southeast of Ferraraccio Field along Interstate-24. The airstrip parallels the interstate and is separated by a tree row. It has a single turf runway (13-31) that is approximately 1,800 feet in length. There are two single engine aircraft based out of this airport for private use. There is no control tower and no ATC. All traffic is VFR or under control of the Memphis ARTCC. There are no known conflicts with air traffic associated with Fort Campbell.

4.2.1.3 Airspace Use and Management

The immediate ROI is under the control and management of four separate but integrated organizations of Fort Campbell, including Campbell Control Tower, Sabre Control Tower, Campbell Approach Control and Eagle Radio AIC. This controlled airspace includes all of the sections and stratifications of the RA including the R3701 and R3702A, B & C, as well as the three airports within the Class-D bubble: CAAF, SAHP, and Outlaw Field (Clarksville Airport). Each entity controls a different geographical area of the ROI beginning with the Class-D bubble of each airfield. Sabre Control Tower manages aircraft within its segment of the bubble but only up to 1,700 feet above MSL. Campbell Control Tower manages its segment of the bubble all the way to its vertical extent at 3,100 feet above MSL. Campbell Approach Control also manages the airspace above SAHP from 1,700 feet above MSL up to ceiling at 3,100 feet above MSL and the entire Class-D segment of Outlaw Field. Eagle Radio AIC manages range activities and all of the RA stratifications. Campbell Approach manages the area outside of these controlled spaces to 3,100 feet above MSL. Outside of this area and above this area is under the control of the Memphis ARTCC.

These four entities receive handoffs of commercial and private aircraft from the Memphis ARTCC as they traverse the controlled airspaces surrounding the tri-airport region as well as between each other. The ARTCC also routes commercial air traffic around the R3702, when activated. Campbell Approach Control, Campbell Control Tower and Sabre Control Tower work in concert with Range Control via Eagle Radio AIC for all flight activities within the RA. The 19th Air Support Operations Squadron (ASOS) handles coordination and rectification of Air Force training flights within the RA in order to ensure safe separation of activities. Neither the ASOS nor Joint Tactical Attack Controllers (JTACs) directly control aircraft in the RA; rather they coordinate air activities with Eagle Radio and other controlling entities to ensure safe JAAT operations. The A-371 Alert Area is not managed but is a warning to pilots to be vigilant of unusual air activity such as aerial acrobatics and training flights.

4.2.1.3.1 Unmanned Aircraft System Operations

Many of the units stationed at Fort Campbell, as well as transient units coming for training on the range, operate a variety of UASs. Presently, only Tier I and small Tier II vehicles are being operated including the RQ-7B & C Shadow (Tier II) and the smaller hand-held RQ-11 Raven (Tier I). The much larger MQ-1C Gray Eagle Extended Range Multipurpose (ERMP) UAS (Tier II) are programmed to arrive in the coming year. The Raven and Shadow airframes are operated on the Range within the R3702-A airspace. Designated 3-dimensional areas have been established for the different airframes and training objectives.

RQ-7B Shadow

RQ-11 Raven

MQ-1C Gray Eagle

The RQ-7B Shadow is a Tier II short-range tactical UAS that requires radio line of sight (RLOS) during operations. It typically operates between 8,000 and 10,000 feet AGL and has a maximum range of 27 miles. Besides basic flight training, the aircraft are used for artillery targeting and reconnaissance over the impact area. A new airframe version (RQ-7C) has recently been acquired that has a larger wingspan to allow an increased payload for laser targeting equipment and possible weaponization. The Shadow are primarily launched and recovered from established airfields, including a new runway and hangar/classroom facility at TA-19.

These aircraft are typically stored at the unit's Company Operations Facility (COF) or the Tactical Equipment Maintenance Facility (TEMF) and are transported to specified areas within the range for training flights. TA-19 and Suckchon would be the two primary operational areas for Shadow Operations with Indian Mound acting as a secondary location. There are seven units stationed at Fort Campbell that train on this airframe. Current operational protocol allows for L/R to occur during a 0.5 hour window every even hour of the day during the work week. This is done to avoid continual conflicts between ground fire and L/R activities.

The RQ-11 Raven is a Tier I small UAS. It is hand launched and ground or net recovered. This allows units to deploy the device practically anywhere in the theater of combat. Training is restricted to within six ROZs located on the range. These areas are of differing configurations and located throughout the range to provide a variety of training opportunities without conflicting with one another. The aircraft requires RLOS and typically operates at between 250 and 500 feet AGL although it is capable of flight up to 15,000 feet above MSL. It has a maximum range of 6.2 miles. At Fort Campbell they are operationally restricted from surface up to 2,000 feet above MSL. ROZ-3 is located at TUAS-19 and ROZ-4 is located at Indian Mound creating a potential conflict between Raven Operations and Shadow Operations at these two airfields since clearance surfaces overlap each other. Shadows carry transponders and are seen and controlled by Eagle Radio AIC while Ravens do not and cannot be identified on radar. Communication is essential to prevent midair collisions of these airframes running simultaneous operations in the same airspace.

Three units are programmed to receive a Company of MQ-1C Gray Eagle UAS between the spring of 2015 and the end of 2017, including one company of the 101st CAB and two companies of the 160th SOAR Airborne. Each unit will receive nine airframes to be permanently located and flown from SAHP. It is the present understanding that each company will keep four aircraft operational for training leaving five in crates ready for deployment. New hangars/Operations Facilities, COFs and supporting infrastructure are being constructed specifically for these new missions. It is most likely that each company will only operate one or possibly two airframes at any given time. These aircraft will eventually depart from SAHP and fly through Class-D airspace into the R3702-A, ascending up through R3702-B & C to Class A airspace for training sorties. Presently, these aircraft are not certified for IFR operations nor are any Army operators certified to fly IFR. It is the Army's intent to rectify this situation prior to full fielding of this UAS.

Presently, UAS vehicles are not allowed to operate freely in non-restricted airspace because they do not have "see and avoid" capability, which the FAA has determined to be necessary in VFR airspace. The Federal Government recently directed the FAA, through the FAA Reauthorization Act, to establish policies and procedures through which UAS will be able to fly freely within the National Airspace System (NAS) by the year 2015. Once enacted, these aircraft will be able to fly outside of the RA, thereby reducing range related airspace use conflicts. Until the FAA establishes protocol for free flight through the NAS, it will be necessary to establish a certificate of airworthiness/authorization (COA) with the FAA for controlled passage through the NAS in order to transit from the launch site at SAHP to the R3702. This path is primarily within the Class-D bubble associated with SAHP. Although under control of Sabre Control Tower, the FAA and DoD will require ground observers within 1 NM visual attainment of the aircraft while it is outside of the RA. For launches towards the RA (towards prevailing wind direction), this can be accomplished with two observers, one located in the tower and one located along 101st Airborne Division Road. Recoveries will need to circle northeast for approach and recovery requiring two to three observers depending on the pattern selected (see Figure 4.2-19 in Section 4.2.2.5 for typical L/R patterns at SAHP).

4.2.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, a significant impact to airspace would be one that led to a violation of FAA regulations that affects aviation safety or results in substantial infringement of private or commercial flight activity. The following sections discuss the potential for adverse impacts to airspace for the No Action and Proposed Action Alternatives.

4.2.2.1 No Action Alternative

Without implementing any of the Proposed Action Alternatives, Fort Campbell would continue to perform its mission status quo with the potential for minor to moderate airspace use impacts at Fort Campbell. As units redeploy from the theater back to home station, an increased range and airspace usage is anticipated, which would considerably increase congestion, and thereby, delay training activities or reduce the efficiency or safety of those activities. Although Fort Campbell has a highly active and diverse airspace, adequate separation of all ground-based and airborne activities are currently well managed. Additional air activity within the R3702 would require comprehensive de-confliction planning due to the overall density of activity, particularly in certain areas of the range where newly developed facilities have greatly improved training efficiency. These areas are seeing higher than normal congestion. Any increase in air-related range activities would require adjustment through tighter scheduling and/or expansion of training times beyond the basic workday (daylight hours) and Monday – Friday workweek.

The overall impact of the No Action Alternative relative to airspace is less than significant. The primary airspace action, which would not be implemented under the No Action Alternative, is the

modification of Fort Campbell controlled airspace associated with Alternative 4. Alternative 4 proposes expanding the RA through reactivation of an old, long since deactivated section known as the R3703. Not reactivating the R3703 would have a minor negative impact on MQ-1C Gray Eagle training flights. This airframe would be stationed at SAHP requiring the UAS to operate in non-restricted airspace for a distance of approximately 2.7 NM. Even with an appropriate COA, this is a burdensome operation with a slightly increased risk of mid-air conflict.

4.2.2.2 Alternative 1

This alternative provides site specific construction, modernization and operations in support of Soldier training. Of the three listed projects (Refer to Section 2.2.1 for detailed description of projects) only one (Saunders LZ runway with glide slopes) has an airspace component (see Table 4.2-1). That project would construct a runway at the Saunders LZ to support rotary wing airframes as well as Sherpa and smaller fixed wing aircraft for Special Operations loading/unloading of personnel and equipment associated with parachute jump training. This site could also be used to support FAARP and Shadow UAS L/R operations. This LZ already supports rotary wing traffic as an un-improved or minimally improved surface. Paving the runway would not dramatically increase its usage for rotary wing aircraft. Allowing its use as a FAARP would increase its usage as there is currently only one location for this activity on the range in TA-30. Due to its proximity to Echo-1, it is assumed that the 160th SOAR would get the highest use from improved facilities at this location.

Use of this facility for fixed wing aircraft would change the airfield and the airspace supporting it. As a short-field or assault runway, there are runway clearance areas and imaginary surfaces that would need to be established and maintained (see Figure 4.2-13). These criteria require a Primary Surface centered over the runway of 150 feet wide extending the length of the runway and overruns plus 200 feet on both ends or a total length of 500 feet from the end of the runway. There also would be a Maintained Area outside of the Primary Surface of an additional 60 feet on either side running the length of the runway and aligning with the beginning of the Clear Zone. This area is to be free of obstructions of any kind and must be graded to within +10 to -20 percent slope. Encompassing this whole area is an Exclusion Area that is 700 feet wide, centered on the runway and extending 500 feet beyond the runway end, which aligns with the end of the Primary Surface (300 foot overrun plus 200 feet). The Exclusion Area would be free of all buildings, trees or obstacles not directly associated with the airfield. Only features required to operate the airfield are allowed in the Exclusion Area such as aprons, taxiways, NAVAIDS, aircraft, support equipment, etc. There is no transitional slope associated with an LZ. Clear Zones and ADCS at the runway ends are required. The Clear Zone is a trapezoidal area beginning at the end of the Maintained Area at 270 feet wide, centered over the runway. It extends outward 500 feet and is 500 feet wide at the outer end. The ADCS is an imaginary plane that extends upward from the end of the Clear Zone and is also a trapezoidal configuration. It is 500 feet wide at the beginning and 2,500 feet at the minimal outer edge distance of 10,500 feet. It is preferred, but not required, that this surface extend out at the same width (2,500 feet) for another 21,500 feet (32,000 feet total). This surface rises at a rate of 35 horizontal to one vertical. No object fixed or mobile may penetrate this surface, such as trees, buildings, towers, vehicles, etc.

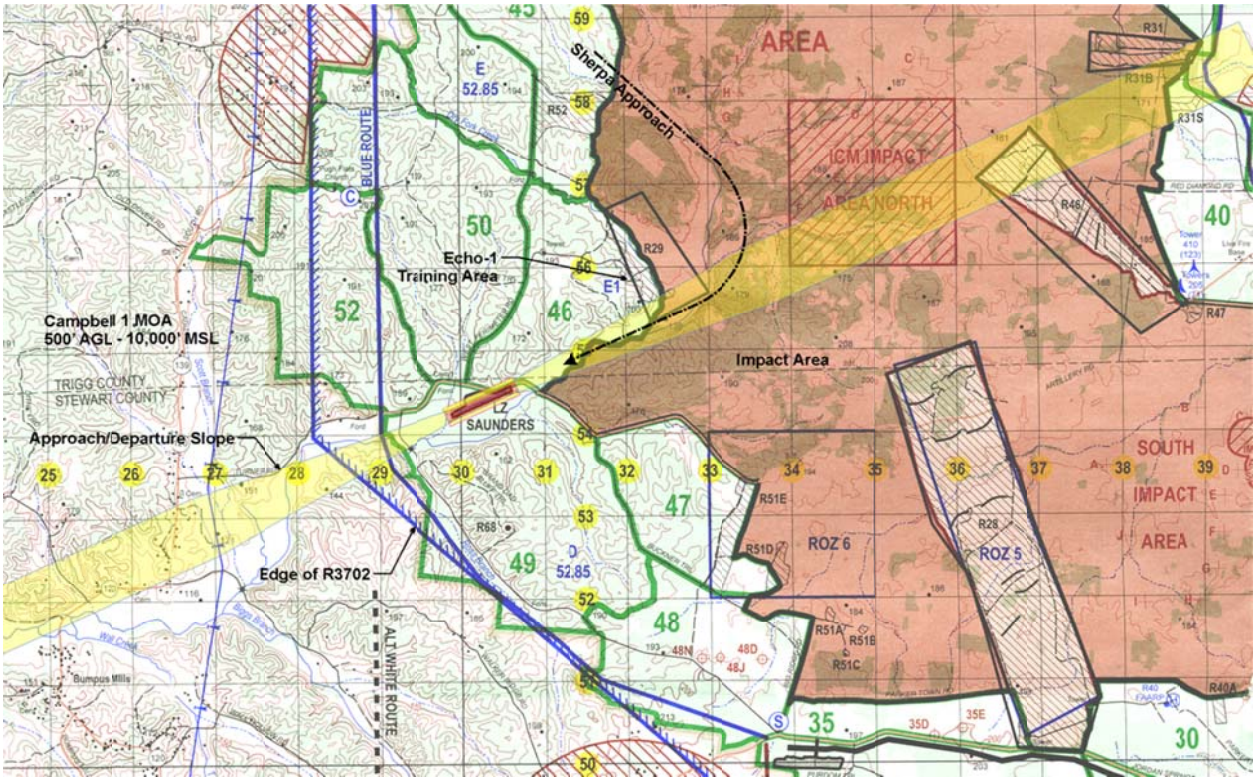


Figure 4.2-13. Proposed Saunders LZ as FLS with Imaginary Surfaces

The clearance surfaces surrounding the airfield would need to be cleared of trees and other obstructions in accordance with the criteria. The access road (Turner Road/Buckner Trail) intersects the Primary Surface, Maintained Area and Exclusion Area. This would need to be realigned outside of these areas or secured from use during airfield operations. The eastern ADCS extends out over Echo-1 TA and the ICM Impact Area North, requiring cessation of all flight and live fire activities of the North Impact Area during flight operations at that airfield. The ADCS is at approximately 120 feet AGL at the point over Echo-1 taking into account grade changes in that area. This would be in direct conflict with CAS training operations at the MOUT site. Depending on the level of airfield usage this could be seen as a considerable impact to training operations and safety.

The ADCS west intersects with the Blue Route at approximately 75 feet AGL. This would need to be de-conflicted by Eagle Radio AIC, which poses a minor impact as traffic on the air routes is typically VFR. The ADCS exits the RA at approximately 135 feet AGL and extends another 2.4 NM before reaching the floor of the Campbell 1 MOA area of protection. This pattern results in an increased level of military air traffic exposed to civilian VFR traffic. There is very little civilian VFR traffic in this area; however, so there is only minor or no impact. Glide slopes for this airfield follow a natural valley in the terrain allowing clearance for the 35:1 ADCS in both directions. Turning out of or in to the ADCS from pattern may require a steeper climb/descent or greater distance out to allow appropriate altitude. Sherpas and other small fixed wing aircraft would typically climb and descend at a rate much steeper than 35:1. Considering prevailing wind direction, Sherpa approaches would most likely originate over the Impact Area from the north between the ICM Impact Area North and Range 29 and turn right into the ADCS corridor for recovery.

Regarding overall airspace congestion, the additional traffic generated by the proposed improvements of this facility would benefit the DoD by providing more flexibility in training

opportunities to other installations that have fixed wing aircraft. It could, however, reduce training opportunities for Fort Campbell units through increased airspace use in this area by non-installation units and aircraft. Depending on the level of usage, this could be considered a minor to moderate impact to airspace use for the installation with a small benefit to DoD units that could train at Fort Campbell.

Table 4.2-1. Summary of Site-specific Projects Airspace Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial						
		Reduction of military airspace	Interference with commercial or private aviation	Increased flight safety hazard	Increased air traffic/airspace use	Reduced visibility or airspace obstruction	Other (disruption of other training activities)	Overall Impact
Construct a Driving Skid Pad	Range 51E	N	N	N	N	N	N	N
Construct a Gravel Foot March Trail	On The Line Road	N	N	N	N	N	N	N
Construct a Runway with Glide Slopes	Saunders LZ	N	Min	Mod	Min	Min	Mod	Mod

LZ = landing zone

4.2.2.3 Alternative 2

This alternative provides preliminary evaluation of predefined AUZs to facilitate future modernization and range facility construction. Although it is not known exactly what might be constructed at each area, a list of possible activities is provided as a baseline for evaluation. Airspace criteria are typically specific to a particular type of activity requiring different levels of clear zone protections (i.e., airframes they can support) for different types of facilities. The potential actions for each AUZ are discussed individually below. The potential impacts to airspace for each AUZ are summarized in Table 4.2-2 following the AUZ discussion.

TA 11 AUZ. While the village TA would not have a direct impact on airspace, it is assumed that it would utilize CAS as part of the ground training exercises or be used specifically for CAS or aerial insertion training in urban environments. This particular site in the upper northwest corner of TA-11 is very near the Charlie Route air corridor providing two-directional travel north-south through the range. It is also near the already congested Bastogne LZ and MOUT site. This puts training operations relative to the village in potential conflict with air traffic on Charlie Route, both of which would be operating VFR at near the same altitude. It also brings a higher level of congestion to an already busy area of the installation. Air traffic on the Charlie Route, however, is typically infrequent. Weighing all implications, the congestion issues are considered a minor impact on airspace use.

TA 20 AUZ. This site and proposed facilities are similar in character to the TA 11 AUZ but with the added benefit of being located further from the existing MOUT sites. This would support de-densification of a congested area and eliminate potential conflict with the Charlie Route. It is to

be located within the boundaries of the LZ Los Banos, which would present a conflict of use, in that only one or the other activity (LZ training or ground training) could be conducted at any given time, which results in a loss of capacity for LZs through a gained capacity for MOUT training. This LZ is unique in that it is unimproved in its entirety with no constructed facilities. Considering the number of LZs on the range, their infrequent usage and the insignificant offerings of this particular LZ, the potential impact is negligible.

TA 52 AUZ. This site and proposed facilities are similar in character to TA 11 and 20 AUZs. These facilities are located well away from the other existing and proposed MOUT sites but lies in close proximity to Echo-1 TA of the 160th SOAR, which includes a MOUT village. This project also calls for the development of a new DZ and/or LZ. This TA is split half inside and half outside the RA (see Figure 4.2-14).

The three proposed sites reside in between the edge of the RA and the Blue Route, which parallels it at approximately 0.5 mile to the east. The Range Support building would be underneath the Blue Route, but would present no issues in terms of airspace. The location of the MOUT village may be in conflict with the Blue Route due to their proximity and the fact that both would be operating VFR. Rotary wing aircraft providing CAS or nap-of-the-earth (NOE) approaches from the west would be operating in uncontrolled airspace until just before the training site. CAS or NOE from any other direction places them in conflict with the Blue Route. The proposed Pugh Flats DZ/LZ is located in a clearing very near the edge of the R3702 at the upper edge of TA-52. This effectively limits the asset to three directions, or subjects the aircraft to unprotected airspace outside the RA. It is also close to a no-fly-zone, further putting limitations on its usefulness. Airspace congestion in this area would increase if all actions were implemented. Activities include the proposed Pugh Flats DZ/LZ; Area-52 MOUT village; Echo-1 Training Site; and Range 29 including a MOUT village with heavy air traffic. These factors combined represent a moderate impact to airspace use.

Aardvark LZ AUZ. The proposed projects for this AUZ do not include any airspace-related or effected facilities. Although this is one of the most highly utilized LZs on the range, the proposed projects would have no effect on airspace use.

Golden Eagle FLS AUZ. This AUZ calls for the construction of an additional parallel runway adjacent to the existing assault runway at Golden Eagle FLS (see Figure 4.2-15). This new runway would be dedicated to small fixed wing aircraft, including the Sherpa, often used for parachute jump training. Only one of the runways could be used at any given time and therefore have separate and independent clear zones and imaginary surfaces. Obstruction clearing and ground placement of facilities must adhere to both sets of criteria (AR 95-2). This runway would extend 2,000 feet long by 80 feet wide. Placement is flexible since there is ample open space available but it would likely be constructed over the old taxiway (see Figure 4.2-15).

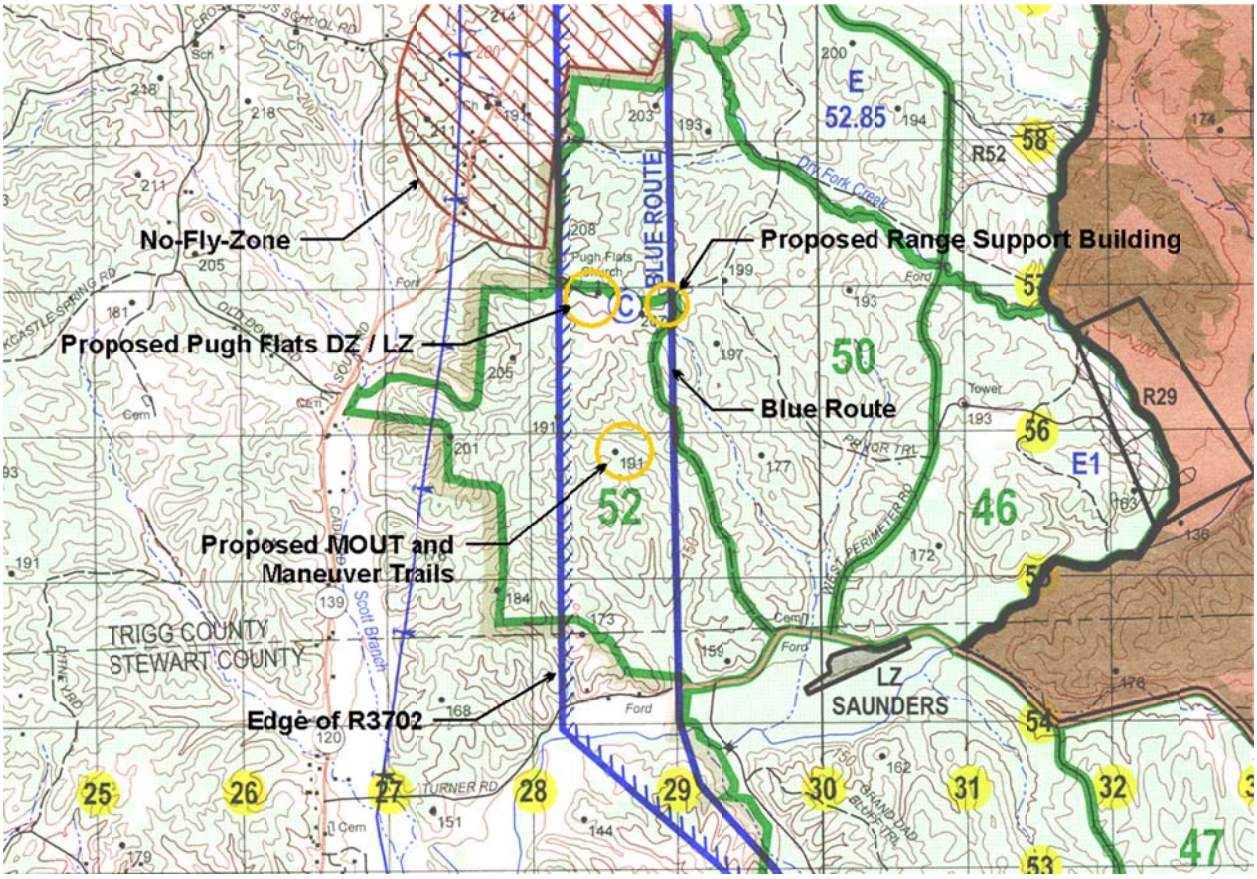


Figure 4.2-14. Training Area 52 MOUT

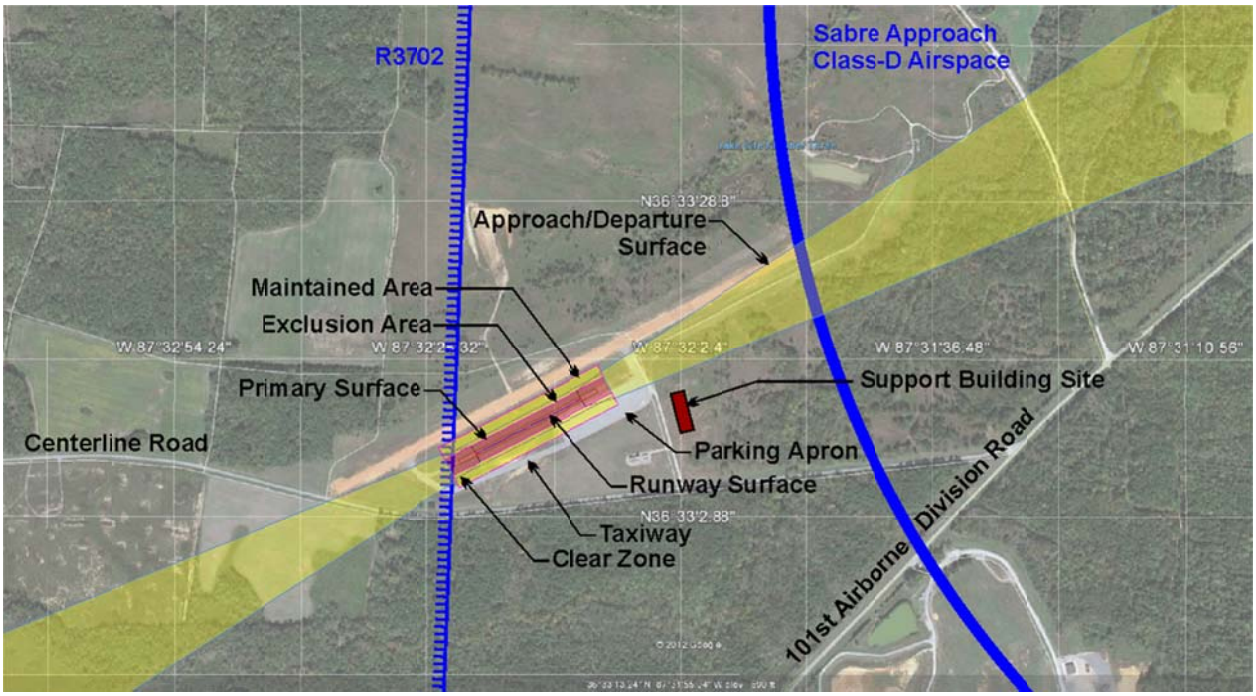


Figure 4.2-15. Golden Eagle FLS Additional Runway with Imaginary Surfaces

This project would require a Primary Surface centered over the runway of 150 feet wide extending the length of the runway and overruns plus 200 feet on both ends or a total length of 500 feet from the end of the runway. There also would be a Maintained Area outside of the Primary Surface of an additional 60 feet on either side running the length of the runway and aligning with the beginning of the Clear Zone. This area is to be free of obstructions of any kind and must be graded to within +10 to -20 percent slope. Encompassing this whole area is an Exclusion Area that is 700 feet wide, centered on the runway and extending 500 feet beyond the runway end, which aligns with the end of the Primary Surface (300 foot overrun plus 200 feet). The Exclusion Area should be free of all buildings, trees or obstacles not directly associated with the airfield. Only features required to operate the airfield are allowed in the Exclusion Area such as aprons, taxiways, NAVAIDS, aircraft, support equipment, etc. There is no transitional slope associated with an LZ. Clear Zones and ADCSs at the runway ends are required. The Clear Zone is a trapezoidal area beginning at the end of the Maintained Area at 270 feet wide, centered over the runway. It extends outward 500 feet and is 500 feet wide at the outer end. The ADCS is an imaginary plane that extends upward from the end of the Clear Zone and is also a trapezoidal configuration. It is 500 feet wide at the beginning and 2,500 feet at the minimal outer edge distance of 10,500 feet. It is preferred, but not required, that this surface extend out at the same width (2,500 feet) for another 21,500 feet (32,000 feet total). This surface rises at a rate of 35 horizontal to 1 vertical. No object fixed or mobile may penetrate this surface, such as trees, buildings, towers, vehicles, etc. The majority of the existing parking apron cannot be used while this is an active runway. All other criteria appear to be compatible with existing conditions.

This AUZ also calls for the construction of a classroom and parachute packing facility to allow for quick turn-around of parachute jump training units. The proximity of this facility to the DZs in the range would greatly benefit that activity reducing flying time to another location off-site for reload. The placement of any structures must remain outside of the Maintained Area and Clear Zones as defined above. This runway is uniquely located between the Class-D bubble of SAHP and the edge of the R3702. This means that the airfield itself is under the jurisdiction of Campbell Approach Control while aircraft are on the ground. Once airborne, they are either under the control of Sabre Control Tower to the east or Eagle Radio AIC to the west. Aircraft on final approach from the east would initially be in Class-D airspace controlled by Sabre Control Tower. They would exit the Class-D and transit approximately 0.5 NM of the Class-E airspace operated by Campbell Approach before landing. Launch and recovery protocol would need to be established to reduce control transfers and ensure safe flight operations.

Construction of this facility would increase the usage of this airfield and may also conflict with its original intent as a C-130 assault field because only one user may occupy the field at any given time. Construction of this facility could possibly increase airspace congestion by attracting other non-installation units to come to Fort Campbell to use these facilities. There would also be increased traffic between the DZs and the airfield as they rotate back and forth for jump training. This is only considered to have a minor impact because its location is well outside of the busier northern half of the range complex.

Indian Mound LZ AUZ. This project is designed to provide the same benefit described for Alternative 1 and the Golden Eagle Flight LS AUZ, namely, an additional runway at Indian Mound LZ for small fixed wing aircraft supporting parachute jump training through the provision of quick turn-around reload. Indian Mound LZ is a well utilized facility for Raven UAS operations and is the secondary L/R site for Shadow UAS operations. It is located in a highly congested area of the range immediately adjacent to the North Impact Area (see Figure 4.2-16). Runway safety zones extend out over the Impact Area as well as TUAS-19 suggesting that increased flight activities would directly impact use of both of those adjacent facilities. No Shadow L/R at TUAS-19 could be conducted simultaneous to L/R at Indian Mound. Range activities near the

South Impact Area including Range 28, would need to be stopped. No Shadow operations could be conducted at Indian Mound during Sherpa or other fixed wing L/R and no Raven operations could be conducted at either ROZ-3, ROZ-4 or ROZ-5. The eastern ADCS intersects Delta Route creating a potential conflict as both would be operating VFR at near the same altitude.

In general, this area of the range is very congested. Adding an additional L/R activity further exacerbates the situation and significantly reduces other training opportunities in the area. The anticipated level of activity in this area of the range would either increase the safety risk or reduce the quantity and quality of training conducted here. These factors together present a significant impact to Fort Campbell airspace use.

The change in airfield configuration and use brings a different set of clear zones and imaginary surfaces than what currently exists for use as a Shadow L/R site (see Figure 4.2-17). This would be considered a short-field or assault runway requiring a Primary Surface centered over the runway of 150 feet wide extending the length of the runway and overruns plus 200 feet on both ends or a total length of 500 feet from the end of the runway. There is also a Maintained Area outside of the Primary Surface of an additional 60 feet on either side running the length of the runway and aligning with the beginning of the Clear Zone. This area is to be free of obstructions of any kind and must be graded to within +10 to -20 percent slope.

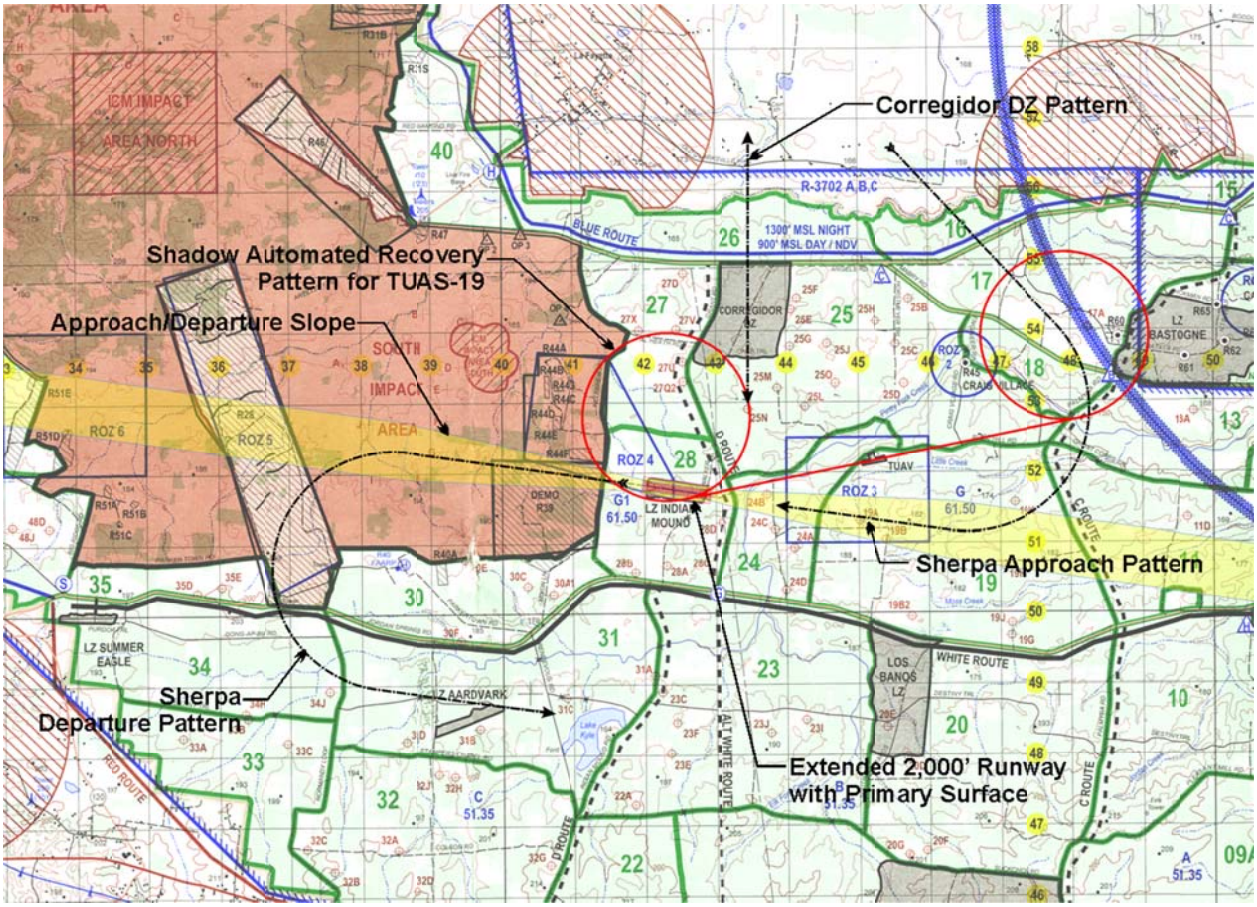


Figure 4.2-16. Indian Mound Runway Improvements with Imaginary Surfaces

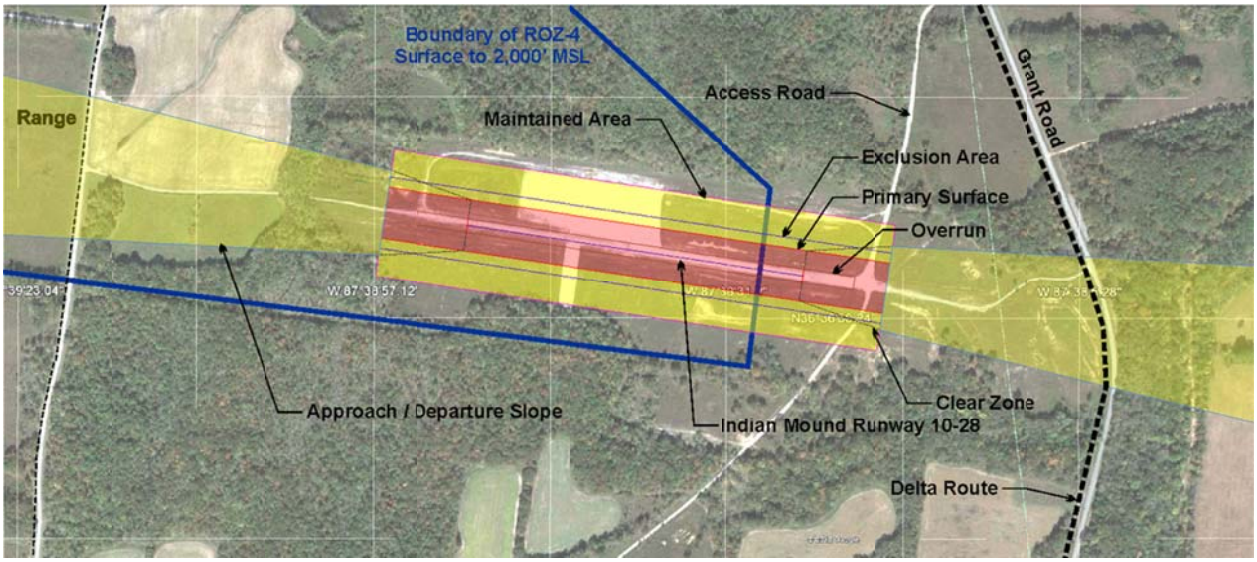


Figure 4.2-17. Indian Mound Runway Improvements with Imaginary Surfaces

Encompassing this whole area is an Exclusion Area that is 700 feet wide, centered on the runway and extending 500 feet beyond the runway end, which aligns with the end of the Primary Surface (300 foot overrun plus 200 feet). The Exclusion Area should be free of all buildings, trees or obstacles not directly associated with the airfield. Only features required to operate the airfield are allowed in the Exclusion Area such as aprons, taxiways, NAVAIDS, aircraft, support equipment, etc. There is no transitional slope associated with an LZ. Clear Zones and ADCS at the runway ends are required. The Clear Zone is a trapezoidal area beginning at the end of the Maintained Area at 270 feet wide, centered over the runway. It extends outward 500 feet and is 500 feet wide at the outer end. The ADCS is an imaginary plane that extends upward from the end of the Clear Zone and is also a trapezoidal configuration. It is 500 feet wide at the beginning and 2,500 feet at the minimal outer edge distance of 10,500 feet. It is preferred but not required that this surface extend out at the same width (2,500 feet) for another 21,500 feet (32,000 feet total). This surface rises at a rate of 35 horizontal to one vertical. No object fixed or mobile may penetrate this surface, such as trees, buildings, towers, vehicles, etc. Most of the Clear Zones are acceptable with the exception of some necessary tree clearing under the ADCS. The access road would need to be secured during L/R operations on both sides of the airfield and the aircraft parking apron cannot be used as it is wholly within the Maintained Area.

Suckchon DZ AUZ. This project provides for the construction of support facilities at the new Suckchon TUAS runway site. While these ground facilities would not directly affect airspace use, better facilities would encourage an increased use of the site, which would result in increased air traffic in that portion of installation airspace and subsequently decreased airspace congestion in the northern section near TUAS-19 and Indian Mound LZ. This would be considered beneficial.

Veghel DZ AUZ. This project promotes a fourth site for construction of a small fixed wing runway at an abandoned LZ near the Veghel DZ (see Figure 4.2-18). The intent is to provide the same benefits as described in Alternative 1 and the Golden Eagle Flight LS and Indian Mound LZ AUZs. Runway characteristics are similar and required Clear Zones and imaginary surfaces are the same. The ADCS to the southwest intersects the Blue Route at a very low altitude (approximately 66 feet AGL) causing some concern for conflict as both are flying VFR in the same airspace. The ADCS reaches approximately 180 feet AGL as it exits the R3702 restricted airspace. As it exits the RA it enters airspace beneath the Campbell 1 MOA. This

airspace begins at 500 feet AGL and rises up to 10,000 feet above MSL. Further out, the ADCS crosses a north-south oriented high-power transmission line at approximately 272 feet AGL. The height of the obstruction could easily meet or exceed the transit height. To further complicate the ADCS, it traverses airspace very near to a no-fly-zone at approximately 150 feet AGL. The ADCS on the northeast side of the proposed airfield also intersects the Blue Route at approximately 150 feet AGL resulting in the same potential conflicts. It exits the RA at approximately 196 feet AGL. There are no other obstructions or issues further out in that direction.

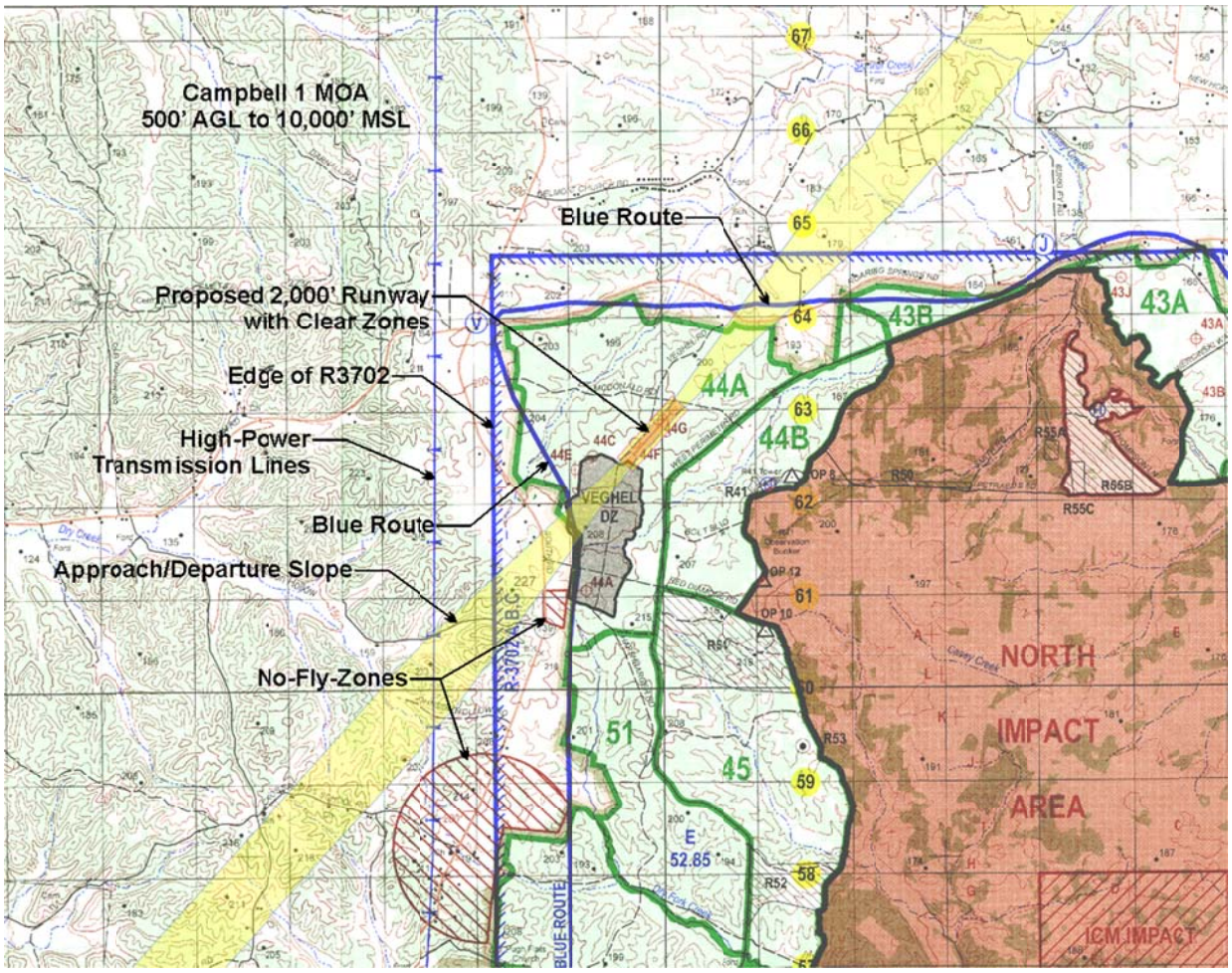


Figure 4.2-18. Veghel DZ Runway Addition with Imaginary Surfaces

Ground obstructions are many in this area, which was re-vegetated following closure of the original airfield. Access to the site is good, although access roads would need to be relocated or secured during flight operations. In general, this location would not adversely impact overall range airspace use significantly as it is well away from most other activities, with one exception. It is in conflict with one of the aerial gunnery ranges located in the upper northwest corner of the North Impact Area. The general flight path to that facility is perpendicular to the ADCS of this proposed airfield and at nearly the same altitude. Both of these activities require flight through the MOA under the control of Campbell Approach Control, then transfer to Eagle Radio AIC as they enter the R3702 airspace.

Table 4.2-2 provides a summary of airspace impacts for each AUZ.

Table 4.2-2. Summary of Potential Airspace Impacts per AUZ

Proposed AUZ	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial						
	Reduction of military airspace	Interference with commercial or private aviation	Increased flight safety hazard	Increased air traffic/airspace use	Reduced visibility or airspace obstruction	Other (disruption of other training activities)	Overall Impact
TA 11	N	N	Mod	Mod	N	N	Min
TA 20	N	N	N	Min	N	N	Min
TA 52	N	Min	Min	Mod	N	N	Min
Aardvark LZ	N	N	N	N	N	N	N
Golden Eagle FLS	N	B	N	Min	N	Min	Min
Indian Mound LZ	N	N	S	Mod	N	S	S
Suckchon DZ	N	N	N	B	N	N	N
Veghel DZ	N	Min	Min	Min	Min	Min	Min

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; TA = training area

Collectively, these AUZs tend to focus on two primary issues that have an effect on airspace use; construction of additional MOUT facilities and construction of an airstrip to support the Sherpa and parachute jump training. The best site for a MOUT facility that would utilize rotary wing CAS in training operations would be one that is further away from the highly congested northern section of the range and has the least conflicts with other activities.

If all of the AUZ options of Alternative 2 were enacted, there could be potential conflict between the five proposed Sherpa runways (Golden Eagle FLS, Indian Mound LZ, Summer Eagle LZ, Saunders LZ and Veghel LZ) should they be utilized simultaneously. If they were not to be used simultaneously, they would likely not all be constructed as they do not offer vastly different benefits. These runways, with intersecting L/R glide slopes, could be difficult for Eagle Radio to deconflict between themselves as well as with all of the other concurrent and overlapping air activities, including rotary wing route and non-route VFR traffic, rotary wing CAS and LZ training operations, Raven UAS flight operations (from surface to 2,000 feet above MSL), Shadow L/R (ground to 4,000 feet above MSL) and flight operations (4,000 block 6,000), other LZ and DZ operations, and artillery fire from all locations throughout the range. In general, however, impacts of this alternative are considered minor to moderate.

4.2.2.4 Alternative 3

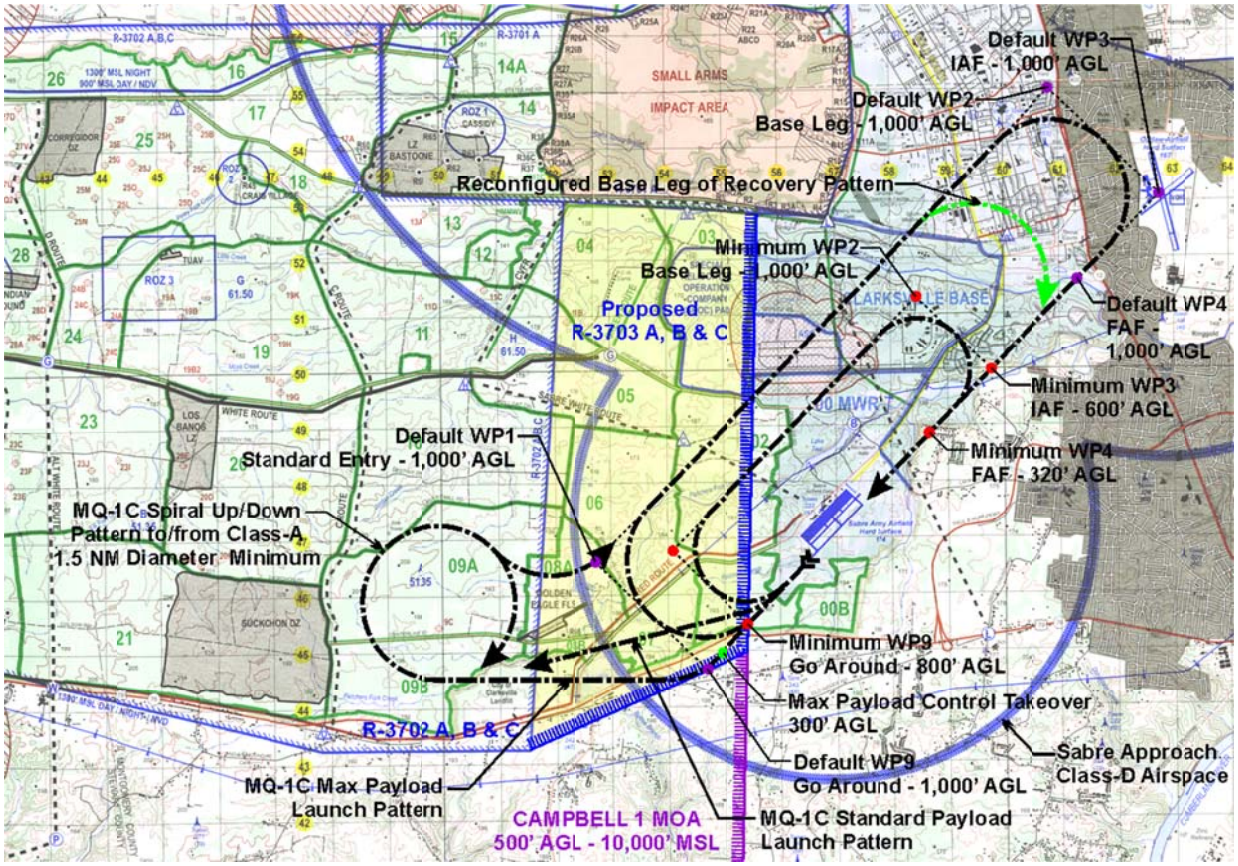
This alternative discusses regular maintenance activities for range assets. None of these have any effect on airspace use, and therefore, have no impact to airspace use.

4.2.2.5 Alternative 4

This alternative proposes reactivation of three stratifications of a previously operated RA including the R3703-A, B & C. If approved by the FAA, reactivation of the R3703 RA would allow for expanded training opportunities, including artillery ground fire, rotary wing training and UAS training. It would effectively reduce the distance of uncontrolled airspace between the range and SAHP from 2.7 NM to just 0.5 NM. This would greatly improve public safety by reducing the amount of time that civilian and commercial aircraft are exposed to UAS and other military aircraft are exposed to civilian and commercial aircraft. An expanded RA also benefits ground fire and rotary wing air traffic by providing additional training opportunities that would result in reduced congestion in the R-3702.

Two conditions were used for analysis of MQ-1C Gray Eagle UAS training operations; standard and maximum payload configurations. Distances and altitudes were calculated based upon standard operating procedures and normal conditions. Changes in weather such as wind direction and speed, air pressure and/or precipitation can dramatically alter results. The automated launch sequence requires straight flight up to 300 feet AGL before takeover by operators. At standard payload this puts the aircraft at approximately 0.38 NM lateral distance from launch point and at max payload approximately 1.27 NM lateral distance from launch point (refer to Figure 4.2-19 for graphic representation of the projected flight path). Typical training conditions would follow standard payload operational procedures allowing for a turn into the proposed R3703 at the southeast corner of the range by TA-01. The total distance of travel from launch to the edge of the R-3702 is approximately 2.75 NM and a total exposure outside of controlled airspace of just 0.75 NM if the R3703 was reactivated. All of this property is installation owned. This pattern crosses the Red Route at an altitude of approximately 1,575 feet AGL or 2,168 feet above MSL. This path also crosses near the Golden Eagle FLS ADCS at approximately 1,968 feet AGL rendering operations at that airfield suspended during L/R of the Gray Eagle. Gray Eagle L/R would require deconfliction of these activities.

Maximum payload launch procedures would traverse the southern edge of the R3703 as it exits Class-D airspace. The max payload scenario has a total distance of travel from launch to the edge of the R-3702 of approximately 3 NM, 2.2 NM of which is over public or private land including the community of Woodlawn, Tennessee. It should be noted, however, that this is still within Class-E airspace and the Campbell 1 MOA. This pattern crosses the Red Route at an altitude of approximately 638 feet AGL or 1,231 feet above MSL. Deconfliction would be necessary. Once safely in the R-3702, both flight operations would spiral up at the tightest allowed turning radius (0.75 NM radius) into Class-A airspace where they would be free to operate under IFR conditions. This will require operators to be IFR rated, qualified and current. The location of the up spiral is not set and would be dependent upon other range activities and locations at the time. It is most likely that this would be conducted in an area of the range that is less congested, such as the far southeast corner as depicted in Figure 4.2-19, in order to minimize disruption of other activities including traffic on the color routes. Regardless, the up spiral location the launch pattern has the potential to conflict with air operations at Suckchon TUAS.



WP#: Way Points at fixed geographic locations; FAF: Final Approach Fix; IAF: Initial Approach Fix

Figure 4.2-19. MQ-1C Gray Eagle Operational Launch & Recovery Patterns at SAHP

Changes to UAS operational procedures in the NAS are evolving. The FAA is projected to authorize UAS to safely fly in the NAS along with all VFR traffic by 2015 most likely through the use of a ground-based "sense and avoid system" (GBSAAS). Until that time, the FAA and DoD still require ground observers or chase planes for UAS while outside of a restricted area. For SAHP, this would result in two personnel as ground observers for launch in the westerly direction (prevailing winds) and two or three personnel for recovery. Ground observers must have visual attainment of the aircraft within 1 NM in any direction. It should be noted that observers would be required on the "go-around" leg, as well for recovery in case of an aborted landing. A single individual in the control tower can observe in all directions for 1 NM. The default pattern, however, exceeds that distance. All of these operational procedures would be established in the COA prior to flight operations.

It has been determined that artillery ground fire training could be executed from TAs 01, 02, 06 and 07 towards the South Impact Area. Ground fire from TA-01 and TA-07 has the potential for disruption of air traffic on the Red Route, which is a return route from the range to SAHP that follows 101st Airborne Division Road along a line between TA-07 - TA-06 and TA-01 – TA-02. Although artillery are authorized to over-fire aircraft in-flight, the distance separating the as yet undetermined firing points and aircraft operating on the Red Route may be too close. High-angle ground fire from the M-777 has the potential of exceeding the highest stratification of the R3703, which is FL180. It is highly unlikely that the trajectory necessary for impact into even the closest segment of the South Impact Area would allow penetration of the R3703 ceiling and therefore not considered a negative impact of this alternative. Coordination of artillery fire

through lower stratifications would be necessary in order to de-conflict lower level rotary wing traffic and higher level UAS traffic at 4,000 block 6,000.

Rotary wing air traffic would benefit from having airspace protected over this area contiguous to the R-3702. Expanded restricted airspace would provide additional training opportunities that would have a decongesting effect on the rest of the range. The Special Operations Helicopter Company pad would be fully enveloped by the proposed RA making those operations somewhat safer. It should be noted that installation internal traffic would not change, which accounts for 99 percent off all potential traffic in this area.

Reactivation of the R3703-A, B & C as presented within this EIS would not adversely affect commercial or private aviation. The vast majority of the area is over installation property and the airspace is primarily within the SAHP and CAAF Class-D bubbles. Presently, only military aircraft utilize this airspace through agreements with Outlaw Field to hold their traffic east of Fort Campbell Boulevard and through control of the Class-D airspace by Sabre Control Tower and Campbell Control Tower (see Table 4.2-3). As previously stated, during the formal request process, an additional NEPA document would be prepared, based on the official request for the change of airspace designation with the FAA. It would be tiered off from this PEIS.

Table 4.2-3. Summary of Impacts Caused by Reactivation of R3703-A, B & C

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Reduction of military airspace	Interference with commercial or private aviation	Increase flight safety hazard	Increase air traffic/airspace use	Reduced visibility or airspace obstruction	Overall Impact
Reactivate R3703-A, B & C	B	N	B	N	N	N

4.2.2.6 Alternative 5

This alternative essentially implements Proposed Action Alternatives 1-4. All of the impacts identified individually for the alternatives would remain in effect for the collective implementation described in this alternative with the added implications of overlapping and intersecting air activities throughout the range. In general, it would result in a much more congested and complex airspace primarily within the R-3702. The following discussion provides the adverse impacts of combined alternatives.

Proposed elements that may be added which combined could adversely affect Fort Campbell airspace use include expansion of Saunders LZ (Alternative 1) for fixed wing aircraft including Sherpas, new training facilities (Alternative 2, Golden Eagle AUZ), Pugh Flats DZ/LZ and a range support facility. As the local terrain is steep and the orientation of the Saunders runway directs air traffic across the range to the east and out over public and private land to the west, air traffic associated with the Pugh Flats DZ/LZ would most likely be oriented north-south creating an intersecting point of conflict. Both of these activities would need to be deconflicted

from general traffic along the Blue Route. All of these activities would operate VFR using advisory information from Eagle Radio AIC and visual attainment for self deconfliction.

In addition, proposed runway improvements at Indian Mound LZ (Alternative 2, Indian Mound AUZ) have the potential for L/R conflict with Saunders LZ (Alternative 1) if conducted simultaneous. Both patterns cross over the impact area creating additional conflict with all live fire activities essentially shutting down the entire range (small arms range excluded). It is unlikely that mid-air conflict would occur as the goal would be to minimize use of the airspace over the impact area in order to reduce down time for live fire exercises. Indian Mound would be traffic pattern left to the south following launch while Saunders LZ would either approach across the entire impact area or enter from the northwest, traffic pattern right for final approach. Recovery at Indian Mound also has a potential impact from air drops being conducted at Corregidor with a north-south flight path, Shadow L/R from TUAS-19, Raven operations in both ROZ-3 and ROZ-4, air traffic on the Delta Route and potentially the Charlie Route. This is one of the most congested areas of the range.

Those activities that remain within the R-3702 are subject to deconfliction by Eagle Radio and Range Control. Those activities that require flight outside of the RA, particularly at low altitudes would experience the same level of negative impacts described for Saunders LZ in Alternative 1 above. If Saunders LZ (Alternative 1) is implemented along with Veghel LZ AUZ (Alternative 2) the resultant crossing of traffic patterns outside of the RA could become problematic. This is exacerbated by the fact that control handoffs would be necessary between Eagle Radio AIC and Campbell ATC as aircraft traverse the boundary of the R-3702.

The proposed runway addition at Golden Eagle (Alternative 2) would be in the same general airspace as the Shadow automated landing procedure pattern for TUAS Suckchon (located within the area of Alternative 2, Suckchon DZ AUZ) and the transit route for MQ-1C departing SAHP en route to the R-3702. This path also intersects the Red Route providing easterly transit of rotary wing traffic from the range to SAHP. While on-going activities at Golden Eagle FLS have not caused significant issues for any of these other activities, use of the Sherpa runway would be more frequent. It is also expected that MQ-1C air operations would be conducted through multiple sorties per day. Additionally, TUAS Suckchon is new and has not yet been fully integrated into training procedures. It is likely that UAS L/R would not be conducted at the same time as Golden Eagle L/R or Shadow L/R at Suckchon TUAS. Even though Golden Eagle FLS is outside of the Class-D airspace designation for Sabre Approach, all activities associated with that airfield should be strictly controlled by Sabre Approach with close coordination with Eagle Radio AIC.

Expansion of restricted airspace through reactivation of the R3703 (Alternative 4) is beneficial to the combined collective of alternatives as it would result in decongestion of airspace through decentralization of air activities over a larger area. The addition of Gray Eagle UAS operations would bring significant conflict to other on-going activities as well as proposed operations such as Sherpa operations at Golden Eagle FLS (Alternative 2 – Golden Eagle AUZ). These two activities are further impacted by Shadow L/R from Suckchon TUAS, whose auto-recovery pattern uses the same airspace.

It should be understood that several projects have been proposed, but not all of the projects would necessarily be implemented. Selection of the proper location for various activities is paramount to safe operations in the RA. For instance, separations would be made between conflicting activities such as Raven operations in the ROZs separate from Shadow operations at TUAS sites. Separation of these activities from artillery fire would also be considered. Current scheduling requires cease fires to allow for safe L/R and training flights of UAS. It would improve training if geographic separations as discussed for the Proposed Action Alternatives were made rather than time separations.

This page intentionally left blank

4.3 Noise

4.3.1 AFFECTED ENVIRONMENT

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

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Sound frequency is measured in Hertz. The human ear responds differently to different frequencies. "A-weighing", measured in A-weighted decibels (dBA), approximates a frequency response that expresses the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in Table 4.3-1.

Table 4.3-1. Common Sounds and Their Levels

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

Source: Harris, 1998
dBA = A-weighted decibel

The dBA noise metric describes steady noise levels, although very few noises are, in fact, constant. Therefore, A-weighted Day-night Sound Level (ADNL) has been developed. Day-night Sound Level (DNL) is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (L_{eq}) is often used to describe the overall noise environment. L_{eq} is the average sound level in dB.

The Noise Control Act of 1972 [42 USC 4901 et seq] directs Federal agencies to comply with applicable Federal, state, and local noise control regulations. In 1974, the USEPA provided information suggesting that continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses, such as residences, schools, churches, and hospitals. The states of Kentucky and Tennessee and the counties associated with Fort Campbell do not maintain a noise ordinance.

4.3.1.1 Existing Conditions

Communities Noise Levels (L_{eq} and DNL) were estimated for the surrounding areas using the techniques specified in the American National Standard *Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with*

an observer present. Table 4.3-2 outlines the estimated background noise levels within the communities adjacent to the installation. These communities contain a variety of noise-sensitive areas, such as residents, schools, churches, or hospitals. Notably, Christian and Montgomery counties have higher population densities, and subsequently background noise is higher due to vehicle traffic, lawn maintenance, and other anthropogenic activities (ANSI, 2003; USCB, 2013).

Table 4.3-2. Estimated Background Noise Levels at Nearby Communities

County	Communities Adjacent to Installation	Estimated Existing Sound Levels (dBA)			Description
		ADNL	L_{eq} (Daytime)	L_{eq} (Nighttime)	
Montgomery County, Tennessee	Clarksville, Hazelwood, St. Bethlehem, Woodlawn	55	53	47	Suburban Residential and Light Commercial
Christian County, Kentucky	Fort Campbell North, Lafayette, Herndon, Hopkinsville, Pembroke, Oak Grove, St. Elmo	50	48	42	Quiet Urban and Suburban Residential
Trigg County, Kentucky	Cadiz	45	43	37	Very Quiet Suburban and Rural Residential
Stewart County, Tennessee	Big Rock, Dover				

Source: ANSI, 2003
ADNL = A-weighted Day-night Sound Level; dBA = A-weighted decibel; Leq = Equivalent Sound Level

4.3.1.2 The Military Noise Environment at Fort Campbell

The military noise environment consists primarily of three types of noise: transportation noise from aircraft and vehicles, noise from firing at small-arms ranges, and impulsive noise from large-caliber weapons firing and demolition operations. AR 200-1 defines recommended noise uses from Army activities for established uses of land with respect to environmental noise.

Fort Campbell maintains an Integrated Operational Noise Management Plan (IONMP), and recently prepared a Joint Land Use Study (JLUS). These plans foster communication between Fort Campbell and its civilian neighbors. They also provide a method for responding to civilian issues regarding noise that is generated by training activities. Other goals of the plans include the education of installation personnel and surrounding residents, management of noise complaints, mitigation of noise and vibration, and noise abatement procedures (Fort Campbell, 2009). Notably, Fort Campbell is in the process of updating its IONMP to reflect current training conditions.

Airfields on the installation include CAAF, Destiny Heliport, and SAHP. The primary sources of noise at the airfields result from fixed-wing and rotary-wing aircraft operations. Approximately 400 rotary-wing aircraft are stationed at Fort Campbell and are used extensively throughout the TAs and the areas adjacent to the installation. These operations are a substantial component of the military training conducted principally by the 101st Airborne Division (Fort Campbell, 2012a). The high number of annual aircraft operations at CAAF generates noise levels beyond the installation that can interfere with the daily activities of nearby residents. Aircraft noise primarily affects portions of Oak Grove, Hopkinsville, and unincorporated Christian County. It causes moderate compatibility issues with surrounding uses (Fort Campbell, 2009).

Small arms systems and training, including the M16 rifle (5.56-mm ammunition), the M240 (7.62 mm), M249 (5.56 mm), and 0.50-caliber machine guns are located in the eastern portion of the installation. Small arms activities are audible in some areas beyond the installation boundary, but currently do not pose significant compatibility issues with surrounding uses (Fort Campbell, 2009).

Large-caliber weapons noise emanates from several demolition areas in the central portion of the installation, and heavy weapons firing is conducted in the north and south impact areas in the western portion of the installation. The firing of large-caliber weapons (greater than 0.50 caliber) affects areas off-post, particularly portions of Stewart and Christian counties, and communities such as Lafayette. During periods of intense training, the short-term noise from these activities can be quite loud in some off-post areas. Such periods of intense activity occasionally lead to complaints from nearby residents, particularly when artillery firing takes place at night. These activities cause moderate compatibility issues with surrounding uses (Fort Campbell, 2009).

4.3.2 ENVIRONMENTAL CONSEQUENCES

This section provides a discussion of the environmental impacts to the noise environment that would result from the No Action Alternative and the Proposed Action Alternatives. Impacts were primarily assessed by reviewing existing noise conditions at the installation, and determining the potential effects construction and operation components would have on nearby noise sensitive areas. The extent of the noise impacts would depend on the size, nature, and proximity of the project to noise-sensitive land uses, such as residential areas. A significant impact to noise would (1) result in the violation of applicable Federal, state, or local noise ordinance; (2) create incompatible land uses for areas with sensitive noise receptors outside the installation boundary; or (3) would be loud enough to threaten or harm human health.

4.3.2.1 No Action Alternative

Selecting the No Action Alternative would result in no changes in the impact to the ambient noise environment. Installation operations and the current levels of training noise would continue without change. Fort Campbell would continue to implement its IONMP to limit the effects of noise on neighboring communities. Ambient noise conditions would remain unchanged when compared to existing conditions, and as described in Section 4.3.1.

4.3.2.2 Alternative 1

All site-specific projects outlined under Alternative 1 would have short-term minor adverse effects. Short-term effects would be due to construction noise. There would no long-term changes in the noise environment from any of the site- specific projects. Table 4.3-3 shows site specific noise effects for Alternative 1.

Table 4.3-3. Summary of Noise Impacts from Site-specific Projects

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial				
		Increased noise during construction to on-post receptors	Increased noise during construction to off-post receptors	Increased noise during training to on-post receptors	Increased noise during training to off-post receptors	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	Min	Min	N	N	Min
Construct a Gravel Foot March Trail	On The Line Road	Min	Min	N	N	Min
Construct a Runway with Glide Slopes	Saunders LZ	Min	Min	N	N	Min

LZ = landing zone

Construction. Table 4.3-4 presents typical noise levels (dBA at 50 feet) that the USEPA has estimated for the main phases of outdoor construction. Individual pieces of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high construction noise typically extends to distances of 400 to 800 feet from the site of major equipment operations.

Table 4.3-4. Noise Levels Associated With Outdoor Construction

Construction Phase	L_{eq} (dBA)
Ground clearing	84
Excavation, grading	89
Foundations	78
Structural	85
Finishing	89

Source: USEPA, 1971
dBA = A-weighted decibel

Table 4.3-5 shows the distance to the closest noise sensitive areas (NSAs) (e.g., residential housing) and the level of short-term effects from construction of site-specific projects. The projects are well within the installation boundary and would not contribute to appreciable noise off-post. Limited truck and worker traffic may be audible at some nearby on-post locations. Given the temporary nature of the proposed construction activities and the limited amount of noise that heavy equipment would generate at these distances, these impacts would be minor.

Table 4.3-5. Distance to Closest NSA from Site-Specific Projects

Project Name	Distance to Closest NSA (feet)	Closer than 800 Feet?	Level of Effects
Construct a Driving Skid Pad	2,814	No	Minor
Construct a Gravel Foot March Trail	2,849	No	Minor
Construct a Runway with Glide Slopes	3,213	No	Minor

Note: The zone of relatively high construction noise typically extends to distances of 400 to 800 feet from the site of major equipment operations.
NSA = noise sensitive area

Although construction-related noise impacts would be minor, the following BMPs would be performed to reduce further any realized noise impacts:

- Construction would primarily occur during normal weekday business hours (i.e., 9:00 a.m. to 5:00 p.m.), and
- Construction equipment mufflers would be properly maintained and in good working order.

Construction noise would dominate the soundscape for all on-site personnel. Construction personnel, and particularly equipment operators, would wear adequate personal hearing protection to limit exposure and ensure compliance with Federal health and safety regulations.

Operations. None of the site-specific projects outlined under Alternative 1 would have changes to live fire training activities, use of weaponry, demolitions, or aircraft operations. Therefore, there would be no long-term changes in existing training noise associated with these activities. During power outages, NSAs may experience incremental increases in noise if back-up generators were installed. During their operation, the back-up generators would be perceived as audible but distant. Traffic patterns and corresponding noise levels along on-post roadways and trails would change to accommodate incremental changes in training. Traffic volumes and vehicle speeds are low for these types of roadways, and noise increments attributable to changes in traffic would be barely perceptible. These effects would be minor.

There are no noise-sensitive areas proposed for construction under Alternative 1, and all the proposed facilities would be completely compatible with the existing training noise environment.

4.3.2.3 Alternative 2

The establishment of the AUZs under Alternative 2 would have short- and long-term minor adverse effects. Table 4.3-6 outlines the distance to the closest NSAs and potential noise effects for the proposed AUZs. Short-term effects would be due to construction noise, however, adverse effects would be reduced through implementation of BMPs as discussed in Alternative 1. Long-term effects would be due to changes in helicopters and UAS operations, maneuvers training, and possible increase in live fire or aircraft noise. Although not planned at this time, if there were an increase in live fire or aircraft noise, the effects could be moderate or significant. There are no noise-sensitive areas in which construction would occur under Alternative 2, and all the proposed facilities would be completely compatible with the existing training noise environment.

Table 4.3-6. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Distance to Nearest Noise Sensitive Receptor (feet)	Potential/Likely Future Activities	Potential Impacts to Noise Environment
TA 11	8,672	• Maneuver training • Live fire and demolition activities	• Temporary increase in construction noise • Temporary increase in truck noise during the delivery of equipment • Increase in helicopters and UAS noise • Increase in maneuvers training noise • Possible increase in live fire or aircraft noise
TA 20	7,278		
TA 52	8,325		
Aardvark LZ	10,062	• Additional UAS operations • Additional fixed-wing or rotorcraft operations	
Golden Eagle FLS	3,453		
Indian Mound LZ	14,565		
Suckchon DZ	3,644		
Veghel DZ	823		

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; TA = training area

Construction. The nature and overall level of noise from construction would be similar to Alternative 1. The AUZs are well within the installation boundary and construction projects would not contribute appreciably to noise off-post. Limited truck and worker traffic may be audible at some nearby on-post locations. Given the temporary nature of the proposed construction activities and the limited amount of noise that heavy equipment would generate at these distances, these impacts would be negligible. There is an NSA less than 1,000 feet from the Veghel DZ; at this distance, heavy equipment noise would be audible but distant during quiet periods of the day (e.g., nighttime hours).

Operations. The establishment of the AUZs under Alternative 2 would not necessarily affect military training activities, use of weaponry, demolitions, or aircraft operations. Future training activities within the proposed AUZs, however, could include additional maneuvers training, changes in UAS operations, the establishment of small- or large-caliber firing ranges, demolition training sites, or expanding fixed-wing or rotorcraft air operations. Notably, maneuver training, firing, and demolition activities would be more likely to occur in the TAs, whereas UAS operations and air operations changes would be more indicative of the LZs/ DZs.

Noise from Helicopters. Alternative 2 would allow for additional rotorcraft activities at LZs, DZs and other areas throughout the proposed AUZs. Noise from individual helicopter overflights would generate distinct acoustical events, and could potentially bother residents directly beneath the flight path.

No changes to land compatibility would be expected from changes in helicopter operations at the AUZs. For common Army helicopters, several hundred operations over a one-day period would be needed to generate areas of incompatible land use at a point directly below the flight track. Under the vast majority of helicopter routes, aircraft operations are far below the levels needed to generate areas of incompatible land use. The Army is cognizant that operations below current flight levels could lead to complaints or disturb the surrounding communities. Therefore, even though the operational levels for the support helicopters associated with the action would be too low to generate areas of incompatible land use, individual overflight levels have been considered herein.

A good predictor of annoyance at airfields and training routes with 50 to 200 operations per day is the maximum sound level. The maximum sound levels for Army aircraft are listed in Table

4.3-7. In general, Army helicopters flying at 1,000 feet AGL would annoy between 13 and 20 percent of the individuals directly beneath the flight path (Table 4.3-8). Given the limited number, relatively low noise levels, and sporadic nature of helicopter operations, these effects would be minor. Notably, rotorcraft activities connected to the proposed AUZs would be primarily confined to areas within the installation boundary.

Table 4.3-7. Maximum Sound Level[1] in dBA from Helicopters and UASs

Distance (feet)	Helicopters						UASs	
	AH-1	AH-64	CH-47D	OH-58D	UH-1	UH-60	Gray Eagle	Predator
500	85	83	89	80	83	82	82	78
1,000	78	77	83	74	76	76	76	72
2,000	72	70	76	67	70	69	70	66
5,000	61	59	67	56	60	58	62	58
10,000	52	50	59	47	52	48	56	52

Sources: USAF, 2007; USACHPPM, 2003, and USAF, 1998.
[1]Overall sound level during run-up (i.e., take-off) used as a reasonable worst-case for in-flight operations.
dBA = A-weighted decibel; UAS = unmanned aerial system

Table 4.3-8. Percentage of Population Highly Annoyed from Aircraft Noise

Maximum Sound Level (dBA)	Percentage Highly Annoyed
70	5
75	13
80	20
85	28
90	35

dBA = A-weighted decibel

Noise from UASs. Conducting UAS missions would have long-term minor adverse effects on the noise environment. These effects would be due to individual UAS overflights that would generate distinct but distant acoustical events. Because of the airspace restrictions and the limited levels of UAS noise, no residences, communities, or sensitive noise receptors would experience any notable change to the overall noise environment due to changes in UAS activities.

Noise associated with the operation of UASs would be comparable to a small propeller driven airplane, small armored ground vehicles, or medium trucks. The loudest part of a UAS landing and takeoff cycle is the run-up before takeoff. Table 4.3-7 outlines the maximum sound level from individual UAS overflights, assuming the run-up sound levels as the reasonable worst case. Because the UAS would be in flight, the actual sound levels would be less than those shown herein. During take-off and landing, UAS would be audible at some nearby residences. These acoustical events would be similar to a small propeller airplane, and would be perceived as distinct but distant. Once a UAS reaches approximately 3,000 feet AGL, it would no longer be heard on the ground (USACHPPM, 2003).

Because of their relatively low noise levels, UAS operations are not commonly accounted for when determining the effects of air operational noise on communities and individuals living adjacent to airports and military air installations. Overall, increases in the activity from the use of the Gray Eagle and Predator UASs would translate into negligible (not distinguishable from existing) changes in the overall noise environment. As with helicopters, no changes to existing areas of incompatible land use would be generated due to changes in UAS operations at Fort Campbell. Specifically, the noise generated by UASs during run-up and takeoff is not sufficient to change the (65-dBA DNL) areas of incompatible land use surrounding SAHP or CAAF. Due to the limited amount of noise, these activities would have a less than significant effect on the noise environment.

Noise from Military Vehicles. Military vehicle maneuvers may occur along unpaved roads and various off-road areas within the proposed AUZ. Vehicle maneuvers would occur during both daytime and nighttime hours, making vehicle noise an issue of concern for maneuver training close to AUZ boundaries. Ground-based training vehicles are substantially quieter than other sources of military noise, including aircraft, small arms, and heavy artillery. Military vehicles, dominated by high mobility multipurpose wheeled vehicles (HMMWVs), light trucks, and medium trucks, would produce noise levels comparable to construction equipment and heavy trucks. Maximum sound levels for Army tactical vehicles at both 50 and 100 feet are outlined in Table 4.3-9.

Table 4.3-9. Maximum Sound Levels for Army Tactical Vehicles

Equipment Type	Maximum Sound Level (dBA)	
	50 feet	100 feet
Howitzer M109	95.6	91.6
D-8K Dozer	92.2	86.5
M548 Ammo Carrier	85.0	79.0
M88 Recovery Vehicle	96.8	91.5
M113 Personnel Carrier	86.8	81.9
ABLV Bridge Launcher	95.9	90.5
M1A1 Tank	89.4	84.9

Source: ANG, 2000
dBA = A-weighted decibel

Because vehicle speeds are low during most maneuver activities and vehicles tend to be relatively dispersed during off-road maneuvers, maneuver activities would be expected to produce hourly average noise levels of less than 55 dBA at a distance of about 500 feet, with brief peaks of 65 to 70 dBA. In general, these activities would be barely perceptible (i.e., just above background levels) at distances of 0.5 and 1.0 miles, and would be perceived as audible but distant during the quieter periods of the day. Because the proposed AUZs would be well inside the installation perimeter, such noise levels would not cause significant noise effects off-post.

Live Fire Training and Additional Air Operations. At this time, the Army is uncertain as to the exact nature of training that would occur within the AUZs. Therefore, noise effects resulting from live fire training or expanding fixed-wing operations in the proposed AUZs are discussed in general terms for the purpose of this PEIS. In general, the nature and the overall level of noise associated with these activities would be similar to those under existing operations. The training noise resulting from live fire activities or expanding fixed-wing operations could highly annoy communities along the perimeter of the installation, constituting significant adverse effects. Subsequent NEPA analysis and comprehensive noise modeling would be conducted, where necessary, to determine the effects of specific activities.

Additional Noise Sources. NSAs within a mile of an AUZ may experience an incremental increase in noise if generators were installed. During their operation, the generators would be perceived as audible but distant. Traffic patterns and corresponding noise levels along on-post roadways and trails would change to accommodate incremental changes in training. Traffic volumes and vehicle speeds are low for these types of roadways, and noise increments attributable to changes in traffic would be barely perceptible. These effects would be minor.

4.3.2.4 Alternative 3

Routine range and training land actions and environmental stewardship guidelines outlined under Alternative 3 would have short- and long-term minor adverse effects. Table 4.3-10 outlines potential effects to the noise environment from routine actions. Short-term effects would be due to construction noise, however, adverse effects would be reduced through implementation of BMPs as discussed in Alternative 1. Long-term effects would result from ongoing maintenance activities and the introduction of new sources of noise, such as generators.

Construction. Effects would be similar in nature and overall level to that of Alternative 1 for the facilities requiring construction. These activities typically would be short-term and limited to the daylight hours. Appendix F contains the environmental stewardship guidelines that would be implemented, as necessary, for routine range actions to further reduce adverse impacts to the noise environment. Overall effects would be minor.

Table 4.3-10. Summary of Routine Action Impacts on the Noise Environment

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial				
	Increased noise during construction to on-post receptors	Increased noise during construction to off-post receptors	Increased noise during training to on-post receptors	Increased noise during training to off-post receptors	**Overall Impact**
Contract O&E Target and Residue Removal	Min	N	N	N	Min
Culvert Installation/Maintenance	Min	N	N	N	Min
Drop Zone/Landing Zone Maintenance	Min	N	Min	N	Min
Low Water Crossing Site Creation & Maintenance	Min	N	N	N	Min
Maneuver Damage Repair	Min	N	N	N	Min
Maneuver Trail Creation, Hardening, & Maintenance	Min	N	N	N	Min
Observation Point Creation	Min	N	N	N	Min

Operations. All activities outlined under Alternative 3 would be confined to areas within the installation, and none would introduce changes to live fire training, the use of weaponry, demolitions, or aircraft operations. Therefore, there would be no long-term changes to the existing noise environment associated with these activities. Traffic noise levels along on-post

roadways and trails would change to accommodate the incremental changes in operational and maintenance activities. Traffic volumes and vehicle speeds are low for these types of roadways, and noise increments attributable to changes in traffic would be barely perceptible. Notably, many of the routine actions are by definition "ongoing" maintenance, and the overall level of these would be similar in scope to the activities currently being conducted at the installation. These effects would be minor.

4.3.2.5 Alternative 4

Alternative 4 would have long-term minor adverse effects. There would be no construction or other temporary sources of noise associated with the reactivation of installation-controlled airspace. Long-term effects would be due to a redistribution of existing UAS fixed-wing and rotorcraft operations within Fort Campbell airspace, as well as due to new artillery firing points established in TAs 06, 07, 08A, and 08B, which would fire into the South Impact Area.

Effects from changes in UAS operations would be similar in nature and overall level to the effects of Alternative 2. Because of their relatively low noise levels, UAS operations are not commonly accounted for in determining the effects of air operational noise on communities and individuals living adjacent to airports and military air installations. Overall, increases in the activity from the use of the Gray Eagle and Predator UASs would translate into negligible (not distinguishable from existing) changes in the overall noise environment.

New artillery firing points may be established in TAs 06, 07, 08A, and 08B, which would fire into the South Impact Area. Although there would be no increase in the total amount of artillery training, this would constitute a broader distribution of the noise when compared to existing conditions. The BNOISE2 noise model was run for a single 155mm Howitzer. It was estimated that a distance of 3,500 feet (1,067 meters) in TAs 06, 07, 08A and 08B would be the minimum distance for which there would be elevated concern or the potential for complaints from nearby NSAs. The training noise resulting from establishing a firing point within 3,500 feet of the installation boundary could generate complaints from communities along the perimeter of the installation, potentially constituting significant adverse effects. Although the exact location of the proposed firing points is unknown, in the final planning stages, firing points in TAs 06, 07, 08A and 08B would be located at least 3,500 feet (1,067 meters) from the installation boundary, to ensure they would not appreciably affect the overall noise at the installation, and the effects would be less than significant under NEPA. If firing points in TAs 06, 07, 08A and 08B were to be established within 3,500 feet (1,067 meters) of the installation boundary, subsequent NEPA analysis and comprehensive noise modeling would be conducted.

Fort Donelson National Battlefield, a National Park, is located approximately 25 miles southwest of Fort Campbell and is within the current Fort Campbell MOA. Notably, the number and types of air operations above the Fort Donelson National Battlefield would not change with the reactivation of the installation controlled airspace as described in this PEIS. Therefore, there would be no effects to the soundscape within the Fort Donelson National Battlefield.

4.3.2.6 Alternative 5

Short- and long-term minor adverse effects would be expected for Alternative 5. Regardless of the number of Proposed Action Alternatives selected, there would be short-term increases in noise from construction activities, however, adverse effects would be reduced through implementation of BMPs as discussed in Alternative 1. Long-term incremental changes in on-post noise would occur from new training activities.

Construction. Tables 4.3-6, 4.3-7, and 4.3-10 outline potential effects to the noise environment from construction of the combined actions. It is not expected that the overall effects from construction would be greater with the implementation of Alternatives 1 through 4 individually,

as it is not anticipated that any activities outlined would be heavily concentrated in any one location during the same period. BMPs associated with construction noise would be similar to Alternative 1. These effects would be minor.

Operations. Most activities and noise effects for Alternatives 1 through 4 would be confined to areas within the installation. Although there would be no change in the number of on-post personnel, there would be minor long-term effects resulting from the addition of generators, changes in helicopters and UAS operations, maneuvers training, and possible increases in live fire or aircraft noise. These effects would be similar in nature and level as those outlined under Alternatives 1 through 4. There are no projects identified in Alternatives 1 through 4 that when combined would have greater than significant effects. Therefore, effects under Alternative 5 would be minor.

There would be no appreciable change in off-post noise from the combined actions unless there was an increase in live fire training or fixed-wing aircraft operations, or if a firing point in TAs 06, 07, 08A and 08B were to be established within 3,500 feet (1,067 meters) of the installation boundary. The training noise resulting from these activities could highly annoy communities along the perimeter of the installation, constituting a significant adverse impact. Subsequent NEPA analysis and comprehensive noise modeling would be conducted, where necessary, to determine the impacts of specific activities.

This page intentionally left blank

4.4 Air Quality and Greenhouse Gases

4.4.1 AFFECTED ENVIRONMENT

4.4.1.1 National Ambient Air Quality Standards and Attainment Status

The USEPA Region 4, the KDEP, and the TDEC regulate air quality at Fort Campbell. The CAA (42 USC 7401-7671q), as amended, assigns the USEPA the responsibility to establish the primary and secondary NAAQS (40 CFR Part 50) that specify the acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead. Short-term NAAQS (1-, 3-, and 24-hour periods) have been established for pollutants that contribute to acute health effects. Long-term NAAQS (annual averages) have been established for pollutants that contribute to chronic health effects. While each state has the authority to adopt standards stricter than those established under the Federal program, both the Commonwealth of Kentucky and the State of Tennessee accept the Federal standards.

Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas. Federal regulations designate AQCRs with levels below the NAAQS as *attainment* areas. *Maintenance* areas are AQCRs that have previously been designated as nonattainment and have been redesignated to attainment for a probationary period through implementation of maintenance plans. Christian and Trigg counties in Kentucky are within the Paducah, Kentucky-Cairo, Illinois Intrastate AQCR (AQCR 72) (40 CFR 81.69). Montgomery and Stewart counties in Tennessee are within the Middle Tennessee Intrastate AQCR (AQCR 47) (40 CFR 81.120). The USEPA has designated Montgomery and Christian counties as maintenance areas for the 8-hour O_3 NAAQS (USEPA, 2013a) (see Figure 4.4-1). All other areas on Fort Campbell associated with the Proposed Actions are in full attainment for all criteria pollutants. Notably, trends in recent monitoring data indicate that within the next few years the area [including Fort Campbell] may be designated as a nonattainment area for $PM_{2.5}$.

The USEPA monitors levels of criteria pollutants at representative sites in each region throughout Kentucky and Tennessee. For reference purposes, Table 4.4-1 shows the highest monitored concentrations of criteria pollutants for monitoring locations closest to Fort Campbell.

4.4.1.2 Installation-Wide Emissions

Fort Campbell is considered a major source for the purposes of air permitting, and holds two major operating permits. The KDEP Division of Air Quality permit (#V-12-006) expires in June 2017, and the TDEC Air Pollution Control Board permit (#559002) expires in September 2017 (KDEP, 2012; TDEC, 2012). The permits include all monitoring and recordkeeping requirements associated with stationary sources of air emissions at the installation. Primary stationary sources of air emissions include boilers, generators, and fuel storage areas. Table 4.4-2 lists Fort Campbell's facility-wide air emissions from all significant stationary sources.

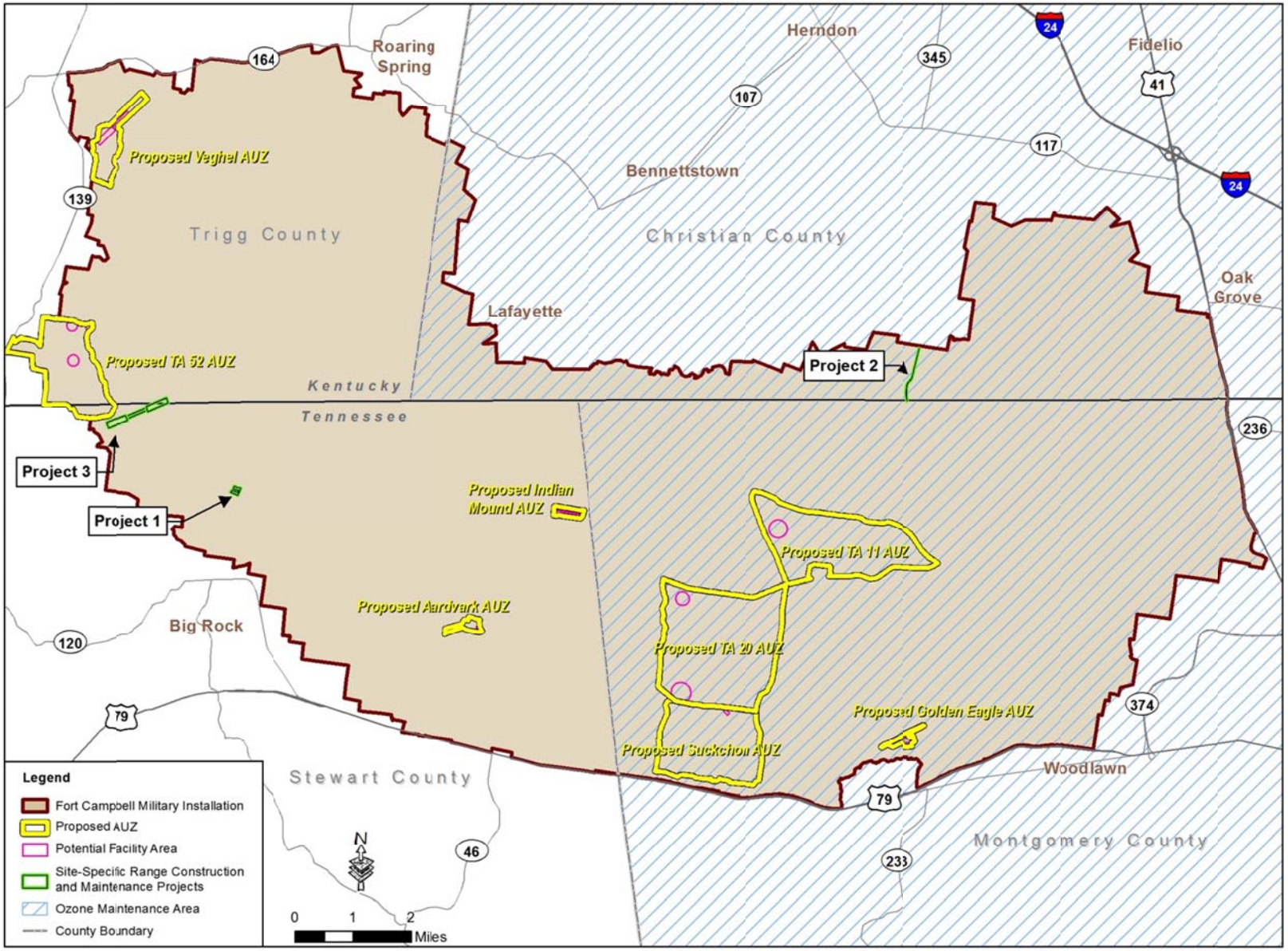


Figure 4.4-1. Ozone Maintenance Areas within Fort Campbell and Adjacent Areas

Table 4.4-1. Air Quality Standards and Monitored Data

Pollutant	Air Quality Standards	Monitored Data	
		Kentucky	Tennessee
O_3			
8-hour[a] (ppm)	0.075	0.078	<no data>
SO_2			
1-hour[b] (ppb)	75	14	55
3-hour[b] (ppm)	0.5	<no data>	<no data>
$PM_{2.5}$			
24-hour[c] (µg/m^3)	35	20	19
Annual arithmetic mean[d] (µg/m^3)	12	9.9	9.5
PM_{10}			
24-Hour[a] (µg/m^3)	150	<no data>	29

Source: 40 CFR 50.1-50.12, USEPA, 2013b.

[a]The 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations over each year must not exceed 0.08 ppm.

[b]Not to be exceeded more than once per year.

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

[d]The 3-year average of the weighted annual mean $PM_{2.5}$ concentrations must not exceed 15.0 ug/m^3.

O_3 = ozone; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter; SO_2 = sulfur dioxide.

Table 4.4-2. Annual Air Emissions for Stationary Sources at Fort Campbell

Pollutant	Emissions (tons/year)
CO	42.8
NO_x	57.7
VOCs	6.7
$PM_{2.5}$	1.9
PM_{10}	1.9
SO_2	0.8

Source: Fort Campbell, 2012b

Note: O_3 is not directly emitted but is represented by NO_x and VOCs, its precursors.

CO = carbon monoxide; NO_x = nitrogen oxides; O_3 = ozone; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

4.4.1.3 Permitting Requirements

Both TDEC and KDEP oversee programs for permitting the construction and operation of new or modified stationary source air emissions in their states. Air permitting is required for many industries and facilities that emit regulated pollutants. Based on the size of the emissions units and type of pollutants emitted, both states set permit rules and standards for emissions sources. This section outlines the primary Federal and state permitting regulations.

Construction Permits. The permitting process begins with the application for a construction permit. Any new stationary sources of air emissions would require permits to construct in one form or another. There are three types of construction permits available through TDEC or KDEP for the construction and temporary operation of new emissions sources: Prevention of Significant Deterioration (PSD) permits in attainment areas, Major Source Construction Permits

in Nonattainment Areas (Nonattainment New Source Review [NNSR]), and Minor New Source Construction Permits. NNSR permits are required for new major sources in nonattainment areas. Since Fort Campbell is within an area designated as attainment or maintenance, NNSR is not required.

Thresholds that determine the type of construction permit that might be required depend on both the quantity and type of emissions. The PSD regulations specify that major new stationary sources or major expansion projects to an existing major source within an air quality attainment area must undergo PSD review. The PSD process would apply to all pollutants for which the region is in attainment (all criteria pollutants, hazardous air pollutants [HAPs], and greenhouse gases [GHG]). Any net increase of criteria pollutants that would result in a "major modification" would subject Fort Campbell to the PSD review requirements (40 CFR §52.21). Thresholds requiring a major permit modification at Fort Campbell are outlined in Table 4.4-3.

Table 4.4-3. Major Modification Thresholds of Criteria Pollutants at Fort Campbell

Pollutant	PSD Major Modification Threshold (tons/year)
CO	100
NO_x	40
SO_2	40
PM	25
PM_{10}	15
$PM_{2.5}$	10
VOCs	40
CO_2e	75,000

Source: 40 CFR Part 52

CO = carbon monoxide; CO_2e = carbon dioxide equivalents; NO_x = nitrogen oxides; O_3 = ozone; PM = particulate matter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; PSD = Prevention of Significant Deterioration; SO_2 = sulfur dioxide; VOCs = volatile organic compounds; CO_2e = total emissions from various greenhouse gases scaled by their global warming potential.

The PSD permitting process typically takes 18–24 months to complete. Sources subject to PSD are typically required to complete the following:

- Best Available Control Technology (BACT) review for each criteria pollutant and GHG
- Maximum Achievable Control Technology (MACT) review for regulated HAPs and designated categories
- Predictive air dispersion modeling
- Establishing procedures to measure and record emissions and/or process rates
- Meeting the New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements
- A public involvement process

A *minor source construction permit* would be required to construct minor new sources with the Potential to Emit (PTE) less than the sources outlined in Table 4.4-3. The minor source permitting process typically takes 4 to 5 months to complete. Sources subject to minor source permitting could be required to complete the following:

- BACT review for each criteria pollutant
- MACT review for regulated HAPs and designated categories
- Predictive air dispersion modeling, upon request
- Establish procedures for measuring and recording emissions and process rates

Operation Permits. A Title V Significant Permit Modification is required for facilities whose emissions increases exceed the emissions thresholds outlined in Table 4.4-3. In addition, a Significant Permit Modification would be required if it were to become necessary to establish federally-enforceable limitations to reduce potential emissions below these thresholds. A minor permit modification would be required if emissions were below these thresholds and a federally-enforceable limit was not necessary. Submission of an application for these permit modifications would be required within one year of the first operation of a new emissions source.

In addition to the permitting requirements to construct and operate new or modified emissions sources, NSPS and NESHAPs set emissions control standards for categories of new stationary sources of both criteria pollutants and HAPs. The NSPS process requires USEPA to list categories of stationary sources that cause or contribute to air pollution and that might reasonably be anticipated to endanger public health or welfare. The NSPS program sets uniform emissions limitations for many industrial sources. The CAA Amendments of 1990, under revisions to Section 112, required USEPA to list and promulgate NESHAPs to reduce the emissions of HAPs, such as formaldehyde, benzene, xylene, and toluene from categories of major and area sources (40 CFR Part 63). New stationary sources whose PTE were to exceed either 10 tons per year (tpy) of a single HAP, or 25 tpy of all regulated HAPs, would be subject to MACT requirements.

4.4.1.4 Climate and Greenhouse Gases

Fort Campbell's average high temperature is 90.4° Fahrenheit (°F) (32.4° Celsius (°C)) in the hottest month of July. Its average low temperature is 25°F (-3.9°C) in the coldest month of January. Fort Campbell has average annual precipitation of 51.8 inches (131.6 centimeters) per year. The wettest month of the year is March, with an average rainfall of 5.4 inches (13.7 centimeters) (Idcide, 2013).

GHGs are components of the atmosphere that trap heat relatively near the surface of the earth, and therefore, contribute to the greenhouse effect and climate change. Most GHGs occur naturally in the atmosphere, but increases in their concentration result from human activities, such as the burning of fossil fuels. Global temperatures are expected to continue to rise as human activities continue to add CO_2, methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. Whether or not rainfall would increase or decrease remains difficult to project for specific regions (USEPA, 2013c; IPCC, 2007).

Regulatory Review and Permitting. Currently, USEPA has promulgated two regulations that 1) require the reporting of GHG emissions annually, and 2) require that BACT is addressed for new or modified sources that occur after January 2, 2011. The final rules apply to fossil fuel suppliers and industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and engines. The rule does not require control of GHGs, rather it requires only that sources above certain threshold levels monitor and report emissions. In addition, USEPA also recently promulgated the Tailoring Rule that established a CO_2 equivalent (CO_2e) threshold for permitting purposes (i.e., construction and operation) of 75,000 tpy for modifications and 100,000 tpy for new sources (Table 4.4-3). This rule "tailors" the major source permitting rules outlined above (i.e., PSD) to apply to GHGs.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* outlines policies intended to ensure that Federal agencies evaluate climate-change risks and vulnerabilities, and to manage the short- and long-term effects of climate change on their operations and mission. The EO specifically requires agencies within the DoD to measure, report, and reduce their GHG emissions from both their direct and indirect activities. The DoD has committed to reduce 34 percent of GHG emissions from non-combat activities by 2020 (DoD, 2010). In addition, the CEQ recently released draft guidance on when and how Federal

agencies should consider GHG emissions and climate change in NEPA analyses. The draft guidance includes a presumptive effects threshold of 27,563 tpy (25,000 metric tpy) of CO_2e emissions from a Federal action (CEQ, 2010).

4.4.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, an impact to air quality would be considered significant if it were to affect the achievement or maintenance of NAAQSs or if it were to lead to a violation of the Title V operating permit. The following sections discuss the potential for adverse impacts to air quality that could result from the No Action Alternative and the Proposed Action Alternatives.

4.4.2.1 No Action Alternative

Selecting the No Action Alternative would result in no effect on air quality. This alternative would continue the existing training missions and environmental programs, and would maintain the existing environmental conditions through current operational controls. Range maintenance, upgrades, and construction activities would occur in accordance with existing procedures. Because the number and type of new activities would remain relatively constant under the No Action Alternative, Fort Campbell would continue their current use of fossil fuels, resulting in similar levels of emissions of both criteria pollutants and GHGs. Ambient air-quality would remain unchanged when compared to existing conditions.

4.4.2.2 Alternative 1

Short- and long-term minor adverse effects would be expected. Short-term effects would result from the generation of airborne dust and other pollutants during construction, and long-term effects would result from the introduction of new stationary sources of pollutants, such as generators. Air quality effects would be minor unless the emissions were to exceed the General Conformity Rule (GCR) *de minimis* (of minimal importance) threshold values or the GHG threshold in the draft CEQ guidance, or unless there were a violation of any Federal, state, or local air regulation.

A summary of air quality and GHG impacts for site-specific projects are outlined in Table 4.4-4. Most effects from site-specific projects would be short-term and would end upon completion of the construction phase.

4.4.2.2.1 General Conformity

The GCR requires Fort Campbell to review all projects to ensure that the projects would not impede the Kentucky or Tennessee efforts to maintain the O_3 NAAQS in the region. Because USEPA has designated Montgomery and Christian counties as maintenance areas for the 8-hour O_3, the GCR applies to projects within these counties. Table 4.4-5 outlines the current attainment status for each site-specific project and a general description of potential impacts to air quality. Notably, the driving skid pad and the proposed Saunders asphalt light landing strip would be within either Trigg or Stewart County, which are in full attainment for the NAAQS. Due to their location, the GCR would not apply to these projects. A preliminary review was performed to determine the applicably of the GCR if the region were to be designated nonattainment for $PM_{2.5}$.

Table 4.4-4. Summary of Site-specific Projects Air Quality[a] and GHG Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
		Increase of Criteria Pollutant emissions during construction	Increase of Criteria Pollutant emissions during operations	Increase of dust generation during construction	Increase of dust generation during operations	Increased GHG production	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	Min	N	Min	N	N	Min
Construct a Gravel Foot March Trail	On The Line Road	Min	N	Min	N	N	Min
Construct a Runway with Glide Slopes	Saunders LZ	Min	N	Min	N	N	Min

[a]Although unlikely, there is a possibility that a back-up generator or a small generator for power production for more remote locations would be required.

LZ = landing zone

Table 4.4-5. Site-specific Projects - Attainment Status and Summary of Effects

Proposed Project	Attainment Status	Potential Impacts to Air Quality
Construct a Driving Skid Pad	Attainment	• Fugitive dust • Heavy Equipment Emissions • Short- term Minor Adverse Effects
Construct a Gravel Foot March Trail	Maintenance	
Construct a Runway with Glide Slope	Attainment	

The projects emissions and the *de minimis* thresholds were carried forward to determine the applicability of the GCR and the level of impact under NEPA. Construction emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gases. The requirements of the GCR are not applicable because the total emissions from all activities associated with Alternative 1 would be below the *de minimis* thresholds for both O_3 and $PM_{2.5}$ (Table 4.4-6). These impacts would be minor. For attainment pollutants, the GCR *de minimis* thresholds of 100 tpy were carried forward to determine the level of effects under NEPA. Detailed emission calculations and a Record of Non-Applicability (RONA) are provided in Appendix G.

Table 4.4-6. Air Emissions Compared to *De Minimis* Thresholds - Alternative 1

	Estimated Emissions (tpy)							
Activity/Source	**CO**	**NO_x**	**VOCs**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	***De minimis* Threshold [tpy]**	**Exceeds *De Minimis* Thresholds? [Yes/No]**
Construction	1.5	0.2	0.3	0.1	1.5	0.2	100	No
Operations	<None>							

CO = carbon monoxide; NO_x= nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; tpy = tons per year; VOCs = volatile organic compounds

For purposes of analysis, it was assumed that all construction activities would be compressed into one 12-month period. Therefore, regardless of the ultimate implementation schedule, annual emissions would be less than those specified herein. Small changes to a facility location and design, and moderate changes in the quantity and type of equipment used, would not substantially change these emission estimates, and would not change the determination under the GCR or the level of effects under NEPA.

Regulatory Requirements. Kentucky Administrative Rules (KAR) and Tennessee Division of Air Pollution Control (TDACP) outline requirements with which a developer must comply when constructing new facilities, such as controlling fugitive dust and prescribed burning. These requirements include the following:

- Open burning (401 KAR 63-005; TDAPC Chapter 1200-3-4)
- Fugitive emissions (401 KAR 63-010)
- Asphalt paving operations (401 KAR 63-025; TDAPC Chapter 1200-3-18.32)
- Visible emission regulations (TDACP Chapter 1200-3-5)
- Fugitive dust (TDACP Chapter 1200-3-8)

This listing is not all-inclusive; the Army and any contractors would comply with current KDEP and TDEC applicable requirements with compliant practices and/or products.

All persons responsible for any operation, process, handling, transportation, or storage facility that could result in fugitive dust would take reasonable precautions to prevent such dust from becoming airborne. Reasonable precautions might include using water to control dust from building demolition, road grading, or land clearing. The Army and any contractor would ensure that all excavations, stockpiles, access roads, waste areas, and all other work areas were free from enough excess dust to avoid causing a hazard or nuisance. In addition, air pollution restrictions do not allow the burning of materials on the installation.

4.4.2.2.2 Greenhouse Gases

No activity has been identified within Alternative 1 that would result in the ongoing emission of GHGs; therefore, no impacts are anticipated.

4.4.2.3 Alternative 2

Short- and long-term minor effects would be expected. Short-term effects would result from the generation of airborne dust and other pollutants during construction, and long-term effects would result from the introduction of new stationary sources of pollutants, such as generators. Air quality effects would be minor unless the emissions were to exceed the General Conformity Rule *de minimis* threshold values or the GHG threshold in the draft CEQ guidance, or unless there were a violation of any Federal, state, or local air regulation.

A summary of air quality impacts during likely actions (see Table 2-2) at the proposed AUZs are outlined in Table 4.4-7. Most effects would be short-term and would end upon completion of the individual project. There is a possibility that a back-up generator or a small generator for power production for more remote locations would be required for the operation of one or more of the proposed facilities, such as classrooms or small operations buildings.

Table 4.4-7. Summary of Impacts on Air Quality from Actions at AUZs

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Increase of Criteria Pollutant emissions during construction	Increase of Criteria Pollutant emissions during operations	Increase of dust generation during construction	Increase of dust generation during operations	Increased GHG production	**Overall Impact**
Construct a range support building[a]	Min	Min	Min	Min	Min	Min
Construct maneuver trails	Min	N	Min	N	N	Min
Tree harvesting to open areas for maneuver	Min	N	Min	N	N	Min
Develop a drop zone	Min	N	Min	N	N	Min
Add additional buildings to the urban training site	Min	N	Min	N	N	Min
Construct an additional gravel maneuver trail	Min	N	Min	N	N	Min
Reconfigure former gravel taxiway into a 2,000-footasphalt runway[a]	Min	Min	Min	Min	Min	Min
Construct 3 UAS hangers[a]	Min	Min	Min	Min	Min	Min

[a]Although unlikely, there is a possibility that a back-up generator or a small generator for power production for more remote locations would be required.

AUZ = adaptable use zone; UAS = unmanned aerial system

General Conformity. Table 4.4-8 outlines the current attainment status for each proposed AUZ TA and a general description of potential impacts to air quality. Notably, TA 52, Aardvark LZ, Indian Mound LZ, and Veghel DZ AUZs are within either Trigg or Stewart counties, which are in full attainment for the NAAQS; therefore, because of their location the GCR would not apply to any projects in these AUZs.

Table 4.4-8. Attainment Status and Summary of Effects by AUZ

Proposed AUZ	Attainment Status	Potential Impacts to Air Quality
TA 11	Maintenance	• Fugitive dust • Heavy Equipment Emissions • Possible Small Remote Generator(s) • Short- and Long-term Minor Adverse Effects
TA 20	Maintenance	
TA 52	Attainment	
Aardvark LZ	Attainment	
Golden Eagle FLS	Maintenance	
Indian Mound LZ	Attainment	
Suckchon DZ	Maintenance	
Veghel DZ	Attainment	

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; TA = training area

The emissions for projects at the proposed AUZs and the *de minimis* thresholds were carried forward to determine the applicability of the GCR and the level of impact under NEPA. Construction emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gasses. Operational emissions were estimated for a small generator at remote locations. The requirements of the GCR are not applicable because the total emissions from all likely activities associated with Alternative 2 would be below the *de minimis* thresholds for both O_3 and $PM_{2.5}$ (Table 4.4-9). These impacts would be minor. Detailed emission calculations and a RONA are in Appendix G. Future development activities within the AUZs not outlined within this PEIS would require review to determine the applicability of the GCR and the level of impact under NEPA.

Table 4.4-9. Air Emissions Compared to *De Minimis* Thresholds - Alternative 2

	Estimated Emissions (tpy)							
Activity/Source	**CO**	**NO_x**	**VOCs**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	***De minimis* Threshold [tpy]**	**Exceeds *De Minimis* Thresholds? [Yes/No]**
Construction	21.5	26.9	15.6	3.5	5.3	2.0	100	No
Operations	1.6	7.3	0.6	0.5	0.5	0.5	100	No

CO = carbon monoxide; NO_x= nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; tpy = tons per year; VOCs = volatile organic compounds

Regulatory Requirements. Any new stationary sources of air emissions could be subject to Federal and state air permitting regulations, including PSD, minor new source review, and Title V permitting. There would be no new appreciable sources of air emissions associated with Alternative 1; however, any new stationary source of air emissions (e.g., back-up generators or other fuel burning equipment) would be inventoried and reviewed for addition to the installation's operational air permit and to ensure compliance with all applicable state and Federal air regulations. In addition, new sources would be subject to NSPS and NESHAP requirements. Such equipment would include: boilers with outputs greater than or equal to 10 million British Thermal Units, or any boiler that uses fuel oil; hot water heaters with capacities greater than or equal to 120 gallons; concrete batch plants and asphalt plants; and debris-grinding equipment.

All other regulatory requirements and BMPs associated with both construction and new stationary sources would be similar to those outlined under Alternative 1. Future development activities that include additional stationary sources of air emissions would be added to one of

the installation's Title V permits and would have to meet all the requirements therein. Due to the in-place regulatory controls, impacts would be less than significant.

Greenhouse Gases. Ongoing emissions of GHGs would be limited to the use of remote generators. When combined, all operational activities of likely projects proposed within the AUZs would generate approximately 270 tons (245 metric tons) of CO_2. This is below both the CEQ presumptive effects threshold and the PSD major source threshold outlined in the "tailoring" rule for GHG emissions. These effects would be minor. Future development activities that include additional stationary sources of GHGs would be added to one of the installation's Title V permits and would have to meet the regulatory requirements in the "tailoring" rule. No activity has been identified that would lead to a violation of the installation's Title V permit(s) or exceed the major modification thresholds outlined in the PSD "tailoring" rule. These effects would be minor.

4.4.2.4 Alternative 3

Short- and long-term minor effects would be expected. Short-term effects would result from the generation of airborne dust and other pollutants during construction, and long-term effects would result from the introduction of new stationary sources of pollutants, such as generators. Air quality effects would be minor unless the emissions were to exceed the General Conformity Rule *de minimis* threshold values or the GHG threshold in the draft CEQ guidance, or unless there were a violation of any Federal, state, or local air regulation.

A summary of air quality impacts during routine range and environmental stewardship projects are outlined in Table 4.4-10. Most effects would be short-term and would end upon completion of the individual project. There is a possibility that a back-up generator or a small generator for power production for more remote locations would be required for the operation of the proposed facilities, such as classrooms or small operations buildings. Appendix F contains environmental stewardship guidelines that would be implemented, as necessary, for routine range actions to further reduce adverse impacts to air quality.

Table 4.4-10. Summary of Impacts on Air Quality[a] from Routine Actions

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Increase of Criteria Pollutant emissions during construction	Increase of Criteria Pollutant emissions during operations	Increase of dust generation during construction	Increase of dust generation during operations	Increased GHG production	**Overall Impact**
Contract O&E Target and Residue Removal	N	N	N	N	N	N
Culvert Installation/Maintenance	Min	N	Min	N	N	Min
Drop Zone/Landing Zone Maintenance	Min	N	Min	N	N	Min
Low Water Crossing Site Creation & Maintenance	Min	N	Min	N	N	Min
Maneuver Damage Repair	N	N	N	N	N	N
Maneuver Trail Creation, Hardening, &	N	N	N	N	N	N

Table 4.4-10. Summary of Impacts on Air Quality[a] from Routine Actions

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Increase of Criteria Pollutant emissions during construction	Increase of Criteria Pollutant emissions during operations	Increase of dust generation during construction	Increase of dust generation during operations	Increased GHG production	**Overall Impact**
Maintenance						
Observation Point Creation	N	N	N	N	N	N

[a]Although unlikely, there is a possibility that a back-up generator or a small generator for power production for more remote locations would be required.

General Conformity. The emissions for routine range and environmental stewardship projects and the *de minimis* thresholds were carried forward to determine the applicability of the GCR and the level of impact under NEPA. Short-term emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gases. Notably, many of the activities are maintenance activities currently being performed at the installation, and their continuation would not result in an increase in emissions and would be *de minimis*. The requirements of the GCR are not applicable because the total emissions from all activities associated with Alternative 3 would be *de minimis* (Table 4.4-11 and Table 4.4-12).

Table 4.4-11. Routine Range and Training Land Actions

Activities with Emissions Below the Applicability Thresholds
Culvert Installation
Low Water Crossing Site Creation
Maneuver Trail Creation and Hardening
Observation Point Creation
Activities with a Clearly De Minimis Increase in Emissions
Contract O&E Target and Reside Removal
Culvert Maintenance
Drop Zone/Landing Zone Maintenance
Low Water Crossing Site Maintenance
Maneuver Damage Repair
Maneuver Trail Maintenance

Table 4.4-12. Air Emissions Compared to De Minimis Thresholds - Alternative 3

	Estimated Emissions (tpy)							
Activity/Source	**CO**	**NO_x**	**VOCs**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	***De minimis* Threshold [tpy]**	**Exceeds *De Minimis* Thresholds? [Yes/No]**
Construction	0.2	0.4	0.2	0.1	0.1	<0.1	100	No
Operations	1.6	7.3	0.6	0.5	0.5	0.5	100	No

CO = carbon monoxide; NO_x= nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; tpy = tons per year; VOCs = volatile organic compounds

Maintenance activities currently being performed at the installation would not result in an increase in emissions and would be *de minimis* (Table 4.4-11). Each activity would meet at least one of the following exemptions under the GCR:

- Routine maintenance and repair activities, including repair and maintenance of administrative sites, roads, trails, and facilities (40 CFR 93.153(c)(2)(iv)),
- The routine, recurring transportation of materiel and personnel (40 CFR 93.153(c) (2)(vii)),
- Actions with respect to existing structures, properties, facilities and lands where future activities conducted would be similar in scope and operation to the activities currently being conducted at the existing structures, properties, facilities, and lands (40 CFR 93.153(c)(xix)),
- Planning, studies, and provisions of technical assistance (40 CFR 93.153(c) (2)(xii)),
- Routine operation of facilities, mobile assets, and equipment (40 CFR 93.153(c) (2)(xiii)), or
- Actions that implement a decision to conduct or carry out a conforming program, such as prescribed burning actions, which are consistent with a conforming land management plan (40 CFR 93.153(4)).

In addition, Trigg and Stewart counties are in full attainment for the NAAQS; therefore, the GCR would not apply to any routine range and training land actions in these counties. These impacts would be minor. Detailed emission calculations and a RONA are in Appendix G.

Regulatory Requirements. All regulatory requirements and BMPs associated with both construction and new stationary sources would be similar to those outlined under Alternative 1. Notably, no new stationary sources of emissions would be associated with any of the maintenance actions outlined for Alternative 3; therefore, new source permitting, NSPS, and NESHAP requirements would not apply to these activities. In addition, prescribed burning activities would be in accordance with the Fort Campbell IWFMP and coordinated through the Fire Program Management Officer or fire tower operator (Fort Campbell, 2007). Annual burning takes place in TAs on a two-year rotation for impact areas and three-year rotation for all other TAs (Fort Campbell, 2013a). General Conformity may be required in maintenance areas unless emissions are *de minimis*, or unless the IWFMP "conforms" to the state's Smoke Management Program, State Implementation Plan (SIP), or has been subject to a previous conformity analysis.

Greenhouse Gases. Ongoing emissions of GHGs would be limited to the use of remote generators. All operational activities combined would generate approximately 270 tons (245

metric tons) of CO_2, which would be below both the CEQ presumptive effects threshold and the PSD major source threshold outlined in the "tailoring" rule for GHG emissions. These effects would be minor.

4.4.2.5 Alternative 4

Negligible effects would be expected. There would be no construction or changes in the types of aircraft. The GCR would not apply because there would be no increase in emissions of any criteria pollutant. No new stationary sources of emissions would be associated with Alternative 4; therefore, new source permitting, NSPS, and NESHAP requirements would not apply. There would be no increase in GHG emissions. These effects would be negligible.

4.4.2.6 Alternative 5

Short- and long-term minor effects would be expected. Short-term effects would result from the generation of airborne dust and other pollutants during construction, and long-term effects would result from the introduction of new stationary sources of pollutants, such as generators. Regardless of the number of alternatives selected, air quality effects would be minor unless the emissions were to exceed the General Conformity Rule *de minimis* threshold values or the GHG threshold in the draft CEQ guidance, or unless there were a violation of any Federal, state, or local air regulation.

A summary of air quality impacts for the combined actions are outlined in Tables 4.4-4, 4.4-7, and 4.4-9. Most effects would be short-term and would end upon completion of the individual project. There is a possibility that a back-up generator or a small generator for power production for more remote locations would be required for the operation of future proposed facilities within the AUZs, such as classrooms or small operations buildings.

The emissions for the collective actions and the *de minimis* thresholds were carried forward to determine the applicability of the GCR and the level of impact under NEPA. Heavy equipment emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gases. Notably, many of the activities would occur outside of the maintenance area or would not result in an increase in emissions (i.e., *de minimis*). The requirements of the GCR are not applicable because the total emissions from all activities (if all Proposed Action Alternatives were selected) would be below the *de minimis* thresholds for both O_3 and $PM_{2.5}$ (Table 4.4-13). These effects would be minor.

Table 4.4-13. Estimated Air Emissions Compared to *De Minimis* Thresholds

Activity/Source	CO	NOx	VOCs	SOx	PM10	PM2.5	*De Minimis* Threshold [tpy]	Exceeds *De Minimis* Thresholds? [Yes/No]
Construction Emissions (tons per year)								
Alternative 1	1.5	0.2	0.3	0.1	1.5	0.2	100	No
Alternative 2	21.5	26.9	15.6	3.5	5.3	2.0	100	No
Alternative 3	0.2	0.4	0.2	0.1	0.1	<0.1	100	No
Alternative 4	<none>							
Alternative 5	23.2	27.5	16.1	3.7	6.9	2.2	100	No

Table 4.4-13. Estimated Air Emissions Compared to *De Minimis* Thresholds

Activity/Source	CO	NOx	VOCs	SOx	PM10	PM2.5	*De Minimis* Threshold [tpy]	Exceeds *De Minimis* Thresholds? [Yes/No]
Net Operational Emissions (tons per year)								
Alternative 1	<none>						100	No
Alternative 2	1.6	7.3	0.6	0.5	0.5	0.5	100	No
Alternative 3	1.6	7.3	0.6	0.5	0.5	0.5	100	No
Alternative 4	<none>						100	No
Alternative 5	3.2	14.6	1.2	1.0	1.0	1.0	100	No

Note: Small discrepancies due to rounding may exist.
CO = carbon monoxide; NO_x= nitrogen oxides; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; SO_x = sulfur oxides; tpy = tons per year; VOCs = volatile organic compounds

Regulatory Requirements. All regulatory requirements and BMPs associated with both construction, maintenance, and new stationary sources would be similar to those outlined under Alternatives 1, 2, and 3. Notably, no new stationary sources of emissions would be associated with any of the maintenance actions; therefore, new source permitting, NSPS, and NESHAP requirements would not apply to these activities.

Greenhouse Gases. Ongoing emissions of GHGs would be limited to the use of remote generators. All combined operational activities would generate 270 tons (245 metric tons) of CO_2. This is below both the CEQ presumptive effects threshold and the PSD major source threshold outlined in the "tailoring" rule for GHG emissions. These effects would be minor.

This page intentionally left blank

4.5 Soils

4.5.1 AFFECTED ENVIRONMENT

4.5.1.1 Soils

The soils at Fort Campbell provide surfaces for maneuvering and other exercises, mediums for constructing/digging force protection structures, and foundations for buildings and other structures. Most of the soils at Fort Campbell are silt loams that drain easily and are fairly deep; however, silt loams are also inherently unstable, and are very susceptible to both wind and water erosion.

4.5.1.1.1 Fort Campbell Soil Formation and Landscape Position

Soils at Fort Campbell generally formed in cherty limestone residuum or in loess mantles overlying limestone residuum (weathered bedrock). Several limestone formations underlie Fort Campbell, including the St. Genevieve and the St. Louis Limestone formations (Fort Campbell, 2012c). Due to the limestone formations, karst landscape is typical across the installation. Karst landscapes are formed by the dissolution of limestone from precipitation, and are characterized by sink holes, sinking streams, closed depressions, subterranean drainage, and caves (Kentucky Geological Survey, 2013). In particular, the north and northeastern sections of the installation, east of the Casey Creek Subwatershed and north of the Little West Fork Subwatershed, are located in a highly karstic area. This area is characterized by thin soil mantles, sinks, and fractured and solution-weathered limestone (USACE, 1994).

Most of the soils on the installation are relatively old and have formed over thousands of years. These soils are typically upland soils, and have undergone soil genesis long enough to develop argillic horizons (accumulated silicate clay) and belong to the Alfisol and Ultisol soil orders[3]. Some younger soils also can be found, typically in floodplains or in disturbed (urban) areas. These soils have no or little soil profile development, and are classified as Entisols and Inceptisols. Table 4.5-1 lists the soils and characteristics mapped at Fort Campbell by Soil Series and their classification to the subgroup level (e.g., Dickson silt loam, Glossic Fragiudults). The locations of these soils series within Fort Campbell are depicted on Figure 4.5-1.

The majority of the soils developed in silty mantles over limestone, or limestone residuum, and include the Dickson, Hammack, Crider, Lax, Pembroke, Brandon, Sengtown, Taft, and Guthrie soil series. They are all Ultisols or Alfisols. All of these soils, except Taft and Guthrie, are located on upland ridge tops and side slopes. Taft and Guthrie are both poorly to somewhat poorly drained soils that developed on upland flats, stream terraces, or depressions. Guthrie is a hydric soil, and Taft has hydric inclusions. Dickson covers the largest portion of Fort Campbell. Almost one-third of the installation, mostly in the center, has been mapped as Dickson silt loam or Dickson silty clay loam. Dickson is the Tennessee State soil. This soil is highly erodible land (HEL) (discussed in Section 4.5.1.2); however, it is mostly gently sloping (2-6 percent slopes) and can be successfully managed. Hammack silt loam is another widespread soil series, common across the installation, except in the Saline Creek watershed. Hammack silt loams are also HEL, but are typically steeper sloped (5-20 percent slopes) and, therefore, are more likely to erode than the Dickson soil. The same holds true for Sengtown gravelly silt loam, which covers about one-tenth of the installation. The Sengtown soils are HEL and tend to be moderately to severely steeply sloped (5-60 percent slope), and exhibit severe erosion hazards depending on the location and type of activity proposed on the land.

[3] A soil order is the highest order in the Soil Taxonomy system used by the U.S. Department of Agriculture (USDA), and is determined by the presence or absence of major diagnostic horizons. In Table 4.5-1, Alfisols are those soils ending in –alfs, and Ultisols are those ending in -ults. Entisols end in –ents, and Inceptisols end in –epts.

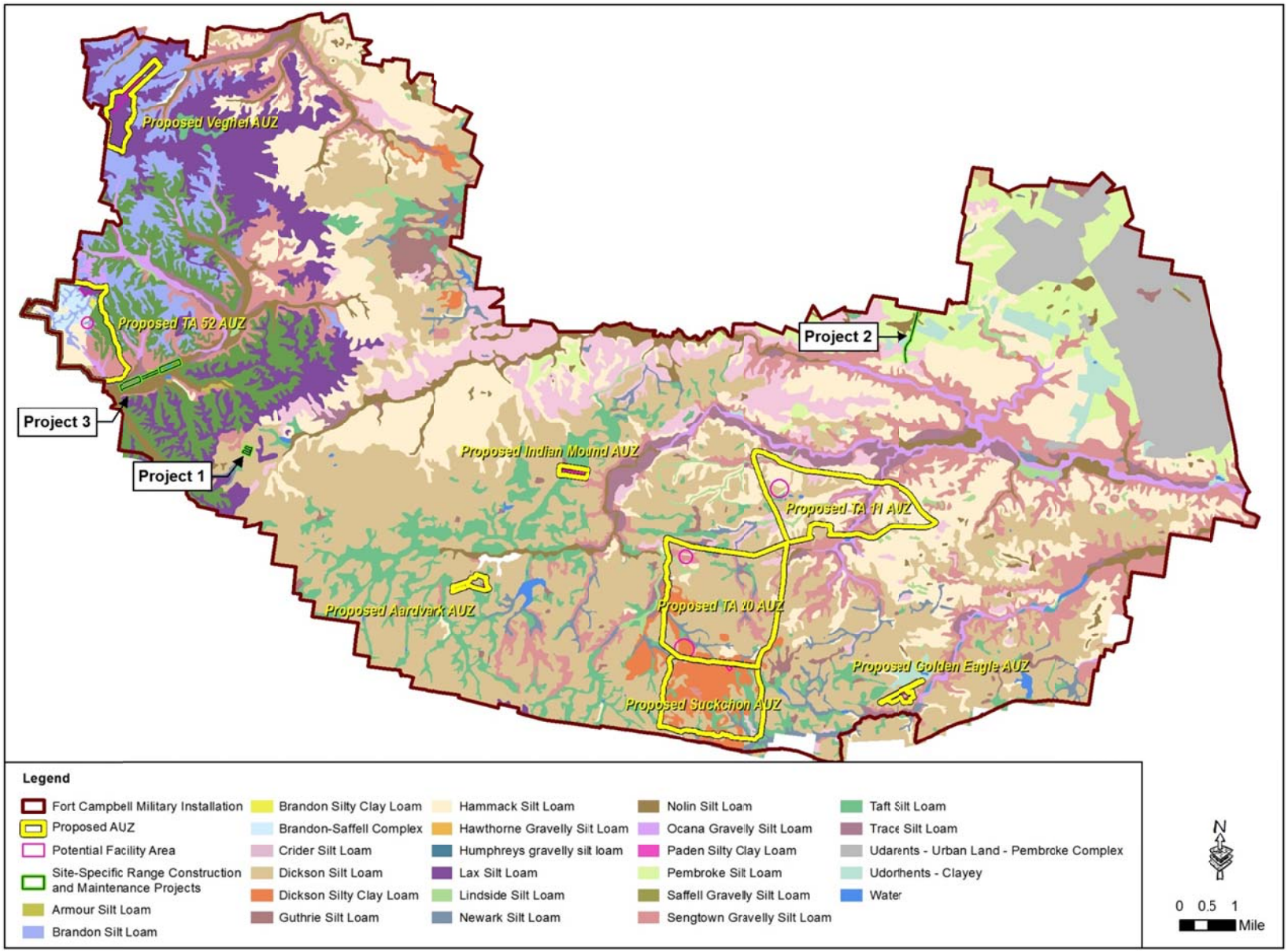


Figure 4.5-1. Fort Campbell Soil Series

Table 4.5-1. Fort Campbell Soils

Soil Series ***Soil Subgroup***	**Slope (Per-cent)** ***Soil Unit Symbol***	**Acres**	**Per-cent[1]**	**Per-cent sub-total**	**Characteristics**
Dickson silt loam/silty clay loam 0 to 12 percent slopes *Glossic Fragiudults*	0 to 2 *(DsB)*	1,631	1.6	29.8	Very deep, moderately well-drained soils that have a slowly permeable fragipan[2] in the subsoil. Formed in a silty mantle 2 to 4 feet thick and the underlying residuum of limestone. They are on nearly level to sloping uplands. Moderately well-drained; medium to slow runoff; moderate permeability above the fragipan and slow to very slow permeability in the fragipan. Somewhat limited for the construction of roads and buildings without basements. *HEL*
	2 to 6 *(DkB2/ DsC)*	28,941	28.0		
	6 to 12 *(DsC2)*	256	0.2		
Hammack silt loam *Glossic Paleudalfs*	2 to 5 *(MoB)*	3,445	3.3	16.9	Very deep, well-drained, moderately permeable soils formed in a loess mantle and the underlying cherty residuum from limestone. These soils are on ridgetops and sideslopes of rolling to hilly areas. Well-drained, runoff is medium or rapid. Permeability is moderate. Very limited for the construction of roads, and not (MoB) to somewhat limited for the construction of buildings without basements. *HEL*
	5 to 12 *(BeB2, HxC)*	8,223	7.9		
	2-12 *(BeC2)*	5,890	5.7		
Sengtown gravelly silt loam *Typic Paleudalfs*	5 to 12 *(Ba)*	4,553	4.4	10.0	Very deep, well-drained, moderately permeable soils on uplands. Formed in residuum weathered from cherty limestone. Well-drained. Medium to very high runoff. Moderately slow to slow permeability. Ba is somewhat limited, and Be and Rf are very limited for construction of roads and buildings without basements. *HEL*
	12 to 20 *(Be)*	3,830	3.7		
	20 to 60 (Rf)	2,000	1.9		
Lax silt loam *Typic Fragiudults*	2 to 5 *(LaB)*	3,942	2.4	6.2	Very deep, moderately well-drained soils on uplands. Formed in a silty mantle over gravelly alluvium and residuum of limestone. The soil has a dense fragipan in the lower subsoil. Moderately well-drained; low to medium runoff; moderate permeability above the fragipan and very slow permeability in the fragipan. Somewhat limited for the construction of roads and buildings without basements. *HEL*
	5 to 12 *(LaC)*	2,443	3.8		
Taft silt loam *Glossaquic Fragiudults*	0 *(Ta)*	5,548	5.4	5.4	Very deep, somewhat poorly-drained soils with a fragipan in the subsoil. Formed in a silty mantle of loess or alluvium and the underlying residuum of

Table 4.5-1. Fort Campbell Soils

Soil Series *Soil Subgroup*	Slope (Per-cent) *Soil Unit Symbol*	Acres	Per-cent[1]	Per-cent sub-total	Characteristics
					limestone or shale. These are nearly level soils and are on upland flats, stream terraces, and in depressions. Somewhat poorly-drained; slow runoff; slow permeability. Somewhat limited for the construction of roads, and very limited for the construction of buildings without basements.
Udarents – Urban Land	0 to 6 *(Ud)*	5,481	5.3	5.3	Not a series. Characterized by lack of soil structure due to disturbance from construction. Not rated for suitability for the construction of roads and buildings.
Crider silt loam *Typic Paleudalfs*	0 to 2 *(CrA)*	361	0.3	4.9	Very deep, well-drained, moderately permeable soils on uplands. Formed in a loess mantle and the underlying residuum from limestone. Well-drained. Runoff ranges from low to high. Permeability is moderate. Very limited for the construction of roads, and not limited for the construction of buildings without basements.
	2 to 5 *(CrB)*	4,724	4.6		
Saffell gravelly loam *Typic Hapludults*	20 to 60 *(SaF)*	4,258	4.1	4.1	Very deep, well-drained, moderately permeable soils that formed in loamy and gravelly marine sediments of Tertiary Age. Runoff is low to high depending on slope. Very limited for the construction of roads and buildings without basements. *HEL*
Pembroke silt loam *Mollic Paleudalfs*	2 to 5 *(PeB)*	3,764	3.6	3.6	Very deep, well-drained soils formed in a thin silty mantle of loess underlain by older alluvium or residuum of limestone or both. They are on nearly level uplands and karst areas. Well-drained. Runoff is low. Permeability is moderate to moderately slow. Very limited for the construction of roads, and not limited for the construction of buildings without basements.
Nolin silt loam *Fluventic Eutrudepts*	0 *(No)*	3,520	3.4	3.4	Very deep, well-drained soils formed in alluvium derived from limestones, sandstones, siltstones, shales, and loess. These nearly level soils are found on flood plains, in depressions which receive runoff from surrounding slopes, and on the natural levees of major streams and rivers. Well-drained. The surface runoff is negligible to low on nearly level slopes and ranges to rapid on the steeper banks of streams and rivers. Permeability is moderate. The soil is subject to rare to frequent flooding or ponding in depressions for variable durations of time. Very limited for the construction of roads and buildings without basements.

Table 4.5-1. Fort Campbell Soils

Soil Series ***Soil Subgroup***	**Slope (Per-cent)** ***Soil Unit Symbol***	**Acres**	**Per-cent[1]**	**Per-cent sub-total**	**Characteristics**
Brandon silt loam *Typic Hapludults*	5 to 12 *(BrC3)*	1,400	1.3	2.6	Very deep, well-drained soils formed in a silty mantle, presumably loess, which is 20 to 40 inches thick over very gravelly or gravelly marine and riverine deposited materials. Well-drained. Runoff ranges from low to high. Permeability is moderate in the silty upper part and is extremely variable in the gravelly substratum, and can range from moderately rapid to slow. Very limited for the construction of roads, and somewhat (BrC3) to very (BrD3) limited for the construction of buildings without basements. *HEL*
	12 to 20 *(BrD3)*	1,330	1.3		
Trace silt loam *Ultic Hapludalfs*	0-2 *(TrA)*	1,444	1.4	2.0	Very deep, well-drained soils on low stream terraces. Formed in about 2.5 to 5 feet of moderately permeable silty alluvium underlain by extremely gravelly alluvium with rapid to very rapid permeability. Well-drained; slow runoff; moderate permeability in the solum and rapid to very rapid in the substratum. Somewhat limited for the construction of roads, and very limited for the construction of buildings without basements.
	2 to 5 *(TrB)*	642	0.6		
Ocana gravelly silt loam *Dystric Fluventic Eutrudepts*	0 *(Ec)*	1,623	1.6	1.6	Deep to very deep, well-drained soils with moderately rapid permeability. Formed in gravelly alluvium on flood plains. Well-drained; slow runoff; moderately rapid permeability. Very limited for the construction of roads and buildings without basements.
Newark silt loam *Fluventic Endo-aquepts*	0 *(Ne)*	1,343	1.3	1.3	Very deep, somewhat poorly-drained soils formed in mixed alluvium from limestone, shale, siltstone, sandstone, and loess. The soil is on nearly level flood plains and in depressions. Somewhat poorly-drained. Runoff is negligible or very low. Permeability is moderate. Most areas are subject to occasional or frequent flooding or ponding. Some areas are subject to rare flooding. Very limited for the construction of roads and buildings without basements.
Guthrie silt loam *Typic Fragiaquults*	0 *(Gu)*	1,151	1.1	1.1	Very deep, poorly-drained soils with a fragipan in the lower subsoil. The soil formed in silty material on upland flats and depressions. Poorly-drained; negligible to very slow runoff; moderate permeability above the fragipan and slow to very slow permeability in the fragipan. Some areas are ponded for several weeks during the winter and spring. Very limited for the construction of roads

Table 4.5-1. Fort Campbell Soils

Soil Series *Soil Subgroup*	Slope (Per-cent) *Soil Unit Symbol*	Acres	Per-cent[1]	Per-cent sub-total	Characteristics
					and buildings without basements.
Udorthents – clayey	0 *(Uf)*	882	0.9	0.9	Not a series, since no set of common characteristics exists for this Entisol. Not rated for suitability for the construction of roads and buildings.
Lindside silt loam *Fluvaquentic Eutrudepts*	0 *(Ln)*	830	0.8	0.8	Very deep, moderately well-drained soils formed in alluvium washed mainly from lime influenced soils on uplands. They occur on nearly level flood plains. Moderately well-drained. Runoff is medium and permeability is moderate. Very limited for the construction of roads and buildings without basements.
Humphreys gravelly silt loam *Ultic Hapludalfs*	2 to 5 *(HuB)*	38	<0.1	<0.1	Very deep, well-drained soils on foot slopes, alluvial fans, and stream terraces. The soil formed in a mixture of alluvium and colluvium derived from cherty limestone, siltstone, and shale. Well-drained; medium to very low runoff; moderately rapid permeability. Not limited for the construction of roads and buildings without basements.
Armour silt loam *Ultic Hapludalfs*	5 to 12 *(AmC2)*	31	<0.1	<0.1	Very deep, well-drained soils on stream terraces, foot slopes, and valley floors. These soils formed in old alluvium, valley fill, or in alluvium and the underlying residuum of limestone. Well-drained; medium runoff; moderate permeability. Very limited for the construction of roads and buildings without basements. *HEL*

Sources: Fort Campbell, 2012e; NRCS, 2012a; NRCS, 2012b; NRCS, 2012c; and NRCS, 2012d
[1]Percent indicates percentage of total Fort Campbell land area.
[2]Fragipan is a hard, cemented sub-horizon that restricts penetration of water and plant roots.
HEL = Highly Erodible Land (see Section 4.5.1.3)

The Saffell soil series are well-drained, very steeply sloped soils that developed in marine sediments. They are located in the western part of the installation. Saffell soils are HEL.

The Nolin, Ocana, Lindside, Newark, Trace, Humpreys, and Armour soil series all developed in alluvium. Trace, Humpreys, and Armour are well-drained older soils (Alfisols) and are found mostly on stream terraces. Nolin, Ocana, Lindside, and Newark are younger soils (Inceptisols), developed mostly in recent alluvium on flood plains. Some also developed in depressions that receive runoff from surrounding slopes, or on the natural levees of major streams and rivers. The soils, except for Armour, are level or nearly level, and vary from being somewhat poorly-drained to well-drained. The soils are located throughout the installation. Armour is very well-drained, moderately sloped, and HEL.

4.5.1.1.2 Soil Resources at Proposed Site-Specific Range Projects

Table 4.5-2 lists the type and extent of soils mapped at each proposed site-specific project. Limiting characteristics for construction and training activities include HEL, hydric inclusions (indicator of wetland potential), karst features, and limitations for suitability for the construction of roads and buildings without basements. Projects 1 and 4 are proposed on DkB2 and BeC2. Both soils are HEL land, and BeC2 is also moderately sloped (between 6 and 12 percent slope). Projects 7, 8, and 9 are proposed on PeB and Uf, which are gently sloped (less than 6 percent slope), not HEL, but have experienced a high degree of erosion previously. None of the projects are proposed on steeply (12 to 20 percent), or very steeply (20 percent or above) sloped soils.

Table 4.5-2. Soils at Proposed Site-Specific Projects

Project ID	Description	Soil Map Unit *(Symbol)*	Limiting Characteristics	Acres
1	Driving Skid Pad	Dickson silt loam, 2 -6% slope *(DkB2)*	HEL	7.2
2	Gravel Foot March Trail along On-The-Line Road	Nolin silt loam, 0% slope *(No)*	--	0.2
		Crider silt loam, 2-5% slope *(CrB)*	Eroded	0.3
		Pembroke silt loam, 2-5% slope *(PeB)*	Eroded	0.8
		Udorthents - clayey, 0% slope *(Uf)*	--	0.1
3	Glide Slope NE	Newark silt loam, 0% slope *(Ne)*	Hydric inclusions	1.3
		Nolin silt loam, 0% slope *(No)*	--	12.1
		Trace silt loam, 0-2% slope *(TrA)*	--	3.9
		Water	--	5.8
	Glide slope SW	Trace silt loam, 0-2% slope *(TrA)*	--	18.4
		Nolin silt loam, 0% slope *(No)*	--	5.0
	Runway	Trace silt loam, 0-2% slope *(TrA)*	--	11.4

4.5.1.1.3 Soil Resources at Proposed AUZs

Table 4.5-3 lists the type and extent of soils mapped at each proposed AUZ. As shown in the table, limiting characteristics for construction and training activities include HEL, hydric inclusions (indicator of wetland potential), slopes, and karst features. All of the proposed AUZs have a wide extent of HEL land mapped within their footprints: Golden Eagle FLS (100 percent HEL), LZ Aardvark (95 percent HEL), LZ Indian Mound (97 percent HEL) and Suckchon DZ (97 percent HEL). However, are all located on gently sloping soils (less than 6 percent slope). Suckchon DZ does have some moderately to steeply sloped soils (DsC2, Ba, Be), but they

amount to less than 16 percent of the AUZ. TA-11 (86 percent HEL), on the other hand, has moderately to very steep slopes (5-60 percent slope) on 34 percent of the mapped HEL land. The majority of this land is BeB2 and Be. The Hammack soils are also previously eroded. The TA-20 area has both a low (15 percent) HEL extent, and is more gently sloped. Only 12 percent of the HEL land has slopes that exceed 5 percent, the great majority of which are mapped as Ba. TA-52 (93 percent HEL) is dominated by very steep slopes. Seventy-three percent of the AUZs have slopes that exceed 20 percent. The majority of the land has been mapped as BaE, SaF, and BxE. Veghel is 100 percent HEL, with 48 percent that has slopes that exceed 5 percent; however, most has been mapped as the moderately sloped LaC.

Table 4.5-3. Soils at Proposed AUZs

AUZ	Soil Map Unit *(Symbol)*	Limiting Characteristics	Acres	%
Golden Eagle FLS	Dickson silt loam, 2-6% slope *(DkB2)*	HEL	49.4	100
Aardvark LZ	Taft silt loam, 0% slope *(Ta)*	Hydric inclusions	2.9	5.2
	Dickson silt loam, 2-6% slope *(DkB2)*	HEL	53.2	94.8
Indian Mound LZ	Taft silt loam, 0% slope *(Ta)*	Hydric inclusions	1.7	3.3
	Dickson silt loam, 2-6% slope *(DkB2)*	HEL	48.5	96.7
Suckchon DZ	Newark silt loam, 0% slope *(Ne)*	Hydric inclusions	51.9	3.6
	Sengtown gravelly silt loam, 5-12% slope *(Ba)*	HEL Moderately Steep Slopes	13.1	0.9
	Sengtown gravelly silt loam, 12-20% slope *(Be)*	HEL Steep Slopes	17.4	1.2
	Dickson silt loam, 0-2% slope *(DsB)*		156.9	11.0
	Taft silt loam, 0% slope *(Ta)*	Hydric inclusions	181.6	12.7
	Crider silt loam, 2-5% slope *(CrB)*	Eroded	19.9	1.4
	Dickson silt loam, 2-6% slope *(DkB2)*	HEL	226.1	15.8
	Dickson silty clay loam, 2-6% slope *(DsC)*	HEL Severely Eroded	568.6	39.8
	Dickson silty clay loam, 6-12% slope *(DsC2)*	HEL Severely Eroded Moderately Steep Slopes	194.0	13.6

Table 4.5-3. Soils at Proposed AUZs

AUZ	Soil Map Unit *(Symbol)*	Limiting Characteristics	Acres	%
TA 11	Hammack silt loam, 2-5% slope *(MoB)*	HEL	463.9	26.2
	Ocana gravelly silt loam, 0% slope *(Ec)*		58.8	3.3
	Sengtown gravelly silt loam, 5-12% slope (*Ba)*	HEL Moderately Steep Slopes	68.7	3.9
	Sengtown gravelly silt loam, 12-20% slope *(Be)*	HEL Steep Slopes	186.4	10.5
	Sengtown gravelly silt loam, 20-60% slope *(Rf)*	HEL Very Steep Slopes	19.6	1.1
	Taft silt loam, 0% slope *(Ta)*	Hydric inclusions	17.3	1.0
	Trace silt loam, 0-2% slope *TrA)*		20.8	1.2
	Trace silt loam, 2-5% slope *(TrB)*		14.0	0.8
	Crider silt loam, 2-5% slope *(CrB)*	Eroded	68.9	3.9
	Hammack silt loam, 5-12% slope *(BeB2)*	HEL Eroded Moderately Steep Slopes	245.7	13.9
	Hammack silt loam, 2-5% slope *(MoB)*	HEL Karst	138.3	7.8
	Dickson silt loam, 2-6% slope *(DkB2)*	HEL	403.7	22.8
	Water		6.7	0.4
	Lindside silt loam, 0% slope *(Ln)*		54.8	3.1
TA 20	Hammack silt loam, 2-5% slope *(MoB)*	HEL	52.2	2.0
	Newark silt loam, 0% slope *(Ne)*	Hydric inclusions	110.7	4.3
	Sengtown gravelly silt loam, 5-12% slope *(Ba)*	HEL Moderately Steep Slopes	227.7	8.9
	Sengtown gravelly silt loam, 12-	HEL Steep Slopes	8.4	0.3

Table 4.5-3. Soils at Proposed AUZs

AUZ	Soil Map Unit *(Symbol)*	Limiting Characteristics	Acres	%
	20% slope *(Be)*			
	Dickson silt loam, 0-2% slope *(DsB)*		327.5	12.8
	Taft silt loam, 0% slope *(Ta)*	Hydric inclusions	93.0	3.6
	Trace silt loam, 0-2% slope *(TrA)*		27.2	1.1
	Trace silt loam, 2-5% slope *(TrB)*		3.0	0.1
	Crider silt loam, 2-5% slope *(CrB)*	Eroded	39.3	1.5
	Hammack silt loam, 5-12% slope *(BeB2)*	HEL Eroded Moderately Steep Slopes	60.7	2.4
	Dickson silt loam, 2-6% slope *(DkB2)*	HEL	1267.0	49.6
	Water		1.6	0.1
	Dickson silty clay loam, 2-6% slope *(DsC)*	HEL Severely Eroded	301.8	11.8
	Dickson silty clay loam, 6-12% slope *(DsC2)*	HEL Severely Eroded Moderately Steep Slopes	1.9	0.1
	Guthrie silt loam, 0% slope *(Gu)*	Hydric	1.5	0.1
	Lindside silt loam, 0% slope *(Ln)*		31.4	1.2
TA 52	Lax silt loam, 5-12% slope *(LaC)*	HEL	18.2	1.7
	Baxter-Hammack complex, 20-30% slope *(BaE)*	HEL Very Steep Slopes	240.4	21.9
	Brandon-Saffelll complex, 20-50% slope *(BxE)*	HEL Very Steep Slopes	178.6	16.3
	Hammack-Baxter complex, 6-12% slope	HEL Moderately Steep Slopes	29.4	2.7
	Ocana gravelly silt loam, 0-2% slope *(Ec)*		51.9	4.7
	Saffell gravelly loam, 20-60%	HEL Very Steeply Sloped	154.7	14.1

Table 4.5-3. Soils at Proposed AUZs

AUZ	Soil Map Unit *(Symbol)*	Limiting Characteristics	Acres	%
	slope *SaF)*			
	Sengtown gravelly silt loam, 5-12% slope *(Ba)*	HEL Moderately Steep Slopes	68.3	6.2
	Sengtown gravelly silt loam, 20-60% slope *(Rf)*	HEL Very Steep Slopes	130.7	11.9
	Nolin silt loam, 0-2% slope *(No)*		18.3	1.7
	Lax silt loam, 5-12% slope *(LaB)*	HEL Moderately Steep Slopes	17.5	1.6
	Dickson silt loam, 6-12% slope *(DsC2)*	HEL Moderately Steep Slopes	8.4	0.8
	Trace silt loam, 0-2% slope *(TrA)*		1.4	0.1
	Brandon silt loam/silty clay loam, 12-25% slope *(BsD3)*	HEL Steep Slopes	14.2	1.3
	Brandon silt loam, 5-12% slope *(BrC3)*	HEL Eroded Moderately Steep Slopes	163.0	15.0
Veghel DZ	Lax silt loam, 5-12% slope *(LaC)*	HEL Moderately Steep Slopes	138.9	42.5
	Brandon silt loam, 5-12% slope *(BrC3)*	HEL Eroded Moderately Steep Slopes	7.6	2.3
	Brandon silt loam, 12-20% slope *(BrD3)*	HEL Eroded Steep Slopes	9.2	2.8
	Lax silt loam, 2-5% slope *(LaB)*	HEL	171.3	52.4

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; HEL = highly erodible land; LZ = landing zone; TA = training area

4.5.1.2 Erosion and Erosion Management

Soil is formed over hundreds, often thousands, of years. When uncovered, it can become detached from the soil column by the impact of rain water or from the force of wind. When detached by rain, it can travel with the water in the form of overland flow to surface waters. Once soil particles become suspended in runoff, they change from being natural resources that support plant growth to pollutants in the form of sediment. Soil erosion is a vast problem on Fort Campbell from past clear-cut logging activities, establishment of historic firebreaks, agricultural practices, and maneuver training. Many of the Fort Campbell soils formed in silty loess mantles, parent material that was deposited thousands of years ago by wind. As these soils are disturbed or not protected by vegetative cover, they become unstable and easily eroded.

Many of the soils on Fort Campbell are classified as HEL (Figure 4.5-2). Determinations for HEL are based on an erodibility index (EI), and calculated using factors from the Universal Soil Loss Equation (USLE), such as regional rainfall intensity and volume (R), individual soil susceptibility to erosion (K), and slope length and steepness (LS). EI is represented by the formula RKLS/T, where T is the soil loss tolerance. A soil is defined as HEL if the LS factor for the shortest length and minimum percent of slope is used and the RKLS/T value equals or exceeds 8, at which point the maximum annual rate of soil erosion is expected to cause a decline in long-term cropland productivity. While HEL was developed for agricultural cropland and for water erosion only, it is a valuable tool in soil management used to identify soils that are at risk being eroded if not managed correctly. Table 4.5-1 identifies the soil series that have been classified by the NRCS as HEL. There is a total of approximately 70,598 acres (67.9 percent of total area) of HEL on Fort Campbell.

Erosion takes many forms. Sheet erosion is difficult to detect as soil is removed more or less uniformly across the surface. Rill erosion forms small channels that are irregularly dispersed and is often seen on bare land. Rill erosion can be smoothed over with tillage, while gully erosion forms large channels that cannot be corrected by ordinary tillage practices. Gullies are formed by accelerated erosion, and are often started as rill erosion. On Fort Campbell, deep gullies can present difficulties for maneuvering activities. Fort Campbell recognizes the importance of keeping its soils in place to support plant growth, since a variety of vegetation communities are important for training exercises (Section 4.7), and are mediums for the construction of ranges, maneuvering trails, buildings, etc. Fort Campbell recognizes that sedimentation is the number one pollutant of Fort Campbell waterways, which has caused several streams to not meet their state-designated uses (i.e., being placed on a 303(d) list) (Section 4.6)). Sedimentation has also led to indirect impacts to endangered bats that utilize aquatic insects as forage (Section 4.7). For these reasons, Fort Campbell has adopted an aggressive soil erosion management policy.

The effects of military training and vegetation management on soil erosion vary widely, depending on the type and intensity of the activity and the location of the activity with respect to HEL and slopes. The two most common types of training conducted at Fort Campbell are maneuvers and live-firing exercises. Maneuvering heavy wheeled or tracked vehicles can cause a high level of disturbance to soils and vegetation, which can cause accelerated soil erosion. In particular, repeated maneuvering in a small area greatly disturbs the area, and especially compacted soils may be difficult to rehabilitate. Prior to training, proposed training activities and training site locations are coordinated with the Fort Campbell Environmental Division to screen for and avoid sensitive areas, including highly erodible soils and steep slopes. Detailed recovery plans agreed upon by the units (e.g., ARNG) and Range Division are also required prior to training to ensure that the land will be recovered following the training exercise.

Vegetation management (clearing and prescribed burns) within the TAs also impacts soil stability. When the soils become void of vegetation after clearing or prescribed burning, they are very susceptible to erosion until vegetation is re-established. Disturbance from firing exercises also increases erosion. The firing of munitions into the soil causes soil disturbance and increases the potential for wind and water erosion around heavily targeted areas. Munitions firing also increases the potential for fire, and in turn, increases the potential for soil erosion due to lack of vegetative cover.

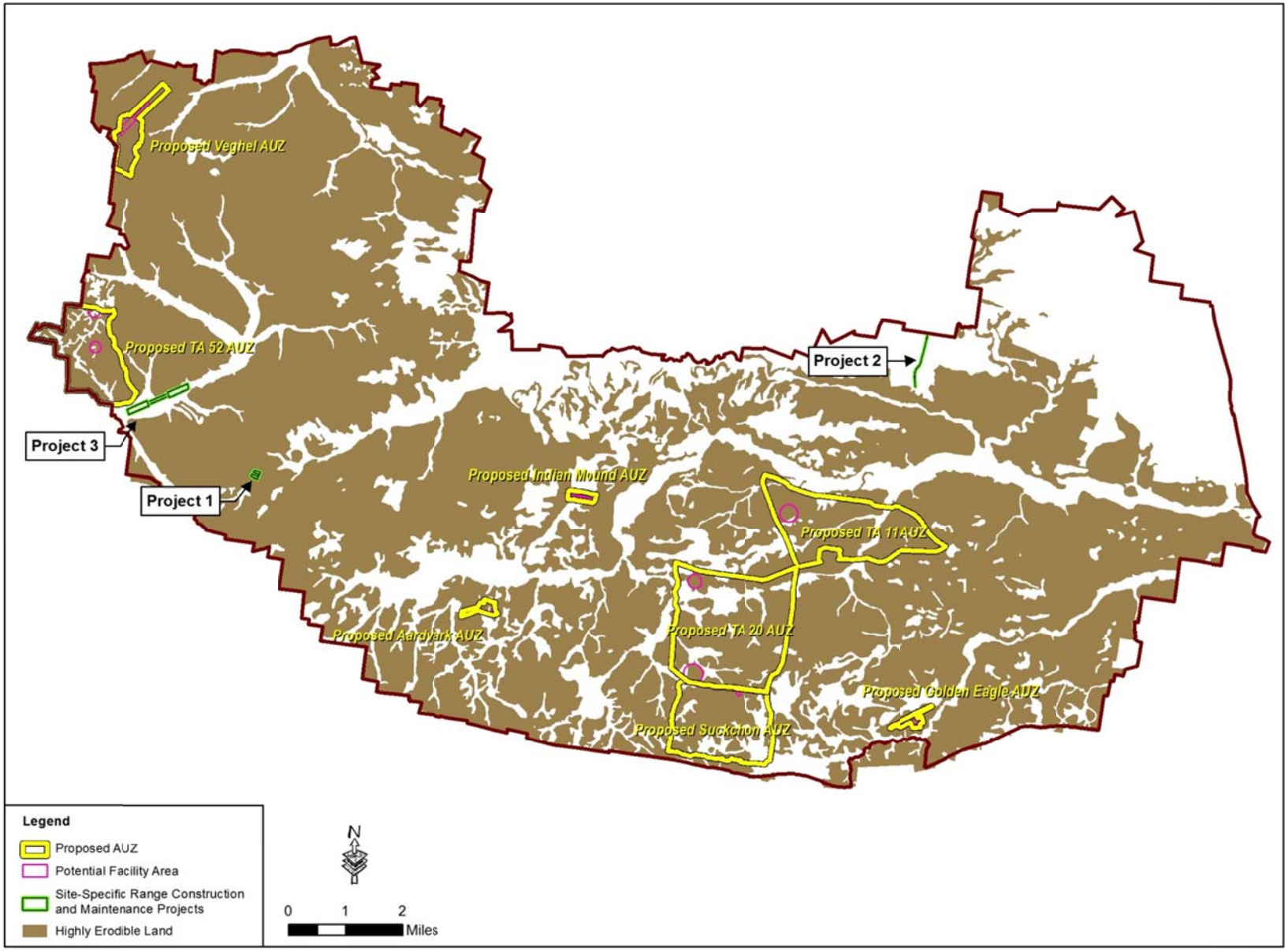


Figure 4.5-2. Fort Campbell Highly Erodible Land

4.5.1.2.1 Fort Campbell Integrated Training Area Management Program

Five basic management techniques are used at Fort Campbell to minimize military training effects to the soil and vegetation, and therefore, reduce the potential for soil erosion: (1) limit total use; (2) redistribute use; (3) modify kinds of use; (4) alter the behavior of use; and (5) manipulate the natural resources for increased durability. This is done through the ITAM Program. The ITAM Program is responsible for inventorying and monitoring land conditions, rehabilitating lands unsuitable for training, and integrating training requirements with land capacity.

ITAM includes management of training lands (HEL), and integrates range/ITAM activities with environmental land management activities. The program performs biological evaluations on the land quality and land carrying capacity and then makes recommendations regarding repairs and reconfigurations of the training sites. When needed, ITAM provides training land remediation, reconfiguration, and maintenance to sustain the TAs for all-weather training activities. TA stewardship guidelines are listed in Fort Campbell Regulation 385-5 – Sustainable Range Program. For example, the ITAM Program must recover all excavated areas to natural contour following the completion of field training. The ITAM Program monitors recovery efforts and enforces digging recovery requirements for training exercises occurring in TAs, particularly those adjacent to water bodies.

The ITAM Program at Fort Campbell is administered by the ITAM/Range Division of the G3/Directorate of Plans, Training, Mobilization (G3/DPTM), and consists of four components: 1) RTLA, 2) LRAM, 3) Training Requirements Integration (TRI), and 4) Sustainable Range Awareness (SRA). The G3/DPTM works closely with the Fort Campbell Environmental Division towards integrating land management activities and natural resource management programs.

4.5.1.2.2 Environmental Stewardship Guidelines

In an effort to comprehensively manage and protect soil resources on Fort Campbell, the INRMP contains soil management goals and objectives designed to protect soil resources and prevent soil destabilization and erosion. With the implementation of the existing soil resource environmental stewardship guidelines contained within the INRMP and the ITAM environmental stewardship guidelines compiled in Appendix F, the impact of training exercises is reduced as much as possible. After training, land evaluations determine which remediation measure is needed, and if training must be rotated to another area while the land recovers.

Measures to control sediments to reduce and avoid impacts to surface water quality contained in the Fort Campbell Policy for Storm Water Erosion and Sediment Control at Construction Projects are discussed in Section 4.6.1.3.2. This policy establishes the management of storm water, prevention of erosion, and control of sediment for construction or land clearing activities on the installation, and ensures that all activities are compliant with state permits. The regulatory levels for total maximum daily load (TMDL) and parameters (sediment, pathogens, nutrients, etc.) vary from watershed-to-watershed, depending on the severity of the impairment and the intended uses of the stream.

4.5.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, impacts from soil erosion would be considered significant if 1) the landscape were not sustained for military training; 2) excessive soil loss were to impair plant growth; or 3) Federal, state, or local laws pertaining to this resource were violated. The following sections discuss the potential for adverse impacts to soils and soil erosion for the No Action and Proposed Action Alternatives.

4.5.2.1 No Action Alternative

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in the potential for adverse impacts to soil resources, primarily in the form of soil erosion. Existing Army management of soils at Fort Campbell would continue to address the adverse effects of military training. Fort Campbell would not implement one or more of the Proposed Actions; however, range construction projects would continue, as needed, and would undergo a project-by-project evaluation under NEPA. Individual planning and siting of projects may result in soil impacts from development and training within areas prone for erosion (HEL). The Proposed Action Alternatives, which contain projects for areas that are prone to erosion, would necessitate a broad overview of existing range conditions, needs, and environmental resource constraints, and may especially reduce cumulative impacts to soil resources. Fort Campbell, however, would still be required to implement the ITAM Program to repair and restore training lands and comply with Federal and sediment management regulations; therefore, overall adverse impacts would be less than significant.

4.5.2.2 Alternative 1

Table 4.5-4 summarizes the potential for adverse impacts to soil resources. The text following the table supports impact conclusions made within the table by protect.

Table 4.5-4. Summary of Site-specific Projects Soils Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial						
		Approximate acreage of potential soil impact	Permanent loss of soil	Soil compaction	Wind erosion (construction)	Water erosion (construction)	Soil stability (operations)	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	7.2	Min	Mod	Mod	Min	Min	Min
Construct a Gravel Foot March Trail	On The Line Road	2.8	Min	Min	Min	Min	Min	Min
Construct a Runway with Glide Slopes	Saunders LZ	57.4	Min	Min	Mod	Mod	Min	Min

LZ = landing zone

The construction of the Driving Skid Pad would result in a permanent loss of up to 7.2 acres, which would become paved or compacted. The entire project area is classified as HEL; however, the project area is nearly level. During construction of the driving skid pad, soils would be disturbed by grading and compaction, and water and wind erosion from exposed soils would be expected to increase. There is a greater potential for moderate wind erosion than water erosion, as the site is nearly level and thus is less susceptible to water erosion. Operation of the skid pad would not directly impact soils since the pad would be paved; however, soil erosion

and compaction may increase due to the use of dirt or gravel roads by vehicles traveling to the site for training, or from vehicles parked in the vicinity of the site. As apparent from Plate 1 (Appendix C), existing soils are eroded and have experienced previous compaction from training. The implementation of environmental stewardship guidelines in Appendix F (e.g., soil erosion control measures, the development of a site-specific stormwater pollution prevention plan (SWPPP), and incorporation of low impact design (LID)), as well as adherence to conditions put forth in a NPDES general permit and the implementation of the ITAM program during operations, would reduce overall impacts to soil resources to minor.

Construction of the Gravel Foot March Trail along On The Line Road would result in permanent loss of up to 1.4 acres of soils, none of which are HEL. During construction, minor wind and water erosion is expected to occur. Compaction and disturbance of adjoining soils from construction machinery is also expected; however, these soils were likely previously disturbed and compacted from the construction of On The Line Road. Operational impacts to soil would include wind erosion (dust) during marching, and water erosion resulting from runoff from the semi-impervious surface of the trail. The application of the soil erosion prevention measures discussed for the Driving Skid Pad and contained within Appendix F would reduce adverse impacts to minor.

The proposed Runway with Glideslopes at Saunders LZ would permanently impact up to 17.4 acres of soils. The runway portion of the proposed project would not cause any significant direct impact as the current area is an existing dirt runway. The construction of the runway would be anticipated to have minor adverse impacts. The glideslopes are proposed on mostly forested, undisturbed soils, and therefore, a potential exists for soil compaction and erosion resulting from the removal of forested vegetation within the approximate 40 acres required for the glide slopes. These locations are relatively flat and do not contain HEL; however, the large area of clearing could cause moderate amounts of wind and water soil erosion, as these areas are cleared and stabilized with herbaceous vegetation. During construction, there would also be some compaction of the surrounding soils due to construction equipment. There are no direct operational impacts expected; however, runoff from the large, impervious surface of the runway could cause minor indirect impacts to surrounding soils in the form of surface erosion. Construction and operational adverse impacts would be reduced by the same soil erosion preservation measures as discussed for the Driving Skid Pad and contained within Appendix F.

Alternative 1 would not result in a landscape that is unsustainable for military training, in excessive soil loss impairing plant growth, or in a violation of Federal, state, or local soil erosion laws. Therefore, impacts would be less than significant.

4.5.2.3 Alternative 2

Table 4.5-5 summarizes the extent of the environmental constraints within each AUZ and the potential for adverse impacts to soil resources based on the likely potential activities (Chapter 2, Table 2.2). Soils referred to as “at risk” refers to soils that are HEL and have slopes exceeding 5 percent.

Table 4.5-5. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints[1]	Potential Impacts to Soils
TA 11	• 1,526 acres HEL (85 percent of total land). • Steep slopes throughout area – mostly adjacent to streams (Be, BeC2). • 521 acres (34 percent) "at risk" soils include: o 186 acres Sengtown gravelly silt loam, 12-20 percent slopes (Be); o 246 acres Hammack silt loam, 5-12 percent slopes (BeB2); o 20 acres Sengtown gravelly silt loam, 20-60 percent slope (Rf); and o 69 acres Sengtown gravelly silt loam, 5-12 percent slopes (Ba).	• Permanent loss of soils from the construction of training facilities (e.g., village, range support building, and parking lots). • High potential for adverse impacts to disturbed soils on construction sites from erosion, due to the amount of HEL and "at risk" soils. • Potential for indirect adverse impacts to adjoining soils from construction soil compaction and surface runoff. • High potential for soil compaction and exposed soils from the clearing of trees and the construction of maneuver trails, due to the amount of HEL and "at risk" soils.
TA 20	• 1,920 acres HEL (75 percent of total land). • 299 acres (12 percent) "at risk" soils include: o 228 acres Sengtown gravelly silt loam, 5-12 percent slope (Ba). o 61 acres Hammack silt loam, 5-12 percent slope (BeB2). o 8 acres Sengtown gravelly silt loam, 12-20 percent slope (Be), and o 2 acres Dickson silty clay loam, 6-12 percent slope (DsC2).	• Permanent loss of soils from the construction of training facilities (e.g., village, range support building, and parking lots). • Potential for adverse impacts to disturbed soils on construction sites from erosion. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff. • Potential for soil compaction and exposed soils from the clearing of trees and the construction of maneuver trails.
TA 52	• 1,006 acres HEL (91 percent of total land). • 73 percent of area has slopes that exceed 20 percent. • 1,006 acres (91 percent) "at risk" soils include: o 155 acres Saffell gravelly loam, 20-60 percent slope (SaF); o 131 Sengtown gravelly silt loam, 20-60 percent slope (Rf); o 240 acres Baxter-Hammack,	• Permanent loss of soils from the construction of training facilities (e.g., village, range support building, and parking lots). • High potential for adverse impacts to disturbed soils on construction sites from erosion, due to the amount of HEL and "at risk" soils. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff. • High potential for increased erosion from the clearing of trees and the construction of maneuver trails, due to

Table 4.5-5. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints[1]	Potential Impacts to Soils
	20-30 percent slope; o 179 acres Brandon-Saffell, 20-50 percent slope; and o 163 acres Brandon 5-12 percent slope (BrC3). o 68 acres Sengtown gravelly silt loam, 5-12 percent slope (Ba). o 29 acres Hammack-Baxter complex, 6-12 percent slope. o 18 acres Lax silt loam, 6-12 percent slope (LaC). o 10 acres Brandon silty clay loam, 12-25 percent slope, o 5 acres Dickson silt loam, 5-12 percent slope (DsC). o 5 acres Brandon silt loam, 12-20 percent slope (BrD3). o 3 acres Hawthorne gravelly silt loam, 12-20 percent slope.	the amount of HEL and "at risk" soils. • Potential for soil compaction and exposed soils from the clearing of trees and the construction of maneuver trails.
Aardvark LZ	• 53 acres HEL (95 percent of total land), which are also considered "at risk" soils; Dickson silt loam, 5-12 percent slope.	• Permanent loss of soils from the construction of training facilities (e.g., range support building, latrine, gravel maneuver trail, and AVN sling block scoring area). • High potential for adverse impacts to disturbed soils on construction sites from erosion. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff.
Golden Eagle FLS	• 49 acres HEL (100 percent of total land). • No "at risk" soils.	• Permanent loss of soils from the construction of training facilities (e.g., urban training site buildings, range support building, and asphalt runway). • Potential for adverse impacts to disturbed soils on construction sites from erosion. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff.
Indian Mound LZ	• 49 acres HEL (97 percent of total land). • No "at risk" soils.	• Permanent loss of soils from the construction of training facilities (e.g., range support building, warehouse building, parking lot, latrines, and asphalt runway).

Table 4.5-5. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints[1]	Potential Impacts to Soils
		• Potential for adverse impacts to disturbed soils on construction sites from erosion. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff.
Suckchon DZ	• 1,019 acres HEL (97 percent of total land). • 224 acres (16 percent) "at risk" soils include: o 194 acres Dickson silty clay loam, 6-12 percent slope (DsC2); o 17 acres Sengtown gravelly silt loam, 12-20 percent slope (Be); and o 13 acres Sengtown gravelly silt loam, 5-12 percent slope (Ba).	• Permanent loss of soils from the construction of training facilities (e.g., range support building, parking area, latrine, and hangers). • Potential for adverse impacts to disturbed soils on construction sites from erosion. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff.
Veghel DZ	• 327 acres HEL (100 percent of total land). • 156 acres (48 percent) "at risk" soils include: o 139 acres Lax silt loam, 5-12 percent slope (LaC); o 9 acres Brandon silt loam, 12-20 percent slope (BrD3); and o 8 acres Brandon silt loam, 5-12 percent slope (BrC3)	• Permanent loss of soils from the construction of training facilities (e.g., (asphalt runway, support and warehouse building, and latrines). • Potential for adverse impacts to disturbed soils on construction sites from erosion. • Potential for indirect adverse impacts to adjoining soils from construction compaction and surface runoff.

Sources: Fort Campbell, 2012e; NRCS, 2012a; NRCS, 2012b; NRCS, 2012c; and NRCS 2012d

[1]"At risk" soils refers to soil that are HEL and have slopes exceeding 5 percent.

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; HEL = highly erodible land; LZ = landing zone; TA = training area

As discussed in Chapter 2, Alternative 2 is a planning tool used for the purpose of future development siting and to understand the existing environmental constraints (e.g., HEL) within the proposed AUZs that could affect development or training. The development of each AUZ could result in significant adverse impacts to soil resources. Erosion could potentially degrade the landscape to the degree that it would be unsustainable for military use, could not support plant growth, and would exceed the acceptable erosion rates as per Federal, state, or local laws. Permanent loss of soils would be anticipated due to the construction of impermeable surfaces. Increased erosion and compaction of soils would be anticipated due to the construction of permanent structures and maneuver areas. Training exercises, such as maneuvering, have the potential to cause significant adverse impacts if done on highly erosive and steeply sloped land.

Because all of the proposed AUZs have a very high percentage of HEL (Table 4.5-5), any kind of disturbance to these soils has the potential for significant soil loss and sedimentation of nearby streams. The level of impact, however, would be lessened as construction projects are phased, and the loss of soil (construction of buildings, parking lots, etc.) within the AUZs would occur over time, allowing sediments to be managed during each construction project. The impact assessment in Table 4.5-5 assumes that the existing soil conservation and protection measures (see Appendix F) are being implemented, including an avoidance/minimization of high intensity TAs to "at risk" soils, which would limit the area of maneuver trails, and reduce the adverse impact to soils from significant to moderate, due to the construction of maneuver trails and areas.

As shown in Table 4.5-5, the proposed AUZs for TA-11, TA-52, Aardvark LZ and Veghel DZ have high percentages (greater than 25 percent) of "at risk" soils. "At risk" soils are HEL, in addition to having moderate to very steep slopes (slopes that exceed 12 percent).

While it is unlikely that the construction of range support buildings in TA 11 and 52 AUZs would be sited on these soils, it is probable that maneuvering would impact these areas. Maneuver training exercises are a primary cause for soil disturbances on Fort Campbell. Maneuver trails on proposed AUZ TA-11 and TA-52 would have significant adverse impacts to soils if the maneuvering were to impact large areas of "at risk" soils listed in Table 4.5-5 (environmental constraints). In TA-11, most of these soils are alongside the intermittent streams, and the required 50-foot riparian buffer would help protect the soils from disturbance. Training impacts within these AUZs would also be expected to be moderate as long as "at risk" soils are not being used extensively for maneuver training. Most of the soils within the proposed TA-52 AUZ are HEL. All of these soils also have slopes exceeding 5 percent; 73 percent of the entire area has slopes exceeding 20 percent, some as steep as 60 percent. Due to the extreme slopes of the highly unstable, forested HEL soils, clearing and constructing maneuver trails in a majority of the proposed TA-52 AUZ would be expected to cause significant adverse impacts. Limiting maneuver trail construction within at-risk soils would reduce impact levels to less than significant.

The Aardvark LZ AUZ is dominated by soils with slopes ranging from 5 to 12 percent. Since the proposed construction footprints within this AUZ are very small (approximately 3 activity acres), the overall adverse impacts to soils would be minor. Further larger-scale development within this AUZ would likely be restricted due to the existing LZ and airspace clearance requirements.

Approximately 48 percent of the soils at the Veghel DZ are considered "at risk". The Veghel DZ is therefore expected to experience moderate adverse impacts due to the loss of soils and the soil erosion of disturbed soils during the construction of facilities (asphalt runway, range support buildings, parking area, warehouse, and latrine). The proposed 2,000-foot asphalt runway would be constructed within a former runway area, reducing the overall impacts to soil resources. Further larger-scale development within this AUZ would likely be restricted due to the existing DZ and ground surface clearance requirements within the DZ.

Proposed AUZ TA-20, even though geographically close to TA-11, has only a low percentage (12 percent) of HEL soils with moderate slopes, and no HEL soils with steep slopes (exceeding 12 percent). Adverse impacts from the construction of the village, support building, and maneuver trails are, therefore, expected to be minor to moderate with the implementation of Fort Campbell environmental stewardship guidelines. Adverse impacts from use of the maneuver trails would be expected to be moderate.

The remaining three AUZs in Table 4.5-5 do not include maneuver trails, and would impact a much smaller soil footprint. Although these proposed AUZs contain mostly HEL (ranging from 97 to 100 percent), they contain relatively gentle slopes, with the exception of the Suckchon DZ

AUZ, for which 16 percent of the soils are "at risk". The existing soils within these AUZs are mostly compacted, partially vegetated, and show signs of previous erosion. The only exception to this is Suckchon DZ, which is proposed in an area with mostly established vegetation. Only minor adverse impacts are expected at Golden Eagle and Indian Mound LZ AUZ construction projects. Due to the presence of "at risk" soils, moderate adverse impacts to soil resources within the Suckchon DZ AUZ, primarily in the form of increased erosion potential during construction, would be anticipated with the implementation of environmental stewardship guidelines.

As a part of future planning within these AUZs, careful attention must be given to the location of HELs, especially when combined with moderately to steeply sloped surfaces ("at risk" soils). Soil constraints mapping (showing HEL and steeply sloped locations) should be used as tools in the early identification of areas where construction or training should be limited or avoided. Adherence to Fort Campbell Environmental Stewardship Guidelines (Appendix F), including overall INRMP conservation goals and objectives and the *Fort Campbell Policy for Storm Water Erosion and Sediments,* would also limit the impact to soil resources. Soil conservation directives and BMPs, erosion control measures and LIDs/BMPs listed in each site-specific SWPPP, and training stewardship measures taken through the ITAM program would reduce impacts to soils. Measures that would have direct mitigative impacts on soil resources during AUZ development include:

- Limit site-intensive land-disturbing activities, when possible, on the least erodible lands. The potential erodibility of a site as determined from existing soil types (non-HEL), slopes, and vegetative cover, as well as the location of adjacent wetlands/surface waters should be considered in order to minimize impacts on these resources.

4.5.2.4 Alternative 3

Table 4.5-6 summarizes the potential type and intensity of soil resource impacts as a result of routine range projects, after the implementation of existing environmental stewardship range construction guidelines that have been compiled and summarized in Appendix F.

Routine training and range projects that have the greatest potential to cause moderate adverse impacts to soil resources are maneuver trail construction projects. Projects involving maneuver trail construction and hardening would likely involve a considerable amount of soil disturbance, which has the potential to cause soil erosion and compaction during both construction and operation. In addition, the construction of the trails increases the amount of impervious and semi-impervious surfaces, which increases stormwater runoff. Without the application of the environmental stewardship guidelines listed in Appendix F, the impact on soil resources from the construction and operation of maneuver trails would most likely be significant depending on the extent of the trails. Impacts would be reduced to moderate if guidelines were followed, including the avoidance of "at risk" soils (HEL soils with slopes exceeding 5 percent), immediate stabilization of shoulders, the use of hardening materials to prevent ruts from developing, and other management practices.

Active training facilities would be anticipated to experience soil disturbances during operations. The level of disturbance would be directly related to the intensity and frequency of training and the characteristics of the soils in which these TAs are sited. Those occurring on HEL soil would have a greater potential for erosion. The maintenance of vegetative cover and implementation of the ITAM program to restore damaged and degraded areas would reduce the level of adverse impacts to soils during operations.

Table 4.5-6. Summary of Routine Action Impacts on Soils

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Permanent loss of soil	Soil compaction (construction and operations)	Wind erosion (construction)	Water erosion (construction)	Soil stability (operations)	**Overall Impact**
Contract O&E Target and residue Removal	N	Min	Min	Min	Min	Min
Culvert Installation/Maintenance	N	Min	N	Min	Min	Min
Drop Zone/Landing Zone Maintenance	N	Mod	Mod	Mod	Min	Mod
Low Water Crossing Site Creation & Maintenance	N	Min	N	Min	Min	Min
Maneuver Damage Repair	N	Mod	Mod	Mod	B	Mod
Maneuver Trail Creation, Hardening, & Maintenance	Mod	Mod	Mod	Mod	Mod	Mod
Observation Point Creation	Min	Min	Min	Min	Min	Min

The maintenance of DZs/LZs would be anticipated to cause soil disturbances and increase erosion and compaction during construction if the existing woody vegetation were removed and if soils were graded. There is less soil disturbance in areas with established herbaceous vegetation.

Maneuver grounds can be restored through grading, shaping, and damage repair. However, grading, reshaping, and compacting soils can cause moderate impacts. This is especially prevalent during construction activities, as construction can cause a high level of disturbance to soils and can result in erosion and compaction. Once vegetation is re-established on the training land, the soil is expected to stabilize again. The impact on long-term soil stability for operations would be beneficial for these projects.

The construction of observation points is expected to cause minor adverse impacts due to erosion during construction. Observation points have relatively small construction footprints, and the implementation of sediment and erosion control measures would reduce impacts.

The other routine training and range projects contained within Table 4.6-6 that are not discussed above are expected to have no more than minor adverse impacts to soil resources. In general, these projects would impact small footprints, or do not involve ground disturbance, and are therefore likely to only cause negligible to minor adverse impacts to soil resources.

4.5.2.5 Alternative 4

The reactivation of installation-controlled airspace would have no adverse impacts to soil resources. No ground disturbing activities would occur that would have the potential to directly or indirectly adversely impact soil resources.

4.5.2.6 Alternative 5

The implementation of Proposed Action Alternatives 1-4 would not create a greater adverse effect than the impacts described for each alternative. Therefore, overall impacts would be less than significant. The environmental stewardship guidelines contained in Appendix F would be used in the siting and planning of projects to minimize and avoid impacts to soil resources. Furthermore, the construction of projects identified in Alternatives 1 and 2, along with routine range and training land actions discussed in Alternative 3, would not all occur within the same geographic area or during the same construction season. These projects would be constructed throughout Fort Campbell as shown on Figure 4.5-1 and as funding becomes available, most likely between FY 14 – 18. Alternative 5 would not result in a landscape unsustainable for military training, in excessive soil loss impairing plant growth, or in a violation of Federal, state, or local soil erosion laws. Impacts would be less than significant.

This page intentionally left blank

4.6 Water Resources

4.6.1 AFFECTED ENVIRONMENT

Water resources include surface waters (streams, lakes, and ponds), wetlands, and groundwaters. Surface and groundwaters are typically interconnected via a system of recharge and discharge areas. Due to the karst landscape, however, surface water can bypass traditional groundwater recharge processes and enter directly into the groundwater through sinkholes, caves, and disappearing streams. A number of groundwater discharge springs are present throughout the installation. The locations of caves and springs have been recorded, and are available as a part of the Fort Campbell GIS data.

Fort Campbell policy is to avoid any impacts to wetlands to the greatest extent possible or to coordinate with the USACE for unavoidable impacts and provide compensatory mitigation through the Section 404 permit process. Wetlands are therefore excluded from this discussion, but are shown on water resources maps to provide an indication as to their occurrence during range planning. In addition, the checklist (Appendix B) requires the consideration of wetlands during project tiering from this PEIS and Appendix F contains environmental stewardship guidelines for the avoidance and protection of wetlands within Fort Campbell.

4.6.1.1 Surface Water (Watersheds) and Floodplains

Fort Campbell has approximately 51 miles of perennial streams, 267 miles of intermittent streams, 114 miles of wet weather conveyances[4] (WWC) and 110 acres of open water (4 small man-made lakes) (Fort Campbell, 2012e, USGS, 2012). Figure 4.6-1 shows the location of watersheds and types of surface waters[5] within the installation. The installation is drained by nine sub-watersheds, which include Saline Creek, Dry Fork Creek, Fletcher's Fork Creek, Jordan Creek, Noah's Spring Branch, Piney Fork Creek, Skinner Creek, Casey Creek, and Little West Fork Creek (Figure 4.6-1). These nine sub-watersheds are the primary management units in the Fort Campbell Watershed Management Plan (Fort Campbell, 2012c). All watersheds on the installation eventually drain to the Cumberland River, a tributary of the Ohio River, which drains to the Mississippi River and ultimately to the Gulf of Mexico. A more detailed discussion of each watershed can be found in the INRMP and the Water Management Plan (Fort Campbell, 2012c).

[4] Wet weather conveyances are watercourses that flow only in direct response to precipitation runoff, and do not support fish or organisms that include an aquatic phase of at least 2 months.

[5] Figure 4.6-1 and stream data cited in Chapter 4.6 are primarily compiled from Fort Campbell GIS data layers (Fort Campbell 2012e). The data, however, excludes streams located inside the impact areas. Access to impact and demolition areas is restricted due to hazards associated with training and unexploded ordnance; therefore, no natural resource management activities are conducted within impact and demolition areas, except for use of prescribed fire to manage vegetation. USGS data was used within the impact areas to assess stream resources (USGS, 2012).

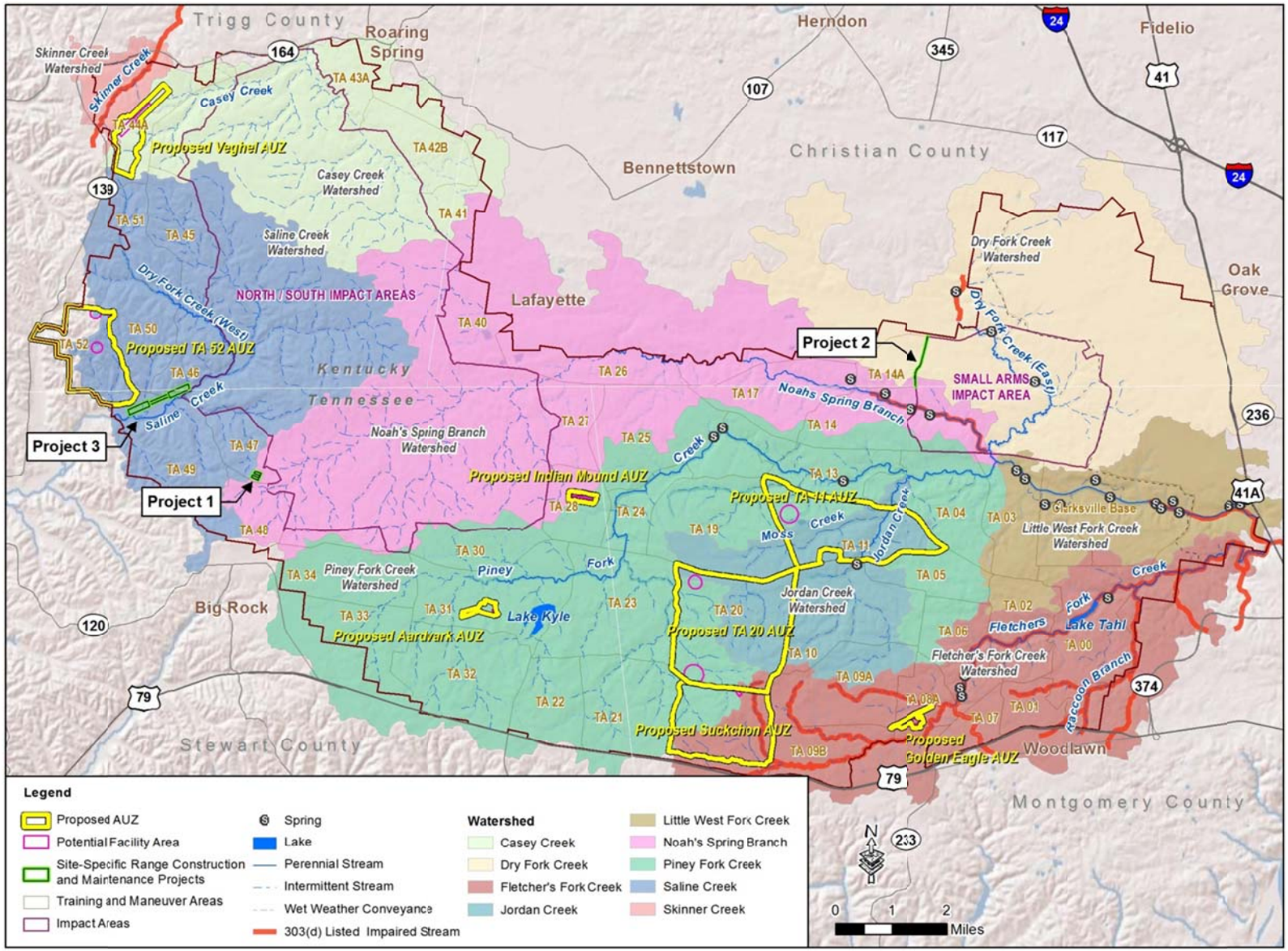


Figure 4.6-1. Fort Campbell Watersheds and Streams

Surface water resources on Fort Campbell provide food, water, shelter, and breeding sites for insects, fish, amphibians, waterfowl, and a variety of other wildlife. In particular, aquatic insects are a critical food source for the gray bat and the Indiana bat, both federally-endangered, that have been observed at Fort Campbell (see Section 4.7.1.3.1). Surface water is also used for recreation and the lakes (primarily Lake Kyle) are used for training. All training in streams and their buffers are avoided, and streams are crossed only at designated locations and using hardened crossings.

EO 11988, *Floodplain Management*, instructs Federal agencies to consider the location of floodplains in the siting and development of projects. Typically, projects involving the placement of structures (i.e., buildings, berms, inadequately sized bridges) that have the potential to affect floodwater elevations or flows are discouraged. There are a total of 3,342 acres of 100-year floodplains mapped at the installation. These are typically correlated with the floodplain soil series of Guthrie silt loam, Ocana gravelly silt loam, and Trace silt loam (see Section 4.5). The extent and location of 100-year floodplains are shown on Figure 2.1.

4.6.1.2 Surface Water Quality

The CWA requires each state to develop a program to monitor, assess and report on the quality of its waters. The TDEC, Division of Water Pollution Control (WPC) and the KDEP, Division of Water (KDOW), systematically assess their waters and determine where the water quality is impaired. The water quality of a stream is considered impaired, if it does not meet its designated use (e.g., Warm Water Aquatic Habitat). Impaired waters are reported annually to the USEPA and published on the state “303(d)” lists. Section 303(d) of the CWA requires states to prioritize and target water bodies on their list for development of water quality improvement strategies (i.e., TMDLs), and to develop such strategies for impaired and threatened waters.

Table 4.6-1 lists all the major streams on Fort Campbell, their designated uses, and water quality status for each designated use, if assessed. Table 4.6-2 lists all the streams that occurred on the TDEC (2010) or KDOW (2011) 303(d) list, and the course of the water quality impairments as well as the source when known[6]. The location of the impairments is also listed (and shown in Figure 4.6-1). Streams on the installation that occur on the Tennessee 2010 303(d) list are Fletcher’s Fork Creek (and its tributary, Raccoon Branch), Noah’s Spring Branch, and Little West Fork Creek (TDEC, 2010). Streams that occur on the Kentucky 2010 303(d) list are Dry Fork East Creek, Skinner Creek, and Casey Creek (KDOW, 2010). The impairments of Dry Fork East Creek and Casey Creek occur outside the Fort Campbell boundaries, but the contributing watershed is within the installation.

[6] The 303(d) list differs slightly from the 303(d) list cited in the INRMP since it references the TDEC 2004 and the KDOW 2003 303(d) lists. Since then, Piney Fork Creek has been delisted, and Noah’s Spring Branch has been added to the list.

Table 4.6-1. Designated Uses and Water Quality Status of Fort Campbell Streams

Sub-watershed	Designated Uses and Water Quality Status								
	Fish and Aquatic Life – Fish Consumption	Industrial Water Supply	Recreation – General	Livestock and Wildlife Watering	Irrigation	Warm Water Aquatic Habitat	Primary Contact Recreation	Secondary Contact Recreation	Fish and Aquatic Life – Fish, Wildlife, and Shellfish Protection and Propagation
Piney Fork Creek			NA	NA	NA				NA
Noah's Spring Branch			Good	Good	Good				**I**
Dry Fork East Creek	NA					**I**	NA	NA	
Fletcher's Fork/Raccoon Branch			NA	Good	Good				**I**
Jordan Creek			NA	Good	Good				Good
Little West Fork Creek		Good	Good	Good	Good				**I**
Saline Creek		Good	NA	Good	Good				Good
Casey Creek	NA					**I**	Good	NA	
Skinner Creek	NA					**I**	NA	NA	

Sources: TDEC, 2010. Year 2010 303(d) list; KDOW, 2011. Year 2010 303(d) list.

NA = Not assessed; I = Impaired

Note: Shaded grey cells indicate non-designated uses; e.g., Piney Fork Creek is not designated as Warm Water Aquatic Habitat.

Table 4.6-2. List of Impaired Waters (Cause and Source)

Sub-watershed	Location of Impairment	Distance (miles)	Cause and Source of Impairment
Noah's Spring Branch	From Little West Fork to KY Stateline (impact area)	2.8	Cause and source unknown
Dry Fork East Creek	5.8 to 6.6 mi (immediately outside Fort Campbell border)	0.8	Sediment/siltation, source unknown; Impaired portion of stream is outside of Fort Campbell; however, much of contributing watershed is on the installation (Cantonment and Impact Area)

Sub-watershed	Location of Impairment	Distance (miles)	Cause and Source of Impairment
Fletchers Fork Creek	From Little West Fork to headwaters – Fletchers Fork and Raccoon (includes Raccoon Branch)	25.3	Anthropogenic Substrate Alterations (habitat alteration) caused by non-point source (NPS) pollution from Military Base Facilities (Fort Campbell)[1]
Little West Fork Creek	Little West Fork from West Fork Red River to Fort Campbell Sewage Treatment Plant Outfall	9.9	Low dissolved oxygen, high total phosphorus, sediment/siltation. Probable sources are municipal point source discharge (sewage), and NPS pollution from military base (Fort Campbell)
Skinner Creek	Mouth to headwaters	5.8	Sedimentation/siltation from sources outside state jurisdiction or borders. Stream is impaired before entering into Fort Campbell. Very small contribution from Fort Campbell watershed
Casey Creek	From Little River to Skinner Creek	3.6	Sedimentation/siltation from sources outside state jurisdiction or borders. Impaired portion of stream is outside Fort Campbell boarders and occur after confluence of Skinner Creek (also impaired)

Sources: TDEC, 2010. Year 2010 303(d) list; KDOW, 2011. Year 2010 303(d) list; TDEC, 2012. Year 2012 303(d) list DRAFT

[1]TMDL assessments for both Fletchers Fork and Raccoon Branch were completed in 2011; a TMDL has not yet been assigned (Aerostat, 2011a and b; USEPA, 2012). These segments are delisted from the TDEC DRAFT 2012 303(d). Fletchers Fork Creek and Raccoon Branch were listed in 2001 due to a failing biorecon survey. Biorecon surveys conducted in 2009 by TDEC indicate the streams appear to have improved (TDEC WPC 2012 DRAFT 303(d) list). It is now thought that the appearance of impacts in 2001 may have been due to recent dry conditions. Fletcher Fork Creek and Raccoon Branch are both delisted in the TDEC 2012 DRAFT 303(d) list.

As shown in Table 4.6-2, a primary cause of stream impairment on Fort Campbell is siltation. Most of the soils on Fort Campbell are silt loams, which are highly erodible when disturbed (see Section 4.5). Suspended sediment degrades the water quality by increasing water temperatures and reducing light penetration and visibility. The sediment and runoff also carries agricultural nutrients and pesticides into the waterways. In addition, as the sediments settle, they smother spawning areas, aquatic insects, and submerged aquatic vegetation. As a result, several of the Section 303(d) streams on Fort Campbell are impaired due to siltation of aquatic habitat (do not meet their designated uses as aquatic habitat or fish, wildlife, and shellfish protection and propagation).

Surveys were completed and TMDLs developed recently for Fletcher's Fork Creek and Jordan Creek (Aerostat, 2011a and 2011b). The Fort Campbell Watershed Management Plan states that evaluation and data collection will take place in FY12 for Saline Creek, FY13 for Skinner Creek, and FY14 for Casey Creek. TMDLs will be developed for each of those watersheds the year following data collection. An extensive stream assessment, monitoring and evaluation will take place in FY12 for Jordan Creek, in FY13 for Fletcher's Fork Creek, in FY14 for Noah's Spring Branch, in FY15 for Piney Fork Creek, and in FY16-17 for Little West Fork Creek.

The TDEC Division of Water Pollution Control regulates “aquatic resource alteration” of perennial and intermittent streams, and wetlands (waters of the state) under Section 401 of the CWA. Tennessee does not require permits for alterations of wet weather conveyances (channelized ephemeral waterways) (Rules of TDEC Water Quality Control Board, Division of Water Pollution Control, Section 1200-4-7-03). The KDOW regulates water quality, including stream conservation and restoration in "waters of the state" under Section 401 of the CWA. Coordination and application for a 401 permit are required in Kentucky for disturbances of 200 or more linear feet of perennial streams. Intermittent streams and wet weather conveyances are not regulated as waters of the state in Kentucky (Fort Campbell, 2012c).

4.6.1.3 Fort Campbell Water Resource Management

4.6.1.3.1 Fort Campbell Training Mission and Water Resources Management

As previously stated, a primary cause of impaired streams on Fort Campbell is siltation caused by habitat modification including development of historical firebreaks and past training activities. Sediment deposition in streams ranges from moderate to severe and is the most serious water quality threat at Fort Campbell (Fort Campbell, 2012c). The effects of military training on water resources vary widely depending on the type and intensity of the training. The two most common types of training conducted at Fort Campbell are maneuvers and live-firing exercises. Maneuvering heavy wheeled or tracked vehicles can cause a high level of disturbance of soil and vegetation, and cause accelerated soil erosion and thereby sedimentation of nearby waterways. In particular, repeated maneuvering in a smaller area will create the most disturbances, and especially highly compacted soils may be difficult to rehabilitate. Mechanized maneuvers as well as artillery training have a medium to high level of impact on natural resources. These types of training activities require some type of rehabilitation after training has ceased in order to avoid or minimize long-term alteration of existing conditions (Fort Campbell, 2012c). Prior to training, proposed training activities and training site locations are coordinated with the Fort Campbell Environmental Division to screen for and avoid sensitive areas including highly erodible soils and riparian areas. Detailed recovery plans agreed upon by the units (e.g., National Guard) and Range are also required prior to training to ensure the land is recovered following the training exercise.

In addition to military training, vegetation management within the TAs also impact soil stability and indirectly water quality. Live fire ranges, for example, typically are cleared, or vegetated only with short herbaceous species, to facilitate training. Natural resource management on these ranges generally involves maintenance and monitoring of soil stability and management of vegetation primarily through use of prescribed fire and mowing. When the soils become void of vegetation after prescribed burning, they are very susceptible to erosion until the vegetation has become re-established. Disturbance from firing exercises also increases erosion. If the detached soil is allowed to reach waterways, they would have a negative effect on water quality as discussed in Section 4.6.1.2.

Five basic management techniques are used at Fort Campbell to minimize military training effects to the soil and vegetation, and therefore, water resources: (1) limit total use; (2) redistribute use; (3) modify kinds of uses; (4) alter the type(s) of training; and (5) manipulate the natural resources for increased durability. This is done through the ITAM Program (see Section 4.5.1.2.1).

4.6.1.3.2 Stormwater Management

Storm water runoff associated with construction activities is regulated by both Kentucky and Tennessee by the NPDES General Permit. Also, Fort Campbell is regulated by both states under the Municipal Separate Storm Sewer System (MS4) permitting program, for municipalities

and entities serving a population of less than 100,000 (Fort Campbell, 2005b). The KDOW has jurisdiction over the Lower Cumberland River watershed, which includes Casey, Saline, and Skinner Creek watersheds, while the TDEC has jurisdictional control over the Red River Watershed, which Little West Fork watershed belongs to. Storm water management and permitting is handled by the Fort Campbell Environmental Division, Compliance Branch.

The *Fort Campbell Policy for Storm Water Erosion and Sediment Control at Construction Projects* (for projects over 1 acre) establishes management of storm water, prevention of erosion, and control of sediment for construction or land clearing activities on the installation, and ensures that all activities are compliant with state permits (Fort Campbell, 2005b). The policy and its implementation is intended to provide a regulatory mechanism to ensure compliance of Fort Campbell's commitment to water quality sustainability, each state's storm water construction general permit, MS4 permit, and the future establishment of state TMDLs (see Section 4.6.1.2). Key elements of the policy include Construction Site Final Stabilization Guidance, Storm Water Construction NPDES Permit Notice of Intent and Notice of Termination, SWPPPs, Storm Water LID Requirements, and Forestry Management.

The KDEP and TDEC issues NPDES permits for storm water discharges to waters of the state, and require that a SWPPP is developed for each site. The SWPPP identifies potential sources of pollution, and includes storm water management controls such as sediment and erosion control, runoff-management, preventative maintenance, employee training, and more. It is required that the SWPPP incorporates specific LID strategies or IMPs (Integrated Management Practices) in order to implement the policies adopted at Fort Campbell and to achieve water quality and reduced runoff rate objectives. While no one technology may be appropriate or applicable to all projects, some measures will be required for all projects.

It is the policy of Fort Campbell to reduce storm water peak runoff rates during the design storm event to predevelopment levels. Predevelopment levels are defined as the peak rate of runoff that would be produced by the design storm event[7] from native grassland indigenous to the area. New project construction and storm water system uses design features that insure that post-development storm water runoff does not exceed pre-development runoff levels. Fort Campbell also requires that each new project must implement LID storm water management strategies or other IMPs. LID seeks to mitigate the impacts of increased runoff and storm water pollution by utilizing practices such as rainwater capture, native landscaping, onsite infiltration, conveyance, preserve exiting trees/vegetation, pervious construction materials, and detention/retention basins. LID can reduce the volume and intensity of storm water flows. In addition, incorporating green spaces into the overall master plan of the installation will help capture, retain and slow storm water, mimicking a more natural flow (Fort Campbell, 2012c).

Fort Campbell encourages the implementation of measures that require minimal operation and maintenance effort. Following is a list of LID strategies from the Unified Facilities Criteria (UFC) Design LID Manual (UFC 3-210-10, 2004) to minimize runoff volume and preserve existing flow paths:

- Grade to encourage sheet flow and lengthen flow paths.
- Maintain natural drainage divides to keep flow paths dispersed.
- Create small-scale drainage areas to reduce runoff volume.
- Disconnect impervious areas such as pavement and roofs from the storm drain network, allowing runoff to be conveyed over pervious areas instead.

[7]A design storm event is a theoretical storm event of a given frequency interval and duration used in the analysis and design of a stormwater and drainage facility.

- Preserve the naturally vegetated areas and soil types that slow runoff, filter out pollutants, and facilitate infiltration.
- Direct runoff into or across vegetated areas to help filter runoff and encourage recharge.
- Provide small-scale distributed features and devices that help meet regulatory and resource objectives.
- Treat pollutant loads where they are generated, or prevent their generation.

LID devices (otherwise referred to as IMPs) to minimize runoff volume, preserve existing flow paths, and maintain water quality include:

- *Bioretention*: Vegetated depressions that collect runoff and facilitate its infiltration into the ground.
- *Dry Wells*: Gravel- or stone-filled pits that are located to catch water from roof downspouts or paved areas.
- *Filter Strips*: Bands of dense vegetation planted immediately downstream of a runoff source designed to filter runoff before entering a receiving structure or water body.
- *Grassed Swales*: Shallow channels lined with grass and used to convey and store runoff.
- *Infiltration Trenches*: Trenches filled with porous media such as bioretention material, sand, or aggregate that collect runoff and exfiltrate it into the ground.
- *Inlet Pollution Removal Devices*: Small stormwater treatment systems that are installed below grade at the edge of paved areas and trap or filter pollutants in runoff before it enters the storm drain.
- *Permeable Pavement*: Asphalt or concrete rendered porous by the aggregate structure.
- *Permeable Pavers*: Manufactured paving stones containing spaces where water can penetrate into the porous media placed underneath.
- *Rain Barrels and Cisterns*: Containers of various sizes that store the runoff delivered through building downspouts. Rain barrels are generally smaller structures, located above ground. Cisterns are larger, are often buried underground, and may be connected to the building's plumbing or irrigation system.
- *Soil Amendments*: Minerals and organic material added to soil to increase its capacity for absorbing moisture and sustaining vegetation.
- *Tree Box Filters*: Curbside containers placed below grade, covered with a grate, filled with filter media and planted with a tree in the center.
- *Vegetated Buffers*: Natural or man-made vegetated areas adjacent to a water body, providing erosion control, filtering capability, and habitat.
- *Vegetated Roofs*: Impermeable roof membranes overlaid with a lightweight planting mix with a high infiltration rate and vegetated with plants tolerant of heat, drought, and periodic inundation.

4.6.1.3.3 Fort Campbell Watershed Management Plan

The Fort Campbell Watershed Management Plan (Fort Campbell, 2012c) was developed to identify strategies to delist Fort Campbell 303(d) streams and keep those, as well as the remainder of the streams, supporting their classified uses. This plan builds off the protection

measures contained within the INRMP, and contains the following 10 main watershed strategies.

1. Continue to execute the five year management cycle per the existing Watershed Management Plan, while balancing annual workloads of the Fort Campbell resource programs.
2. Establish baseline data to adequately characterize water quality and monitor progress of streams for all streams and calculate impervious surface acreage.
3. Develop TMDLs for impaired streams. Surveys were completed and TMDLs developed recently for Fletcher's Fork Creek and Jordan Creek (Aerostat, 2011a and 2011b).
4. Develop watershed stakeholders/partners group to help identify public concerns and values, develop consensus among affected parties, and produce efficient and effective solutions through an open, inclusive process.
5. Develop a priority list for stream repair and specific watershed action plans.
6. Update plan upon completion of first five goals and develop a timeline for and track stream repair/maintenance.
7. Incorporate better construction design that imitates natural flow regimes as well as incorporate green spaces into overall master plan and individual construction sites to prevent further degradation. This includes reducing impervious surfaces, compacted soils, and loss of mature vegetation through the use of LID designs.
8. Implement stream bank protection measures to include maintenance of riparian buffers and bridge flow, maintaining the quality of the 100-foot (perennial stream, lakes and ponds) or 50-foot (intermittent streams) vegetated riparian buffer, and developing a maintenance schedule to keep bridges free of debris to decrease erosion at the bridge abutments.
9. Increase watershed stewardship through watershed outreach and education for schools/community programs/home school associations.
10. Continue stream and watershed monitoring to assess the effectiveness and results of the watershed management strategies and plan.

4.6.1.3.4 Environmental Stewardship Guidelines

In an effort to comprehensively manage and protect water resources on Fort Campbell land, the INRMP outlines conservation standards and a number of management goals and objectives to improve, protect, and enhance water quality. With the implementation of the existing water resource environmental stewardship guidelines contained within the INRMP and SWPPP documents and compiled in Appendix F, the impact of training exercises are reduced as much as possible. After training exercises land evaluations will determine what remediation is needed, and if training is required to be rotated to another area while the land recovers (Fort Campbell, 2012c).

4.6.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, significant impacts to water resources would include the exceedance of TMDLs for sediments that causes a change in surface water impairment status, or an unpermitted direct impact to a water of the U.S. The following sections discuss the potential for adverse impacts to water resources for the No Action and Proposed Action Alternatives.

4.6.2.1 No Action Alternative

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in continued adverse impacts to water

resources (see Section 4.6.1.3.1). Existing Army management of natural resources at Fort Campbell would continue to reduce the adverse effects of military training as discussed in Section 4.6.1.3.

Fort Campbell would not implement any of the Proposed Actions; however, range construction projects would still continue, as needed, and would undergo a project-by-project evaluation under NEPA. Individual planning and siting of projects could possibly result in a future net increase of water resource impacts such as accumulated pressure on watersheds, whereas the programmatic AUZ approach would allow for a broad overview of existing range conditions, needs, and environmental resource constraints such as impaired streams. Fort Campbell, however, would still be required to comply with Federal and state water resource conservation and management regulations; therefore, overall adverse impacts would be less than significant.

4.6.2.2 Alternative 1

Table 4.6-3 summarizes the potential for adverse impacts to water resources. The text following the table supports impact conclusions made within the table by project.

Table 4.6-3. Summary of Site-specific Projects Water Resources Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial						
		Increased turbidity (construction)	Degraded water quality (operations)	Increased impervious surface/stormwater runoff	Permanent fill in floodplain	Channelization of stream	Loss of streambed	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	Min	Min	Min	N	N	N	Min
Construct a Gravel Foot March Trail	On The Line Road	Mod	Min	Min	N	N	N	Min
Construct a Runway with Glide Slopes	Saunders LZ	Mod	Mod	Mod	N	N	N	Mod

LZ = landing zone

Construction of the Driving Skid Pad would result in the loss of up to 7.2 acres of permeable surface resulting in an increase of storm water runoff. During construction of the driving skid pad, the potential for sedimentation of the nearby Noah's Spring Branch tributary would increase from surface water runoff, and short term degradation of water quality and aquatic habitat would be expected. Noah's Spring Branch is on the KDOW impaired waters list; however, the impaired section is not close to the Driving Skid Pad location (see Figure 4.6-1). Operations at the skid pad would increase the potential for oil and gas spills from vehicles used for practicing maneuvers; therefore, the probability of these pollutants to make it into the stream would also increase. Water quality conservation measures such as development of a site-specific SWPPP to minimize input of sediment, petroleum products, and other contaminants into the storm water system, and implementation of environmental stewardship guidelines listed in

Appendix F (e.g., enforcement of the riparian buffer zones) would reduce any water resources impacts to minor.

Construction of 1.7 acres of Gravel Foot March Trail would result in an increase in surface water erosion during construction (see Section 4.5.2.2) and storm water runoff from creation of semi-permeable surface (compacted soil, gravel trail). The Gravel Foot March Trail is located partly in the Dry Fork Creek (East) watershed and partly in the Noah's Spring Branch watershed. Both are listed on the KDOW impaired waters list (see Table 4.6-2), and the site is nearby both sections of impaired waters. The primary potential for adverse impacts to nearby impaired surface waters would be sedimentation during construction. The area of impact is stretched over a distance of 1.7 acres; application of environmental stewardship guidelines listed in Appendix F would reduce the potential for sedimentation to these water resources. The trail would be engineered with gravel to accommodate the foot traffic and prevent erosion during operations.

Construction of the Saunders Runway with Glide Slopes would result in a permanent conversion of 3.9 acres of forested riparian buffer zone associated with an intermittent stream within the Saline Creek watershed. These forested areas would be cleared and replaced with herbaceous cover to maintain required aircraft approach and departure clearances. Conversion of forested riparian buffer into herbaceous cover would increase the potential for sedimentation as the site is cleared and revegetated. In addition, the herbaceous riparian buffer would likely be prone to erosion and additional sedimentation during operations. As shown in Table 4.6-1, Saline Creek meets its designated water quality uses and is classified as "good".

Construction impacts would be short term, but moderate, due to the size of the area that would be disturbed, and the high erodibility of the soils (see Section 4.5.2.2). The erosive nature of the soil, and the close proximity of the project to Saline Creek tributaries, would cause moderate impacts to the stream from sedimentation. Loss of up to 17.4 acres of permeable surfaces would increase storm water runoff, and pollutants such as oil or gas that would be carried with the runoff. The impact of storm water runoff on the water quality of the Saline Creek tributary, however, would be minor due to SWPPP and NDPES requirements to minimize input of sediment, petroleum products, and other contaminants into the storm water system (see Section 4.6.1.3.2). Enforcement of the riparian buffer zones, and implementation of the goals and strategies summarized in Appendix F would further reduce water quality impacts. The proposed paved runway would be located on top of an existing dirt trail. Paving this area and treating the storm water according to the *Fort Campbell Policy for Storm Water Erosion and Sediment Control* Policy (see Section 4.6.1.3.2) and applying environmental stewardship guidelines listed in Appendix F would decrease impacts to water quality. Additionally, 2.2 acres of 100-year floodplain occur within forested areas proposed for clearing. No direct impacts would occur to floodplains; construction staging areas and equipment would not be stored within these locations to prevent any impacts in the event of a flood.

As Alternative 1 would not result in exceeding the TDMLs, change the classification or otherwise result in an unpermitted discharge for the affected watershed, adverse impacts would be less than significant.

4.6.2.3 Alternative 2

Table 4.6-4 summarizes the extent of environmental constraints within each AUZ and the potential for adverse impacts to water resources based on the likely potential activities (Chapter 2, Table 2.2).

Table 4.6-4. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts to Water Resources
TA 11	• 1.2 miles of perennial stream. • 2.7 miles of intermittent stream. • 3.7 miles of Wet Weather Conveyance. • 115.8 acres of riparian buffer. • 0.4 acres of 100-year floodplain. • Erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Piney Fork Creek tributary from construction. • Increased (long term) surface water runoff volume from increase in impervious surfaces. • Increased (long term) sedimentation from maneuver trails and tree clearing. • Potential loss of perennial stream. • Potential loss of intermittent stream. • Potential loss of WWC. • Potential loss of riparian buffer. • Potential loss of 100-year floodplain.
TA 20	• 3.8 miles of intermittent stream. • 6.1 miles of Wet Weather Conveyance. • 134.0 acres of riparian buffer. • Erodible soils prone to sedimentation. • Documented sink holes and their associated 100-foot buffers.	• Increased (short term) sedimentation of Piney Fork Creek tributary from construction. • Increased (long term) surface water runoff volume from increase in impervious surfaces • Increased (long term) sedimentation from maneuver trails and tree clearing; Piney Creek and Jordan Creek tributaries. • Potential loss of intermittent stream. • Potential loss of WWC. • Potential loss of riparian buffer. • Potential contamination of groundwater through sink holes.
TA 52	• 0.9 miles of intermittent stream. • 1.2 miles of Wet Weather Conveyance. • Steep slopes, very erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Saline Creek tributary from construction. • Increased (long term) surface water runoff volume from increase in impervious surfaces. • Increased (long term) sedimentation from maneuver trails and tree clearing. • Potential loss of WWC. • Potential loss of riparian buffer.
Aardvark LZ	• 0.3 miles of intermittent stream. • 3.0 acres of riparian buffer. • Erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Piney Fork Creek tributary from construction. • Slight increase (long term) in surface water runoff volume from increase in impervious surfaces. • Increased (long term) sedimentation from maneuver trails and tree clearing; Piney Creek and tributaries. • Potential loss of intermittent stream • Potential loss of riparian buffer.
Golden Eagle FLS	• Fletcher's Fork Creek sub-watershed – on 2010 303(d) list (impaired fish and aquatic life from NPS pollution). • Erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Fletcher's Fork Creek from construction activities. • Increased (long term) surface water runoff volume from increase in impervious surfaces • Increased sediment load to already impaired stream/stream.

Table 4.6-4. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts to Water Resources
Indian Mound LZ	• Noah's Spring Branch sub-watershed (partly) – on 303(d) list (impaired fish and aquatic life from unknown source). • Erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Noah's Spring Branch and Piney Fork Creek from construction activities. • Increased (long term) surface water runoff volume from increase in impervious surfaces. • Increased sediment load to already impaired stream.
Suckchon DZ	• 1.7 miles intermittent stream. • 0.7 miles of Wet Weather Conveyance. • 68.5 acres of riparian buffer. • Fletcher's Fork Creek sub-watershed – on 2010 303(d) list (impaired fish and aquatic life from NPS pollution). • Erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Fletcher's Fork Creek from construction activities. • Increased (long term) surface water runoff volume from increase in impervious surfaces • Increased sediment load to already impaired stream.
Veghel DZ	• Within Casey Creek sub-watershed – on 303(d) list (impaired aquatic habitat from siltation). • 0.4 miles of intermittent stream. • 8.6 acres of riparian buffer. • Erodible soils prone to sedimentation.	• Increased (short term) sedimentation of Casey Creek tributary from construction. • Increased (long term) surface water runoff volume from increase in impervious surfaces. • Increased (long term) sedimentation from maneuver trails and tree clearing. • Potential loss of intermittent stream. • Potential loss of riparian buffer. • Increased sediment load to already impaired stream.

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; NPS = non-point source; TA = training area; WWC = wet weather conveyance

Alternative 2 looks at the proposed AUZ areas that could potentially be impacted from future Fort Campbell range development activities. Development and training within each of these AUZs could result in significant adverse impacts to water resources through creating a potential for exceeding the TDML, and degrading surface water impairment statuses. Since Fort Campbell streams are already stressed, as indicated by the number of streams on the 303(d) list, additional impervious or exposed surfaces would further stress the streams/watersheds. The direct loss of waterways and associated riparian buffers and sedimentation of receiving waterways surrounding the AUZ would contribute adversely to surrounding surface water quality. Also, Fort Campbell soils are highly erosive and vulnerable to exposure and increases in storm water runoff (see Section 4.5).

As stated in Chapter 2, Alternative 2 serves as a planning tool for future development siting and understanding existing environmental constraints (e.g., surface waters, buffers, impaired waters) within the proposed AUZs, which could affect development or training. As a part of future planning, the management conservation measures listed below would be considered to reduce adverse impacts to water resources within each AUZ. The existing environmental stewardship guidelines listed in Appendix F would also be implemented as appropriate, however, due to the highly erosive nature of the Fort Campbell soils, and the sensitive nature of its water resources, the LID management measures below could further serve to mitigate any

adverse impacts to water resources. LID measures reduce the energy and velocity of storm water runoff, provide an area to allow the water to infiltrate into the soil, and capture and settle sediments before they reach waterways. This would also contribute to groundwater recharge, and cleaner surface water runoff to receiving streams. Recommended LIDs include:

- *Install or preserve vegetated buffer strips*. Vegetated buffer strips would be areas installed downgrade from areas of disturbance such as maneuver trails or areas, parking areas, village training sites, or paved runways and would intercept surface runoff. If possible, these could be areas of existing vegetation that is left undisturbed during clearing. If existing vegetation is of low quality, or area is barren, then appropriate native vegetation would be established with the purpose of providing a sustainable, low maintenance vegetative buffer between the area of disturbance and downgrade waterways. (LID summarized from PG CO, MD, 1999).
- *Construct bioretention areas*. A bioretention area is a soil bed with plants that filters runoff within a shallow depression having an underdrain system. Permeable soils with moderate to high infiltration rates are required, and the depth to bedrock must be at least 3 feet. Bioretention areas installed correctly capture runoff from runways, buildings, parking areas and other impermeable or semi-impermeable surfaces and significantly mitigate the effects of storm water sediment and volume loads to nearby streams.
- *Construct dry wells.* Dry wells are small pits backfilled with pea gravel and covered partly with soil that collects runoff from building rooftops. Permeable soils with moderate to high infiltration rates are required, and the depth to bedrock must be at least 3 feet. This LID would be appropriate for the proposed Range Support Building, latrines and hangars, and for buildings within the training sites.
- *Construct grass swales and infiltration trenches.* Grass swales and or infiltration trenches could mitigate impacts to surface waters by slowing down or guiding surface flow. Grassed swales could prevent or restructure the formation of gullies in hilly TAs or down gradient from impermeable or semi impermeable surfaces. Infiltration trenches could slow down runoff, capture suspended solids, and promote water infiltration.
- *Widen riparian buffers.* In areas down gradient of particularly highly erosive soils, steep slopes, intensive training (including maneuvering) riparian buffers could be widened to exceed 50 feet for intermittent streams. Most of the streams down gradient from the AUZs are intermittent streams, and some would benefit from a wider riparian buffer zone.

All construction projects would be done in compliance with Federal and state regulations as discussed in Section 4.6.1.3, a SWPPP would be developed and a NPDES general permit would be issued before construction would begin. In addition, Fort Campbell natural management programs and policies would be applied to each project to protect water resources (see Section 4.6.1.3).

Prior to construction of any project within the AUZs, the checklist (Appendix B) would be completed to determine whether the project would occur within close proximity of water resources so as to require a buffer, or would involve increased runoff or other actions that could adversely affect water resources. The checklist also makes sure that the project is in compliance with state and Federal regulations and permits, and determines whether coordination with KDEP and TDEC would be necessary and a NPDES permit required; therefore, impacts would be anticipated to be less than significant.

4.6.2.4 Alternative 3

Table 4.6-5 summarizes the potential type and intensity of water resource impacts as a result of routine range projects. The intensity of potential impacts consider use of existing environmental stewardship range construction guidelines that have been compiled and summarized in Appendix F.

Table 4.6-5. Summary of Routine Action Impacts on Water Resources

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial						
	Increased turbidity (construction)	Degraded water quality (operations)	Increased impervious surface/storm water runoff	Permanent fill in floodplain	Channelization of stream	Loss of streambed	**Overall Impact**
Contract O&E Target and Residue Removal	Min	Min	Min	N	N	N	Min
Culvert Installation/Maintenance	Mod	Min	N	Min	Mod	Mod	Mod
Drop Zone/Landing Zone Maintenance	Mod	Mod	Min	N	N	N	Mod
Low Water Crossing Site Creation & Maintenance	Mod	Mod	N	N	N	Min	Min
Maneuver Damage Repair	Min	B	B	N	Min	Min	Min
Maneuver Trail Creation, Hardening, & Maintenance	Mod	Mod	Mod	N	N	Mod	Mod
Observation Point Creation	Min	N	Min	N	N	N	Min

The routine actions listed in Table 4.6-5 could have varying impacts on water resources largely depending on how expansive each individual action is, and how well soil erosion prevention and water quality preservation measures and other environmental stewardship guidelines are carried out during both construction and operations. These projects could potentially cause significant adverse impacts to water resources, mostly from soil disturbance and sedimentation of surface waters. Following site selection of these routine projects, the checklist (Appendix B) would be completed to evaluate the potential for impacts. Actual direct impacts to surface waters, riparian buffers and acreage of the construction disturbance footprint would be determined. This would include determination of whether coordination with state or Federal regulators would be required for unavoidable impacts. The intent of the checklist is to identify specific environmental stewardship guidelines to minimize or avoid adverse impacts from construction of routine range projects.

The intensity of each impact within Table 4.6-5 has been estimated assuming standard construction conditions, and do not take the cumulative impact of several larger projects being executed at the same time in the same sub-watershed into consideration. It has been assumed that Fort Campbell environmental stewardship policy of avoidance of impacts to water resources would be followed during the planning phase of each site construction, and therefore, structures such as observation points would be placed outside of floodplains and stream riparian buffers.

Projects that have greater potential to cause moderate adverse impacts to water resources typically involves large areas (DZ/LZ maintenance), involves a high level of soil disturbance (maneuver trail construction) or have direct impacts on water resources (culvert installation, low water crossings). Projects that involve construction of a single structure (observation points) would be expected to cause only minor adverse impacts to water resources as long as conservation measures and policies are adhered to. Restoration projects (O&E removal and maneuver damage repair) would generally be expected to cause beneficial impacts to water resources compared to existing conditions. These projects would be aimed towards returning training land to sustainable conditions, and leveling and establishing vegetative cover would reduce soil erosion and sedimentation of surface waters.

4.6.2.5 Alternative 4

The reactivation of installation controlled airspace would have no adverse impacts to water resources. No ground disturbing activities would occur, which would have the potential to directly or indirectly adversely impact water resources.

4.6.2.6 Alternative 5

Implementation of Proposed Action Alternatives 1-4 would not create a greater adverse effect than those impacts described for each alternative; therefore, overall impacts would be less than significant. It is assumed that the existing environmental stewardship guidelines contained within Appendix F would be used in the siting and planning projects identified to minimize and avoid impacts to water resources. Furthermore, construction of projects identified in Alternatives 1 and 2, along with routine range and training land actions discussed in Alternative 3 would not all happen within the same geographic area or during the same construction season. These projects would be constructed throughout Fort Campbell as shown on Figure 4.6-1 and as funding becomes available, most likely between FY 14 – 19. As Alternative 5 would not result in exceeding the TDML, change the classification or otherwise result in an unpermitted discharge for the affected watershed, adverse impacts would be less than significant.

4.7 Biological Resources

4.7.1 AFFECTED ENVIRONMENT

Fort Campbell lies within the Interior Plateau ecoregion[8], which is locally characterized by the Western Pennyroyal Karst Plain (Francisco et al., 2011). Common biological communities include a mosaic of bluestem (*Andropogon/Schizachyrium* spp.) prairie and oak–hickory (*Quercus-Carya* spp.) forest with more mesic sites covered in mixed deciduous forest dominated by American beech (*Fagus grandifolia*) and oak. Upland woods are dominated by white oak (*Quercus alba*) with beech, red maple (*Acer saccharum)*, yellow-poplar (*Liriodendron tuliperfa*), and pignut hickory (*Carya glabra*). Fields of big bluestem (*A. gerardii*) and little bluestem (*S. scoparium*) also historically occur within this region. Scattered barrens (i.e., bluestem prairie dominated by little bluestem) are maintained at Fort Campbell and various nature preserves. On abandoned agricultural land, successional fields of broomsedge (*A. virginicus*) and sumac (*Rhus* sp.) and older successional forests of eastern redcedar (*Juniperus* v*irginiana*) and black locust (*Robinea pseudoacacia*) are common. Past and current anthropogenic influences within the local region include agricultural production (e.g., hay, cattle, cotton, corn, small grains, soybeans, and tobacco); expanding urban areas primarily surrounding Clarksville, Tennessee, and Hopkinsville, Kentucky; oil and gas production; and military reservation (Fort Campbell, 2012c).

Fort Campbell's TA consists of 89,687 acres. With the exception of roads, cleared areas, and structures associated with training and support facilities, most of the TAs consist of natural habitat including forests, grasslands and barrens, old fields, fields leased for agriculture, streams, lakes, and wetlands. Fort Campbell's INRMP (Fort Campbell, 2012c) provides documentation of the natural resources within the installation and management guidance. This plan is primarily used to support the affected environment discussion and on-going management actions at Fort Campbell described within this PEIS.

4.7.1.1 Vegetation

Undeveloped land on Fort Campbell consists of the following terrestrial habitat types, which are characterized by their plant communities: Grasslands and Barrens; Agricultural Fields; and Forest (Fort Campbell, 2012c). Fort Campbell also recognizes a "Riparian Zone" (riparian buffer) which correlates to higher functioning habitat associated with waterways. The distribution of these habitat types within the installation is presented on Figure 4.7-1. Appendix D of the INRMP contains a floristic inventory of Fort Campbell conducted in 1992, which inventoried 89 plant families and 423 species. General plant communities within the main four types of terrestrial communities are discussed within this section including the importance of Riparian Zones in habitat quality.

[8] Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance. Ecoregions are general purpose regions that are critical for structuring and implementing ecosystem management strategies across Federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources in the same geographical areas (USEPA, 2012).

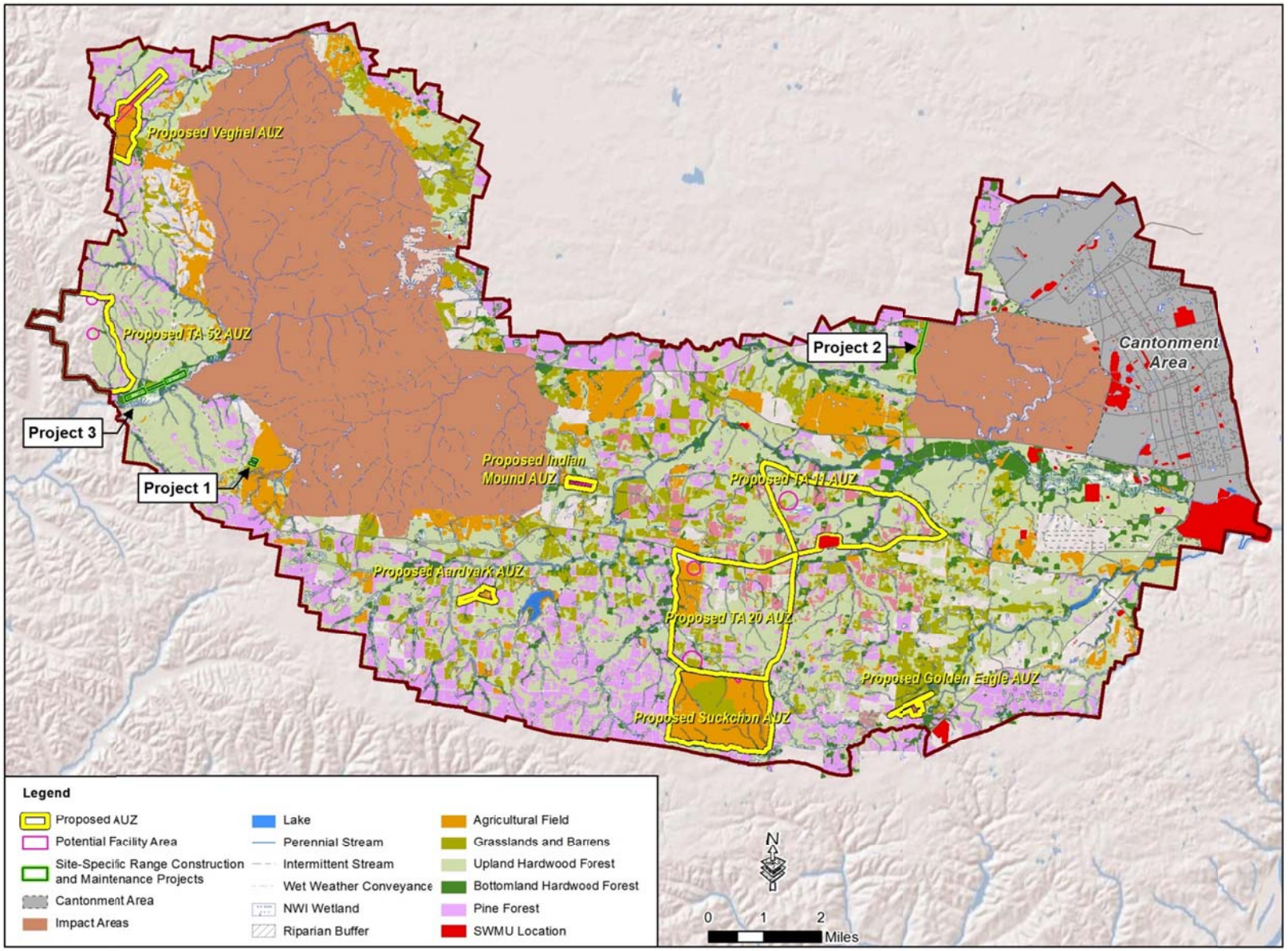


Figure 4.7-1. Fort Campbell Training Areas Terrestrial Habitat Types

4.7.1.1.1 Grassland and Barrens

The grassland barrens and old field communities (collectively referred to as open areas) includes 19,253 acres on Fort Campbell of non-forested areas that are not developed (built-up) and are not currently under agricultural outlease. These communities are characterized by primarily herbaceous-dominated communities with woody growth no taller than 21 inches high. Open areas demonstrate varying degrees of succession and can become overgrown by thick woody brush, which limits accessibility for training. As a result, a majority of open areas are maintained with prescribed fire to limit woody growth (Fort Campbell, 2012c).

Fort Campbell manages open areas using a four-tiered system to determine the value as TA, native grassland barrens community, or agricultural lease area. The following four tiers have been developed based upon presence of indicator floral species, and potential for restoration or cultivation (Fort Campbell, 2012c):

- **Tier 1** is composed of high quality native grassland barren sites with high priority for management and preservation.
- **Tier 2** is characterized by medium quality sites with potential for restoring a high quality barrens community with moderate levels of effort.
- **Tier 3** sites are low quality, degraded barren communities in which restoration would require a significant effort and several prescriptions for treatment.
- **Tier 4** is characterized by severely degraded fields not suitable for ecological restoration.

High and medium quality (Tier 1 and 2) native grassland barrens occupy 5,239 acres on Fort Campbell and are composed of moderate to tall perennial native warm season grasses such as big bluestem, broomsedge, two-edged panic grass (*Panicum anceps*), little bluestem, and Indian grass (*Sorghastrum nutans*). These communities have declined from historic levels due to cultivation, a lack of fire, invasive species, and development. Management of these communities at Fort Campbell has maintained one of the largest remaining remnant barrens east of the Mississippi River. Due to the uniqueness of these communities and the high level of endemic species, these grasslands are a high priority for protection by state and Federal agencies as designated natural areas. In 2001, Fort Campbell signed a Memorandum of Agreement with the TWRA and the KDFWR that establishes a cooperative means for re-establishing, enhancing, and protecting native warm season grasses on the installation, and allows the state agencies to harvest native warm season grass seeds from Fort Campbell.

Open areas on Fort Campbell that do not contain plant species associated with native grassland barrens are classified as old fields. Less than 500 acres of old field communities exist on Fort Campbell and are dominated primarily by grasses. Woody shrubs and trees, however, typically are present where fire has been absent for several years. These areas are often managed by prescribed fire to control growth of woody species to maintain conditions suitable for military training. In addition to training, old fields on Fort Campbell are used for hunting and provide wildlife habitat. Old fields containing patches of low-growing woody vegetation are an important component of habitat for wildlife.

4.7.1.1.2 Agricultural Fields

The agricultural fields within Fort Campbell consist of 6,185 acres of cropland (e.g., hay, wheat, corn, grain sorghum, and soybeans) managed by the Agricultural Lease Program. Hay fields typically contain perennial cool-season grasses and a variety of legumes (chiefly clover and alfalfa). The more abundant grasses include varieties of tall fescue (e.g., *Festuca arundinacea*), bluegrass (*Poa* spp.), orchard grass (*Dactylis glomerata*), and timothy (*Phleum pretense*) (Fort

Campbell, 2012c). Due to the agricultural management of these areas, biological diversity would be lower than other non-developed biological communities.

4.7.1.1.3 Forest

Forested areas occupy 49,812 acres on Fort Campbell and consist primarily of deciduous (hardwood) communities with pine plantations predominant in the southwest part of the installation. The three dominant forest types found on Fort Campbell as detailed in the Forest Management Plan (Appendix K of the INRMP) are summarized below. Analyses show that the general forest health on Fort Campbell is comparable to that of forests of the surrounding region (Fort Campbell, 2012c).

Between 1990 and 2000, 4,074 thousand board feet (MBF) of hardwood timber and 160,282 tons of pine products were sold by contract. Since Fort Campbell was established, a total of 52,455 MBF of hardwood and 346,079 tons of pine products have been sold. Sales have been administered through the USACE, Louisville District, though Fort Campbell was given authority to manage sales in-house in 1997. The expansion of a hardwood pulp industry into the local market has recently opened opportunities to generate income from additional forest management activities, including timber stand improvement (Fort Campbell, 2012c).

Upland Hardwood Forest

Upland hardwood forests are the dominant forest type on Fort Campbell and vary considerably in composition depending on topography, soil, and land use history. Dominant tree species include white oak, black oak (*Q. velutina*), northern red oak (*Q. rubra*), yellow poplar, hackberry (*Celtis occidentalis*), sweetgum (*Liquidambar styraciflua*), sugar maple, red maple (*A. rubrum*), American elm (*Ulmus americana*), and ash (*Fraxinus* sp.) (Fort Campbell, 2012c).

Bottomland Hardwood Forest

Bottomland hardwood forests are concentrated on broad floodplains and other poorly drained areas. Due to their position in the landscape, they are also associated with flooding regimes that range from periodic to permanent. Tree and shrub species characteristic of Fort Campbell's bottomland hardwood forests include sycamore (*Platanus occidentalis*), American elm, boxelder (*Acer negundo*), red maple, river birch (*Betula nigra*), white ash (*F. americana*), Japanese honeysuckle (*Lonicera japonica*), blackgum (*Nyssa sylvatica*), black cherry (*Prunus serotina*), white oak, multiflora rose (*Rosa multiflora*), blackberry (*Rubus* spp.), sassafras (*Sassafras albidum*), and coralberry (*Symphoricarpos orbiculatus*) (Fort Campbell, 2012c).

Pine Forest

Forests of planted pine trees (pine plantations) cover 11,734 acres of the installation. The forests consist primarily of loblolly pine (*Pinus taeda*) and other conifers including shortleaf pine (*P. echinata*), eastern white pine (*P. strobus*), and Virginia pine (*P. virginiana*). Of these, only Virginia pine and shortleaf pine are native to the region (Fort Campbell, 2012c). Due to the timber management of these areas, biological diversity would be lower than other forest communities as the even-aged pine stands are managed to only these few pine species.

4.7.1.1.4 Riparian Zones

Riparian zones (buffers) are ecologically important areas recognized by Fort Campbell for the protection of aquatic habitat (Fort Campbell, 2012c). Their position in the landscape adjacent to water bodies generally support biological communities distinct from the surrounding upland because the continually wet habitat allows development of riparian-dependent plant and animal communities. Plants in the riparian zone typically are tolerant of periodic flooding or saturated soils and plant debris into streams provide in-stream channel structure, increasing aquatic

habitat diversity while decreasing streambank erosion. Species diversity and productivity is also often greater in riparian areas because these areas contain species from both aquatic and terrestrial communities. Vegetation in the riparian zone protects water quality by controlling runoff flow, stream temperature, and reducing input of sediment, nutrients, and contaminants into surface water from activities in the subwatershed.

Riparian areas also form natural travel corridors for wildlife foraging, migration, and dispersal. When riparian areas are distinct from surrounding uplands, they can function as travel corridors and provide refuge for riparian-dependent species.

Due to the ecological significance and benefits provided by riparian zones, Fort Campbell maintains a 100-foot-wide vegetated buffer along each side of perennial streams (first-order and larger), lakes, and ponds. A 50-foot-wide vegetated buffer is maintained along each side of intermittent streams. Fort Campbell has 2,897 acres of riparian buffer management areas (see Figure 4.7-1). Within these areas, training and non-training activities that impact water quality and aquatic habitat are limited (e.g., timber harvest and creation of skid trails is prohibited).

4.7.1.2 Wildlife and Aquatic Life

Fort Campbell provides habitat for numerous terrestrial and aquatic species. An inventory of wildlife and aquatic species documented on Fort Campbell are located within Appendices D, I and N of the INRMP. General distributions of common wildlife and aquatic life are discussed within this section.

4.7.1.2.1 Mammals

Forty species of mammals have been recorded and/or documented on Fort Campbell (Fort Campbell, 2012c). Mammals inhabiting the installation include species typically found in forest and grasslands in the region, including bats (e.g., *Myotis* spp., *Lasiurus* spp.), beaver (*Castor canadensis*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*) bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), and coyote (*Canis latrans*). Small game species on the installation include coyote, gray fox, groundhog (*Marmota monax*), opossum (*Dasypus novemcinctus*), eastern cotton tail (*Sylvilagus floridanus*), raccoon, gray squirrel (*Sciurus carolinensis*) and fox squirrel (*Sciurus niger*). The white-tailed deer (*Odocoileus virginianus*) is the only large game mammal hunted recreationally on the installation. Most mammals found on Fort Campbell are locally common and are not protected by Federal or state law. Three federally-protected species are present on Fort Campbell; the Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) are listed as endangered, and the northern long-eared bat (*M. septentrionalis*) is listed as threatened (see Section 4.7.1.3 for more detailed information).

4.7.1.2.2 Birds

Fort Campbell has recorded 214 species of birds (Fort Campbell, 2012c). The installation supports diverse groups of songbirds, waterfowl, wading birds, and raptors. Certain species are present year-round, while others are present during limited seasons (e.g., nesting, wintering), or only occasionally during migration. Game birds found on Fort Campbell include the Wild Turkey (*Meleagris gallopavo*), Common Crow (*Corvus brachyrynchos*), Mourning Dove (*Zenaida macroura*), Northern Bobwhite (*Colinus virginianus*), and American Woodcock (*Philohela minor*); several species of waterfowl are also hunted. Great Blue Heron (*Ardea herodias*) rookeries are present in TAs 1, 11, 19, and within the Small Arms Impact Area near the Dry Fork Creek and Noah's Spring Branch confluence.

Migratory Birds

As a Federal agency, the DoD is required to comply with the Migratory Bird Treaty Act (MBTA) and EO 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds." The MBTA is an international treaty protecting migratory birds and their habitats. The MBTA prohibits take of migratory birds (and their nests, eggs, feathers, etc.) without a specific permit from the USFWS. EO 13186 states that Federal agencies must identify adverse effects of their actions on migratory birds, and develop a Memorandum of Understanding with the USFWS that promotes conservation of migratory bird populations and their habitats. Under the 2003 National Defense Authorization Act, the Secretary of the Interior was required to authorize incidental take of migratory birds during military readiness activities. The proposed exemption states that if the DoD determines that a proposed or ongoing military readiness activity has a measurable negative effect on a population of a migratory bird species of concern, the DoD must confer and cooperate with the USFWS to develop reasonable conservation measures to minimize or mitigate effects. Non-military readiness activities are not exempt from the MBTA or EO 13186. The DoD must obtain a Special Purpose Permit for non-military readiness actions involving take of migratory birds.

In 2005, Fort Campbell developed the Migratory Bird Management Strategy (MBMS), which is a conservation strategy for protecting and managing migratory birds on Fort Campbell. The MBMS describes Fort Campbell's duties under the MBTA and EO 13186, and provides management guidelines with respect to conservation planning, implementation and mitigation measures on the installation. Globally, 1,048 species are currently protected under the MBTA. The MBMS, however, focuses upon the 22 species of Birds of Conservation Concern (BCC) found on Fort Campbell. BCC are a subset of the species protected under the MBTA, and are designated by the USFWS as species deserving special consideration due to populations that are declining, small, restricted, or dependent upon vulnerable habitats. Most of the 22 species of BCC on Fort Campbell depend upon open grassland habitat. The Army has designated two species, Henslow's sparrow and Bachman's sparrow, as species at risk (see Section 4.7.1.3 for additional information).

Appendix I of the INRMP contains migratory bird species recorded on Fort Campbell and the installation's MBMS, including the process for evaluation of migratory bird habitat quality and conservation plans for 11 known breeding BCC species on Fort Campbell (Fort Campbell, 2012c). Two migratory bird nesting seasons occur within the Fort Campbell region; April 1 through July 15 for forest-dwelling nesting species, and April 15 through August 31 for ground nesting species (USFWS, 2013).

Fort Campbell examines the effect of land uses or management activities (e.g., training exercises, prescribed fire) within each habitat to identify effects to birds. Over 1,000 nests, representing several species of birds, have been monitored to investigate effects of training and management activities on productivity. Preliminary evidence suggests predation by snakes and mammals is the primary cause of nest failure. Training exercises appear to have a minor impact on nesting birds. The rate of nest predation on Fort Campbell is consistent with rates reported in other studies, and does not appear to be influenced by habitat suitability or activities specific to Fort Campbell (Fort Campbell, 2012c).

4.7.1.2.3 Reptiles and Amphibians

Previous surveys for reptiles and amphibians on Fort Campbell have identified 5 species of turtles, 4 species of lizards, 16 species of snakes (including two venomous species), 13 species of salamander, and 12 species of frogs and toads (Fort Campbell, 2012c). These species are recorded in Appendix D of the INRMP. Generally, the species of reptiles and amphibians

identified on Fort Campbell are relatively common and abundant in the region. The exception is the barking tree frog (*Hyla gratiosa*), which is deemed in need of management in Tennessee.

4.7.1.2.4 Fish

Previous fish surveys conducted in Fort Campbell streams and lakes indicate that approximately 60 fish species are present on the installation (Fort Campbell, 2012c). These species are recorded in Appendix D of the INRMP. The most common fishes identified include: stonerollers (*Campostoma oligolepis*), creek chubs (*Semotilus atromaculatus*), scarletfin shiners (*Lythrurus fasciolaris*), southern redbelly daces (*Phoxinus erythrogaster*), northern hogsuckers (*Hypentelium nigricans*), banded sculpins (*Cottus carolinae*), blackspotted topminnows (*Fundulus olivaceus*), bluegills (*Lepomus macrochirus*), longear sunfishes (*Lepomis megalotis*), fantail darters (*Etheostoma flabellare*), and Mamequit darters (*Etheostoma* sp).

4.7.1.2.5 Invertebrates

Previous invertebrate surveys on Fort Campbell have identified over 100 species of caddisflies, 27 taxa of mayflies (*Ephemeroptera*), 90 taxa of aquatic beetles (*Coleoptera*), 9 species of aquatic snails (*Gastropoda*); 10 species of crayfish, 26 stonefly (*Plecoptera*) taxa, 23 species of dragonflies and damselflies; and 42 species of butterflies (Fort Campbell, 2012c). These species are recorded in Appendix D of the INRMP.

Many of the streams on Fort Campbell do not provide suitable habitat for mussel fauna due to factors including intermittent flows, unstable substrate, and sediment deposition. The reach of the Little West Fork that occurs on Fort Campbell above the wastewater treatment facility provides the most stable habitat characteristics observed during previous mussel surveys; a large number of mussels were observed in Little West Fork Creek between the water intake facility and a small unnamed tributary entering from the north, near McNair Road (Fort Campbell, 2012c). Lists of recorded mussels are found in Appendix D of the INRMP.

4.7.1.3 Protected Species

Federally-listed threatened or endangered species receive protection under the ESA. All Army land uses, including military training and testing, timber harvesting, and recreation, are subject to ESA requirements for the protection of listed species and critical habitat. Management of federally-listed species on Fort Campbell is conducted in accordance with the ESA, Endangered Species Recovery Plans, and U.S. Army regulations and guidance. The USFWS is the primary Federal agency with which Fort Campbell cooperates on fish and wildlife management. The USFWS provides signatory agreement on the INRMP concerning conservation, protection, and management of the fish and wildlife resources.

4.7.1.3.1 Animals

Previous surveys for rare, threatened, and endangered animal species have been conducted within the installation, which included investigations of mammals, birds, reptiles, amphibians, fish, crustaceans, and mollusks listed by the USFWS, or monitored by Tennessee and/or Kentucky, and potentially occurring on or near Fort Campbell and in the surrounding area. Table 4.7-1 contains rare, threatened or endangered species observed at Fort Campbell and their conservation status (Fort Campbell, 2012c). As part of the PEIS effort, wildlife databases were also reviewed to describe the typical habitat where these species are likely to occur. Only two federally-protected species have been observed on the installation; the federally-endangered Indiana bat and the gray bat. No critical habitat, however, for the gray bat or Indiana bat exists on Fort Campbell. The bald eagle, which was formally a federally-threatened species, occasionally is observed on Fort Campbell in winter.

Table 4.7-1. Rare, Threatened, and Endangered Animal Species Observed on Fort Campbell

Scientific Name	Common Name	Status (Rank)			Habitat[1]
		Fed	KY	TN	
Myotis austroriparius	Southeastern Bat	--	E	--	**Cave/Forest/Riparian.** Typically hibernates in caves, often in association with Indiana bats. From about mid-April to late October, many may move into cavities in large, hollow trees often associated with bottomland habitats near water.
Myotis sodalis	Indiana Bat	E	E	E	**Cave/Forest.** Indiana bats hibernate in caves during the winter. Adult females and their young roost in hollow trees and under loose bark (typically trees > 3-inch diameter during the summer while adult males roost primarily in caves, using trees as temporary roosts.
Myotis grisescens	Gray Bat	E	E	E	**Cave.** Species is the most restricted of all mammals to cave habitat. They use caves year-round.
Myotis septentrionalis	Northern Long-Eared Bat	T	E	--	**Cave/Forest.** Use the Indiana bat habitat description for this species.
Nycticieus humeralis	Evening Bat	--	T	--	**Forest/Developed.** Primarily roost in hollow trees but can also roost in buildings or under bridges
Sorex longirostris	Southeastern Shrew	--	--	D	**Open Areas/Riparian.** Occurs in a variety of habitats, but often found in bogs, marshes, or swampy areas, or in dense ground cover (briers or honeysuckle vines) in wooded areas.
Synaptomys cooperi	Southern Bog Lemming	--	--	D	**Open Areas.** Prefers low areas of moist, grassy fields, meadows, or swamps with thick vegetation.
Zapus hudsonius	Meadow Jumping Mouse	--	--	D	**Open Areas/Agricultural/Riparian.** Prefer open-grassy fields, but also use hay fields, shrubby fields, fence rows, and edges of woods. They are frequently found in moist areas or near water.
Accipiter striatus	Sharp-shinned Hawk	--	S	D	**Forest.** Large stands of deciduous, coniferous, and mixed pine-hardwood forests and pine plantations.
Actitis macularia	Spotted Sandpiper	--	E	--	**Riparian.** Utilize a wide variety of wetland habitats including stream and river shorelines and shores of ponds and large reservoirs.
Ammodramus henslowii	Henslow's Sparrow	S	S	D	**Open Areas**. Large, flat, overgrown, moist fields, with scattered low shrubs or saplings. Typically found in native warm season grass fields, one year or more since burning, and unmowed hayfields.

Table 4.7-1. Rare, Threatened, and Endangered Animal Species Observed on Fort Campbell

Scientific Name	Common Name	Status (Rank)			Habitat[1]
		Fed	KY	TN	
Anas clypeata	Northern Shoveler	--	E	--	**Riparian.** Fresh-water areas with surrounding cover. Ponds, marshes, sloughs, and creeks.
Anas discors	Blue-winged Teal	--	T	--	**Riparian.** Fresh-water areas with surrounding cover. Ponds, marshes, sloughs, and creeks.
Ardea herodias	Great Blue Heron	--	S	--	**Riparian.** Freshwater areas along lakes and rivers.
Asio flammeus	Short-eared Owl	--	E	--	**Open Areas.** Marshes, prairies, grassy plains, old fields, and open woodlands.
Bubulcus ibis	Cattle Egret	--	S	--	**Open Areas/Agricultural/Riparian.** Wet pastureland and marshes, fresh water situations, dry fields, agricultural areas (especially irrigated ones).
Certhia americana	Brown Creeper	--	E	--	**Forest/Riparian.** Preferred habitat includes forest, woodlands, forested floodplains and swamps. Most often found in coniferous and mixed forests.
Chondestes grammacus	Lark Sparrow	--	T	T	**Open Areas/Agricultural.** Found in heavily grazed pastures, cultivated and fallow fields with brushy edges, and clearcuts planted in pines.
Circus cyaneus	Northern Harrier	--	T	D	**Open Areas/Agricultural/Riparian.** Open wetlands, meadows, pastures, prairies, grasslands, croplands, and riparian woodlands.
Cistothorus platensis	Sedge Wren	--	S	--	**Open Areas.** Grassy or shrubby fields and wet meadows.
Dendroica fusca	Blackburnian Warbler	--	T	--	**Forest.** Coniferous and mixed forest, open woodland, second growth.
Dolichonyx oryzivorus	Bobolink	--	S	--	**Open Areas/Agricultural.** Tall grass areas, flooded meadows, prairie, deep cultivated grains, and hayfields.
Egretta caerulea	Little Blue Heron	--	E	D	**Riparian.** Found along rivers, ponds, and lakes.
Empidonax minimus	Least Flycatcher	--	E	--	**Forest.** Open woodland and brushy areas, forest borders, thinned woodland, tall second growth.
Falco peregrinus	Peregrine Falcon	--	E	E	**Open Areas/Riparian.** Found in a variety of open habitats, including along lakes, rivers, and bluffs.
Fulica americana	American Coot	--	E	--	**Riparian.** Freshwater lakes, ponds, marshes, and larger rivers. Also on land bordering these habitats.
Ictinia mississippiensis	Mississippi Kite	--	S	D	**Forest/Riparian.** Found in mature woodlands and bottomland forests near the Mississippi River and other wooded western rivers.

Table 4.7-1. Rare, Threatened, and Endangered Animal Species Observed on Fort Campbell

Scientific Name	Common Name	Status (Rank)			Habitat[1]
		Fed	KY	TN	
Junco hyemalis	Dark-eyed Junco	--	S	--	**Forest/Open Areas.** Habitats include various sorts of coniferous, mixed, and deciduous forest; forest edge; forest clearings; open woodland; brushy areas adjacent to forest; and burned-over lands.
Lanius ludovicianus	Loggerhead Shrike	--	--	D	**Open Areas.** Short grasslands with isolated trees or shrubs, including pastureland, cropland, and old fields.
Lophodytes cucullatus	Hooded Merganser	--	T	--	**Riparian.** Streams, lakes, swamps, marshes, and estuaries; nests usually in tree cavities in forested regions near water.
Nycticorax nycticorax	Black-crowned Night-heron	--	T	--	**Riparian.** Marshes, swamps, wooded streams, mangroves, shores of lakes, ponds, lagoons; salt water, brackish, and freshwater situations
Pandion haliaetus	Osprey	--	T	--	**Riparian.** Occur primarily along rivers, lakes, and reservoirs.
Passerculus sandwichensis	Savannah Sparrow	--	S	--	**Open Areas.** Prefers habitat with short to intermediate vegetation height, intermediate vegetation density, and a well-developed litter layer.
Peucaea aestivalis	Bachman's Sparrow	--	E	E	**Open Areas.** Open mature pine woods, grassy old fields, young clearcuts, abandoned farmland, and occasionally young commercial pine plantations. Most habitats remain suitable for only 3 to 5 years unless regularly thinned and burned to reduce understory vegetation.
Phalacrocorax auritus	Double-crested Cormorant	--	E	--	**Riparian.** Lakes, ponds, rivers, and swamps.
Pheucticus ludovicianus	Rose-breasted Grosbeak	--	S	--	**Forest/Riparian.** Second-growth woods, mature forest edge, borders of swamps and wooded streams, dense growths of small trees.
Podilymbus podiceps	Pied-billed Grebe	--	E	--	**Riparian.** Occurs in ponds, sloughs, and marshes, in marshy inlets and along edges of rivers, lakes, and reservoirs.
Pooecetes gramineus	Vesper Sparrow	--	E	D	**Open Areas/Agricultural.** Short grass and weedy fields, meadows, heavily grazed fields with scattered shrubs, fence posts, or rocks for song perches.
Sitta canadensis	Red-breasted Nuthatch	--	E	--	**Forest.** Coniferous and mixed forest, aspen woodland.

Table 4.7-1. Rare, Threatened, and Endangered Animal Species Observed on Fort Campbell

Scientific Name	Common Name	Status (Rank)			Habitat[1]
		Fed	KY	TN	
Sphyrapicus varius	Yellow-bellied Sapsucker	--	--	D	**Forest/Riparian.** Young forests and along streams, especially in aspen and birch.
Tyto alba	Barn Owl	--	S	D	**Open Areas/Agricultural.** Along forest edge, hayfields, lightly grazed pastures, and wet meadows.
Vireo bellii	Bell's Vireo	--	S	--	**Open Areas/Forest/Riparian.** Dense, low vegetation, bushy fields, and young undergrowth in woodlands and forests usually near water.
Hyla gratiosa	Barking Tree Frog	--	S	D	**Forest/Riparian.** Found in wet woodlands and shallow ponds.
Cryptobranchus alleganiensis	Eastern Hellbender	--	S	D	**Riparian.** Found in clear fast-flowing rivers and streams that have abundant cover such as logs and debris.
Eumeces inexpectatus	Southeastern Five-lined Skink	--	S	--	**Forest/Riparian.** Wet pine flatwoods.
Thamnophis s. sauritus	Eastern Ribbon Snake	--	S	--	**Forest/Riparian.** Wetlands, swamps, ponds, lakes, vegetation surrounding aquatic habitats in woodland areas.
Esox niger	Chain Pickerel	--	S	--	**Riparian.** Vegetated lakes, swamps, and backwaters and quiet pools of creeks and small to medium rivers.

[1]Species preferred habitat descriptions came from online sources including Eastern Kentucky University Department of Biological Sciences, Kentucky Fish and Wildlife, 2013; NatureServe Explorer, 2013; and Tennessee Wildlife Resources Agency, 2013.

Status (Federal, State or Conservation Concern)

E = Endangered; T = Threatened; S = Special Concern; D = "Deemed in Need of Management"

The northern long-eared bat (*Myotis septentrionalis*) occurs in forested areas on Fort Campbell. The species was recently listed as "threatened" under the ESA (effective May, 2015). In response to the listing, the Army conducted a programmatic informal consultation for the northern long-eared bat with the USFWS under Section 7 of the ESA. The informal consultation identified criteria under which construction projects would be considered "Not Likely to Adversely Affect" northern long-eared bat (Informal Conference & Management Guidelines on the Northern Long-eared Bat [*Myotis septentrionalis*] for Ongoing Operations on Installation Management Command Installations, USAEC, May 2015).

Because the Indiana bat is also found on Fort Campbell, management for forest bats is completed at the more stringent levels supporting Indiana summer roosts. When screening each upcoming construction project, Fort Campbell will use the Army's programmatic informal consultation. The Army will conduct a Section 7 Consultation for any project that does not meet the criteria for "Not Likely to Adversely Affect". For environmental reviews in areas that preclude Indiana bats, Fort Campbell will follow the management guidelines found in the informal consultation.

Currently, Fort Campbell is conducting maternity roost surveys for the northern long-eared bat to meet requirements under the 4(d) Rule and the programmatic consultation. All located roosts will be protected in accordance with the programmatic informal consultation. Following the

survey, Fort Campbell will complete a programmatic ESA Section 7 documentation for the species. In addition, Fort Campbell is currently preparing an Endangered Species Management Component (ESMC) for this newly-listed species. The ESMC establishes a conservation program for the species in accordance with the ESA Section 7(a)(1) and supplements the Installation Natural Resources Management Plan, demonstrating a benefit to the species.

In January 2016, the USFWS issued a "Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions." Within the White-Nose Syndrome Zone, the final 4(d) rule prohibits incidental take of northern long-eared bats in their hibernacula, which may be caused by activities that disturb or disrupt hibernating individuals when they are present as well as the physical or other alteration of the hibernaculum's entrance or environment when bats are not present. Fort Campbell detected and confirmed presence of the disease in 2011 in one cave (Morgamie Cave) and in the Cold War era bunkers. All caves and cave-like structures are off-limits, and anyone entering those places must complete the USFWS/ White-Nose Syndrome decontamination protocols.

For species without specific Federal legal protection, but considered rare by KDFWR or TDEC, Fort Campbell does not manage at the species level, but rather at the ecosystem level (see Section 4.7.1.4). Management objectives are established to sustain a variety of natural habitat types likely to support a diverse group of species, including rare species.

Effective July 28, 2007, the USFWS removed the bald eagle from the list of threatened and endangered species due to meeting or exceeding established recovery goals throughout the species range. The species is still afforded Federal protection under the Bald and Golden Eagle Protection Act and the MBTA. Bald Eagles (*Haliaeetus leucocephalus*) are occasional visitors to the installation. A few eagles have been observed at Lake Taal and Lake Kyle; however, there are no records of nesting or foraging Bald Eagles on the installation.

Because of their federally-protected status, Fort Campbell has established specific management objectives for the gray bat and Indiana bat. In addition, the timber rattlesnake (*Crotalus horridus*) and two species of birds (Bachman's sparrow and Henslow's sparrow) that inhabit Fort Campbell are considered species at risk by the installation and are managed for conservation and protection. Due to their protection and conservation status, further information on these species is contained within this section.

Gray Bat

Gray bats forage on Fort Campbell from approximately April through September. Most perennial and some intermittent streams on Fort Campbell provide suitable foraging habitat for gray bats, and they have been identified in seven of the nine subwatersheds on Fort Campbell (primarily Fletcher's Fork, Piney Fork, Jordan, and Saline creeks' watersheds). Gray bats have not been identified in the Dry Fork East Creek Subwatershed, and no surveys for bats have been conducted in the Skinner Creek Subwatershed. No Critical Habitat, however, has been designated by the USFWS for the gray bat on Fort Campbell (Fort Campbell, 2012c).

Gray bats inhabit caves year-round, but the species is limited to a few caves that provide a narrow range of climate conditions. Different caves are occupied by gray bats during the summer maternity season and winter hibernation. Gray bat hibernacula (winter caves) are generally deep, vertical caves that act as cold air traps. Gray bats hibernate in clusters of up to several thousand individuals. Gray bats migrate to summer caves that provide microclimate conditions different than those in hibernacula. Reproductive females form maternity colonies in caves with warm interiors that are typically within about 0.5 mile of a water body (lake, reservoir, stream) that provides foraging habitat (USFWS, 1982). No caves providing suitable summer or winter roost habitat for gray bats are known to exist on the installation. Past surveys of the two

known caves on Fort Campbell have found no use by Indiana bats or gray bats. Caves near the installation, however, are occupied during summer and winter by gray bats, including Big Sulfur Spring Cave in Kentucky, and Tobaccoport and Bellamy caves in Tennessee (Fort Campbell, 2012c).

Gray bats typically forage over streams, reservoirs, and lakes, and through the adjacent riparian vegetation. Both large and small perennial streams provide suitable foraging habitat for gray bats. Forested riparian zones may improve the suitability of a river or reservoir for foraging gray bats. Forested corridors between caves and foraging areas are important to the survival of gray bats; forest is thought to provide cover from predators. The USFWS Gray Bat Recovery Plan recommends maintaining forested shorelines and riparian zones near gray bat maternity colonies (USFWS, 1982).

Gray bats primarily consume flying insects emerging from aquatic life stages. Terrestrial insects also are common prey. Studies comparing prey selection with prey availability have indicated gray bats are opportunistic feeders. Water pollution and siltation that adversely affect aquatic insect larvae may, therefore, also affect the survival of gray bat colonies (USFWS, 1982).

Indiana Bat

The USFWS recognizes “suitable habitat"(summer and/or winter) that is appropriate for use by Indiana bats. Suitable winter habitat (hibernacula) is restricted to underground caves and cave-like structures (e.g., abandoned mines, railroad tunnels); none of which is known to be present within the Proposed Action project areas. Suitable summer habitat for Indiana bats consists of the variety of forested/wooded habitats where they roost, forage and travel; forested blocks, linear features such as wooded fencerows, riparian forests, and other wooded corridors are all suitable summer habitat. Suitable summer habitat varies from dense to loose aggregates of trees with variable amounts of canopy closure (USFWS, 2011).

A suitable roost tree refers to a tree (live or dead) with a diameter at breast height (DBH) of 3 inches or greater that exhibits any of the following characteristics: exfoliating bark, crevices, or cracks (Fort Campbell, 2012c). A suitable primary maternity roost tree refers to a dead or partially dead tree that is at least 9 inches DBH and has cracks, crevices, and/or loose or exfoliating bark. Trees in excess of 16 inches DBH are considered optimal for maternity colony roosts (USFWS, 2007).

The Indiana bat has been documented in very low numbers on Fort Campbell during summer and autumn (approximately mid-April through September). No caves or mines providing suitable winter habitat for Indiana bats are known on the installation. Caves used by Indiana bats, however, are located within 5 miles. Results of several years of intensive, installation-wide mist net surveys suggest that small numbers of solitary male Indiana bats may occasionally inhabit Fort Campbell during summer and the spring/autumn migration periods. No female Indiana bats have been captured and no maternity colonies have been identified on the installation. No Critical Habitat for the Indiana bat has been designated by the USFWS on Fort Campbell (Fort Campbell, 2012c).

For approximately six months (mid-October through mid-April) each year, Indiana bats hibernate in caves or mines. A small percentage of available caves and mines offer the narrow range of climatic conditions (temperature, humidity, and air flow) required by the species. The period when bats leave the hibernaculum and migrate to summer habitat, called spring staging, occurs from approximately mid-April through early May. During the summer maternity season (approximately mid-May through mid-August), Indiana bats occupy summer habitat. They forage at night in upland and riparian forests, along wooded edges between forests and croplands, and

over fields. Indiana bats roost during daytime in upland or bottomland habitats under exfoliating bark or in crevices/hollows of live or dead trees, or occasionally in tree cavities (USFWS, 2011).

At the end of summer, from approximately mid-August through September, Indiana bats return to hibernacula and enter a period of activity near the hibernaculum, called swarming. Swarming is significant because most mating occurs during that period, and foraging during swarming helps individuals accumulate fat reserves necessary to survive winter in hibernation (USFWS, 2011).

Forest habitat is essential to the survival of the Indiana bat. Indiana bats utilize forested areas as roosting and foraging habitat in the spring, summer, and fall. Forested corridors between summer roosts and foraging habitat are important; Indiana bats may avoid open fields to travel along forested corridors, even if it increases commuting distance. Large-scale clear-cutting or other forms of extensive tree removal eliminate Indiana bat maternity and foraging habitat, and remove corridors between caves and foraging habitat, leaving the bats vulnerable to predation. Removal of riparian forest may also result in degradation of water quality and elimination of prey species (USFWS, 2007).

Bachman's Sparrow

The Bachman's sparrow is a DoD Species at Risk bird that is seasonally present on the installation and is one of only a few birds that are completely endemic to America. This species has strict habitat requirements consisting of a high volume of grasses and forbs, and some scattered trees and shrubs with an open under-story on dry, upland sites. Installation populations occur within and adjacent to the Impact Areas. Several live fire ranges have populations due to the frequent fires that simulate the habitat favored by the sparrow. The installation has seasonal management restrictions to ensure installation actions do not directly or indirectly impact this species.

Henslow's Sparrow

The Henslow's sparrow is a DoD Species at Risk and a potential candidate species under the ESA. The bird is one of the fastest declining songbirds in North America due to the loss of suitable grassland nesting habitat. The sparrow is rarely encountered on grassland fragments less than 75 acres. Fort Campbell actively monitors and manages habitat utilized by this species on the installation. Imposed seasonal mowing restrictions, during the breeding season, protect nesting sites.

Timber Rattlesnake

The timber rattlesnake is a DoD species at risk reptile that occurs throughout the rear maneuver space. The species occupies a variety of forested habitats near dens or rookeries. Rattlesnake populations are in decline due to habitat degradation, disturbances around dens or rookeries, and indiscriminant killings. Fort Campbell actively surveys for this species to determine home ranges and population size. Management efforts to protect known occupied forest habitat are included within the INRMP.

4.7.1.3.2 Plants

Fort Campbell does not support any federally-listed plant species; however, the installation does have 20 state-listed species. Table 4.7-2 lists rare, threatened or endangered plant species observed at Fort Campbell and their conservation status (Fort Campbell, 2012c). As part of the PEIS effort, plant databases were also reviewed to describe the typical habitat where these species are likely to occur.

Table 4.7-2. Rare, Threatened, and Endangered Plant Species Observed on Fort Campbell

Scientific Name	Common Name	Status (Rank)		Habitat[1]
		KY	TN	
Agalinis auriculata	earleaf false foxglove	E	E	**Open Areas.** Prairie-like glades, barrens, and openings.
Carex alata	broadwing sedge	T	--	**Open Areas/Forested/Riparian.** Marshes, wet thickets, and woods.
Eurybia hemispherica	Tennessee aster	E	--	**Open Areas.** Glades, barrens, and prairies.
Gymnopogon ambiguus	bearded skeleton-grass	S	--	**Forest.** Sandy pine woodlands.
Hieracium longipilum	hairy hawkweed	T	S	**Open Areas.** Fields and prairies.
Hydrastis canadensis	goldenseal	--	S	**Forest.** Mesic, deciduous forests.
Juglans cinerea	white walnut or butternut	S	T	**Forest/Riparian.** Rich woods of river terraces and valleys, also dry rocky slopes.
Lespedeza capitata	roundhead lespedeza	S	S	**Open Areas.** Dry, upland prairies.
Malus angustifolia	Southern crabapple	S	--	**Open Areas/Riparian.** Well drained, moist and acid soils of valleys and lower slopes, stream banks, borders of woodlands, fence rows, and old fields.
Muhlenbergia glabriflora	smooth-flowered hair grass	S	S	**Open Areas.** Edge of dry forests, in prairies, thickets, and along roadsides in pine and oak associations.
Oenothera linifolia	thread-leaf sundrop	E	--	**Open Areas.** Glades, rocky fields.
Panax quinquefolius	American ginseng	--	S	**Forest.** Full shade underneath deciduous hardwood species.
Phacelia ranunculacea	blue scorpionweed	S	S	**Forest/Riparian.** Riverine woods; moist alluvial forests.
Populus grandidentata	largetooth aspen	--	S	**Open Areas.** Pioneer tree after fires and logging and on abandoned fields.
Prenanthes aspera	rough rattlesnake root	E	E	**Open Areas.** Dry prairies.
Prenanthes barbata	barbed or bearded rattlesnake root	E	S	**Forest/Riparian**. Mixed hardwoods and riparian forests.
Rudbeckia subtomentosa	sweet coneflower	E	T	**Open Areas.** Wet to moderate moisture; prairies, meadows.
Scleria ciliata	fringed nutrush	E	--	**Open Areas.** Wet to dry, sandy soil in thickets, pinelands, and disturbed areas.
Silphium laciniatum	compass plant	T	T	**Open Areas.** Prairies, open, disturbed sites.
Silphium pinnatifidum	Southern prairie-dock	--	E	**Open Areas.** Wet or dry prairies, semi-disturbed areas.

[1]Species preferred habitat descriptions came from online sources including the Center for Plant Conservation, 2013 and eFloras, 2013.

State or Conservation Status: E = Endangered; T = Threatened; S = Special Concern

4.7.1.4 Fort Campbell Natural Resources Management Program

4.7.1.4.1 Ecosystem Adaptive Management

Fort Campbell manages terrestrial habitat for the purpose of conserving and enhancing existing flora and fauna and to conserve, protect, and sustain biological diversity while supporting the

military mission. Terrestrial habitat management activities are directed towards maintenance of healthy ecosystems and restoration of degraded ecosystems to pre-1942 functions and values.

To facilitate this effort, Fort Campbell uses an adaptive ecosystem management strategy to protect, conserve, enhance, and monitor resources and to adjust INRMP management objectives based upon the effects of management activities. Monitoring programs indicate whether management measures and strategies are effective in achieving intended objectives. This adaptive management approach preserves and enhances natural resources while providing the optimum environmental conditions required to sustain the military mission and realistic training conditions. Ecosystem management is an evolving management scheme. As new information and ideas are gleaned from current research, Fort Campbell's resource management will change to reflect the best information available.

Forest Management

The Forestry Program manages approximately 49,812 acres of forest on the installation. Forestry Program duties include prescribed burning, forest fire protection, firebreaks/forest access roads, forest product sales, forest improvements, forest monitoring, forest pest monitoring, planning, Environmental Quality Officer training, and environmental education. The Forest Management Plan (FMP) is the primary guidance for the Forest Management Program on Fort Campbell and is based upon the Ecosystem Management Approach. The FMP is located within the Fort Campbell INRMP as an appendix.

The FMP designates Desired Future Conditions (DFC) for each of the nine sub-watersheds on Fort Campbell. A DFC describes the forest structure and ecosystem components that will characterize the final state of a forest stand or sub-watershed. The FMP describes each DFC, the processes used to assign a DFC to individual forest stands, and the expansion to the watershed scale. Some of the DFCs established in the FMP support goals for training and other resources, including:

- Conversion of selected pine plantations to grasslands, which will expand available TA and support the restoration of native grasslands.
- Development/maintenance of old-growth forest to promote biological diversity and encourage additional habitat for endangered bats and other wildlife.
- Maintenance of conditions within impact areas and tactical concealment areas that promote training.
- Maintenance of conditions and forest management practices within minimum use areas including riparian zones, wetlands, and caves/karst that protect the quality of those resources.
- Maintenance of conditions in selected stands near the installation boundary that screen noise and military activity to minimize disturbance to residents outside the boundary.

Open Area Management

The Grassland Management Plan (Fort Campbell, 2012c) describes the basis for classifying each open area based upon factors such as slope, vegetation, presence of rare, threatened, or endangered species, and military training requirements. A management and use prescription for each open area has been developed, which may include prescribed burning, mechanical clearing, herbicide application or other techniques designed to maintain the parcel. The Plan describes routine monitoring of open areas designed to ensure desired physical characteristics and species are maintained. Incorporated into the Grassland Management Plan is a strategy for maintaining and expanding habitat for native warm season grasses. The Plan contains goals and techniques from wildlife management plans (e.g., grassland birds, quail, rabbit) for selected

open areas, and includes management prescriptions to maintain plant diversity and protection of rare plants found in open areas.

Ranges typically are cleared, or vegetated only with short herbaceous species, to facilitate training. Therefore, natural resource management on ranges generally involves maintenance and monitoring of soil stability and management of vegetation primarily through use of prescribed fire and mowing.

4.7.1.4.2 Fort Campbell Training Mission and Natural Resource Management

Primary management consideration is given to the management of indigenous listed, proposed, and candidate species habitats. Military training can have both negative effects on and positive benefits to natural resources. The two major types of training conducted are maneuvers and live-firing exercises. Impacts resulting from these activities include the destruction of terrestrial and aquatic habitat and soil erosion. Maneuver damage is by far the most widespread negative effect on the natural resources at Fort Campbell. Maneuvering heavy wheeled vehicles across even the best-suited landscapes can cause damage to vegetation and soils. For this reason, soils require timely land rehabilitation efforts at appropriate intervals. Vegetation as well as soils can be damaged by regular use on areas such as trails, bivouac sites, and firing points. In addition, vehicles can be a source of invasive species when relocating from other training sites. Wildlife populations can also be harmed by field equipment training, small arms firing, or by mission-related wildfires.

The intensity, severity, and types of resulting environmental impacts will depend to a great extent upon the type of units involved in training, where training activities are concentrated, and the duration of the action. Low impact activities are those that generally will not disturb the vegetation or soil and will require no rehabilitation. Medium impact activities may cause some disturbance or change that may require minor rehabilitation or may recover over time without aid. High impact activities typically cause significant change to the soils or vegetation of the area, which will require timely attention to avoid or minimize long-term alteration of existing conditions. Some training activities may be conducted at different levels of disturbance.

Five basic management techniques can be used to minimize military training effects to the soil and vegetation resources: (1) limit total use; (2) redistribute use; (3) modify kinds of use; (4) alter the behavior of use; and (5) manipulate the natural resources for increased durability.

Vehicle maneuvers, tracked and wheeled, have the potential to cause the greatest military-related impact to the Fort Campbell ecosystem. Vehicles used by the 101st Airborne Division and tenant units range from HMMWVs to MRAP vehicles. Military vehicle training may involve single vehicle maneuvers up to platoon or company-sized elements (approximately 6 vehicles/30 Soldiers per platoon). Soil compaction and erosion are the most probable results of vehicle maneuvers. Appropriate planning (e.g., avoiding steep slopes, highly erodible soil types, and wet soils) and preparation (gravelling of tank trails, etc.) can mitigate much substrate damage. Prior to training, proposed training activities and training site locations are coordinated with the Fort Campbell Environmental Division to screen for and avoid sensitive areas previously mentioned. Detailed recovery plans agreed upon by the units (e.g., National Guard) and Range are also required prior to training to ensure the land is recovered following the training exercise.

Bivouacking has impacts similar to civilian campgrounds. Soil compaction and trampling of vegetation increase runoff rates and may lead to higher erosion. There may also be a change in vegetation composition to more damage and disturbance tolerant species. During wet conditions, vehicles may create ruts if pulled off-road. Rotation of sites and careful site selection can minimize the damage caused by bivouacking.

The greatest benefit of the training mission is light to moderate military disturbance. Fort Campbell supports thousands of acres of barren/grassland habitat that requires periodic soil disturbances. Military training exercises provide soil disturbances that were once provided by the American bison (*Bison bison*). While other lands in the region have been converted to other uses, Fort Campbell has retained the natural character of the landscape, acting as a refuge for many rare plants and animals and threatened natural plant communities.

Natural succession has the biggest impact to the training mission. Although Fort Campbell supports a robust prescribed fire program, woody encroachment into open areas has the potential to displace aviation or artillery training actions due to rotor strike or projectile strike hazards. Aviation and artillery activities can occur in any field located within the TAs. Areas determined to be mission critical for these activities are frequently mowed to reduce these hazards.

4.7.1.4.3 Wildlife Management

The Fort Campbell Conservation Branch is responsible for maintaining healthy populations of game and non-game fauna on the installation, in a manner consistent with the military mission. As part of maintaining a diverse, self-sustaining ecosystem, the Conservation Branch maintains populations of non-game mammals, birds, amphibians, reptiles, fish, and invertebrates, and habitat suitable for those species, on the installation. Conservation Branch wildlife biologists conduct species inventories, monitor population trends, and manage habitat for non-game species. Species that are rare, imperiled, or otherwise declining are monitored, and habitat is managed to support declining species to the extent practicable.

Conservation Branch wildlife biologists develop and implement species-specific management plans, monitor population trends, and manage habitat for fish, wildlife, and invertebrate species. Management of fish and wildlife is integrated with forestry, agricultural leasing, land management, and the ITAM Program. In accordance with DoD and U.S. Army policies, fish and wildlife management on Fort Campbell is conducted in cooperation with the USFWS, KDFWR, and TWRA.

4.7.1.4.4 Endangered Species Management

Management of federally-listed species on Fort Campbell is conducted in accordance with the ESA, endangered species recovery plans, and U.S. Army regulations and guidance. The ESA requires all Federal agencies to conserve listed species. All Army land uses, including military training and testing, timber harvesting, and recreation, are subject to ESA requirements for the protection of gray bats, Indiana bats and northern long-eared bats.

The ESMC for Indiana bats and gray bats was prepared and authorized in 2001 and reauthorized in 2008. These are located within the Fort Campbell INRMP as appendices. An ESMC update (2013-2017) is currently in the approval process. Fort Campbell is seeking a Biological Opinion from the USFWS regarding the ESMC. AR 200-1 requires an ESMC for each installation where federally-listed species occur. The purpose of the ESMC is to ensure compliance with the ESA, while meeting the requirements of the military mission on the installation. The ESMC provides guidance for coordination with the Threatened and Endangered Species Program Manager to ensure proposed projects do not affect endangered bats. The ESMC also describes conservation goals and objectives developed to maintain or enhance suitable habitat for endangered bats on Fort Campbell. The ESMC covers a period of five years and is reviewed annually and updated as necessary.

Activities on Fort Campbell that potentially affect gray bats and/or Indiana bats adversely include:

- timber harvest activities,

- operation of tracked or wheeled vehicles on bare soil, vegetation, or other unimproved surfaces,
- operation of tracked or wheeled vehicles on unimproved stream crossings,
- excavation for engineering/force protection (e.g., foxholes, berms),
- construction without appropriate sediment control management,
- unimproved firebreaks lacking erosion control measures,
- improper use of pesticides,
- unstable streambanks, and
- untreated or poorly treated discharges into streams on the installation.

The protection of foraging and roosting habitat for Indiana and gray bats has led to the establishment of varying restrictions that apply to land use throughout the TAs. The installation has seasonal management restrictions to ensure installation actions do not directly or indirectly adversely affect either species. Because these bats typically (especially the gray bat) forage over water and in associated riparian areas, a substantial portion of their diet is insects with aquatic life stages. These bats also drink water from streams and lakes. Maintenance of good water quality is critical to management and conservation of the Indiana and gray bat on Fort Campbell. Chemical contaminants in water may be transferred to gray bats via drinking water or insects emerging from the water. Pollutants and silt may affect the survival of aquatic insects, which ultimately affects prey availability for gray bats. Fort Campbell regularly monitors the abundance and diversity of aquatic insect fauna in streams where bats forage. Annually, samples of aquatic insects are collected from 20 sites. Fort Campbell identifies insects in each sample and calculates the Index of Biological Integrity, the Ephemeroptera, Plecoptera, Trichoptera ratio, and the percentage of emerging species to evaluate water quality and availability of prey for gray bats (Fort Campbell, 2012c).

As previously stated, due to the ecological significance and benefits provided by riparian zones, including to the Indiana and gray bat, Fort Campbell maintains a 100-foot wide vegetated buffer along each side of perennial streams (first-order and larger), lakes, and ponds. A 50-foot wide vegetated buffer is maintained along each side of intermittent streams. Additionally, Fort Campbell restricts clearing of forested tracts to no larger than 20 acres, especially within the Casey Creek, Saline Creek, Fletcher's Fork, Jordan, and Piney Fork Creek subwatersheds as these subwatersheds lie between foraging areas and roost caves used by gray bats. Training actions are also restricted near caves and in and around foraging areas for the Indiana and gray bats (Fort Campbell, 2012c).

In addition, tree removal activities are seasonally restricted to ensure that no "take" of an endangered species occurs. Fort Campbell restricts removal of trees from 15 March until 15 November, to avoid harm to roosting Indiana bats. The Fort Campbell Endangered Species Program has also issued an Indiana bat tree evaluation procedure for single tree removal which includes the following steps to assess potential impacts (Fort Campbell, 2012c):

1. Fort Campbell biologists conducts a habitat assessment to evaluate potential Indiana bat habitat and provide final report to the USFWS.
2. If suitable roosting habitat is present within a proposed project area and tree removal cannot be avoided, Fort Campbell biologists will conduct acoustic monitoring and/or mist-netting surveys within that project area prior to project commencement.
3. In areas with little or no suitable habitat present, individual roosting structures can be surveyed between 15 May and 15 August from sunset to complete darkness. If no bats

are observed exiting the structure, the individual tree can be felled within 24 hours of survey.

4. Indiana bat management and monitoring procedures will adhere to the guidelines set forth in the 2012 Draft Revised Indiana Bat Summer Survey Guidance.

Fort Campbell has historically restricted 314 acres of training land seasonally because of training impacts to rare plant species and their habitats. The management and protection of species at risk (Bachman's sparrow and Henslow's sparrow) habitat, including mowing restrictions, was implemented by Fort Campbell to increase these species habitats and reduce impacts to these species during the nesting season. Seasonal restrictions, however, no longer exist for mowing due to loss of habitat from woody encroachment. Fields were becoming too woody to support nesting birds and military training.

Locations of regionally rare state-listed plant species are buffered with signs and are off-limits to military excavation or vehicular activity. These buffered locations vary in size, based on the size of the plant population and the presence of suitable habitat. With habitat improvement, plant numbers generally increase. These buffered locations have not created cumulative restrictions to land use. Endangered plants do however, on occasion, require some effort to ensure that training events resulting in earth disturbance do not impact listed species and candidates.

4.7.1.4.5 NOXIOUS, INVASIVE, AND PEST SPECIES

A noxious weed is any plant designated by a Federal, state, or local government as injurious to public health, agriculture, recreation, wildlife, or property. Noxious weeds are often defined as plants that are growing out of place, that are competitive, persistent, and pernicious. An invasive species is an alien (non-native) species whose introduction does or is likely to cause economic or environmental harm, or harm to human health (EO 13112). The USDA, Animal and Plant Health Inspection Service defines a pest species as any biotic agent (any living agent capable of reproducing itself) that is known to cause damage or harm to agriculture or the environment. The Kentucky Exotic Pest Plant Council (KEPPC) and the Tennessee Exotic Pest Plant Council (TNEPPC) maintain lists of exotic invasive plants in each state (Fort Campbell, 2012c).

EO 13112 requires coordination and enhancement of Federal activities to control and minimize the economic, ecological, and human health impacts caused by invasive species. The term non-native reflects only the origin of the plant and not its ecology. Therefore not all alien or non-native plants are invasive (in fact, only a small fraction of them are). Department of the Army Memo "Army Policy Guidance for Management and Control of Invasive Species" (26 June 2001) provides guidance on implementing the EO. A survey completed on Fort Campbell indicates several noxious plant species on the installation are listed as exotic invasive plants by the KEPPC and/or the TNEPPC. Table 6 of the INRMP contains a list of exotic invasive plants on Fort Campbell that are listed as threats by the state exotic pest plant councils (Fort Campbell, 2012c).

On Fort Campbell, vegetation control is needed primarily along railroad rights-of-way, in areas containing state-listed or rare plants, in graveled areas, along motor pool fences, and within the impact areas. Selective control of noxious weeds is also practiced in agricultural fields, native grass barrens, and old fields. The Fort Campbell INRMP contains the Fort Campbell Integrated Pest Management Plan as an appendix.

4.7.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, significant impacts would include 1) substantial permanent conversion or net loss of habitat at landscape scale; 2) long-term loss or impairment of a substantial portion of local habitat (species-dependent); and 3) unpermitted "take" of threatened and endangered

species or species protected under the MBTA. The following sections discuss the potential for adverse impacts to biological resources for the No Action and Proposed Action Alternatives.

In addition to the discussion below, as part of the PEIS, a draft BA is being prepared for the Indiana and gray bat, which includes the effects of current training and potential future training activities of the Proposed Action Alternatives on the protected bat species. The BA concludes that the Proposed Action Alternatives "may affect but not likely to adversely affect" either species; however, implementation of conservation and protection measures as outlined in the ESMC would result in "no effect" (Fort Campbell, 2013c). "No effect" means there would be no impacts, positive or negative, to listed or proposed resources. This BA will be submitted to the USFWS for review and concurrence. A discussion of relevant measures to reach the "no effect" determination is contained within the alternative discussions below.

4.7.2.1 No Action Alternative

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These activities would be anticipated to result in continued adverse impacts to biological resources (see Section 4.7.1.4.2). Section 4.7.1.4 discusses existing Army management of biological resources at Fort Campbell to reduce the adverse effects of military training and also to provide beneficial impacts to protected and unique biological resources located on Fort Campbell.

Fort Campbell would not implement any of the alternatives; however, range construction projects would still continue as needed and would undergo a project-by-project evaluation under NEPA. Individual planning and siting of projects could result in a future net increase of biological resource impacts such as fragmentation or development within riparian areas, whereas the programmatic AUZ approach would allow for a broad overview of existing range conditions, needs, and environmental resource constraints. Fort Campbell, however, would still be required to comply with Federal and state biological resource conservation and management regulations; therefore, overall adverse impacts would be less than significant.

4.7.2.2 Alternative 1

Table 4.7-3 summarizes the potential for adverse impacts to biological resources. The text following the table supports impact conclusions made within the table by project.

Table 4.7-3. Summary of Site-specific Projects Biological Resources Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial						
		Approximate acreage of potential vegetation impact	Permanent loss or conversion of vegetation	Loss of wildlife habitat	Impacts to TES habitat	Impact to migratory bird nesting	Impact to aquatic habitat	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	7.2	Min	Min	N	N	N	Min
Construct a Gravel Foot March Trail	On The Line Road	2.8	Min	Min	Min	Min	N	Min
Construct a Runway with Glide Slopes	Saunders LZ	57.4	Mod	Mod	Mod	Mod	N	Mod

LZ = landing zone

Construction of the Driving Skid Pad would result in a permanent loss of vegetation and terrestrial wildlife habitat; approximately 7.2 acres of barren habitat. As shown on Plate 1 of Appendix C, a majority of the proposed site is located in an area of barrens already experiencing degraded habitat from training activities. This area is characterized by a combination of exposed soils and herbaceous vegetation periodically maintained through mowing and has limited growth due to training regimes. These existing disturbances would make it unlikely for any species at risk to be present. Additionally, no habitat for the federally-listed Indiana or gray bats is present. A potential exists for impacts to migratory birds, however, the quality of existing habitat and training disturbance regime at the site would make the potential for nesting species unlikely. Operations of the proposed training facility would create the potential for collisions with wildlife; however, the presence of military training would likely create avoidance of most species. Overall adverse impacts from construction and operations would be anticipated to be minor.

Construction of the Gravel Foot March Trail would result in a permanent loss of vegetation and terrestrial wildlife habitat; approximately 1.7 acres barren and 1.1 acres of forested habitat. Plate 2 in Appendix C shows the general layout and location of the proposed trail. Construction would occur along edge of the existing On-The-Line Road and would disrupt edge habitat characterized by a periodically maintained herbaceous road shoulder and forest edge.

Road shoulder habitat and forest edge[9] tend to be lower quality habitat for migratory bird species; therefore, a lower potential would exist to disrupt migratory bird species including species at risk. Impacts to migratory birds if present would be minimized if clearing was conducted outside of the migratory bird season (April 1 – July 15 for forest clearing and April 15 – August 31 for brush or grassland clearing). The clearing of edge habitat would cause a minor reduction in adjacent interior forest as the "edge" would effectively be shifted inward by up to 20 feet. In addition, tree clearing activities (up to 1.1 acres) would result in the clearing of mature trees, which could provide suitable roosting habitat for Indiana bats. Avoidance and minimization measures for bats are discussed at the end of this section. Operations of the proposed march trail would not be anticipated to cause adverse impacts to wildlife.

Construction of the Saunders Runway with Glide Slopes would result in a permanent loss of vegetation and terrestrial wildlife habitat; up to 17.4 acres barren habitat. In addition, creation of the glide slopes would result in a permanent conversion of up to 40 acres of forest to herbaceous or low-lying shrubs to achieve and maintain the landing and take-off departure slopes necessary for aircraft. Approximately 3.9 acres of this forested conversion would occur within riparian zone. As shown on Plate 3 of Appendix C, a majority of the proposed runway site is located within and along an existing dirt trail and in an area of barrens already experiencing degraded habitat from training activities. Construction of the runway, would therefore, be anticipated to have minimal impacts to biological resources and would be similar to those described under the Driving Skid Pad project. The clearing of forested areas to achieve the necessary glide slopes would cause a reduction of interior forest, resulting in habitat fragmentation and conversion. This impact would be less than significant and suitable interior forest within Fort Campbell exists and the overall quantity of interior forests has increased from historic (20th century) levels (also see Chapter 5). In addition, tree clearing activities of up to 40 acres would result in the clearing of mature trees, which could provide suitable roosting habitat for Indiana bats and habitat for migratory bird species. Impacts to migratory birds would be minimized if clearing was conducted outside of the migratory bird season. Impacts to bats would be reduced to less than significant levels through measures discussed at the end of this section. The removal of approximately 40 acres of forest within the Saline Creek Watershed (a watershed recognized by Fort Campbell as priority foraging habitat for the Indiana and gray bat would constitute a moderate adverse impact to these species' foraging habitat. This disturbance, however, would represent less than 1 percent of the total forested area within the Saline Creek Watershed within Fort Campbell. Operations of the proposed runway would create the potential for BASH (see Section 4.2.3); however, overall impacts from operations would be anticipated to be minor. Additionally, maintenance of the glide slopes (prevention of tree growth) would be required to maintain appropriate clearance in the glide slopes; however, these maintenance impacts would also be anticipated to be minor.

Adverse impacts to this federally-protected species would be reduced or avoided through the following minimization measures:

- Fort Campbell restricts removal of trees from 15 March until15 November, to avoid harm to roosting Indiana bats. Fort Campbell has also issued an Indiana bat tree evaluation procedure for single tree removal in the non-harvest period and removal requires

[9] "Edge" habitat occurs where two different habitat types meet, and in human-influenced areas (agricultural, road shoulder, suburban, etc.) the edge is often very abrupt. Opportunistic and adaptable animals operate well in these fragmented edge habitats such as raccoons, foxes, skunks, opossums, squirrels, rat snakes, crows, blue jays, grackles and feral and pet dogs and cats. These species impact bird populations by eating eggs, young birds and even adults. In addition, other non-native birds like European Starlings compete with native cavity nesting birds for nest sites and non-native invasive plants like Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*) and Japanese grass (*Microstegium vimineum*) encroach into these areas, limiting the growth of native plants, disrupting natural succession and limiting vegetative and structural diversity. All factors which impact habitat quality and bird populations.

approval from the Forestry Program, and the comment of the Endangered Species Coordinator. This would apply to all projects involving tree removal activities including the proposed Saunders LZ Runway and Glide Slopes, Gravel Foot March Trail and Range 26 ROCA projects. The Endangered Species Coordinator will ensure seasonal restrictions are implemented, and, if necessary, lead coordination with the USFWS.

- Other than clearcuts prescribed for management of forest pests or sanitation cuts, clearcuts in the Casey Creek, Saline Creek, Fletcher's Fork, Jordan, and Piney Fork Creek subwatersheds will be minimized to blocks no larger than 20 acres. These subwatersheds lie between foraging areas and roost caves used by gray bats. All projects, with the exception of the proposed Saunders LZ Runway and Glide Slopes, fall well below the 20-acre threshold. As described above, approximately 40 acres of clearing would be required for the necessary approach and departure glide slopes associated within the proposed Saunders LZ Runway.

Based on the April 1, 2015 ruling, the northern long-eared is listed as threatened. Fort Campbell is conducting surveys for the presence of maternity roosts on the installation. All located roosts will be protected in accordance with the Programmatic Informal Consultation on the northern long-eared bat with the USFWS under Section 7 of the ESA. Fort Campbell will use the Army's Programmatic Informal Consultation for northern long-eared bat when screening each upcoming construction project, and will conduct local Section 7 Consultation for any project that does not meet the criteria for "Not Likely to Adversely Affect".

The implementation of all of the site-specific projects would be anticipated to have less than significant adverse impacts to biological resources provided avoidance and minimization measures to protected species and species at risk are adhered to (Gravel Foot March Trail and Runway with Glide Slopes). No substantial permanent conversion or net loss of habitat (including species-dependent) would occur at a landscape level and no unpermitted take of protected species would be anticipated. Operations of these projects would not be anticipated to have an adverse impact on biological resources.

4.7.2.3 Alternative 2

Table 4.7-4 summarizes the extent of environmental constraints within each AUZ and the potential for adverse impacts to biological resources based on the likely potential activities (Chapter 2, Table 2.2).

Table 4.7-4. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts to Biological Resources
TA 11	• Undeveloped areas are predominantly forested (87.4 percent) comprised of 1,098.3 acres upland hardwoods, 303.6 acres pine, and 143.6 acres bottomland hardwood forest. • Occurs within the Jordan Creek subwatershed; clear-cutting of forest is targeted less than 20-acre tracts to preserve bat foraging habitat. • Extent of forest cover indicates a likely potential for Indiana bat habitat. • 223.6 acres barren. • • 115.8 acres riparian.	• Loss of habitat. • Habitat fragmentation and loss of interior forest. • Potential for impacts to Indiana bat through tree clearing activities. • Potential impacts to Indiana and gray bat foraging habitat from tree clearing in Jordan Creek subwatershed to accommodate tree harvesting for establishing maneuver areas and maneuver trails. • Potential impacts to species at risk through disturbance of barrens. • Potential impact to migratory bird species through vegetation clearing activities. • Potential impact to aquatic habitat and riparian zones.
TA 20	• Undeveloped areas are predominantly forested (71.3 percent) comprised of 1,319.3 acres upland hardwoods, 402.9. acres pine, and 100.0 acres bottomland hardwood forest. • Extent of forest cover indicates a likely potential for Indiana bat habitat. • Occurs within the Piney Fork Creek and Jordan Creek subwatersheds; clear-cutting of forest is targeted less than 20-acre tracts to preserve bat foraging habitat. • 734.9 acres barren. • Extent of barren habitat indicates a likely potential for species at risk occurrence. • 134.0 acres riparian.	• Loss of habitat. • Habitat fragmentation and loss of interior forest. • Potential for impacts to Indiana bat through tree clearing activities. • Potential impacts to Indiana and gray bat foraging habitat from tree clearing in Piney Fork Creek and Jordan Creek subwatersheds to accommodate tree harvesting for establishing maneuver areas and maneuver trails. • Potential impacts to species at risk through disturbance of barrens. • Potential impact to migratory bird species through vegetation clearing activities. • Potential impact to aquatic habitat and riparian zones.

Table 4.7-4. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts to Biological Resources
TA 52	• Undeveloped areas are forested comprised of 376.43 acres upland hardwoods, 30.8 acres pine, 7.5 acres bottomland hardwood forest, and an additional 680.8 acres of forest not characterized. • Extent of forest cover indicates a likely potential for Indiana bat habitat. • Occurs within the Saline Creek subwatershed; clear-cutting of forest is targeted less than 20-acre tracts to preserve bat foraging habitat. • 22.7 acres riparian.	• Loss of habitat. • Habitat fragmentation and loss of interior forest. • Potential for impacts to Indiana bat through tree clearing activities. • Potential impacts to Indiana and gray bat foraging habitat from tree clearing in the Saline Creek subwatershed to accommodate tree harvesting for establishing maneuver areas, trails, and a drop zone. • Potential impacts to species at risk through disturbance of barrens. • Potential impact to migratory bird species through vegetation clearing activities. • Potential impact to aquatic habitat and riparian zones.
Aardvark LZ	• Undeveloped areas are predominantly barren (93.5 percent) consisting of 52.6 acres barren. • Most of barren habitat has been previously disturbed from military training, and therefore, unlikely to contain species at risk. • 3.6 acres of upland hardwoods located along periphery of AUZ boundaries. • 3.0 acres riparian.	• Loss of habitat. • Potential for impacts to Indiana bat through tree clearing activities. • Potential impact to migratory bird species through vegetation clearing activities. • Potential impact to aquatic habitat and riparian zones. • Although AUZ occurs within the Piney Fork Creek subwatershed; lack of forest acreage would not trigger 20-acre or greater clear-cutting conservation threshold.
Golden Eagle FLS	• Undeveloped areas are barren; 49.5 acres. • Most of barren habitat has been previously disturbed from military training, and therefore, unlikely to contain species at risk.	• Loss of habitat. • Potential impact to migratory bird species through vegetation clearing activities. • Although AUZ occurs within the Fletcher's Fork Creek subwatershed; lack of forest would not trigger 20-acre or greater clear-cutting conservation threshold.
Indian Mound LZ	• Undeveloped areas are barren; 50.3 acres. • Most of barren habitat has been previously disturbed from military training, and therefore, unlikely to contain species at risk.	• Loss of habitat. • Potential impact to migratory bird species through vegetation clearing activities. • Although AUZ occurs within the Piney Fork Creek subwatershed; lack of forest would not trigger 20-acre or greater clear-cutting conservation threshold.

Table 4.7-4. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts to Biological Resources
Suckchon DZ	• Undeveloped areas are predominantly barren (98.8 percent); 1,413.2 acres barren. • Most of barren habitat is under agricultural lease, and therefore, unlikely to contain species at risk or migratory bird nesting habitat. • 7.8 acres upland hardwood and 9.6 acres bottomland hardwood located along periphery of AUZ boundaries. • 68.5 acres riparian.	• Loss of habitat. • Potential for impacts to Indiana bat and migratory birds through tree clearing activities. • Although AUZ occurs within the Fletchers Fork Creek subwatershed; lack of forest acreage would not trigger 20-acre or greater clear-cutting conservation threshold. • Potential impact to aquatic habitat and riparian zones.
Veghel DZ	• Undeveloped areas are predominantly barren (79.7 percent); 260.7 acres barren. • Most of barren habitat is under agricultural lease, and therefore, unlikely to contain species at risk or migratory bird nesting habitat. • 15.9 acres upland hardwood and 47.4 acres pine. • 8.6 acres of riparian.	• Loss of habitat. • Potential for impacts to Indiana bat and migratory birds through tree clearing activities. • Potential impacts to Indiana and gray bat foraging habitat from tree clearing in Casey Creek subwatershed. • Potential impact to aquatic habitat and riparian zones.

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; TA = training area

Alternative 2 looks at areas within the proposed AUZ that would potentially be impacted from future Fort Campbell range development activities. Development of each of these AUZs could result in significant adverse impacts to biological resources due loss of habitat on a landscape level and local habitat including interior forest, natural barrens and grasslands, and riparian zones. The loss of this level of habitat would likely cause adverse impacts to protected species and species at risk representing additional significant adverse impacts. As stated in Chapter 2, Alternative 2 serves as a planning tool for future development siting and understanding existing environmental constraints (e.g., protected habitat) within the proposed AUZs which could affect development or training. As a part of future planning, the following factors would be considered to reduce adverse impacts to biological resources within each AUZ:

- During design, overall disturbance to biological resources would be limited to maintain ecological functions. Reduction of overall footprints of disturbance and maintaining ecological functions would reduce the potential for invasive species establishment. In addition, where feasible, Fort Campbell would focus development within lower quality habitat areas (degraded habitat due to military training, on-going maintenance, and agricultural lease activities) and preserve higher functioning habitat (e.g., natural barrens and grasslands, mature forest, and riparian zones).
- Loss of vegetation within the AUZs would occur over time. As areas within the proposed AUZ become developed, range planners would still avoid and minimize removal of vegetation on a project-by-project basis, and employ mitigating measures (existing environmental stewardship guidelines listed in Appendix F) to minimize the possibility of vegetation loss on a regional basis and prevent elimination of local populations of rare or sensitive plant species (if found present), implement invasive species control measures,

and avoid segmentation of vegetation (habitat) which could cause a significant adverse impact on wildlife.

- The likelihood of 100 percent loss of biological resources within each AUZ would be highly unlikely. Both the requirements of concealment during Soldier training, and SDZ building limitations would likely prevent this extent of disturbance and would require the retention of vegetation and associated habitat.
- Vegetation clearing would occur outside of the migratory bird nesting season (April 1 – July 15 for forest clearing and April 15 – August 31 for brush or grassland clearing).

Prior to construction of any project within the AUZs, the checklist (Appendix B) would be completed to determine whether the project would occur in an area where protected or species at risk are present, as well as the extent and type and extent of habitat (e.g., forested, native barrens and grasslands, agricultural, and riparian zone) that would be potentially impacted once a construction disturbance footprint has been established. In addition, existing environmental stewardship guidelines presented in Appendix F would be considered during the siting, construction, and operations of proposed new facilities within the AUZ. In the event that protected or rare species found in a future project location, the Army would undertake reasonable measures to protect rare species, including those summarized at the end of Alternative 1 regarding the Indiana, gray, and northern long-eared bats. To eradicate invasive species during and after construction Fort Campbell would implement the following measures:

- During construction, invasive species prevention measures would be implemented such as washing of construction equipment prior to on-site construction activities and requiring gravel pits to be free of invasive species to prevent introduction and spread of invasive species.
- Following construction, disturbed areas during project construction would be revegetated as soon as possible with native grass or other appropriate vegetation, preferably in the same growing season as the disturbance, to prevent the establishment and spread of invasive species.
- Following construction, invasive species management would be implemented to control invasive species (i.e., monitoring, manual pulling, mowing, and herbicides) and would help reduce establishment and proliferation of invasive plant species.
- Fort Campbell would still manage the proposed adaptable use zones under the INRMP and ITAM Program to maintain sustainability of use, indirectly benefiting species.

4.7.2.4 Alternative 3

Table 4.7-5 summarizes the potential type and intensity of biological resource impacts as a result of routine range projects, which consider use of existing environmental stewardship range construction guidelines that have been compiled and summarized in Appendix F.

Table 4.7-5. Summary of Routine Action Impacts on Biological Resources

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Permanent loss or conversion of vegetation	Loss of wildlife habitat	Impacts to TES habitat	Impact to migratory bird nesting	Impact to aquatic habitat	**Overall Impact**
Contract O&E Target and Residue Removal	N	Min	N	Min	Min	Min
Culvert Installation/Maintenance	Min	N	Min	N	Min	Min
Drop Zone/Landing Zone Maintenance	Mod	Mod	Mod	Mod	Mod	Mod
Low Water Crossing Site Creation & Maintenance	N	N	Min	N	Min	Min
Maneuver Damage Repair	N	Min	N	Min	N	Min
Maneuver Trail Creation, Hardening, & Maintenance	Mod	Mod	Mod	Mod	Mod	Mod
Observation Point Creation	Min	Min	Min	Min	N	Min

Routine range upgrade, maintenance and construction projects have the potential to cause significant adverse impacts to biological resources through the potential to impact protected and rare species. Following site selection of these routine projects, the checklist would be completed to evaluate the potential for impacts. Actual loss of acreage by habitat type for each project would be determined during completion of the checklist, once limits of construction and specific project footprints have been identified. The intent of the checklist is to identify specific environmental stewardship guidelines to minimize or avoid adverse impacts from construction of routine range projects.

As shown in Table 4.7-5, projects involving larger footprints and projects that involve vegetation clearing by nature (e.g., DZ/LZ and Maneuver Trail construction) have a greater potential to cause moderate adverse impacts to biological resources. Individual buildings (e.g., observation point creation) would require smaller footprints and would, therefore, likely have the potential for only minor adverse impacts to biological resources. Therefore, primarily those projects which are linear in nature or larger-scale (e.g., construction, hardening and maintenance of maneuver trails and DZ/LZ maintenance), involve stream crossing improvements (e.g., culvert and low-water crossings), or involve site restoration (e.g., removal of target residue), would have the potential to adversely impact aquatic habitat. Projects involving the potential for tree clearing activities or disturbances to aquatic habitat also have the potential to impact bat populations through roost disturbance or reduced quality of foraging habitat through sedimentation.

4.7.2.5 Alternative 4

The reactivation of installation-controlled airspace would have no adverse impacts to biological resources. The use of UAS and expanded airspace would expand military training exercises within the additional airspace allotted, which could impact bird populations through increased

bird air strike hazard (BASH) potential; however, this increase would be offset by a decrease of commercial and private aviation during military training exercises. No adverse impacts would be anticipated to bat populations as typical bat foraging behavior and movements would occur well below any training exercises within expanded military airspace within and slightly above the surrounding tree canopies.

4.7.2.6 Alternative 5

Implementation of Proposed Action Alternatives 1-4 would not create a greater adverse effect than those impacts described for each alternative; therefore, overall impacts would be less than significant. It is assumed that the existing environmental stewardship guidelines contained in Appendix F would be used in the siting and planning of projects identified to minimize and avoid impacts to biological resources. Furthermore, construction of projects identified in Alternatives 1 and 2, along with routine range and training land actions discussed in Alternative 3 would not all happen within the same geographic area or during the same construction season. These projects would be constructed throughout Fort Campbell as shown on Figure 4.7-1 and as funding becomes available, most likely between FY 14 – 19. Although the combined implementation of those alternatives involving construction and removal of vegetation and habitat (Alternatives 1, 2 and 3), no substantial permanent conversion or net loss of habitat (including species-dependent) would occur at a landscape level and no unpermitted take of protected species would be anticipated; overall impacts would be less than significant.

4.8 Cultural Resources

4.8.1 AFFECTED ENVIRONMENT

4.8.1.1 Cultural Context

The following cultural context was derived primarily from recent comprehensive prehistoric and historic documentation for Fort Campbell (Bergman and Comiskey, 2006; Leary et al., 2008).

4.8.1.1.1 Prehistoric Context

The cultural prehistory of the Western Highland Rim Section of Tennessee and Kentucky, as well as much of the southeast, is generally described as being composed of four archaeological contexts or "cultural traditions" (Willey and Phillips, 1958). These contexts or cultural traditions along with their approximate temporal boundaries are: Paleoindian (15,000-9,950 Before Present [B.P.]), Archaic (9,950-2,950 B.P.), Woodland (2,950-950 B.P.), and Mississippian (1,050-450 B.P.) (Table 4.8.1) (dates from Bergman and Comiskey, 2006). These temporal boundaries have been further divided into subperiods, based on their material culture, settlement patterns, subsistence, and sociopolitical organization.

Table 4.8.1. Prehistoric Cultural Periods

Broad Temporal Period	Refined Temporal Period	Date Range
Paleoindian	Early Paleoindian	15,000-10,800 B.P.
	Middle Paleoindian	10,800-10,500 B.P.
	Late Paleoindian	10,500-9950 B.P.
Archaic	Early Archaic	9950-7950 B.P.
	Middle Archaic	7950-4950 B.P.
	Late Archaic	4950-2950 B.P.
Woodland	Early Woodland	2950-2150 B.P.
	Middle Woodland	2150-1350 B.P.
	Late Woodland	1350-950 B.P.
Mississippian	Early Mississippian	1050-650 B.P.
	Late Mississippian	650-450 B.P.

B.P. = Before Present

Human settlement of eastern North America is generally thought to have occurred between 15,000 and 11,000 years ago (Anderson, 1996), at the end of the last glacial era. Approximately 17,000 years ago, the final glacial advance of the Pleistocene began to recede, setting the stage for Paleoindian occupation of Eastern North America. The regions below the glacial border, which would have included the Fort Campbell area, were probably cloudy, rainy, and cool. The fluctuations in weather and ice margin induced a rapid and widespread change in floral and faunal communities (Freeman et al., 1996). After 17,000 B.P. there was an open woodland habitat that slowly changed to deciduous woodlands that were firmly established by 11,500 B.P. (Delcourt et al., 1986; Freeman et al., 1996). These boreal forests and adjacent grazing lands supported a wide variety of mammals including the woodland musk ox (*Ovibos moschatus*), mastodon and woolly mammoth (*Mammut sp*.), barren ground caribou (*Rangifer tarandus*), giant beaver (*Castoroides sp*.), and moose-elk (*Cervacles scotti*). Hunting these megafauna species was likely the basis of the Paleoindian economy in conjunction with gathering floral resources (Freeman et al., 1996; Tankersley, 1997).

Paleoindian culture in North America has been traditionally perceived as culturally based on small, semi-isolated, highly nomadic, band-level groups. Cultural process has been viewed in

terms of cultural ecology and the direct interplay between the adaptive-oriented decision-making of Paleoindians and the Late Pleistocene and emerging Holocene environment (Binford, 1980; Griffin, 1967; Mason, 1962; Meltzer, 1988). This perspective has been modified in recent years to incorporate what are now perceived of as the dynamic effects of both increased regionalization and societal interaction rather than simply environmental "stimuli," nomadic wandering, and social isolation (Anderson, 1995; Anderson, 1996). Over the course of the Paleoindian period, "population appears to have grown markedly, group ranges became bounded and appear to have decreased appreciably, and intergroup as well as intragroup interaction became more regular and presumably more formalized, encompassing larger population aggregates" (Anderson, 1995).

The densest concentrations of Paleoindian artifacts in Kentucky occur in Jackson Purchase, Western Coalfield, and Bluegrass physiographic regions (Rolingson, 1964). One such cluster, known as the Little River Paleoindian complex, is near Fort Campbell in Christian County, Kentucky (Gramly and Yahnig, 1991; Smith and Freeman, 1991). Although Paleoindian projectile point/knives have been recorded at Fort Campbell, there is a curious absence of Middle Paleoindian Cumberland-type projectile points. Compared with other continent-wide Paleoindian tool types, Cumberland points have a spatially restricted distribution, especially within and near the Cumberland and Tennessee River drainages of northern Alabama, Tennessee, and Kentucky (Anderson et al., 1996).

The Archaic period in the eastern U.S. dates between 9,950 and 2,950 B.P. During this broad time span, prehistoric cultures in the eastern U.S. underwent considerable changes within the context of increasing population density, increasing intersocietal interactions, and changing environmental conditions. Climatic moderation in the Midwest and Midsouth gradually altered the glacial-boreal ecosystem over several hundred years beginning at approximately 9,000 B.P. This period, referred to as the Hypsithermal climatic interval, is characterized by a trend towards a warmer climate with drier seasons. The most important environmental change was the expansion of deciduous forests, which were established as the dominant forest type by 6,950 B.P. (Cleland, 1976). Deciduous and seasonally dependent plants spread rapidly, causing mass extinctions of Pleistocene megafauna. Smaller animals filling the diverse, and newly vacant, ecological niches replaced megafauna. These changes altered human behavior as the consolidation of resources into specific zones allowed Archaic groups to procure more readily subsistence as it became available within a seasonal schedule.

The increased ecological diversification of this period is reflected in an increase of regionally distinct morphological diversity among some artifact classes (primarily projectile points) seen during the Archaic period (Walthall, 1980). This trend is probably indicative of increased territoriality and the establishment of ethnic boundaries, or those defined by differences in language and cultural practices, perhaps reflecting newly developed vegetation and climate boundaries (Griffin, 1964). At the same time, socially bounded areas of interaction, in this case, those based more on trade and exchange, may be evident in the archaeological record in the distribution and form of exotic artifacts and artifact styles. The apparent escalation of inter-societal interaction during the Archaic period was probably associated with greater sedentism, denser populations, and the emergence of more complex forms of societal organization (Jefferies, 1995).

The Archaic period is generally divided into three subperiods: Early (9,950-7,950 B.P.), Middle (7,950-4,950 B.P.), and Late (4,950-2,950 B.P.) (Bense, 1994; Brown, 1994; Smith, 1986; Steponaitis, 1986). Each of these subperiods is defined and identified primarily on the basis of changes in a limited range of diagnostic artifacts (projectile points) but also on other facets of material culture and patterning in the archaeological record.

The Woodland period in eastern North America is marked by the elaboration of several characteristics noted at the close of the Late Archaic period, at approximately 2,950 B.P. These characteristics include increasing sedentism, more cultural complexity and social exchange, intensification of horticulture, and the widespread use of ceramic technology. The development of an elaborate mortuary complex, including the construction of burial mounds and ceremonial earthworks, indicates the rise of a non-egalitarian social order (Brose, 1979). Wide-ranging trade networks are evident in the exchange of both raw materials and finished objects between peoples across the southeast and the Ohio Valley. A suite of wild plant foods, specifically a number of small starchy seeds, was being intensively utilized and some species were brought under domestication. By the Middle Woodland period, these included sumpweed (*Iva annua L*.), maygrass (*Phalaris carolinia*), chenopod (*Chenepodium* sp.), and sunflower (*Helianthus annuus* L.) (Yarnell and Black, 1985). Corn (*Zea mays*) also appears in the archaeological record during the Middle Woodland period, but did not yet become as common as it would be in later periods.

The Woodland period is generally subdivided into the Early Woodland (2,950-2,150 B.P.), the Middle Woodland (2,150-1,350 B.P.), and the Late Woodland (1,350-950 B.P.). Traditionally, these subdivisions are demarcated by three trends: the first widespread use of pottery across the southeast; the rise and then decline of a vast pan-regional ceremonially-based interaction network; and finally, "a period of political fragmentation, increasing agricultural intensification, and population growth in many areas" (Anderson and Mainfort, 2002).

Mississippian culture was largely a continuation of Woodland period traditions, but with distinctive subsistence and settlement changes including permanent, settled agricultural communities. Large villages were usually fortified with palisades and sites were typically located on small hilltops overlooking broad floodplain farmlands. These villages were associated with smaller hamlets (Lewis, 1996). Farming contributed most of the diet, with corn (*Zea mays*), beans (*Phaseolus vulgaris*) and squash (*Cucurbitis sp*.) forming the basis for subsistence (Lewis, 1996). The bow and arrow was still in use for hunting as well as raiding and warfare. Politically, society was organized around chiefdoms (Fried, 1967). Hierarchical social organization based on ascribed status may have become the norm, as evidenced by very large size of some communities (such as Cahokia in Illinois and Moundville in Alabama) and the presence of large, flat topped mounds to be used as platforms for elite residences. Material culture during this period was marked by a wide scale exchange of intra- and extra- regional prestige goods, including chert hoes made from Dover, Mill Creek, and Kaolin cherts; exotic shells; and copper. The primary artifacts diagnostic to the Mississippian are a wide variety of utilitarian and non-utilitarian shell tempered ceramics, small triangular projectile points, and rectangular, wall-trench houses.

Different classification systems are used to discuss settlement patterns and chronology of the Mississippian cultures in western Kentucky and north-central and western Tennessee. Because Fort Campbell straddles this divide, both can be used as context for its cultural resources. For a more comprehensive context including a discussion of both classification systems see Bergman and Comiskey (2006).

The local, regional expression of Mississippian culture in north-central Tennessee is known as the “Middle Cumberland Culture” (Smith, 1992). The most distinguishing aspect of Middle Cumberland Culture, aside from regionally distinct ceramic assemblages, is the famous “stone-box grave” method of interment. Though the Middle Cumberland Culture is frequently identified by stone box graves, this obscures the true complexity of the archaeological record for this period. Kevin Smith (1992) and Smith and Moore (1996) have developed and refined a regional chronology for Middle Cumberland Mississippian that includes several distinct phases. More importantly, they have developed a model of social and political change to correlate with these phase-level constructs. This model postulates region-wide fluctuations in the degree of

differentiation between status ranks and in the degree of centralized political power. Their model postulated an early or emergent interval called the Spencer phase (1,000-900 B.P.). Following that is the Dowd phase (900-700 B.P.), a period of increased political centralization and differentiation between ascribed status ranks. This phase is followed by the Thruston phase (700-500 B.P.), a later trend toward community-level political autonomy, inter-community confederacies, and community-level decision making hierarchies that were based on achieved rather than ascribed status.

4.8.1.1.2 Historic Context

The following historic context contains a brief summary of the regional history presented by Leary et al. (2008). The area of Fort Campbell was first surveyed in 1768 by Thomas Hutchins (1730-1789), a military engineer and surveyor from New Jersey who was appointed the first "geographer of the U.S." by the Continental Congress in 1781. In the 1770s, hunters began exploring the area, which in 1775 became part of the Transylvania Purchase, an illegal purchase of land from the Cherokee Indians by speculators. In 1775-1776, all of the land of present-day Tennessee became the Washington District of North Carolina and subsequently Washington County, North Carolina, in 1777, both named after George Washington.

In the 1780s, settlers began trickling into the area. European-American settlers initially settled the fertile bottomland along rivers and creeks where they established farms. The hills and ridges in the area also contained rich iron deposits that led to the development of a substantial iron mine and furnace industry. Both the farms and furnaces were operated with the labor of enslaved African Americans (Brandt, 1995).

In 1785, Revolutionary War veteran and explorer John Montgomery (c. 1750-1794) helped found Clarksville at the confluence of the Red and Cumberland rivers. Montgomery had explored this area as early as 1777. Clarksville was named for General George Rogers Clark (1752-1818), a Revolutionary War veteran and national military hero from Virginia who later moved to Louisville, Kentucky.

In 1788, North Carolina established Tennessee County, which encompassed the southern part of Fort Campbell. Two years later, North Carolina ceded rights to all its lands west of the Great Smoky Mountains (including Tennessee County) to the Federal government as the Southwest Territory, which would later become the State of Tennessee. In 1790, North Carolina also established the "North Carolina Military Reservation" along the Cumberland River valley. Soon, scores of veterans of the Revolutionary War arrived from North Carolina to claim land grants inside the reservation as payment for their services in the military. Settlers also migrated from other states, primarily Virginia. This area became known as the Cumberland Settlements and was centered on river towns such as Nashville and Clarksville. In 1790, the population of the Cumberland Settlements, which included Davidson (1783), Sumner (1786), and Tennessee (1788) counties, was estimated to be around 7,000 (Corlew, 1993).

In 1796, the Southwest Territory was admitted into the Union as the State of Tennessee. That year, much of the eastern section of Tennessee County was removed and merged with a section of Sumner County to form Robertson County. Tennessee County was renamed Montgomery County in honor of John Montgomery (Corlew, 1993). In 1803, additional land in the western part of the county was used to form Stewart County. Containing 458 square miles, Stewart County is named for Colonel Duncan Stewart (1761-1820), a Revolutionary War veteran, wealthy planter, and politician from North Carolina who held offices in the House of Representatives for North Carolina, Tennessee, and Mississippi. The Stewart County seat is Dover, established in 1805 on the Cumberland River. The community had been initially settled in the 1790s. It was initially called Monroe, but the name was changed to Dover in honor of the

White Cliffs of Dover in England. Steamboats reached Dover in 1819 and soon iron furnaces were established in the surrounding area (Brandt, 1995).

Fort Campbell also includes portions of Christian and Trigg counties in Kentucky. Following the establishment of the State of Kentucky in 1792, Christian County was formed in 1796. It was named for Colonel William Christian, a Revolutionary War veteran from Virginia. The county seat, Hopkinsville, was settled in 1794 and was named for General Samuel Hopkins. Trigg County was formed in 1820 from parts of Christian and Caldwell counties. It was named for Colonel Stephen Trigg. Colonel Trigg had been fatally wounded in 1792 at one of the last conflicts of the Revolutionary War, the Battle of Blue Licks. Cadiz, Kentucky, an important shipping port on the Cumberland River, became the county seat in 1822 (Leary et al., 2008).

Fort Campbell is located along the Western Rim (called the Pennyrile in Kentucky), a hilly region and center of Middle Tennessee's antebellum iron industry. It is also located near the agriculturally rich "Black Belt" known for large, slave tobacco plantations. Due to the topography, the iron industry was focused in Stewart and Trigg counties and the tobacco farms in Montgomery County, where a tobacco inspection point had been established in 1789.

During the antebellum era, transportation improvements drove the economy of the region. Fort Campbell is located near the prehistoric Palmyra-Princeton Trail, a buffalo and Indian trail used by explorers and early settlers. Also known as "Eddy Trace," the trail connected Palmyra, Tennessee, with the Big Springs at Princeton, Kentucky.

In the 1830s, the community of Indian Mound was established along Cross Creek in the northeastern corner of Stewart County. A U.S. Post Office has served Indian Mound since 1832. The community was named for prehistoric burial mounds, which were recorded in early court records and deeds. During the antebellum era, two iron furnaces operated at Indian Mound (Bagwell, 2011). In 1820, steamships began plying the Cumberland River connecting Dover and Clarksville to distant cities such as New Orleans and Pittsburgh. Improvements to the Cumberland River in the 1830s and 1840s allowed both Dover and Clarksville to become important regional centers of commerce.

In 1838, the Federal government used military force to relocate more than 15,000 Cherokee Indians from the Cherokee Nation - located in North Carolina, Georgia, Alabama, and Tennessee - to reservations in Oklahoma, using a 2,200-mile long transportation network of overland trails and waterways. Thousands of Cherokee Indians died during the treacherous journey, which became known as the "Trail Where They Cried" or more commonly, the "Trail of Tears." The largest section of the Cherokee Nation was in northwest Georgia where 4,000-6,000 Cherokee homes were located. Smaller sections were located in southwest North Carolina, northwest Alabama, and southeast Tennessee. Segments of the Cherokee Trail of Tears removal routes traverse east of Fort Campbell in Montgomery County and to the west in Stewart County. Currently, no segments of the Cherokee Trail of Tears or affiliated resources are known within Fort Campbell.

The Civil War began in the Fort Campbell area when Tennessee seceded from the Union on June 8, 1861. Kentucky maintained its neutrality until the fall of 1861. After the fall of Fort Donelson on the Cumberland River and Fort Henry on the Tennessee River in February 1862, Union troops occupied the nearby town of Dover, Tennessee. Troops set fire to the town to prevent it from falling into the hands of Confederate General Nathan Bedford Forrest. Only four buildings survived the devastating fire. The county courthouse was one of the civic landmarks that burned, destroying most of the county's early land records (Bagwell, 2011; Federal Writers Project, 1939). In 1862, the Union Army captured Fort Defiance and the City of Clarksville by sending gunboats from Fort Donelson up the Cumberland River. Following the battle, the city surrendered. Confederate soldiers attempted to burn the railroad bridge spanning the

Cumberland River but failed. Clarksville soon became a gathering point for slaves to join the Union Army, which created all-black regiments.

The 1870s were marked by improvements to infrastructure and transportation in the region. The Clarksville-LaFayette Pike in Montgomery County continued to be improved, enabling farmers to have better access to local markets for their crops and agricultural products. In 1872 the Louisville & Nashville Railroad purchased the existing antebellum railroad, further strengthening economic ties with those two commercial and industrial cities (Brandt, 1995). The improved transportation systems created an economic boon for the region. Several small rural communities were established, which met the demand for agricultural goods and products such as hogs, cattle, pork, molasses, eggs, hides, tobacco, and lumber.

Transportation improvements continued in the 1880s and 1890s with construction of a series of locks and dams along the Cumberland River. Improvements also focused on building new highways and improving older turnpikes, such as the Clarksville-LaFayette Turnpike, which was improved in 1910 with the labor of African-American convicts.

During the Great Depression, the hilly uplands within Fort Campbell were known as “The Barrens” due to poor soil. Many of the residents of this area were sharecroppers and tenant farmers who lived in small farmhouses made of logs or board and batten. The primary cash crops were corn and dark-fired tobacco. By 1930, the iron industry had all but ceased; none of the 14 antebellum-era furnaces in Stewart County were operational by this date. In 1926, the local historical society purchased the 1850s Dover Hotel and Tavern for use as the Fort Donelson Museum, making it one of the first historic site museums in Tennessee (Federal Writers Project, 1939).

In the 1940s, the Federal government acquired thousands of acres of land in Montgomery and Stewart counties through eminent domain. In 1941, the U.S. Army initiated planning of Camp Campbell, named in honor of General William Bowen Campbell (1807-1867), a veteran of the Mexican War and Civil War as well as governor of Tennessee from 1851-1853. This wartime camp was intended to provide training and mobilization for the Army’s new armored division. Camp Campbell also featured a World War II prison-of-war camp housing some 4,000 German soldiers.

Located in four counties straddling the Tennessee and Kentucky state line, construction of Camp Campbell was initiated in January 1942. In Montgomery County, the U.S. Army acquired 466 tracts containing 42,842 acres in a section of the county known as “The Barrens.” In Stewart County, some 26,000 acres were acquired. Hundreds of families were relocated to nearby towns, villages, and farms. A large number of these families were African American. With few exceptions, all standing buildings and structures were razed, leaving only foundations, so that the land could be used for military training exercises during World War II. Entire communities disappeared including Legate, Parkertown, and Big Meadow in Stewart County and Rose Hill in Montgomery County. In four months, the Army constructed 21 million square feet of billets, warehouses, classrooms, and motor pools at a cost of over $35 million (Beach, 1988). While families living on what became Fort Campbell relocated elsewhere, associated cemeteries as well as homes and agricultural outbuildings remained, and are now identified as cultural resources within the installation.

In its construction of Camp Campbell, the U.S. Army reused many existing roads such as Killebrew/Indian Mound Road and Jordan Springs Road in Stewart County as well as Mabry Road and Rose Hill Road in Montgomery County. The military also constructed new access roads such as Engineer Road along Piney Fork Creek in Montgomery County and Artillery Road at the former Weaver’s Store community in Stewart County. An airfield was constructed on the farm just east of the former Big Meadow community. SR-49/U.S. 79, which runs along the south

side of Fort Campbell, connects Clarksville and Dover. It is known locally as Dover Road. Established in 1935, U.S. 79 connects Russellville, Kentucky, with Round Rock, Texas, just north of Austin.

In late 1942, the 102,414-acre military installation featured 2,422 officers and nearly 42,200 enlisted personnel. By 1944, the post was inhabited by nearly 100,000 men in uniform, which had a significant impact on the local economy in Clarksville since two-thirds of the installation is located in Tennessee. In 1947, the military established the top-secret and highly restricted "Clarksville Base" for the storage and preparation of nuclear weapons. The second of 13 such facilities to be constructed, underground storage facilities were spread over 5,000 acres, connected by well-sealed tunnels. Under fulltime guard by a Marine attachment, the Atomic Energy Commission operated Clarksville Base until 1969, when it was deactivated (Leary et al., 2008). By 1950, Camp Campbell had evolved from a wartime training camp into a permanent installation and was renamed Fort Campbell (Muir, 2010; TDOA, 2011).

In 1944, the TVA constructed Kentucky Dam and Reservoir in Stewart County along the Tennessee River, inundating some 14,000 acres of farmland and most of Fort Henry. This created Kentucky Lake, which at the time was the world's largest man-made lake. In the 1960s, the USACE dammed the Cumberland River just north of Dover, creating Lake Barkley. This inundated approximately 23,500 acres of bottomland in Stewart County alone. The two lakes maintain the same elevation and are connected with a canal. In 1964, this federally-owned land became the 170,000-acre Land Between the Lakes National Recreation Area. This included some 70,000 acres in Stewart County, which is administered by the TVA. In addition, the 50,000-acre Tennessee National Wildlife Refuge is located on the peninsula between the two lakes. In 1964, the National Park Service acquired an additional 500 acres for the Fort Donelson National Military Park. Today, state and Federal agencies control over 44 percent of the land in Stewart County (Brandt, 1995).

4.8.1.2 Archaeological Sites

Archaeological sites and architectural resources within the site-specific and AUZ alternatives (Alternatives 1 and 2) are documented within this section. As Alternative 3 is entirely programmatic in nature and Alternative 4 does not involve ground-disturbance or alternation of the landscape, a discussion of specific cultural resources associated with these alternatives is not discussed in this section.

Based on the Fort Campbell Cultural Resources Management Program (CRMP) geodatabase (geoDB), the locations of the site-specific projects and AUZs (Alternatives 1 and 2) contain 157 known archaeological sites. This includes archaeological sites that are located either partially or wholly within the proposed project locations. These known sites include 56 prehistoric sites, 55 historic sites, and 46 sites with both prehistoric and historic components. Of the 157 identified sites, 5 are located within Alternative 1 locations and 152 are located within Alternative 2 locations.

The Fort Campbell cultural geoDB shows five known archaeological sites within the Alternative 1 locations (Table 4.8-2). These include two prehistoric sites and three sites with both historic and prehistoric components.

Table 4.8-2. Summary of Archaeological Sites in Alternative 1

Site Type	NRHP Status				Total
	Eligible	Potentially Eligible	Not Eligible	Not Assessed	
Prehistoric Sites					
Habitation Site	1	---	---	---	1
Lithic Scatter	---	---	1	---	1
Prehistoric Total	*1*	*0*	*1*	*0*	*2*
Prehistoric/Historic Sites					
Prehistoric Habitation/Mortuary; Historic Isolated Find	1	---	---	---	1
Prehistoric Lithic Scatter; Historic Isolated Find	---	---	1	---	1
Prehistoric Lithic Scatter; Historic Church	---	---	1	---	1
Prehistoric/Historic Total	*1*	*0*	*2*	*0*	*3*
Grand Total	**2**	**0**	**3**	**0**	**5**

NRHP = National Register of Historic Places

The two sites within the Alternative 1 locations that were recommended as eligible to the National Register of Historic Places (NRHP) are 40SW0496 and 40SW0503/0504. 40SW0496 is a prehistoric open habitation camp or village site with a historic rural domestic component. It was recorded by Panamerican Consultants in 1998 and is located on a ridge south of Moss Creek. The prehistoric materials are non-diagnostic, while the historic materials indicate an occupation in the late 19th to early 20th century. 40SW0503/0504 is located in the Saline Creek floodplain and is a prehistoric open-air habitation site from the Mississippian Period. A survey by Panamerican Consultants in 2000 recovered Mississippian period ceramics as well as lithic materials from two adjacent locations which were recorded as sites 40SW0503 and 40SW0504 respectively; however, these sites were combined by the Fort Campbell CRMP because they contain the same cultural components in close proximity to one another. 40SW0503/0504 is considered eligible for the NRHP under Criterion D for its information potential.

The remaining three sites within the Alternative 1 locations were recommended as not eligible to the NRHP. These include one lithic scatter (40SW0528), a lithic scatter with a historic isolate (40SW0527), and a historic church/lithic scatter (40SW0502). All three are located within the glide slope areas at LZ Saunders (Table 4.8-3). All were recommended not eligible to the NRHP following Phase I survey and none received a Phase II evaluation.

Table 4.8-3. Location of Archaeological Sites - Alternative 1

Alternative 1 Location	NRHP Eligibility Recommendation				Total
	Eligible	Potentially Eligible	Not Eligible	Not Assessed	
Glide Slope, LZ Saunders	1	0	3	0	4
Runway, LZ Saunders	1	0	0	0	1
Total	2	0	3	0	5

LZ = landing zone; NRHP = National Register of Historic Places

The Fort Campbell cultural geoDB shows 152 known archaeological sites within the Alternative 2 locations (Table 4.8-4). These include 56 historic sites, 55 prehistoric sites, and 41 sites with both historic and prehistoric components.

Table 4.8-4. Summary of Archaeological Sites - Alternative 2

Site Type	NRHP Status				Total
	Eligible	Potentially Eligible	Not Eligible	Not Assessed	
Historic Sites					
Family Cemetery	---	---	---	10	10
Church and Cemetery	1	---	---	---	1
Farmstead	---	5	2	---	7
Industrial Property	---	2	---	---	2
Isolated Find	---	---	1	---	1
Residence/House Lot	---	7	9	---	16
Transportation Property	---	1	---	---	1
Unassigned	---	2	16	---	18
Historic Total	*1*	*17*	*28*	*10*	*56*
Prehistoric Sites					
Habitation Site	---	---	2	---	2
Isolated Find	---	---	1	---	1
Lithic Scatter	---	3	44	---	47
Unassigned	---	---	5	---	5
Prehistoric Total	*0*	*3*	*52*	*0*	*55*
Prehistoric/Historic Sites					
Prehistoric: Habitation Historic: Residence/House Lot	1	---	---	---	1
Prehistoric: Habitation Historic: Unassigned	1	---	1	---	2
Prehistoric: Isolated Find Historic: Residence/House Lot	---	1	1	---	2
Prehistoric: Isolated Find Historic: Unassigned	---	---	8	---	8
Prehistoric: Lithic Scatter Historic: Industrial Property	---	1	---	---	1
Prehistoric: Lithic Scatter Historic: Isolated Find	---	1	5	---	6
Prehistoric: Lithic Scatter Historic: Residence/House Lot	---	---	5	---	5
Prehistoric: Lithic Scatter Historic: Unassigned	1	---	14	---	15
Prehistoric: Unassigned Historic: Farmstead	---	---	1	---	1
Prehistoric/Historic Total	*3*	*3*	*35*	*0*	*41*
Grand Total	**4**	**23**	**115**	**10**	**152**

NRHP = National Register of Historic Places

Of the 152 sites within Alternative 2 areas, 115 have been recommended as not eligible for listing on the NRHP. Of the 37 remaining sites, 4 have been recommended as eligible, 23 are recommended potentially eligible, and 10 have not been assessed. Eleven of the historic sites contain cemeteries. These sites are discussed in detail below in Section 4.8.1.4. The 152 sites are located within 4 separate Alternative 2 locations (Table 4.8-5).

Table 4.8-5. Location of Archaeological Sites - Alternative 2

Alternative 2 Location	NRHP Eligibility Recommendation				Total
	Eligible	Potentially Eligible	Not Eligible	Not Assessed	
TA 11 AUZ	1	2	27	2	32
TA 20 AUZ	1	8	29	2	40
TA 52 AUZ	1	3	32	5	41
Suckchon DZ AUZ	1	10	20	1	32
Veghel DZ	0	0	7	0	7
Total	**4**	**23**	**115**	**10**	**152**

AUZ = Adaptable Use Zone; DZ = drop zone; NRHP = National Register of Historic Places

The four NRHP-eligible sites are the Bi-County Church and Cemetery (15TR0393), the Clardy 1 Site (40MT0494), an unnamed multi-component habitation site (40MT0586), and the Anna Gray Site (40MT0599).

The Bi-County Cemetery (15TR0393) is a late 19th to early 20th century cemetery containing at least 17 interments. It is associated with 15TR0394, an adjacent scatter of historic debris. 15TR0394 was assumed to be the remains of a community church due to the proximity of the cemetery and was recommended as potentially eligible to the NRHP. 15TR0393 was recommended as eligible to the NRHP under Criterion D due to its potential to provide important information regarding the historic use of the area. No Phase II evaluation was conducted on 15TR0393 due to the presence of human burials. The NRHP recommendation is based on survey level data (Phase I).

40MT0494, the Clardy 1 Site, is a prehistoric open-air habitation (camp site or village) located on an upland ridge between two tributaries of Jordan Creek. This is a multi-component site containing diagnostic prehistoric materials from the Early Archaic through the Early Mississippian periods as well as a late 19th century historic component. The site was recorded by Panamerican Consultants in 1998 and tested and determined eligible for listing on the NRHP under Criterion D (information potential) by Kriesa in 2002. 40MT0586, an unnamed site, is a prehistoric and historic site located on a knoll overlooking an unnamed tributary of Elk Fork Creek. The prehistoric site is an open-air habitation and contains materials from the Late Archaic, Early Woodland, and Late Woodland periods. The historic component is an early 20th century domestic occupation. The site was identified at the survey phase by Panamerican Consultants in 1999 and tested and determined eligible for listing on the NRHP under Criterion D (information potential) by Kreisa in 2002. 40MT0599, the Anna Gray Site, is a multi-component prehistoric open habitation site with the historic component. The prehistoric components include Early Archaic, Late Archaic, and Middle Woodland occupations, while the historic component was a 19th-20th century artifact scatter. The site was recorded at the survey phase by Panamerican Consultants in 2000 and was tested for NRHP eligibility by BHE in 2003. The site was recommended eligible under Criterion D (information potential).

The 23 potentially eligible sites include historic sites (farmsteads, residences, industrial sites, and a bridge), prehistoric lithic scatters, and multi-component sites with both historic and

prehistoric material. None of these sites have been subjected to Phase II evaluations. All were recorded at the survey level.

Ten sites were unassessed regarding their NRHP eligibility. All 10 are family cemeteries that were excluded from subsurface testing due to the presence of human graves. The 10 sites are discussed below in Section 4.8.1.4.

The remaining 115 sites within the Alternative 1 areas were recommended as not eligible to the NRHP. Of these, six (40MT0187, 40MT0192, 40MT0194, 40MT0277, 40MT0619, and 40MT0781) received Phase II evaluations. The remaining 109 sites were recommended not eligible following a Phase I survey.

4.8.1.3 Architectural Resources

Ten architectural resources were identified in the Fort Campbell geoDB. All 10 are standing buildings within the TA 52 AUZ (Alternative 2). All have been subjected to architectural survey and received eligibility NRHP recommendations. The 10 buildings are summarized below in Table 4.8-6. None of these resources are currently considered eligible for the NRHP; however, six are potentially eligible pending further evaluation; the remaining four are not eligible. No known architectural resources were identified within other Alternative 2 AUZ areas or site-specific actions associated with Alternative 1.

Table 4.8-6. Summary of Architectural Resources - Alternative 2

Architectural Number	State Site Number	Alternative 2 Location	Building Type	NRHP Recommendation	Age
TR 151a	15TR0391	TA 52 AUZ	Rural House	Potentially Eligible	circa 1890s
TR 151b	15TR0391	TA 52 AUZ	Barn, Stable	Potentially Eligible	circa 1890s
TR 152	15TR0391	TA 52 AUZ	Barn	Potentially Eligible	circa 1890s
TR 154	---	TA 52 AUZ	Barn	Not Eligible	circa 1890s
TR 150	---	TA 52 AUZ	Barn	Not Eligible	circa 1890s
TR 148	15TR0382	TA 52 AUZ	Stable	Potentially Eligible	circa 1880s
TR 149	15TR0382	TA 52 AUZ	Rural House	Potentially Eligible	circa 1880s
TR 155	---	TA 52 AUZ	Barn	Not Eligible	circa 1890s
TR 153	15TR0395	TA 52 AUZ	Barn	Potentially Eligible	circa 1890s
TR 156	---	TA 52 AUZ	Barn	Not Eligible	circa 1890s

AUZ = Adaptable Use Zone; DZ = drop zone; NRHP = National Register of Historic Places; TA = Training Area

4.8.1.4 Cemeteries

Eleven historic cemeteries are known within the study area, all of which are within Alternative 2 locations. Ten are small family cemeteries and one (15TR0393) is a church cemetery (Bi-County Cemetery). The family cemeteries comprise the 10 unassessed archaeological sites. Subsurface investigations are avoided within cemetery boundaries. Because the subsurface integrity and data potential of these sites remains unknown, none have been assessed regarding their NRHP eligibility. The Bi-County Cemetery (15TR0393) was recommended as eligible to the NRHP under Criterion D due to its potential to provide important information regarding the historic use of the area. The cemeteries are summarized in Table 4.8-7. No historic cemeteries were identified with Alternative 1 sites.

Table 4.8-7. Summary of Historic Cemeteries - Alternative 1

State Site Number	FTC Site Number	FTC Cemetery Number	Cemetery Name	Location	Size (acres)
15TR0393	---	184	Bi-County Cemetery	TS 52 AUZ	0.42
40MT0509	---	39 & 40	Mack Clardy 1 and 2	TA 11 AUZ	0.1
40MT0605	---	47	Grace Shelby Cemetery	TA 20 AUZ	0.15
40MT0622	---	52	Bailey Darnell Cemetery	TA 20 AUZ	0.96
40MT0931	---	37	Mary Shelby Grave	TA 11 AUZ	0.001
40MT0933	---	48	Vaughn Cemetery	TA 20 AUZ	0.15
40MT0934	---	49	Collier and Frank Cemetery	TA 20 AUZ	0.06
40MT0935	---	50	Bailey Darnell Cemetery	TA 20 AUZ	0.001
40MT0936	---	51	Hickory Grove Church	Suckchon DZ AUZ	0.16
40SW0658	---	139	T.J. Carr Cemetery	TA 52 AUZ	0.152
---	FTC-21-902	140	J.L. Chester Cemetery	Suckchon DZ AUZ	0.48

AUZ = Adaptable Use Zone; FTC = Fort Campbell

The Bi-County Cemetery (15TR0393) is a late 19th to early 20th century cemetery containing at least 17 interments. It is associated with 15TR0394, an adjacent scatter of historic debris. 15TR0394 was assumed to be the remains of a community church due to the proximity of the cemetery and was recommended as potentially eligible to the NRHP. 15TR0393 was recommended as eligible to the NRHP under Criterion D due to its potential to provide important information regarding the historic use of the area. No Phase II evaluation was conducted on 15TR0393 due to the presence of human burials. The NRHP recommendation is based on survey level data (Phase I).

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

No Native American Sacred Sites or Properties of Traditional Cultural Importance have been identified within any of the alternatives.

4.8.1.6 Fort Campbell Cultural Resources Management Program

All cultural resources at Fort Campbell are managed by the CRMP. Housed in the Childers House, cultural resource staff oversee permitting, resource investigations, and preservation of all cultural resources within the installation. Cultural resource management is conducted following the procedures outlined in the Integrated Cultural Resource Management Plan (ICRMP). The CRMP reviews project plans for potential effects to cultural resources, conducts small scale cultural surveys, monitors and prepares annual reports on the condition of historic cemeteries and eligible resources, maintains the Fort Campbell cultural resource GIS, manages Fort Campbell's archaeological collections, and reviews Section 106 studies and reports completed by contractors.

Fort Campbell has also entered into a Programmatic Agreement (PA) between the Kentucky State Historic Preservation Office (SHPO), the Tennessee Historical Commission (SHPO), the Advisory Council on Historic Preservation (ACHP), and Fort Campbell that outlines the process alternative for compliance with 36 CFR 800 in considering the effects of operations, maintenance and development on historic properties. A total of 1,670 archaeological sites have

been identified within the installation's boundaries. To date, 751 of these sites have formal determinations of eligibility with concurrence from the appropriate SHPO (Tennessee or Kentucky). Of this total, 13 sites have been determined eligible for the NRHP. As a requirement of the PA, sites lacking formal eligibility determinations require Section 106 Consultations with appropriate SHPOs prior to the initiation of proposed undertakings.

4.8.1.7 Process for Identification of Resources

All identified cultural resources within Fort Campbell are tracked using an installation-wide geoDB in ArcGIS. This geoDB is maintained by staff at the Fort Campbell CRMP.

The geoDB contains the following datasets for the cultural resources at Fort Campbell:

- Cultural Resource Surveys
- Archaeological Sites (points and polygons)
- Historic Properties (Features, Structures, Buildings)
- Isolated Finds[10]
- Existing Structures
- Cemeteries
- In-house CRMP Shovel Tests
- In-house CRMP Cultural Loci[11]

These datasets contain a wide variety of information for each resource type, including but not limited to:

- NRHP Eligibility Status
- Archaeological Investigation Status (Phase I, II, III, etc.)
- Reference Citations for Cultural Resource Investigations
- Current Condition
- Spatial Data (coordinates, size, elevation, etc.)
- Environmental Context (setting, vegetation, ground cover, etc.)
- Resource Information (site type, assemblage type, age, features, etc.)
- Cross-reference Links to Archival Information

The spatial data within the geoDB was extracted based on the ESRI shapefiles that contained locations for all the Proposed Actions, including AUZs, construction and maintenance projects, off-limit areas, and potential project areas. Data extraction was done in ArcGIS 10 by selecting all entries from the Fort Campbell geoDB that were within the boundaries of the Proposed Action Alternatives.

4.8.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, impacts to cultural resources would be considered significant if Army actions 1) generated substantial concerns raised by Indian Tribes regarding potential impacts to properties of religious and cultural significance to those tribes or organizations; 2) caused direct or indirect alteration of the characteristics that qualify a property for inclusion in the NRHP (may

[10] An isolated find is an occurrence of less than three artifacts at a location. More than three artifacts are treated as archaeological sites.
[11] A cultural loci is a location where the artifacts have been found but additional survey has not been completed to determine if the find is an isolated find or a site.

include physical destruction, damage, alteration, removal, change in use or character within setting, neglect causing deterioration, transfer, lease, sale) without appropriate mitigation; or 3) adversely impacted cemeteries. The following sections discuss the potential for adverse impacts to cultural resources for the No Action and Proposed Action Alternatives.

4.8.2.1 No Action Alternative

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. These training activities would potentially cause adverse impacts to cultural resources within Fort Campbell; however, existing management and protection of cultural resources would reduce impacts and continue to provide beneficial impacts of protection to known NRHP and NRHP-eligible sites. Fort Campbell would not implement the Proposed Actions; however, range construction projects would continue as needed and would undergo a project-by-project evaluation in compliance with NEPA and the NHPA.

4.8.2.2 Alternative 1

With the exception of the Saunders LZ project, all other site-specific projects associated with Alternative 1 would have no impacts (refer to Table 4.8-8); these locations have been surveyed and no cultural resources are located within the proposed project footprints. Ground-disturbing activities related to the construction (vegetation clearing) of the glide slopes at the Saunders LZ have the potential to cause adverse effects to two NRHP-eligible archaeological sites (40SW0496 and 40SW0503/0504) through potential soil disturbances from logging equipment. Impacts to these sites would be avoided during clearing activities through manual hand-clearing techniques.

Table 4.8-8. Summary of Site-specific Projects Cultural Resources Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
		Loss/degradation of archaeological site	Loss/degradation of historic structure	Impacts to cemeteries	Impacts to Sacred Site	Alteration of cultural viewshed	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	N	N	N	N	N	N
Construct a Gravel Foot March Trail	On The Line Road	N	N	N	N	N	N
Construct a Runway with Glide Slopes	Saunders LZ	Min	N	N	N	N	Min

LZ = landing zone

4.8.2.3 Alternative 2

Table 4.8-9 summarizes the extent of cultural constraints within each AUZ and the potential for adverse impacts to cultural resources based on the likely potential activities (Chapter 2, Table 2.2).

Ground-disturbing activities within five AUZs (TA 11, TA 20, TA 52, Suckchon DZ, and Veghel DZ) have the potential to cause adverse effects to cultural resources. All five contain NRHP-eligible archaeological sites. Cemeteries are also located in four of the areas (all except Veghel DZ).

Table 4.8-9. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Cultural Constraints	Potential Impacts to Cultural Resources
TA 11	• One NRHP-eligible archaeological site • Two unassessed cemeteries	• Adverse effects to NRHP-eligible archaeological site and two cemeteries from ground-disturbing activities.
TA 20	• One NRHP-eligible archaeological site • Five unassessed cemeteries	• Adverse effects to NRHP-eligible archaeological site and five cemeteries from ground-disturbing activities.
TA 52	• One NRHP-eligible archaeological site • Six potentially eligible historic structures • One eligible cemetery • One unassessed cemetery	• Adverse effects to NRHP-eligible archaeological site, six potentially eligible historic structures, and two cemeteries from ground-disturbing activities.
Aardvark LZ	None	None
Golden Eagle FLS	None	None
Indian Mound LZ	None	None
Suckchon DZ	• One NRHP-eligible archaeological site • Two unassessed cemeteries	• Adverse effects to NRHP-eligible archaeological site and two cemeteries from ground-disturbing activities.
Veghel DZ	• One NRHP-eligible archaeological site	• Adverse effects to NRHP-eligible archaeological site and two cemeteries from ground-disturbing activities.

Source: FTC Cultural Resources Geodatabase

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; NRHP = National Register of Historic Places; TA = training area

Alternative 2 looks at areas within the proposed AUZ that could potentially be impacted from future Fort Campbell range development activities. Development of TA 11, TA 20, TA 52, Suckchon DZ, and Veghel DZ AUZs could result in significant adverse impacts to cultural resources as NHRP-eligible sites and cemeteries are located within these proposed AUZs. As stated in Chapter 2, however, this alternative serves as a planning tool for future development siting and understanding existing environmental constraints (e.g., archaeological, historical, or cemeteries) within the proposed AUZs which could affect development or training. As a part of future planning, the following factors would be considered to mitigate adverse impacts to cultural resources within each AUZ:

- Known archaeological sites and cemeteries would be avoided during the siting of future facilities and TAs.
- Known cultural sites would be protected and managed according to the ICRMP.
- If unavoidable, mitigation of adverse effects to archaeological sites and/or historic structures would be conducted compliant with state and Federal regulations including Section 106 consultation. This could include archaeological data recovery to mitigate the effects on eligible archaeological sites or Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation to mitigate adverse effects to historic buildings. Mitigation of adverse effects to historic cemeteries would require relocation in accordance with the applicable state standards, and may also require archaeological mitigation efforts and analysis if the cemetery is eligible for the NRHP under Criterion D.
- Inadvertent discoveries would be handled according to Fort Campbell procedures contained within the ICRMP.

The Proposed Actions associated with Alternative 2 are programmatic and preferred locations for new construction and other activities that may impact cultural resources have not yet been determined. Furthermore, all of the acreage within TAs on Fort Campbell has not been surveyed for the presence of cultural resources at this date. Therefore, to determine environmental consequences of activities when projects are sited, the CRMP should be consulted to determine if the location has been surveyed for archaeological sites. If not, a survey would be required in compliance with the process outlined in Fort Campbell's ICRMP and Section 106 of the NHPA, as amended. If surveyed, determine the presence of resources that are eligible or potentially eligible for the NRHP and locate activities to avoid such resources. The CRMP should also be consulted to determine the locations of historic cemeteries and avoid impacts to them.

Prior to construction of any project within the AUZs, the checklist (Appendix B) would be completed to determine whether the project would occur in an area where protected cultural resources are present once a construction disturbance footprint has been established. In addition, existing environmental stewardship guidelines presented in Appendix F would be considered during the siting, construction, and operations of proposed new facilities within the AUZ.

Fort Campbell would still manage the proposed AUZs under the ICRMP to protect cultural resources.

4.8.2.4 Alternative 3

Table 4.8-10 summarizes the potential type and intensity of cultural resource impacts as a result of routine range projects which consider use of existing environmental stewardship range construction guidelines that have been compiled and summarized in Appendix F.

Routine activities proposed under Alternative 3 have the potential to cause adverse effects to cultural resources, especially those activities that are conducted in areas that not have been surveyed for cultural resources. As long as routine activities occur in locations that have been surveyed for cultural resources and avoid eligible resources and cemeteries, their effects would be minor or none.

The Proposed Actions associated with Alternative 3 are programmatic and preferred locations for new construction and other activities that may impact cultural resources have not yet been determined. Furthermore, all of the acreage within TAs on Fort Campbell has not been surveyed for the presence of cultural resources at this date. Therefore, to determine environmental consequences of activities when projects are sited, the CRMP should be consulted to determine

if the location has been surveyed for archaeological sites. If not, a survey would be required in compliance with the process outlined in Fort Campbell's ICRMP and Section 106 of the NHPA, as amended. If surveyed, determine the presence of resources that are eligible or potentially eligible for the NRHP and locate activities to avoid such resources. The CRMP should also be consulted to determine the locations of historic cemeteries and avoid impacts to them.

Table 4.8-10. Summary of Routine Action Impacts on Cultural Resources

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Loss/degradation of archaeological site	Loss/degradation of historic structure	Impacts to cemeteries	Impacts to Sacred Site	Alteration of cultural viewshed	**Overall Impact**
Contract O&E Target and Residue Removal	N	N	N	N	N	N
Culvert Installation/Maintenance	Min	Min	Min	N	N	N
Drop Zone/Landing Zone Maintenance	Min	Min	Min	N	N	N
Low Water Crossing Site Creation & Maintenance	Min	Min	Min	N	N	N
Maneuver Damage Repair	N	N	N	N	N	N
Maneuver Trail Creation, Hardening, & Maintenance	Mod	Min	Min	N	N	N
Observation Point Creation	Min	Min	Min	N	N	N

Following site selection of these routine projects, the checklist would be completed to evaluate the potential for impacts. Specific Areas of Potential Effect (APEs) for each project would be determined during completion of the checklist, once limits of construction and specific project footprints have been identified. The intent of the checklist is to identify specific environmental stewardship guidelines to minimize or avoid adverse impacts from construction of routine range projects. APEs would also be evaluated through consultation pursuant to Section 106.

As shown in Table 4.8-10, projects involving new construction (e.g., observation point creation, culvert and low water crossing installation, and maneuver trail construction) have a minor to moderate potential to impact archaeological sites, historic structures, and cemeteries and care should be taken to place these activities in surveyed locations and away from identified eligible sites, structures, and cemeteries. New construction would avoid the locations of known sites, structures, and cemeteries. Projects with larger ground disturbing footprints (e.g., grading and shaping, vegetation clearing, and maneuver trail construction) have a greater potential to cause moderate to significant adverse impacts to cultural resources; when feasible, these projects should be sited in locations that have been surveyed for cultural resources and should avoid impacts to archaeological sites, historic structures, and cemeteries. Prior to construction, any routine activity that disturbs the ground surface and is located in an area that has not been surveyed will require a phased identification and evaluation process pursuant to Section 106 of

the NHPA. Archaeological survey standards are outlined in Section 7.3 of the ICRMP. Where sites may be impacted whose NRHP eligibility has not yet been determined, an eligibility evaluation should be conducted. Evaluation standards are specified in Section 7.4 of the ICRMP.

4.8.2.5 Alternative 4

The reactivation of installation controlled airspace would have no adverse impacts to cultural resources.

4.8.2.6 Alternative 5

Implementation of Proposed Action Alternatives 1-4 would not create a greater adverse effect than those impacts described for each alternative. Although the combined implementation of those alternatives involving construction and ground-disturbing activities (Alternatives 1, 2 and 3), these ground-disturbing activities would be anticipated to avoid properties of religious or cultural significance (including Tribal and cemeteries), and properties eligible or listed on the NRHP. For instances where adverse impacts are unavoidable, mitigation of adverse effects to archaeological sites and/or historic structures would be conducted compliant with state and Federal regulations including Section 106 consultation. Therefore, overall impacts would be less than significant. It is assumed that the environmental stewardship guidelines would be used in the siting and planning of future projects to further minimize and avoid impacts to cultural resources.

4.9 Traffic and Transportation

4.9.1 AFFECTED ENVIRONMENT

4.9.1.1 Roadway Network Surrounding Fort Campbell

Transportation near Fort Campbell is achieved mainly via roadway networks and pedestrian walkways, and is easily accessible by all transportation modes. Regional access is provided by Interstate (I)-24. State routes that provide access to the area include Fort Campbell Boulevard (U.S. Route 41A), the north-south arterial on the eastern boundary of the installation, which provides access to I-24; Dover Road (TN-76/US-79), the east–west arterial on the southern boundary of the installation, connects Montgomery and Stewart counties; Tiny Town Road and 101st Airborne Division Parkway provide access to areas east of Fort Campbell; and Herndon Oak Grove Road and Purple Heart Parkway provide access to areas west.

4.9.1.2 Fort Campbell Roadway Network

On-Post Roadways and Gate Traffic. Fort Campbell has a grid-type roadway system servicing the cantonment area. Screaming Eagle Boulevard provides the majority of public access to the installation with an entrance intersecting Fort Campbell Boulevard. Paved roadways that provide direct access to TAs are Jordan Springs Road, Suckchon Road, Palmyra Road, Pleasant Mill Road, and Ghost Corps Trail. Eight of the 10 gates provide access control points (ACP) from Fort Campbell Boulevard. Table 4.9-1 outlines Fort Campbell gate access, restrictions, and the on-post connecting roadway. Fort Campbell TAs have access points leading to TAs within and along the perimeter of the installation. These provide checkpoints and grant access to the TAs for military personnel. Table 4.9-2 lists the TA access gates, nearest training and maneuver area, and the nearest roadways leading to that gate. Figure 4.9-1 displays the road network and ACPs. Most gates are located along the installation boundary; however, a few of the gates (Angels Road, Mabry Road, and Gate 10) are located within the installation to control access to on-post facilities.

Table 4.9-1. Fort Campbell Cantonment Access Gates

Gate	Hours of Operations and Restrictions	Connecting Roadway
Gate 1	Open Monday-Friday 4:30 a.m.-10:00 p.m.; weekends 6:30 a.m.-10:00 p.m.	William C. Lee Road
Gate 2	Open Monday-Friday 4:30-9:00 a.m. & 3:00-6:00 p.m.; Closed on weekends, Federal holidays, and Days of No Scheduled Actions (DONSA).	Carentan Road
Gate 3	Open Monday-Friday 4:00 a.m.-10:00 p.m.; Weekends 7:00 a.m.-10:00 p.m.; Closed on Federal holidays and on weekends when in conjunction with a Division approved training holiday or Federal holiday weekend.	Jackson Road
Gate 4	Open 24-hours per day, 7 days per week.	Screaming Eagle Boulevard
Gate 5	Open Monday-Friday 4:30-9:00 a.m. & 3:00-6:00 p.m.; Closed on Weekends, DONSA, and Federal holidays.	Forrest Road
Gate 6	Open Monday-Friday 4:30 a.m.-9:00 p.m.; Weekends 7:00 a.m.-9:00 p.m.; Limited hours for DONSA 4:30-9:00 a.m. & 3:00-6:00 p.m.; Closed on Federal holidays, and on weekends when in conjunction with a Division approved training holiday or Federal holiday weekend.	Morgan Road
Gate 7	Open 24-hours per day, 7 days per week; Commercial vehicle inspection entrance.	Gate 7 Road
Gate 10	Open 24-hours per day, 7 days per week.	101st Airborne Division Parkway

Table 4.9-1. Fort Campbell Cantonment Access Gates

Gate	Hours of Operations and Restrictions	Connecting Roadway
Angels Gate	Monday-Friday 5:00 a.m.-5:00 p.m. Closed on weekends, DONSA, and Federal holidays.	Angels Road
Mabry Gate	Open 24-hours per day, 7 days per week.	Mabry Road

Source: Fort Campbell, 2013b

Table 4.9-2. Fort Campbell Training Area Gates

Gate	Nearest Training And Maneuver Area	Connecting Roadway
Garretsburg Road Gate	TA 17	Palmyra Road
Oasis Gate	TA 04	Nightstalker Way
Bell Station Road Gate	TA 14	Herndon Oak Grove Road, Bell Station Spur
CAAF Gate	TA 14	Nightstalker Way, Bell Station Spur
Sabre Airfield Gate	TA 00	Tennessee Avenue, Lafayette Road
11th Airborne Road Gate	TA 01	Lafayette Road, Paul B. Huff Memorial Parkway
101st Airborne Division Gate	TA 07A	Dover Road, Lylewood Road
Palmyra Road Gate	TA 09B and TA 21	Dover Road
Indian Mound Gate	TA 22 and TA 32	Red Top Road, Dover Road
Normandy Loop Gate	TA 32 and TA 35	Dover Road, Legate Road
Big Rock Gate	TA 34 and TA 48	Walter Smith Road, Jordan Springs Road
Artillery Road Gate (2)West	TA 49	Turner Road, Jordan Springs Road
Red Diamond Road Gate	TA 51	S Road, Federal Road 1109
Artillery Road Gate (1)North	TA 40	Lafayette Road

Source: Figure 2-1 Site-Specific Range Construction and Maintenance Project
TA = training area

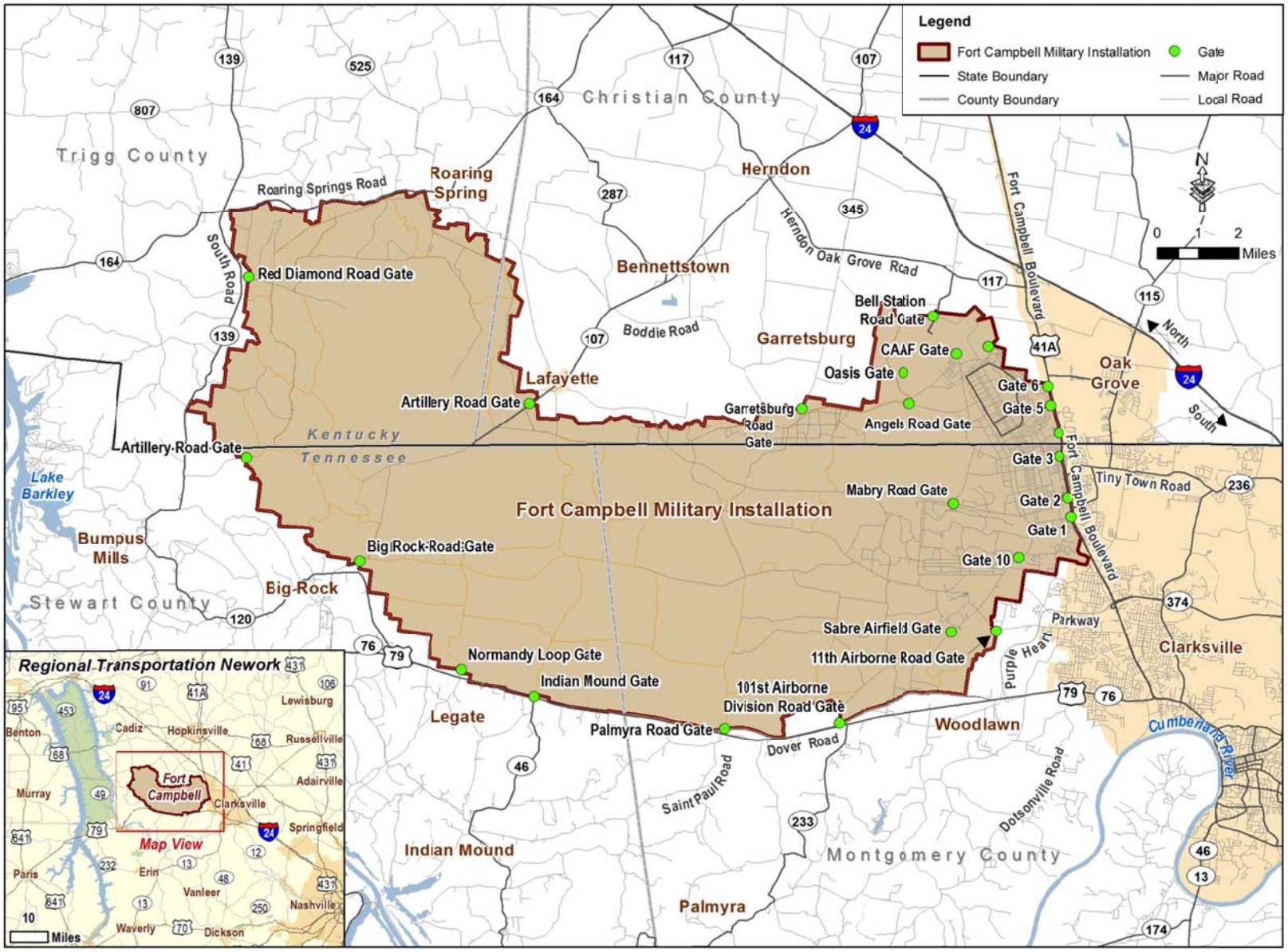


Figure 4.9-1. Fort Campbell Road Network and Access Control Points

Average annual daily traffic (AADT) is the average number of vehicles traveling along a roadway each day. Level of Service (LOS) is a measure of the operational conditions on a roadway or at an intersection. LOS ranges from A to F, with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays). LOS A, B, or C are typically considered good operating conditions. Table 4.9-3 outlines the routes near the installation, their AADT, and their estimated existing LOS. Some of the nearby roadways are already congested during peak traffic periods (i.e., LOS D, E, or F) (ITE, 2003).

Table 4.9-3. Fort Campbell Existing AADT and LOS on Nearby Roadways

Roadway	Average Annual Daily Traffic (AADT) [vpd]	One-Way Peak Hour Volume (V) [vph]	Volume to Capacity Ratio (V/C)	Estimated Existing Level of Service (LOS)
Tiny Town Road	24,107	1,302	0.77	E
Herndon Oak Grove Road	4,168	450	0.26	C
Purple Heart Parkway	29,891	1,614	0.95	E
Dover Road	8,109	438	0.26	C
Fort Campbell Boulevard at Gate 7 Road	22,352	805	0.47	D
Fort Campbell Boulevard at Screaming Eagle Boulevard (Gate 4)	27,873	1,003	0.59	D
I-24 North	34,314	1,853	1.09	F
I-24 South	19,412	1,048	0.62	D

Source: TNDOT, 2013; KYDOT, 2013
AADT = average annual daily traffic; LOS = level of service

Load restrictions limit travel routes from the Cantonment area west to the various TAs (Table 4.9-4). With the exception of Patton and Perimeter Roads, pavement surfaces are in good condition. Patton and Perimeter Roads exhibit varying levels of distress that warrant future remedial measures. Notably, portions of Perimeter Road are unpaved gravel (Terracon, 2013).

Table 4.9-4. Load Restrictions on Roadways Accessing Training Areas

Route	Load Limitation (tons)
Angels Road, east of Mabry	16
Angels Road, west of Mabry	40
Perimeter Road	20 to 24
Palmyra Road	16 to 24
On the Line Road	24
East End Road	24
Mabry Road	30
Jordan Springs Road	40

Source: Terracon, 2013

The existing culverts, are predominantly intact. Culverts most at risk under heavier loading are located in the far western and central parts of the installation on Patton Road, Perimeter Road, Jordan Springs Road, and Palmyra Road. Traffic concerns, however, from these at-risk culverts are lessened for vehicles that cannot reach these roads due to load limitations shown above. In the cantonment area, asphalt surfacing has been placed over concrete. Although intact, most culverts on-post are in need of some level of maintenance.

4.9.1.3 Air, Rail, Barge, and Public Transportation

The closest international airport is Nashville International Airport (BNA), which is approximately 50 miles away and has 478 operations per day (AirNav, 2013). Other nearby airports include, Campbell Army Airfield (HOP), Outlaw Field (CKV), and Hopkinsville-Christian County Airport (HVC). CKV operations include primarily private pilots with some corporate use. Because of CKV's close proximity to the installation, air operations are coordinated through Fort Campbell air traffic control (City of Clarksville, 2013). A detailed description of the existing airspace is presented in Section 4.2 Airspace.

The Army owns and operates a dedicated rail spur serving Fort Campbell. The spur connects to the CSX railroad approximately 16 miles north of Fort Campbell in Hopkinsville, Kentucky. There are approximately 11 miles of track within the installation; 5 miles in Kentucky and 6 miles in Tennessee (City of Clarksville 2013). The closest Amtrak station is approximately 80 miles away in Fulton, Kentucky (Amtrak, 2013).

Water freight transport is an important part of the transportation system in the Fort Campbell area. Fort Campbell owns a dock terminal on the Cumberland River in Tennessee (Old Lock and Dam C) which is a 27-mile drive and approximately 9 miles south of Suckchon DZ. Lylewood Road (County Road 233) provides direct access to the terminal and intersects with Dover Road 0.2 miles east of 101st Airborne Division Road although there is no ACP. The terminal is used for off-loading military equipment from barges but has no secured or outside storage capabilities (TVA, 2013).

Clarksville Transit System (CTS) provides transit service to the area surrounding Fort Campbell. CTS Route 1 provides four stops within the Cantonment area. Route 1 operates Monday through Saturday from 4:40 a.m. to 8:45 p.m. (CTS, 2013).

4.9.2 ENVIRONMENTAL CONSEQUENCES

This section provides a discussion of the potential environmental impacts to transportation resources that would result from the Proposed Actions. Impacts were primarily assessed by reviewing existing traffic conditions of public roadways and the types and frequency of activities that may require use of these roadways. Impact to traffic and transportation would be considered significant if the action results in a two LOS reduction in the functioning of the roadway network on or near the installation.

4.9.2.1 No Action Alternative

Selecting the No Action Alternative would result in no increased effect on traffic and transportation. The installation operations would continue without changes and there would be no new effects to ground, air, rail, barge, or public transportation resources. Because the amount of training would remain relatively constant, under the No Action Alternative, Fort Campbell would continue to train on existing trails and roadways, which would result in similar wear and tear. Traffic and transportation would remain unchanged when compared to existing conditions.

4.9.2.2 Alternative 1

All site-specific projects outlined under Alternative 1 would have short- and long-term minor adverse effects. Short-term effects would be due to increases in construction related traffic. Long-term effects would be due to small changes in on-post traffic leading to the TAs where the site-specific projects would occur. There would be no effects to air, rail, barge, or public transportation.

Construction. Traffic congestion would increase at Fort Campbell due to construction vehicles supporting the site-specific projects. These effects would be temporary in nature and would end with the completion of the construction phase at each site. Both on-post and off-post roadway infrastructure would be sufficient to support the construction traffic. Effects would be minimized by avoiding vehicle movement during peak traffic hours, and placing staging areas where they would least interfere with traffic. All construction vehicles would be equipped with backing alarms, two-way radios, and Slow Moving Vehicle signs when appropriate. Heavy equipment operators and vehicles making material deliveries would strictly adhere to load restrictions on roadways accessing construction sites (Table 4.9-4).

Equipment required for construction of site-specific projects would use Mabry Road, Angels Road, Market Garden Road, Turner Road, and On-The-Line Road. Although Gates 1 and 10 are closer to south-post TAs and DZs, vehicles delivering supplies and equipment would enter through Gate 7, the commercial vehicle inspection entrance (Table 4.9-1). Due to the assembly-line method of construction and reconfiguration of trails, activities may last several days in one area on an intermittent basis. These activities typically would be short-term and limited to daylight hours. These effects would be minor (see Table 4.9-5).

All vehicles associated with construction of site-specific projects would follow Fort Campbell Vehicle Regulations (CAM Regulation 190-5) and Training Directive Formations and Routes (CAM Regulation 350-1), which establish policies and procedures for individuals, units, and agencies operating vehicles on the installation. In general, these requirements include:

- Complying with all posted speed limits and traffic signs;
- Complying with all on-post traffic and safety policies and procedures;
- Coordinating delivery of equipment and supplies with range operations;
- Coordinating construction operational activities with range operations; and
- Avoiding operating motor vehicles on foot paths.

This listing is not all-inclusive; the Army and contractors would comply with current applicable traffic and transportation requirements.

Operations. Alternative 1 and subsequent training activities would be confined to Fort Campbell's range areas. Although there would be no change in the number of on-post personnel, there would be minor long-term effects from changes in traffic to and from range areas due to Alternative 1. Long-term effects would be due to changes in on-post traffic from accessing the proposed TAs. There would be no changes in off-post traffic, and individuals would use the gates currently used to access the proposed facilities. These effects would be minor.

Due to runway upgrades at Saunders LZ; Artillery Road, Turner Road, and FD 1129/1104 would have increased traffic with the establishment of the proposed FARP or UAS launch and recovery zone. Subsequently, this may reduce traffic on roadways near current FARP and UAS launch facilities.

As with construction, all vehicles associated with operation of the proposed facilities would follow Fort Campbell Vehicle Regulations (CAM Regulation 190-5) and Training Directive Formations and Routes (CAM Regulation 350-1).

Table 4.9-5. Summary of Site-specific Projects Traffic and Transportation Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
		Impact to on-post traffic during construction	Impact to on-post traffic from operations	Impact to off-post traffic during construction	Impact to off-post traffic from operations	Degradation in transportation network from operations	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	N	N	N	N	N	N
Construct a Gravel Foot March Trail	On The Line Road	Min	Min	Min	N	N	Min
Construct a Runway with Glide Slopes	Saunders LZ	Min	Min	Min	N	N	Min

LZ = landing zone

4.9.2.3 Alternative 2

The establishment of the AUZs under Alternative 2 would have short- and long-term minor adverse effects. As with Alternative 1, short-term effects would be due to increases in construction related traffic, and long-term effects would be due to small changes in on-post traffic leading to the proposed AUZs. There would be no effects to air, rail, barge, or public transportation. As with Alternative 1, all vehicles associated with construction and operations of the proposed AUZs would follow CAM Regulations 190-5 and 350-1.

Construction. Effects from construction would be similar in nature and overall level to that of Alternative 1. Table 4.9-6 outlines potential effects to transportation resources, and the condition of roadways accessing the proposed AUZs. These activities typically would be short-term and limited to daylight hours. BMPs associated with construction traffic would be similar to Alternative 1. Although Gates 1 and 10 are closer to the proposed AUZs, vehicles delivering supplies and equipment would enter through Gate 7 the commercial vehicle inspection entrance (Table 4.9-1). Overall, construction effects would be minor.

Table 4.9-6. Summary of Potential Construction Impacts by AUZ

Proposed AUZ	Roadways Accessing AUZ	Roadway Capacity	Potential Impacts to Transportation Resources
TA 11	Ghost Corp Trail	Adequate	• Temporary minor increase in construction worker traffic • Temporary minor increase in gate traffic during delivery of equipment and supplies • Small changes in on-post traffic patterns during operation of AUZ facilities. • Minor changes in traffic volumes
TA 20	Suckchon, Palmyra, and Jordan Springs Roads	Adequate	
TA 52	Pryor Trail	Adequate	
Aardvark LZ	Jordan Springs and Destiny Roads	Adequate	
Golden Eagle FLS	Centerline Road	Adequate	
Indian Mound LZ	Jordan Springs and Walker Roads	Adequate	
Suckchon DZ	Suckchon, Palmyra, and Jordan Springs Roads	Adequate	
Veghel DZ	Perimeter and Red Diamond Roads	Adequate	

Source: Fort Campbell, 2012d.
AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; TA = training area

Operations. Alternative 2 and subsequent training activities would be confined to Fort Campbell's AUZs. There would be no change in the number of personnel or long-term effects from changes in vehicle traffic on-post due to Alternative 2. During their operation there would be small increases in on-post traffic on roadways accessing the proposed AUZs (Table 4.9-6). This would reduce traffic on roadways near current training operations. Although the exact nature of the traffic changes is unknown at this time, the redistribution of vehicles would likely have some beneficial effects at current TAs. There would be no changes in off-post traffic, and individuals would use the gates currently used to access the proposed facilities.

4.9.2.4 Alternative 3

Routine range and training land actions under Alternative 3 would have short- and long-term minor adverse effects. As with Alternative 1, short-term effects would be due to increases in construction related traffic, and long-term effects would be due to small changes in on-post traffic from maintenance and on roadways leading to any new facilities. There would be no effects to air, rail, barge, or public transportation. All vehicles would follow CAM Regulations 190-5 and 350-1.

Construction. Table 4.9-7 outlines potential effects to transportation resources from construction during routine actions. These activities typically would be short-term and limited to daylight hours. Vehicles delivering supplies and equipment would enter through Gate 7 (Table 4.9-1). Appendix F contains existing environmental stewardship guidelines that would be implemented, as necessary, for routine range actions to further reduce adverse traffic and transportation impacts. These effects would be minor.

Operations. All activities outlined under Alternative 3 would be confined to areas within the installation. Although there would be no change in the number of on-post personnel, there would be minor long-term effects from changes in traffic to and from any new facilities. Due to their limited size and function, there would be no appreciable change in off-post or gate traffic from these activities regardless of their ultimate location. In addition, many of the routine actions are by definition "on-going" maintenance, and the overall level of these would be similar in scope to activities currently being conducted at the installation. Notably, sustainable range stewardship

guidelines include several infrastructure maintenance-type activities that may cause temporary road closures, rerouting of traffic, and traffic delays.

Heavy equipment operators and vehicles making material deliveries would strictly adhere to load restrictions on roadways (Table 4.9-4). Effects due to road maintenance would be more prevalent along Patton Road, Perimeter Road, Jordan Springs Road, and Palmyra Road in areas that exhibit distress and at at-risk culverts. Culvert maintenance would include removal of blockage, cleaning to remove siltation, cutting of trees that are impacting culvert ends, remediation of erosion and other issues resulting in crimping or loss of culvert sections within the road shoulders. These activities would have minor beneficial effects.

Table 4.9-7. Summary of Routine Action Impacts on Traffic and Transportation

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
	Impact to on-post traffic during construction	Impact to on-post traffic from operations/maintenance	Impact to off-post traffic during construction/maintenance	Impact to off-post traffic from operations	Degradation in transportation network from operations	**Overall Impact**
Contract O&E Target and Residue Removal	N	N	N	N	N	N
Culvert Installation/Maintenance	Min	Min	N	N	N	Min
Drop Zone/Landing Zone Maintenance	Min	Min	N	N	N	Min
Low Water Crossing Site Creation & Maintenance	Min	Min	N	N	N	Min
Maneuver Damage Repair	N	Min	N	N	N	Min
Maneuver Trail Creation, Hardening, & Maintenance	Min	Min	N	N	N	Min
Observation Point Creation	Min	Min	N	N	N	Min

4.9.2.5 Alternative 4

Alternative 4 would have no effects on transportation or traffic. There would be no construction or changes to ground based operations, and there would be no changes in ground traffic either on- or off-post from the changes in installation controlled airspace. There would be no effects to rail, barge, or public transportation. A detailed description of the effects of Alternative 4 on airspace is outlined in Section 4.2 Airspace.

4.9.2.6 Alternative 5

Short and long-term minor adverse effects would be expected. As with Alternatives 1 through 4, there would be short-term increases in traffic from construction activities, and long-term incremental changes in on-post traffic from accessing new facilities. There would be no effects to air, rail, barge, or public transportation.

Construction. Tables 4.9-4, 4.9-5, and 4.9-6 outline potential effects to transportation resources from construction for the combined actions. It is not expected that the overall effects from construction would be greater with the implementation of Alternative 1 through 4 individually, as it is not anticipated that any activities outlined would be heavily concentrated in any one location during the same period. BMPs associated with construction traffic would be similar to Alternative 1. These effects would be minor.

Operations. All transportation-related activities and effects for the combined actions would be confined to areas within the installation. Although there would be no change in on-post personnel, there would be minor long-term effects from changes in traffic to and from any new facilities. Due to their limited size and function, there would be no appreciable change in off-post or gate traffic from the combined actions. In addition, many of the actions are relatively small activities currently being carried out within the existing planning process or by definition are "on-going" maintenance, and the overall level of traffic would be similar in density to what is currently experienced on-post. There are no projects identified in Alternatives 1 through 4 that when combined would have greater than significant effects. These effects would be minor.

4.10 Hazardous and Toxic Substances

4.10.1 AFFECTED ENVIRONMENT

4.10.1.1 Regulatory Background and Definitions

The handling and storage of hazardous materials, toxic substances, and hazardous waste at Fort Campbell are regulated by the Kentucky Hazardous Waste regulations found in Title 401 of the Kentucky Administrative Regulations, Chapters 30 through 49; the Tennessee Hazardous Waste regulations Chapter 0400-12-01; the USEPA Resource Conservation and Recovery Act (RCRA) regulations set forth in the CFR Title 40; and AR 200-1, Environmental Protection and Enhancement. AR 200-1 outlines environmental responsibilities for the Department of the Army (DA), major commands, and installations. It also defines the Army's goal of continually reducing the generation of hazardous waste and procedures for managing those wastes, including waste identification, records management, waste disposal, and training programs.

DA Pamphlet 200-1 supplements AR 200-1 with specific requirements on how to implement and manage the Army's environmental programs. This pamphlet explains detailed procedures and methodology to be followed in preserving, protecting, and restoring environmental quality in accordance with AR 200-1. The DoD also has numerous DoD Instructions, Directives, Technical Bulletins, and Technical Manuals that establish policies and procedures for the safe handling and management of hazardous materials and waste.

Fort Campbell advocates a clean environment and has programs in place to minimize the quantity of hazardous materials used and the generation of hazardous waste. Fort Campbell has developed several plans specific to its operations for the management of hazardous and toxic substances. These plans include a Hazardous Waste Management Plan, a SPCCP that provides guidance concerning the containment and cleanup of spills (for all type hazardous materials), and an installation Spill Contingency Plan.

In addition, the installation has management plans in place for the identification, safe handling, and abatement (if necessary) of toxic substances, including polychlorinated biphenyls (PCBs), lead-based paint, pesticides, and asbestos-containing materials.

4.10.1.2 Hazardous Material Use

Hazardous materials are used at Fort Campbell for installation maintenance, medical training, weaponry, and vehicle maintenance. Typical materials include light ballasts, mercury-containing light bulbs, paint and paint thinners, industrial solvents and degreasers, pesticides, batteries, solvents, petroleum, oils, and lubricants (POLs), and weaponry.

Fort Campbell uses hazardous materials during most of its test activities. Vehicle maintenance (e.g., tire changes, oil changes, battery charging, etc.) require fuels, lubricants, solvents, adhesives, batteries and other products. Weapons training inherently involves discharging ammunition into the impact areas. Depending upon the type of munitions, this could result in the release of heavy metals (e.g., lead) or energetic substances into soils. Fort Campbell does not fire munitions containing radioactive materials such as depleted uranium. Weapons training require that weapons be cleaned using solvents and lubricants.

Army policies for the proper handling of hazardous materials are in AR 200-1, Chapter 9, Materials Management that includes policies to reduce acquisition of hazardous materials through centralized inventory control, BMPs, pollution prevention actions, improved procurement practices, material re-use, recycling, and enhanced shelf-life management. The Pollution Prevention Operation Center (PPOC) establishes a single control point and accountability over the requisitioning, receipt, distribution, and storage of hazardous materials

and operates a centralized Hazardous Materials Control Center to reduce and control the types and quantities of hazardous materials used.

4.10.1.3 Hazardous Waste Management

Fort Campbell is a large-quantity generator of hazardous waste, which means Fort Campbell generates 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste.

Typical hazardous waste generated at Fort Campbell include solvents, oils, paints, anti-freeze, sealants, expired medical supplies, excess ammunition, expired hazardous materials, spill residue, and UXO. Used POLs, used anti-freeze, and spent parts washer solvents are collected for recycling. There are several waste streams (e.g., used batteries and spent fluorescent light bulbs) that are managed as Universal Waste. The Universal Waste regulations (40 CFR Part 273) encourage recycling and proper disposal of some common hazardous wastes while reducing administrative requirements and costs that would be required if these wastes were managed as hazardous waste. Small equipment tests vary considerably in the amount of hazardous materials used and wastes generated. For this reason, the amount of waste generated from year to year will vary with the type and intensity of tests being conducted.

Fort Campbell has a program for the management of hazardous waste at the installation. All hazardous wastes generated onsite are collected and processed through a centrally located hazardous waste management facility, the PPOC. The PPOC provides a single point of accountability for classification, chemical analysis, manifesting, bulking, labeling, and tracking of all waste for ultimate disposal. From the PPOC, hazardous wastes are shipped offsite to an approved treatment, storage, or disposal facility. Fort Campbell does not treat, store, or dispose onsite any RCRA-regulated hazardous wastes. PPOC programs ensure proper management for the requisition, receipt, distribution and storage of all hazardous materials, hazardous waste, and recyclable fuels and oils on Fort Campbell. These processes have enabled Fort Campbell to reduce hazardous waste disposal quantities and related costs by over 80 percent since 1992 (Fort Campbell, 2006b).

Personnel are trained in the proper handling, storage and identification of hazardous waste. Training is also provided to personnel on the safe handling of POL to avoid spills and cleaning up spills should an accident occur.

4.10.1.4 Other Toxic Substances

Toxic substances include PCBs (typically found in transformers and ballasts), lead-based paint (found in older structures where lead-based paint was used), asbestos-containing material (found in materials such as ceiling and floor tile, insulation, and vehicle brake systems manufactured before the 1970s), and pesticides. The installation has plans in place to train personnel to properly identify these substances and to safely manage and conduct abatement activities (if necessary). The plans and procedures in place at Fort Campbell ensure proper identification, scheduling of abatement activities, cleanup, disposition, and monitoring of these substances wherever present in Fort Campbell facilities.

4.10.1.5 Chemical Constituents in Soil

Numerous investigations have been completed or are ongoing at Fort Campbell as a result of past training exercises that have contaminated onsite soil. These investigations have led to various remedial actions incorporating physical site remediation and groundwater monitoring.

More than 500 solid waste management units (SWMUs[12]) have been identified at Fort Campbell with more than 430 SWMUs designated as requiring no further action. The remaining SWMUs are being managed and monitored in accordance with agreements between Fort Campbell and the respective state regulatory agency (i.e., KYDEP or TNDEC). The SWMUs are primarily located in the eastern portion of Fort Campbell within and immediately adjacent to the cantonment area (see Figure 2-1).

4.10.1.5.1 Historical Davy Crockett Weapon Training

Fort Campbell conducted training exercises using the "Davy Crockett" spotting rounds, which contained depleted uranium (DU) in the 1960s. According to the *Installation Specific Archive Search Report (ASR) on the Use of Cartridge, 20mm Spotting 101, Davy Crockett Light Weapon M28 at Fort Campbell* prepared in 2008 (Joint Munitions Command and USACE St. Louis, 2008), the Davy Crockett weapon was fired at Fort Campbell in the 1960s. In 1962, 681 rounds of 20mm Spotting M101 cartridges were shipped to Fort Campbell based on Army records. Based on collected information and on range inspections, the South Impact Area was identified as a TA for the Davy Crockett weapon. Two additional impact areas, the North Impact Area and the Small Arms Impact Area, were determined to be capable of accommodating the Davy Crockett safety and security requirements and, were therefore, evaluated as part of the ASR as potential firing ranges where the Davy Crockett weapons were used. No evidence was found to indicate that the North Impact Area or the Small Arms impact Area were used for Davy Crockett weapons training. Four areas at Fort Campbell were inspected for the presence of Davy Crockett ammunition or debris, including Range 4, OP-2/OP-3, Range 32/OP-13, and Range 41. No Davy Crockett ammunition or debris were identified at any of the locations inspected. At OP-2/OP-3 firing range (see Figure 4.10-1), however, the primary area where 20mm rounds would have been expected, was not inspected because it was within an Improved Conventional Munitions restricted area. There is no evidence that the Davy Crockett spotting rounds were fired elsewhere at Fort Campbell. No records have been identified for disposal associated with the Davy Crockett weapon system. The ASR states the common practice to detonate in place was likely used. Based on the 2008 study and follow-on investigations, Fort Campbell has designated a radiation control area (RCA) in which no munitions are to be fired into the RCA per agreement with the Nuclear Regulatory Commission (NRC) (see Figure 2-3 for RCA location).

[12] SWMU is any discernible waste management unit at a RCRA facility from which hazardous constituents might migrate, regardless of whether the unit was intended for the management of solid and/or hazardous waste. This typically includes, but is not limited to, the following waste management units: landfills; waste piles; surface impoundments; land treatment areas; underground or above ground waste storage tanks; and drum storage areas.

Source: The Brookings Institution, 2013

Figure 4.10-1. Infantry personnel of the 101st Airborne Division preparing to fire a Davy Crockett during a training exercise at Fort Campbell, Kentucky, May 14, 1962.

The Davy Crockett was the smallest and lightest nuclear weapon ever deployed by the U.S. military and was tested by U.S. Army forces from 1961 to 1971. Historical training exercises using the Davy Crocket spotting rounds have resulted in residual quantities of DU at two Army installations (Schofield Barracks on Oahu and Pohakuloa TA on the Island of Hawaii). The Army has applied to the NRC for a license to possess and manage residual quantities of depleted uranium at those installations. The license, once granted, will require the Army to perform specific functions designed to protect public health and safety and the environment. These include a radiation monitoring program and physical access control consistent with NRC's regulations for protecting the public against radiation. Should DU be discovered elsewhere on Army installations (such as Fort Campbell), the Army will conduct an environmental survey to determine if that area needs to be included in the monitoring and access control programs under the license. These programs will support future site decommissioning and cleanup (NRC, 2009).

The NRC requested the Army include environmental radiation monitoring plans and security plans as part of its license application. Two generic plans – applicable to all sites where DU has been found – were provided for NRC review titled, "Physical Security Plan for Depleted Uranium From the M101 Spotting Round" and "Environmental Radiation Monitoring Plan for Depleted Uranium From the M101 Spotting Round." Army sites with residual DU will be added to the license after a site characterization has identified DU and a site-specific environmental radiation monitoring plan has been provided (NRC, 2009).

Under the NRC license, the Army will be required to comply with NRC regulations and standards for protecting the public and the environment from exposure to radiation. The NRC will provide oversight of the Army's monitoring programs through periodic inspections and reviews (NRC, 2009). At Fort Campbell, the Army will perform an assessment, as necessary, to

determine if DU is present. It is likely, if DU is present, that it would be within designated impact areas at the post, which currently have restricted access.

4.10.2 ENVIRONMENTAL CONSEQUENCES

As stated in Table 4.1-1, significant impacts would occur when substantial additional risk to human health or safety would be attributable to Army actions, including direct human exposure, substantial increase in environmental contamination or violation of applicable Federal, state, DoD, and local regulations. The following sections discuss the potential for adverse impacts to cultural resources for the No Action and Proposed Action Alternatives.

4.10.2.1 No Action Alternative

Under the No Action Alternative, training would continue at Fort Campbell as discussed in Chapter 3. The same type and quantity of hazardous materials and toxic substances would be used, and consequently, the same type and quantity of hazardous waste would be generated. Fort Campbell would continue programs to reduce waste streams at the installation and would continue to manage hazardous materials and hazardous waste in accordance with all applicable Federal, state, and Army regulations.

Fort Campbell would not implement any of the Proposed Actions; however, range construction projects would still continue as needed and would undergo a project-by-project evaluation under NEPA. During construction activities there would be a potential for spills of POL and other hazardous materials (e.g., cleaning solvents) to occur. No adverse impacts would occur because Fort Campbell has programs in place for the safe handling of hazardous materials and cleanup procedures that would ensure a spill is immediately contained and cleaned up. Individual planning and siting of projects under the No Action Alternative could result in less efficient purchase and use of hazardous materials if excess hazardous materials expire and have to be disposed of rather than used for another project. The Proposed Actions would allow for better planning of hazardous materials usage and purchase. This would include possible reduction of materials, and consequently, reducing the quantity of hazardous waste generated. Fort Campbell is required to comply with Federal, state, and Army regulations as they pertain to the proper management, storage and disposal of hazardous materials and waste; therefore, overall no adverse impacts would be anticipated from existing conditions.

4.10.2.2 Alternative 1

Table 4.10-1 summarizes the potential for adverse impacts from hazardous and toxic substances and waste. The text following the table supports impact conclusions made within the table by project.

Table 4.10-1. Summary of Site-specific Projects Hazardous and Toxic Substances and Waste Impacts

Project Name	Location	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial					
		Risk of spill during construction	Hazardous or toxic materials used during Construction	Hazardous or toxic waste generated from demolition of structures	Hazardous or toxic waste generated from operations	Risk of spill during operations	**Overall Impact**
Construct a Driving Skid Pad	Range 51E	Min	Min	N	Min	Min	Min
Construct a Gravel Foot March Trail	On The Line Road	Min	Min	N	N	N	Min
Construct a Runway with Glide Slopes	Saunders LZ	Min	Min	N	Min	Mod	Min

LZ = landing zone

Construction of any of the projects listed in Table 4.10-1 would require the use of vehicles and construction equipment (e.g., bulldozers and backhoes). Cleaning solvents may also be used in small quantities to clean parts. Batteries would be present in vehicles and construction equipment and could require replacement during construction. Paints could be used in the construction of the ROCAs (Projects 4 through 9). Minor adverse impacts would occur if hazardous materials (e.g., POLs, cleaning solvents, and paint) are spilled; however, all hazardous materials would be stored in such a manner as to prevent spills and releases. All materials would be handled, stored, and disposed of in accordance with applicable laws and regulations.

No structures are present where range construction and maintenance projects would be located. Therefore, there would be no toxic substances (e.g., lead-based paint, PCBs or asbestos) that are often associated with older structures. No new construction would use these substances. Construction and operation of these projects would not be within SWMU boundaries; therefore, no disturbance of these areas would occur.

Fort Campbell has two large areas designated as impact areas (see Figure 2-1), which are restricted areas where spent ammunition and UXO may exist and where the RCA occurs.

Within the impacts areas, the potential to encounter contaminated soils or UXO would be greatest during the construction stages. Construction of the Alternative 1 projects are located outside of the impact areas and contaminants at these locations are not likely. Contamination could be present from weaponry (lead and other metals) and POLs from vehicle use.

Adverse impacts from construction would be reduced to minor through use of existing environmental stewardship guidelines provided in Appendix F:

- All military units and contractors using the sites would be required to possess and have available appropriate spill response materials for the types and quantities of hazardous materials they may transport and use within proximity to any work area. All spills or releases would be reported and all appropriate remediation measures would be accomplished.
- If unidentified contaminated soils, drums, or unusual debris (e.g., UXO, discarded military munitions, or munitions debris) are encountered at any time on or around the work site, the contractor shall stop work immediately and notify the Public Works Environmental Office and DPTMS Range Division for UXO.
- Any project that involves excavation or movement of soils must include field screening for petroleum (plus any other identified contaminants). Soils registering less than field screening levels indicated in Army policy are considered clean and may be reused on site or transported to the post landfill. Soils exceeding regulatory levels would be remediated in accordance with state regulations.

Operation of the driving skid pad would have the potential for spills of hazardous materials, mainly POLs, to operate and maintain military vehicles.

Operation of the gravel foot march trail would not require the use of hazardous materials and would have no impact to hazardous materials and waste.

Operation of the runway with glide slopes would have the potential for spills of hazardous materials, mainly POLs, from aircraft during takeoff and landing and from the operation of vehicles to transport Soldiers and equipment to the area. This project may also serve as a refueling point, which would have the potential for a spill during refueling. Environmental stewardship guidelines (see also Appendix F) would be followed to reduce impacts to minor during operations.

Construction and operation of all of the site-specific projects would have less than significant adverse impacts to hazardous materials and waste provided the installation complies with regulations, and environmental stewardship guidelines for the safe handling, storage, and disposal of all hazardous materials and waste. Fort Campbell and its contractors would adhere to the SPCCP and have adequate spill response equipment (e.g., absorbent, containers) present during construction and operations. Less than significant impacts would result if contaminated soils are encountered during construction because soil would be left in place, or if remediation is required, contaminated soils would be remediated to achieve regulatory limits. Soil remediation, if appropriate, would be a beneficial impact.

4.10.2.3 Alternative 2

Table 4.10-2 summarizes the extent of environmental constraints within each AUZ and the potential for adverse impacts of hazardous and toxic substances based on the likely potential activities (Chapter 2, Table 2.2).

Table 4.10-2. Summary of Potential Hazardous and Toxic Substance Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts of Hazardous and Toxic Substances
TA 11	• Historic training creates the potential for contaminants to be present in soil (e.g., lead from spent munitions)	• Disturbance of contaminated soils during construction; however, disturbed soils would likely be reused on-site and no soil disposal would be required. • If contaminants are detected that

Table 4.10-2. Summary of Potential Hazardous and Toxic Substance Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts of Hazardous and Toxic Substances
		exceed regulatory levels, Fort Campbell would coordinate with regulatory agencies regarding appropriate remediation. • The increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Training could increase contamination from a spill if hazardous substances are used. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.
TA 20	• Historic training creates the potential for contaminants to be present in soil (e.g., lead from spent munitions)	• Disturbance of contaminated soils during construction; however, disturbed soils would likely be reused on-site and no soil disposal would be required. • If contaminants are detected that exceed regulatory levels, Fort Campbell would coordinate with regulatory agencies regarding appropriate remediation. • The increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Training could increase contamination from a spill if hazardous substances are used. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.
TA 52	• Historic training creates the potential for contaminants to be present in soil (e.g., lead from spent munitions)	• Disturbance of contaminated soils during construction; however, disturbed soils would likely be reused on-site and no soil disposal would be required. • If contaminants are detected that exceed regulatory levels, Fort Campbell would coordinate with regulatory agencies regarding appropriate remediation. • The increase of hazardous material use

Table 4.10-2. Summary of Potential Hazardous and Toxic Substance Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts of Hazardous and Toxic Substances
		and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Training could increase contamination from a spill if hazardous substances are used. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.
Aardvark LZ	• Low potential for contaminants to be present in soil or DU due to historic airstrip use	• Increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Operation as a LZ could cause contamination from leaks of fuel or oil from aircraft. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.
Golden Eagle FLS	• Low potential for contaminants to be present in soil or DU due to historic airstrip use	• The increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Operation as a LZ could cause contamination from leaks of fuel or oil from aircraft. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.
Indian Mound LZ	• Low potential for contaminants to be present in soil due to historic airstrip use	• The increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Operation as a LZ could cause contamination from leaks of fuel or oil (POL) from aircraft. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a

Table 4.10-2. Summary of Potential Hazardous and Toxic Substance Impacts by AUZ

Proposed AUZ	Environmental Constraints	Potential Impacts of Hazardous and Toxic Substances
Suckchon DZ	• Historic training creates the potential for contaminants to be present in soil (e.g., lead from spent munitions)	• Disturbance of contaminated soils during construction; however, disturbed soils would likely be reused on-site and no soil disposal would be required. • If contaminants are detected that exceed regulatory levels, Fort Campbell would coordinate with regulatory agencies regarding appropriate remediation. • The increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release. • Storage of hazardous materials in maintenance hangers would cause a spill. Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.
Veghel DZ	• Historic training creates the potential for contaminants to be present in soil (e.g., lead from spent munitions)	• Disturbance of contaminated soils during construction; however, disturbed soils would likely be reused on-site and no soil disposal would be required. • If contaminants are detected that exceed regulatory levels, Fort Campbell would coordinate with regulatory agencies regarding appropriate remediation. • The increase of hazardous material use and generation of hazardous waste during construction would increase potential for spills. In the event of a spill, Fort Campbell's spill response plans would be implemented to immediately contain and clean up a release.

AUZ = adaptable use zone; DZ = drop zone; FLS = flight landing strip; LZ = landing zone; POL = petroleum, oil and lubricants

Alternative 2 looks at areas within the proposed AUZ that would be potentially impacted from future Fort Campbell range development activities. Although the areas identified for AUZs under Alternative 2 are not in SWMUs or designated impact areas, there is potential exists for encountering UXO, abandoned equipment, or areas of unknown contamination. Vehicle operations and operation of live fire ranges could increase runoff of fuels, motor oils, transmission fluids, hydraulic fluids, grease and brake fluids.

For actions under Alternative 2, project locations would avoid known contamination when siting facilities. If known contamination cannot be avoided, established environmental stewardship guidelines would be followed, including:

- If unidentified contaminated soils, drums, or unusual debris (e.g., UXO, discarded military munitions, or munitions debris) are encountered at any time on or around the work site, the agency or contractor shall stop work immediately and notify the Public Works Environmental Office.
- All military units using the sites will be required to possess and have available appropriate spill response materials for the types and quantities of hazardous materials they may transport and use within proximity to this work area. All spills/releases will be reported to Fort Campbell's DPW, Environmental Division. All appropriate remediation measures will be accomplished.
- Hazardous Waste Operations and Emergency Response (HAZWOPER) certified workers may be needed if clean-up and disposal of hazardous materials is necessary. All materials should be handled, stored, and disposed of in accordance with applicable Federal, state, and Army laws and regulations.
- As necessary, at the earliest time after the project planning charrette a UXO site survey would be performed to determine if ordnance contamination is present and if so, to aid in the design of the range and minimize intrusive work in portions of the range that are contaminated with ordnance and to determine the correct ordnance response actions.
- If UXO contamination is encountered during construction, work within the immediate area would cease and Range Control will notify the installation's EOD team.

No structures are present where range construction and maintenance projects would be located. Therefore, no demolition would occur during construction and no toxic substances (e.g., lead-based paint, PCBs, or asbestos) would be present. Toxic substances could be present if abandoned equipment or structures are found during ground disturbing exercises that contain these substances.

Similar to Alternative 1, construction and operation of the projects listed in Table 4.10-2 would require the use of vehicles and construction equipment (e.g., bulldozers and backhoes) that require fuels and oils to operate. Cleaning solvents and paint may also be used in small quantities during construction. Batteries would be present in vehicles and construction equipment and could require replacement during construction and operation. Disposal of batteries would be done in accordance with regulations through the Fort Campbell Division Material Management Center. Minor adverse impacts would occur if hazardous materials (e.g., POLs, cleaning solvents) are spilled; however, all hazardous materials would be stored in such a manner as to prevent spills and releases. Future operations would have the potential for spills; however, similar to construction, spill response measures would be in place to contain and clean up any spill immediately (see Alternative 1 and Appendix F).

All materials would be handled, stored, and disposed of in accordance with applicable laws and regulations. Contractors must have spill response plans in place prior to commencing work at the installation. Any unused or partly used materials are the property of the contractor, and must be removed from post and disposed of at the contractor's expense. On site refueling operations would conform to existing guidance.

All military units using the sites will be required to possess and have available appropriate spill response materials for the types and quantities of hazardous materials they may transport and use in work areas. All spills/releases would be reported and appropriate remediation measures will be accomplished.

4.10.2.4 Alternative 3

Table 4.10-3 summarizes the potential type and intensity of impacts on hazardous and toxic substances as a result of routine range projects. The intensity of impact presented in Table 4.10-3 considers use of existing environmental stewardship range construction guidelines that have been compiled and summarized in Appendix F.

Table 4.10-3. Summary of Routine Action Impacts on Hazardous and Toxic Substances

Project Name	Type and Intensity of Impact N = none; Min = minor; Mod = moderate; S = significant; B = beneficial				
	Risk of spill during construction	Hazardous or toxic materials used during Construction	Hazardous or toxic waste generated from demolition of structures	Hazardous or toxic waste generated from operations	**Overall Impact**
Contract O&E Target and Residue Removal	N	N	N	N	N
Culvert Installation/Maintenance	Min	Min	N	Min	Min
Drop Zone/Landing Zone Maintenance	Min	Min	N	Min	Min
Low Water Crossing Site Creation & Maintenance	Min	Min	N	Min	Min
Maneuver Damage Repair	Min	Min	N	Min	Min
Maneuver Trail Creation, Hardening, & Maintenance	Min	Min	N	Min	Min
Observation Point Creation	Min	Min	N	Min	Min

Routine range upgrade, maintenance, and construction projects would require the use of hazardous materials such as POLs for equipment and vehicles required for clearing and grading for range construction projects, construction of structures, and maintenance of ranges. Environmental stewardship guidelines as presented in Appendix F would be used to prevent spills or leaks during construction, and maintenance activities. The potential exists for UXO or contaminated soils to exist within range lands. The construction of new firing ranges could result in the potential for the transport of metal small arms munitions (bullets) constituents (primarily lead), from operational small arms range areas. New firing range facilities would follow BMPs outlined in the *Army Small Arms Training Range Environmental Best Management Practice Manual (2005).* This manual provides management and maintenance actions to avoid the potential for the metals to transport out of the range area and the potential to reach receptors at levels that exceed Federal and state established threshold levels.

For all actions under Alternative 3, the following would be adopted:

- All military units using the sites would be required to possess and have available appropriate spill response materials for the types and quantities of hazardous materials

they may transport and use within proximity to this work area. All spills/releases would be reported and appropriate remediation measures will be accomplished.

- If unidentified contaminated soils, drums, or unusual debris (e.g., unexploded ordnance, discarded military munitions, or munitions debris) are encountered at any time on or around the work site, the agency or contractor shall stop work immediately and notify the Public Works Environmental Office. If soil or groundwater requires remediation off-post, it shall be returned to the installation after treatment and certified laboratory analyses, conducted by the treatment facility, to confirm the material does not exceed a regulatory cleanup level.

Project planning would avoid known contamination areas when siting facilities. If known contamination cannot be avoided, established environmental stewardship guidelines will be followed as discussed under Alternatives 1 and 2 and Appendix F. Project proponents would coordinate with installation personnel in a timely fashion prior to project contract award and construction start in order to gain proper regulatory approval of work in a contaminated site, if applicable. During range construction and range operations, military units and contractors would follow pertinent regulations and BMPs for the handling and transfer of hazardous materials and UXO.

Routine actions would result in only a minor temporary increase in the use of hazardous materials, primarily during the construction process. Paints and adhesives are used during building construction; these are generally used to depletion and do not result in the generation of hazardous waste. Heavy equipment used during construction might leak, resulting in small spills of petroleum, antifreeze, or battery acid. These would be cleaned up in accordance with local procedures. A minor increase in spills associated with heavy equipment use and maintenance is possible. Impacts related to hazardous materials and wastes would be minor.

4.10.2.5 Alternative 4

The reactivation of installation-controlled airspace would have no adverse impacts to hazardous and toxic substances. This alternative would increase the quantity of hazardous materials used at the installation (e.g., fuel for aircraft and solvents and oils for maintenance) because more flights would be conducted (e.g., Gray Eagle). This alternative, however, would not generate hazardous waste in quantities beyond what the post can easily manage under its existing hazardous materials and waste management programs; any additional hazardous waste generated could be managed through existing transfer, storage and disposal facilities. Therefore, a minor impact regards to the use and handling of hazardous or toxic materials or hazardous waste would occur under this alternative. Additionally, artillery live fire from newly established firing points in TAs, 06, 07, 08A and 08B into the South Impact area would avoid the RCA; therefore, no adverse impacts would be anticipated regarding DU.

4.10.2.6 Alternative 5

Implementation of Proposed Action Alternatives 1-4 would not create a greater adverse effect than those impacts previously described for each alternative; therefore, overall impacts would be less than significant. It is assumed that the environmental stewardship guidelines discussed in Alternative 3 would be used in the siting and planning of future projects identified in Alternative 2 to avoid impacts from UXO and areas of known contamination. Construction of projects identified in Alternatives 1 and 2, along with routine range and training land actions discussed in Alternative 3 would not all happen within the same time frame. These projects would be constructed throughout Fort Campbell as shown on Figure 4.7-1 and as funding becomes available, most likely between FY 14 – 19. The projects are spread throughout Fort Campbell's TAs and include both ranges and maneuver areas. The individual projects are

dispersed spatially and are not close enough to have combined impacts. In addition, these projects will be separated in time, as discussed above. Even if all projects are executed, the combined impact would not be significant. Fort Campbell would follow regulations and established environmental stewardship guidelines as summarized in Appendix F; therefore, impacts to hazardous materials, toxic substances and hazardous waste would be minor.

5 Cumulative Effects

CEQ regulations implementing NEPA define a “cumulative impact” as follows:

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

USEPA guidance to reviewers of cumulative impacts analyses further adds:

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

This Chapter presents a comprehensive discussion of past, present, and reasonably foreseeable Army actions and non-Army actions within the ROI, other than the Proposed Action, that were reviewed to complete the cumulative impact analysis in this PEIS.

5.1 Impacts Methodology

The Army considered a wide range of past, present, and reasonably foreseeable future actions by researching existing literature and contacting local area planners and state and Federal agencies to identify other projects in the ROI that could contribute to cumulative environmental effects. "Reasonably foreseeable" is defined as those projects that are well-developed, in mature planning stages, and/or have funding secured. Conceptual projects, broad goals, objectives, or ideas listed in planning documents that do not meet the above criteria are not considered reasonably foreseeable for the purposes of this analysis. The Army considered other past, present, or foreseeable future actions regardless of whether the actions are similar in nature to the Proposed Action or outside the jurisdiction of the Army.

5.2 Fort Campbell Location and Cumulative Impacts Setting

Fort Campbell is located in Montgomery and Stewart counties, Tennessee, and Trigg and Christian counties, Kentucky. About 14 percent of the installation is developed, while about 86 percent is undeveloped area maintained for military training. Fort Campbell is home of the 101st Airborne Division (Air Assault) and several tenant units. The primary peacetime mission of Fort Campbell is to support training, mobilization, and deployment of mission-ready forces, by providing services, facilities, and a safe and secure environment for Soldiers, civilians, retirees, veterans, and their families, while transforming for the future.

Fort Campbell is approximately 104,664 acres. More than 15,000 acres encompasses the built-up area of the cantonment area: Administrative Area (9,371 acres), SAHP (2,280 acres), the former Clarksville Base (2,600 acres), CAAF AB03 green space (726 acres) and various solid waste management units (SWMUs). The TA of Fort Campbell consists of approximately 89,687 acres consisting of 26,638 acres of ranges and impact areas and 63,049 acres of light maneuver areas. Except for roads, cleared areas, and structures associated with training and support facilities, most of the TAs consist of natural habitat including forests, old fields, fields leased for agriculture, streams, lakes, and wetlands.

This cumulative impacts analysis considers direct and indirect impacts determined from the alternatives analysis presented in Chapter 4, and the past, present, and future projects considered relevant to the analysis. For the purposes of the cumulative impacts analysis, the Proposed Action's ROI is defined to include Fort Campbell proper, as well as the four-county region (Montgomery and Stewart counties in Tennessee, and Christian and Trigg counties in Kentucky). This four-county ROI includes areas where the Proposed Action's effects would most likely contribute to cumulative environmental effects. Past and present actions within Fort Campbell are captured in the affected environment section of Chapter 4 unless otherwise noted.

Table 5-1 highlights ongoing projects at Fort Campbell which have previously undergone NEPA review and are considered in this cumulative effects analysis (CEA).

Table 5-1. Major Ongoing Actions at Fort Campbell

Action	Description	General Timeframe	Location	Extent/Size	Affected Resources
Aerial Refueling Training Routes in the Vicinity of Fort Campbell, Kentucky	Establish eight published air refueling routes. Training operations would be conducted by the 160th Special Operations Aviation Regiment, with MH-60 Blackhawk helicopters, MH-47 Chinook helicopters, and C-130 Hercules tankers.	2005 – ongoing	Portions of airspace above Kentucky, Tennessee, Illinois, Alabama, and Georgia.	Route would be 60-70 miles in length, occupy blocks of airspace 2,500 to 5,000 or 3,000 to 5000 feet AMSL, and used 50 times per year, for a duration of 2-4 hours per use.	Less than significant impacts associated with an increase in airspace use, noise levels, and air emissions.
Bi-County Solid Waste Management System/Fort Campbell Military Reservation Land Transfer	Land transfer between Bi-County Solid Waste Management Systems (Bi-County) to Fort Campbell Military Reservation.	2005 – ongoing	Portions in Trigg County, KY and Stewart County ,TN; Portions of Fort Campbell in Montgomery County adjacent to Bi-County Landfill	Land transfer of 670 acres from Bi-County to Fort Campbell; Land transfer of 358 from Fort Campbell to Bi-County.	Moderate long term adverse impacts to: land use, air quality, noise, soils, socioeconomics, surface waters, recreation, and aesthetics.
Fort Campbell Range and Training Land Development Plan	Implementation of RTLP-DP, which includes continued use of TAs, ranges, and simulators; modernization of TAs and ranges to meet evolving training standards, use of ammunition and other expendables; maintenance and repair of training infrastructure; and construction of additional facilities at existing TAs and ranges.	2005 - ongoing	Installation-wide	Range and Training Lands	Minor impacts to land use from land use designation changes on post. Minor impacts to water quality from increased impervious surfaces. Increased habitat loss. Minor increases in noise from Tactical Unmanned Aerial Vehicle (TUAV) training.

Table 5-1. Major Ongoing Actions at Fort Campbell

Action	Description	General Timeframe	Location	Extent/Size	Affected Resources
Fort Campbell Army Compatible Use Buffer (ACUB) Program	The Fort Campbell ACUB Program was established in April 2006. The program was established to conserve open space (such as farmland and open barrens) and promote compatible land use around the post's airfields and training facilities.	2005 - ongoing	Regional/Adjacent Communities and Land Uses	Over 1,000 acres to date.	Greater training flexibility for Fort Campbell and reduced incompatible use along its border. Support of local efforts to promote open space and preserve prime agricultural lands within the surrounding region. Habitat conservation.
Fielding of the M1117 Armored Security Vehicle (ASV) at Army Installations in the U.S.	Fielding of ASVs with Military Police Platoons at installations across the U.S.	2005 - ongoing	Installation-wide (programmatic analysis evaluating multiple installations)	No net increase in vehicles or personnel as for every increase in an ASV, one High Mobility Multi-Purpose Wheeled Vehicle was removed.	Minor to moderate air quality impacts; minor noise impacts; minor impacts to soils and vegetation; minor impacts to threatened and endangered species; minor to moderate impacts to surface water quality; minor impacts to facilities; minor impacts from increased volumes of POL use.
Fielding and Use of Mine Resistant Ambush-Protected (MRAP) Vehicles at Army Installations in the U.S.	Use of MRAP vehicles at installations across the U.S.	2010 - ongoing	Existing training and maneuver areas (programmatic analysis evaluating multiple installations)	60 MRAP vehicles at Fort Campbell	Minor to moderate air quality impacts; minor noise impacts; minor localized impacts on soil and vegetation; minor impacts to biological resources; minor to moderate impacts on surface water quality; minor impacts from increased volumes of POL use.

Table 5-1. Major Ongoing Actions at Fort Campbell

Action	Description	General Timeframe	Location	Extent/Size	Affected Resources
Range Complex Master Plan	Impacts from implementing the proposed Range Development Actions. Projects include facilities and range construction and improvements.	2010 - ongoing	TA 40, 42 Range 29, 54 Subsidiary roadways throughout rear TAs	Up to 735 acres	Minor impacts to land use (land use designation change); minor impacts to water quality; minor impacts from increased stormwater runoff.
Force Structure Modification and Growth	The Army completed a PEIS in support of the Army's Growth and Force Structure Realignment in 2007. Fort Campbell troop strength increased by 3,500 Soldiers starting in 2008 and ending in 2010.	2005-2010	Installation-wide	Installation-wide	Less than significant impacts to Infrastructure, training assets, and sustainability.
Future Force 2020	The Army published a draft programmatic EA (PEA) in January 2013 analyzing the impacts of a force reduction of up to 8,000 Soldiers and Army civilians and the impacts from an installation gain of up to 3,000 Soldiers.	2013-2020	Installation-wide	Installation-wide	Significant impacts to socioeconomics from force reduction. Less than significant impacts to facilities from installation gain; significant but mitigable impacts to traffic and transportation from installation gain.

5.2.1 FUTURE ACTIONS

The Proposed Action Alternatives provide a comprehensive look at future range and training projects within Fort Campbell. Regardless of alternative selection, range modernization projects and new facilities to support mission needs would continue to occur at Fort Campbell. Fort Campbell would continue to support mission related changes utilizing the same environmental management approach of the past to ensure no net loss of mission training actions from natural resources and to ensure desired conditions supporting training are met.

Table 5-2 highlights future and foreseeable major construction projects outside of the Proposed Action Alternatives, which are considered in this CEA. These actions are either in the planning process or reasonably could be initiated within the next 5 years. A number of the Army's proposed projects have been previously identified in the installation's Real Property Master Planning Board and are programmed for future execution. In addition, Fort Campbell is projected to field Counter Rocket Artillery Mortar (C-RAM) land-based Phalanx system in FY14 as Force Modernization. Fort Campbell will be preparing for New Equipment training. It is anticipated that the system will fire into the North/South Impact Area.

Table 5-2. Future Foreseeable Major Training and Training Support Related Construction Projects (FY 13 – 17)

Project Title	Type of Action
Live Fire Shoothouse – Range 44A	New Range Construction
160th SOAR Landgraf Hangar 7264 Extension	Facility Improvement/Addition
Infantry Platoon Battle Course – Range 54	New Range Construction
Infantry Squad Battle Course #1 – Range 42	New Range Construction
Aerial Gunnery Range – Range 29	New Range Construction
Multi-Purpose Machine Gun Range #1 – North of Range 31	New Range Construction
Infantry Squad Battle Course #2 – Near Range 50	New Range Construction
Range Training Command Complex – Range 16	New Range Construction
Multi-Purpose Machine Gun Range #2 – Range 42	New Range Construction
Sniper Field Fire Range – Range 46	New Range Construction
Driving Course – TA 47	New Range Construction
19th ASOS Complex Air Force	New Facility
Tactical Equipment Maintenance Facility - 101st CAB	New Facility
Systems Integration Management Office Building (160th SOAR)	New Facility
Infantry Platoon Battle Course	New Range Construction
Logistic Support Facility (160th SOAR)	New Facility
Multi-Purpose Machine Gun Range	New Range Construction

SOAR = Special Operations Aviation Regiment

5.2.2 FOUR-COUNTY REGION OF INFLUENCE

The four-county area surrounding Fort Campbell consists of natural woodlands, farmlands, and some urban development. Urban development is concentrated in Clarksville (abutting the eastern boundary), Oak Grove (adjacent to the northeast border of the installation), Hopkinsville (about 14 miles northeast), and along U.S. Route 41A (adjacent to the eastern boundary), which connects those communities. Primary land uses directly south of Fort Campbell in Montgomery County are agriculture and rural residential. The portion of Christian County immediately adjacent to the northeast of Fort Campbell is also primarily farmland. The areas east and south of Fort Campbell contain substantial urban commercial and residential development, which is concentrated along U.S. Route 41A and within the city limits of Clarksville. Land adjacent to the

installation to the northwest, west, and southwest in Trigg and Stewart counties is mostly forested to the banks of the Cumberland River.

Land use planning and regulation for off-post areas in Tennessee is done by the Clarksville-Montgomery County Regional Planning Commission and for off-post areas in Kentucky by the Hopkinsville-Christian County Planning Commission. The community of Clarksville, Tennessee to the east of the post is the fastest growing of the region's population centers. The communities north of the post, Hopkinsville and Oak Grove, Kentucky, are also expanding. The most significant trend shaping compatibility issues near the installation is the demand for residential housing that is increasing pressure to develop the remaining farms and wooded areas on the urban edge. U.S. Highway 41A and the recently expanded U.S. Highway 79 are also emerging as commercial corridors that could facilitate more intense development and produce light intrusion impacts affecting aviation operations at Fort Campbell, particularly around Campbell Army Airfield and SAHP.

A JLUS prepared in 2007 has been adopted by Fort Campbell and the surrounding counties in Tennessee and Kentucky. The document contains recommended off-post land use practices that would not limit on-post training activities while keeping the surrounding economies viable. Land in the far western portion of Montgomery County adjacent to Fort Campbell is planned to remain forested or agricultural. The city of Clarksville has a zoning ordinance, and zoning in Montgomery County outside the city limits controls residential development. There is no zoning, however, outside city limits in Christian County, and this area could be developed in uses incompatible with the airfield in the future. Commercial activity is expected to increase and concentrate along U.S. Route 41A and at major intersections between U.S. Route 41A with primary roads (e.g., KY 911, I-24, KY 115). Commercial development has been proposed at the intersection of I-24 and KY 115, and an industrial park has been proposed to be located along I-24 (Fort Campbell, 2009).

The population within the four-county ROI has increased over the years. At the 1980 Census, the population living within the ROI was approximately 168,000 individuals. Following the 2000 Census, the population living within the ROI was estimated to be approximately 232,000 individuals. By 2010, more than 280,000 people were living within the ROI. This represents an increase in population of approximately 18 percent in 10 years (USCB, 2010). Clarksville, Tennessee and Hopkinsville, Kentucky are the largest cities within the ROI. Clarksville is the center for commercial manufacturing, transportation, and medical activities in the area. Since establishment in 1942, Fort Campbell has long been a key component of the economy of the regional area, employing several thousand Soldiers and civilian employees within the ROI.

Table 5-3 summarizes projects within the four-county ROI, which were considered for this analysis. The ROI, however, for most VECs analyzed in Chapter 4 does not extend beyond the installation into the four surrounding counties. These projects have been included within this analysis as an indicator of planned activities adjacent to the Fort Campbell ROI.

Table 5-3. Past, Present, and Foreseeable Actions within the ROI

Title	Location	Project Description and Relevance
City of Hopkinsville annexed an 11-mile corridor along U.S. Highway 41A	City of Hopkinsville/U.S. Highway 41A	City of Hopkinsville annexed an 11-mile corridor along U.S. Highway 41A, bringing its corporate limits to within one mile of CAAF. Annexation has already spurred construction along the corridor, including a Wal-Mart Distribution Center, new residential subdivisions, such as Windmill Farms, and several commercial uses.
Hopkinsville housing development around Bell Station Road	City of Hopkinsville	A developer has purchased two small tracts of land around Bell Station Road just north of CAAF and has built 20-25 houses along the road.
Interstate 24 Industrial Park	City of Hopkinsville	A 2,000-acre Interstate 24 Industrial Park just north of the I-24/41A interchange. Currently optioned by Hopkinsville Industrial Foundation, the site sits between exits 86 and 89 along the I-24 corridor. Developers are seeking a single industrial tenant, such as an automobile plant, for the site.
Oak Grove Tourism Commission on Walter Garrett Lane	City of Oak Grove	A development by the Oak Grove Tourism Commission on Walter Garrett Lane off of 41A just east of CAAF will feature a walking trail, playground, city amphitheater, and convention center.
Open-air pedestrian mall/shopping center	City of Oak Grove	City of Oak Grove has proposed an open-air pedestrian mall/shopping center planned along 41A near Gate 7.
The relatively recent expansion of US 41A to six lanes	City of Hopkinsville/U.S. Highway 41A	The widening of US 41A has facilitated commercial activity along the corridor, increasing pressure to convert the unincorporated farmland west of US 41A into more intense residential and retail uses.
Winn Marine Port Expansion	City of Nashville	Winn Materials, located at River Mile 123.9 on the Cumberland River, is planning for a major expansion of its Clarksville port operations positioning Montgomery County to become the largest commercial water port on the Columbia River. The existing terminal is located within 7 miles of I-24 and includes a sheet pile dock structure and handles primarily limestone products and sand.

CAAF = Campbell Army Airfield

5.2.3 POTENTIAL CUMULATIVE EFFECTS BY VECS

5.2.3.1 Airspace

The following section discusses cumulative impacts of the Proposed Action Alternatives within the ROI for airspace. In general, the proposed alternatives 1, 2, 4, and 5 would ultimately result in increased air traffic not only within the range and RA but also in the area surrounding these restricted use areas. Increased usage equates to increased congestion. Much of that traffic spreads out of the RA into the surrounding airspace. Restricted airspace is surrounded by warning areas such as the Campbell 1 and 2 MOAs. Most of the increased air traffic due to implemented Proposed Alternatives would remain within these areas and overall impacts would be less than significant. There are no airspace impacts relative to Alternative 3 and therefore no cumulative impacts.

Cumulative impacts associated with the specifics of Alternative 1 primarily involve the combination of activities that are possible in this very limited area as discussed in Alternative 5. This area lies between the impact area to the east and the edge of R-3702 to the west in a strip just 1 NM wide at the narrowest and 2 NM wide at the widest. Existing activities include LZ Saunders for rotary wing traffic, the northbound Blue Route, Echo-1 TA for the 169th SOAR including Range 29 and a MOUT for CAS, Range 51 and ROZ-6. All of these activities, however, would operate VFR using advisory information from Eagle Radio AIC and visual attainment for self deconfliction and adverse cumulative effects would be less than significant.

The proposed activities within the AUZs associated with Alternative 2 when combined with Fort Campbell airspace use and training needs would generate adverse cumulative effects. While on-going activities at Golden Eagle FLS have not caused significant issues for any of these other activities, use of the Sherpa runway would be more frequent. It is also expected that MQ-1C air operations would be conducted through multiple sorties per day. Additionally, TUAS Suckchon is new and has not yet been fully integrated into training procedures. It is likely that UAS L/R would not be conducted at the same time as Golden Eagle L/R or Shadow L/R at Suckchon TUAS. Even though Golden Eagle FLS is outside of the Class-D airspace designation for Sabre Control Tower, all activities associated with that airfield should be strictly controlled by Sabre Control Tower with close coordination with Eagle Radio AIC. In addition, TUAS Suckchon would bring air traffic during L/R into the same airspace as the MQ-1C Gray Eagle ascent corridor. As previously mentioned, these activities would need careful coordination and should not be conducted within the same timeframe. Both operate on automated procedures that must be scheduled; overall adverse cumulative effects, however, would be less than significant.

The R3703 (Alternative 4) would have three stratifications extending all the way up to Class-A airspace at FL-180. This would have a very minor effect to civic air traffic use within the area as it is relatively small and contiguous with the existing R-3702 and R-3701. During training, it is unlikely that the R3703-B or C would ever be activated without also activating the R-3702 B; therefore, less than significant cumulative impacts are anticipated in respect to private and commercial airspace use surrounding Fort Campbell.

5.2.3.2 Noise

Minor short- and long-term cumulative effects would be expected. Noise effects would be primarily due to the construction and operation of Fort Campbell training facilities, including air operations activities in conjunction with the range projects identified in Tables 5-1 and 5-2. These activities would constitute incremental increases in the overall noise environment.

Noise generated by training activities for all Proposed Action Alternatives would be minor and concentrated in or near current TAs. No significant effects to the existing noise environment

would be anticipated with the addition of the Proposed Action Alternatives to those projects identified (Tables 5-1 through 5-3).

5.2.3.3 Air Quality

The Commonwealth of Kentucky and the State of Tennessee take into account the effects of all past, present, and reasonably foreseeable emissions during the development of their SIPs. Each state accounts for all significant stationary, area, and mobile emission sources in the development of these plans. Estimated emissions generated by the Proposed Action would be *de minimis* and activities under the Proposed Action Alternatives would be of size and nature that would not contribute significantly to adverse cumulative effects to air quality.

The Proposed Action would have short- and long-term minor adverse cumulative effects to air quality. By directly inventorying all emissions in the maintenance region and monitoring concentrations of criteria pollutants in attainment regions, the Commonwealth of Kentucky and the State of Tennessee take into account the effects of all past, present, and reasonably foreseeable emissions in their states. This is done by implementing a regulatory structure designed to prevent air quality deterioration for areas that are in attainment with the NAAQS and to reduce or maintain common or criteria pollutants emitted in the maintenance area to levels that would achieve compliance with the NAAQS (USEPA, 2013d). This structure of rules and regulations are contained in the SIP. SIPs establish a state's plan for meeting clean air standards and associated CAA requirements. The SIPs include:

- State regulations that USEPA has approved;
- State-issued, USEPA-approved orders requiring pollution controls;
- Planning documents, such as area-specific compilations of emissions estimates and computer modeling demonstrating that the regulatory limits assure that the air would meet the NAAQS (USEPA, 2013e).

The SIP process includes (either specifically or indirectly) all sources of air emissions associated with the projects collective actions as described in Chapter 2, and all activities in the region (including those projects identified in Tables 5-1 through 5-3). No large-scale projects or proposals have been identified that when combined with the collective actions, would threaten the attainment status of the region, would have substantial GHG emissions, or would lead to a violation of any Federal, state, or local air regulation. Although there would be an increase in emissions associated with the Proposed Action Alternatives, these activities may introduce long-term incremental beneficial effects to air quality by displacing existing training activities to locations outside the maintenance area, such as the Range 51E, Saunders LZ, and at AUZs C, D, F, and H.

5.2.3.4 Soil Erosion

Soil resources within Fort Campbell have historically undergone changes primarily as a result of changing land use. Soils within the installation mainly supported agricultural production prior to becoming a part of Fort Campbell, and were subject to various degrees of erosion due to traditional cultivation methods, such as plowing and disking, which would break up the soil structure and expose soils to wind and water erosion. Much of the land was in tobacco production, a crop that depletes and acidifies the soil. The conversion to supporting forest communities has in general reduced erosion, stabilized the soils, and aided in formation of healthier soils. Recent development within the cantonment area and training lands (Table 5-1) supports the training mission, but has resulted in adverse impacts to soil resources in the form of loss of permeable surfaces, and increase in susceptibility to erosion from exposure and disturbance of soils during construction as well as from on-going training activities. Future

planned developments (Table 5-2) would result in more impermeable surfaces and likely higher levels of soil erosion from range and facility construction and from training activities; however, soil disturbance and erosion levels are not anticipated to reach the same levels as when the land was in agricultural production prior to being converted to Fort Campbell training land.

Adverse impacts would be offset through Fort Campbell management of its training lands. These measures have been discussed in Section 4.5.1.3.1 and include the environmental stewardship guidelines presented in Appendix F. Natural resource management in support of the overall sustainability of land use at Fort Campbell would continue to reduce training impacts to soils, and would continue the policy of returning training land, including soils, to pre-training conditions after training exercises are completed.

Development planned outside of Fort Campbell (Table 5-3) would also increase loss of soil resources from implementation of projects, such as roadway improvements and urban development. In addition, erosion and compaction of soils from project construction would likely increase. Much of this planned development is located in or adjacent to already urbanized areas, and are likely to involve soils that have been previously disturbed and compacted. The actions are unlikely to cause significant adverse impacts to soil resources.

The Proposed Action Alternatives, in combination with the projects considered within the ROI, are unlikely to cause significant adverse impacts to regional soil resources. All these projects would occur over time. Soil resources, in particular “at risk” soils within Fort Campbell, would be identified and avoided, whenever possible, to minimize impacts to soils from each project.

5.2.3.5 Water Resources

Impacts to water resources over the years have varied greatly as a direct result of land use surrounding the contributing watersheds. Surface waters were historically most degraded in the years before Fort Campbell was constructed when the land was used primarily for farming. The repeated plowing and production of cash crops, such as tobacco, depleted and eroded the soil and caused sedimentation of waterways. When the post was established, much of the open land converted to woodland and the water quality improved in general as erosion and sedimentation declined. Development completed in recent years (Table 5-1) include both training land and the cantonment, and have, in general, resulted in adverse impacts to water resources in the form of increased sedimentation. Construction of new facilities and implementation of training activities have resulted in increased effluent causing water quality alterations (e.g., low dissolved oxygen, high phosphorus, high nitrogen, and other nutrient contents) in water resources, and erosion of stream banks from high volume storm water runoff.

Future and foreseeable major construction projects (Table 5-2) would result in impacts similar to those listed above; however, sedimentation levels are not expected to reach pre-Fort Campbell construction levels.

Adverse impacts would be offset through Fort Campbell water quality protection policies, including riparian and other green buffers; and use of storm water management strategies, including LIDs discussed in Section 4.6.1.3.2 and 4.6.1.3.3. Impacts would also be reduced by following the environmental stewardship guidelines presented in Appendix F. Natural resource management in support of the overall sustainability of land use at Fort Campbell would continue to reduce training and cantonment impacts to water resources, and continue the goal of returning all streams to be fully supporting of their designated uses (i.e., remove all streams from the state 303(d) lists).

Development planned within the ROI outside of Fort Campbell has the potential of impacting Skinner Creek, Noah’s Spring Branch, Dry Fork Creek, and Fletcher’s Fork Creek – all streams whose contributing watershed extends beyond the post. The streams are impaired waters, and

cumulative impacts could potentially include decreased water quality primarily caused by sedimentation from construction activities with the result that the above mentioned streams would not be removed from the state 303(d) lists. Much of the planned development inside the ROI is in connection with already urbanized areas, and would therefore increase storm water volumes and velocity to receiving streams. Although occurring within the same watersheds, implementation of the Proposed Action Alternatives would not be anticipated to cause adverse impacts development beyond Fort Campbell boundaries. All actions increasing impervious surface would be subject to NPDES permitting and sediment and erosion controls.

The Proposed Action Alternatives, in combination with the projects considered within the ROI have the potential to cause significant adverse impacts to regional water resources. However, the proposed projects would occur over time and storm water management would be implemented during construction to reduce storm water and sedimentation impacts. Implementation of LID management conservation measures (Section 4.6.4) would slow and filter storm water and construction runoff, and would reduce any impacts to less than significant.

5.2.3.6 Biological Resources

As previously mentioned, the biological resources within Fort Campbell and the region have changed with the landscape changes since the 1940s. The predominant change has occurred from the transition of agricultural areas and native grass communities into forest. Within Fort Campbell, in more recent years (Table 5-1), development supporting the training mission has occurred in both the cantonment area and training lands, which have resulted in some degree of adverse impact to biological resources primarily in the form of loss or conversion of habitat. In addition, on-going training activities have also caused habitat degradation. Future development planned within the ranges (Table 5-2) including the facility and range construction projects would likely require additional lands and reduction or conversion of habitat. The overall increase in developed areas within the training range lands would constitute a net reduction of available habitat; however, the levels of non-agricultural areas within Fort Campbell (forest and grassland) would likely remain above the historic levels in the 1940s.

Adverse impacts would be offset through Fort Campbell management of its training lands. These measures have been discussed in Section 4.7.1.4, and include the environmental stewardship guidelines presented in Appendix F. Natural resource management in support of the overall sustainability of land use at Fort Campbell would continue to promote the health of ecosystems and species diversity within Fort Campbell. Additionally, management of surface waters (Section 4.6.1.3) would serve in the protection of aquatic habitat in addition to foraging habitat of the Indiana, gray, and northern long-eared bats.

Projects identified outside of Fort Campbell within the four-county ROI (Table 5-3) primarily involve roadway improvements and planned developments within urbanized locations and along existing infrastructure. Similar to projects at Fort Campbell, these would ultimately result in the reduction of available habitat and localized degradation of aquatic habitat (roadway projects involving stream crossings). These developments, however, have primarily been concentrated within or adjacent to previously disturbed locations. These actions are unlikely to cause significant adverse impacts to biological resources. Implementation of the Proposed Action Alternatives would not be anticipated to cause adverse impacts to this development; these projects outside of Fort Campbell are separated outside of the ROI from those projects under consideration as part of the Proposed Action Alternatives.

The Proposed Action Alternatives, in combination with the projects considered within the CEA, are unlikely to cause significant adverse impacts to regional biological resources. All these projects would occur over time. Projects within Fort Campbell would avoid and minimize biological resource impacts on a project-by-project basis, and employ mitigating measures to

minimize significant effects, including the possibility of vegetation loss on a regional basis, to prevent the elimination of local populations of rare or sensitive plant species, prevent the proliferation of invasive species, and avoid segmentation of habitat.

5.2.3.7 Cultural Resources

Adverse impacts to individual sites would be partially offset through Fort Campbell management of its training lands. Cultural resource management in support of the overall sustainability of land use at Fort Campbell would continue to protect significant archaeological sites, historic structures, and historic cemeteries within Fort Campbell.

Projects identified outside of Fort Campbell within the four-county ROI (Table 5-3) primarily involve roadway improvements and planned developments within urbanized locations and along existing infrastructure. Similar to projects at Fort Campbell, these may result in adverse effects to cultural resources if significant sites and historic structures are located in project areas. These developments, however, have primarily been concentrated within or adjacent to previously disturbed locations and are unlikely to cause significant adverse impacts to cultural resources. Implementation of the Proposed Action Alternatives would not be anticipated to cause adverse impacts to development beyond Fort Campbell boundaries.

The Proposed Action Alternatives, in combination with the projects considered within the CEA, are unlikely to cause significant adverse impacts to regional cultural resources. Projects within Fort Campbell would avoid and minimize cultural resource impacts on a project-by-project basis, and employ mitigating measures to minimize significant effects.

The cumulative effects of these undertakings should result in an increase in the documenting and inventory of cultural resources on Fort Campbell with some adverse effects where eligible properties cannot be avoided. Increased use of Fort Campbell for training purposes may result in unintended indirect adverse effects to historic structures, archaeological sites, and historic cemeteries and care should be taken to insure that properties outside project disturbance footprints be protected and avoided.

5.2.3.8 Traffic and Transportation

The size and scope of the combined actions would be extremely limited when compared to other planned projects in the area, such as those outlined in the 2035 Metropolitan Transportation Plan. Projects outlined in that plan that would affect Fort Campbell are listed in Table 5-4 along with additional improvements identified in Table 5-3. The Proposed Action Alternatives could occur concurrently with these and other proposed projects throughout the area; however, due to their limited size and function, there would be no appreciable change in off-post or gate traffic from these activities. There are no projects identified that, when carried out with the combined actions, would contribute significantly to adverse cumulative effects to traffic and transportation. Therefore, there would be minor cumulative effects on transportation resources; effects which would be confined primarily to on-post areas. Implementation of the Proposed Action Alternatives would not be anticipated to cause adverse impacts to other transportation projects listed in Table 5-4.

Table 5-4. Other Transportation Projects Near Fort Campbell

Project	Type of improvement
Lafayette Road to Gate 1	Widening to Five Lanes
I-24 from Fort Campbell Boulevard to Tennessee State Line	Widening from Four to Six Lanes
Gate 4 Extension	New Road
State Line Road Add Center Turn Lane at Oak Grove Road	Reconstruct and Add Center Turn Lane
Gate 5 Extension	New Road from Fort Campbell Boulevard to Oak Grove Road

Source: City of Clarksville, 2013

5.2.3.9 Hazardous and Toxic Substances

With an increase in projects, the possibility for spills from construction and maintenance equipment is increased. This would result in short-term cumulative impacts when added to the potential for spills from other construction and maintenance projects that may be occurring at Fort Campbell at the same time. Field maneuver training, vehicle operations and operation of live fire ranges could increase runoff of fuels, motor oils, transmission fluids, hydraulic fluids, grease, and brake fluids. This would result in short-term cumulative impacts when added to the potential for spills from other construction projects and operations at Fort Campbell. Possible contaminated soils, debris such as abandoned military equipment still containing fluids, or UXO could be encountered with these projects and require remediation. If remediated, these activities combined with the removal of other potentially contaminated items, if encountered, would have a long-term beneficial impact on those areas.

Adverse impacts from the potential for spills would be offset through Fort Campbell's programs for the safe handling, storage and disposal of hazardous and toxic materials in accordance with Federal, state and Army regulations.

Future actions from rearranging airspace at Fort Campbell in the future could increase the use of the South Impact Area for training exercises. There is a likelihood that DU could be present at the South Impact area from historic training with Davy Crockett weapon systems. Future training could disturb DU, if present. Projects identified outside of Fort Campbell within the four-county ROI primarily involve roadway improvements and planned developments within urbanized locations and along existing infrastructure. Whereas these developments would require the use of hazardous materials for the operation of construction equipment and vehicles, each project would be required to manage hazardous materials and waste in accordance with applicable regulations. No adverse impacts associated with the use of hazardous materials or toxic substances would occur. Similarly, no adverse impacts would be expected from the generation of hazardous waste associated with the construction or operation of projects.

The Proposed Action Alternatives, in combination with the projects considered, are unlikely to cause significant adverse impacts to availability of hazardous materials or the ability to safely transport and dispose of hazardous waste at licensed facilities. Projects within Fort Campbell would minimize, to the extent possible, the quantity of hazardous materials and toxic substances used, which would reduce the quantity of hazardous waste generated. Fort Campbell would employ BMPs and comply with applicable regulations and post procedures and plans (e.g., SPCCP) in place for the safe handling and storage of hazardous materials and waste and to immediately respond should a spill occur.

6 Summary of Environmental Consequences

6.1 Environmental Effects Summary

Both the No Action Alternative and the Proposed Action Alternatives would result in some degree of adverse effects to most environmental resources. Table 6-1 presents a summary of the environmental consequences of the alternatives analyzed in this PEIS. The shaded cells within the table indicate the anticipated intensity of impact that would result from the implementation of each Alternative. The implementation of Fort Campbell's resource management plans and programs, mandated by the Army and summarized in Fort Campbell's existing environmental stewardship guidelines (Appendix F), would help avoid significant adverse effects to the some of the affected resources that would result from the Proposed Action Alternatives. The required environmental stewardship guidelines specific to the alternatives are identified in Section 6.2 for those resource areas that would potentially experience adverse environmental impacts.

Table 6-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Airspace				
No Action		■		
Alternative 1	■ →	■ →		
Alternative 2[13]	■ →	■ →		
Alternative 3				■
Alternative 4			■	
Alternative 5[13]	■ →	■ →		
Cumulative		■		
Noise				
No Action				■
Alternative 1			■	
Alternative 2			■	
Alternative 3			■	
Alternative 4			■	
Alternative 5			■	
Cumulative			■	
Air Quality and GHG				
No Action				■
Alternative 1			■	
Alternative 2			■	

[13] Significant airspace impacts to military operations would only be associated with the Indian Mound LZ AUZ. The other AUZs would be anticipated to have no greater than moderate adverse impacts.

Table 6-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Alternative 3			■	
Alternative 4				■
Alternative 5			■	
Cumulative			■	
Soils				
No Action			■	
Alternative 1		■		
Alternative 2[14]	■ →	■ →		
Alternative 3	■ →	■ →		
Alternative 4				■
Alternative 5	■ →	■ →		
Cumulative		■		
Water Resources (Surface Waters and Floodplains)				
No Action			■	
Alternative 1		■		
Alternative 2[15]	■ →	■ →		
Alternative 3		■		
Alternative 4				■
Alternative 5	■ →	■ →		
Cumulative		■		
Biological Resources (Vegetation)				
No Action			■	
Alternative 1		■		
Alternative 2[16]	■ →	■ →		
Alternative 3		■		
Alternative 4				■
Alternative 5[16]	■ →	■ →		
Cumulative		■		
Biological Resources (Wildlife and Aquatic Life)				
No Action			■	
Alternative 1		■		

[14] Impacts to soils would be reduced to less than significant levels; see Table 6-2.
[15] Impacts to surface water quality would be reduced to less than significant levels; see Table 6-2.
[16] Impacts to vegetation and wildlife associated with AUZ development would be reduced to less than significant levels; see Table 6-2.

Table 6-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Alternative 2[16]	■ →	■ →		
Alternative 3		■		
Alternative 4				■
Alternative 5[16]	■ →	■ →		
Cumulative		■		
Biological Resources (Threatened and Endangered Species)				
No Action			■	
Alternative 1[17]	■ →	→	■	
Alternative 2[17]	■ →	→	■	
Alternative 3[17]	■ →	→	■	
Alternative 4				■
Alternative 5[17]	■ →	→	■	
Cumulative			■	
Cultural Resources				
No Action			■	
Alternative 1[18]	■ →	→	■	
Alternative 2[18]	■ →	→	■	
Alternative 3[18]	■ →	→	■	
Alternative 4				■
Alternative 5[18]	■ →	→	■	
Cumulative			■	
Traffic and Transportation				
No Action				■
Alternative 1			■	
Alternative 2			■	
Alternative 3			■	
Alternative 4				■
Alternative 5			■	
Cumulative			■	
Hazardous and Toxic Substances				
No Action				■
Alternative 1[19]	■ →	→	■	

[17] Impacts to Indiana and gray bats would be avoided; see Table 6-2.
[18] Impacts to archaeological sites and cemeteries would be avoided; see Table 6-2.
[19] Impacts to potentially-contaminated sites would be avoided; see Table 6-2 regarding mitigation measures.

Table 6-1. Summary of Adverse Environmental Effects

Alternative	Intensity of Impact			
	Significant	Moderate	Minor	None
Alternative 2[18]				
Alternative 3[19]				
Alternative 4				
Alternative 5[19]				
Cumulative				

6.2 Specific Fort Campbell Policies and Practices Relevant to the Proposed Action Alternatives

As demonstrated throughout Chapter 4 and summarized in Appendix F, Fort Campbell has existing policies and programs designed to reduce or avoid the level of impacts and to comply with Federal regulations and statutes. Table 6-2 outlines the policies and practices that are currently enacted at Fort Campbell that would mitigate potentially adverse significant environmental effects and would not require additional funding.

Table 6-2. Proposed Mitigation

Airspace	Alternative
• CAS training operations at the MOUT site and operations of the proposed Saunders LZ would be deconflicted by Eagle Radio AIC.	1, 5
• Careful scheduling, aircraft control, or limitation of usage of the AUZ training assets would be performed to reduce military airspace congestion.	2, 5
• The placement and orientation of future facilities within the AUZs would be given careful consideration to reduce the creation of airspace and ground training conflicts.	2, 5
• While selection of Alternative 4 would enable Fort Campbell to submit a formal request to FAA regarding airspace changes, all modifications to airspace and subsequent mitigation measures would be determined during the formal request process and would be subject to FAA approval.	4
Noise	**Alternative**
• As training activities, infrastructure, and facilities are proposed in the future, subsequent NEPA analysis and comprehensive noise modeling would be conducted, when necessary, to determine the specific impacts of those activities. Mitigation measures, if required, would be determined at that time.	2, 4, 5
• Firing points in TAs 06, 07, 08A and 08B would be located at least 3,500 feet (1,067 meters) from the installation boundary. At this distance, the firing points would not appreciably affect the overall noise environment outside of Fort Campbell, and the effects would be less than significant under NEPA. If firing points in TAs 06, 07, 08A and 08B were established within 3,500 feet (1,067 meters) of the installation boundary, subsequent NEPA analysis and comprehensive noise modeling would be conducted.	4

Table 6-2. Proposed Mitigation

Air Quality	Alternative
• No additional measures for air quality would be required under the Proposed Action Alternatives. Compliance with existing regulations, permits, and plans would be required for all activities associated with training, infrastructure, and facilities that are proposed in the future, which would reduce the level of effect to less than significant.	All
Soils	**Alternative**
• No additional measures for soils would be required. Compliance with existing regulations, permits, and plans (e.g., SWPPPs, ITAM Program) would be required for construction and training activities.	No Action, 1, 4
• Land-disturbing activities within the proposed AUZs, when possible, would be limited to the least-erodible soil types (e.g., non-HEL, lower sloping soils) to avoid at-risk soils. In particular, the construction of maneuver trails would be avoided in these areas.	2, 3, 5
Water Resources	**Alternative**
• No additional measures for water resources would be required. Projects would be conducted in compliance with Federal and state regulations, including, as necessary, the preparation of site-specific SWPPPs and NPDES permits prior to construction.	No Action, 1, 3, 4
• LID measures (vegetated buffers, biorentention, dry wells, infiltration trenches) would be incorporated as necessary into project design to reduce stormwater runoff velocities and sedimentation into adjacent waterways.	2, 5
Biological Resources	**Alternative**
• Vegetation clearing would be conducted outside of the migratory bird season (April 1 – July 15 for forest clearing and April 15 – August 31 for brush or grassland clearing) to avoid impacts to nesting birds.	No Action, 1, 2, 3, 5
• The removal of trees west of Indian Mound and Grant roads would be restricted from 15 March until 15 November, to avoid harm to roosting Indiana bats. In addition, Fort Campbell would follow its single tree removal procedures for Indiana bat roosting habitat protection.	No Action, 1, 2, 3, 5
• Northern long-eared bat roosts will be protected in accordance with the Programmatic Informal Consultation on the northern long-eared bat with the USFWS under Section 7 of the ESA. Fort Campbell will use the Army's Programmatic Informal Consultation for the northern long-eared bat when screening each upcoming construction project, and will conduct local Section 7 Consultation for any project that does not meet the criteria for "Not Likely to Adversely Affect".	No Action, 1, 2, 3, 5
• Other than clearcuts prescribed for the management of forest pests or sanitation cuts, clearcuts in the Casey Creek, Saline Creek, Fletcher's Fork, Jordan, and Piney Fork Creek subwatersheds will be minimized to blocks no larger than 20 acres, to preserve the foraging areas and roost caves used by gray bats.	No Action, 1, 2, 3, 5

Table 6-2. Proposed Mitigation

• During design, overall disturbance to biological resources would be limited to maintain ecological functions. The reduction of footprints of disturbance and the maintenance of ecological functions would reduce the potential establishment of invasive species. In addition, where feasible, Fort Campbell would focus its development within lower-quality habitat areas (degraded habitat due to military training, on-going maintenance, and agricultural lease activities) and would preserve higher-functioning habitat (e.g., natural barrens and grasslands, mature forests, and riparian zones).	2
• Vegetation loss within the AUZs would occur over time. As areas within the proposed AUZ become developed, range planners would avoid and minimize the removal of vegetation on a project-by-project basis, and would employ the necessary environmental stewardship guidelines (Appendix F). This would minimize the possibility of vegetation loss on a regional basis, prevent the elimination of local populations of rare or sensitive plant species (if found present), implement invasive species control measures, and avoid the segmentation of vegetation (habitat), which could cause a significant adverse impact to wildlife.	2
Cultural Resources	**Alternative**
• Impacts to the two potentially eligible archaeological sites at Saunders LZ would be avoided during clearing activities through manual hand-clearing techniques.	1
• Known archaeological sites and cemeteries would be avoided during the siting of future facilities and TAs.	2, 3
• Known cultural sites would be protected and managed according to the ICRMP.	All
• If unavoidable, the mitigation of adverse effects to archaeological sites and/or historic structures would be conducted compliant with state and Federal regulations. This could include archaeological data recovery to mitigate effects on eligible archaeological sites, or Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation to mitigate adverse effects to historic buildings. The mitigation of adverse effects to historic cemeteries would require relocation in accordance with the applicable state standards, and could also require archaeological mitigation efforts and analysis if the cemetery is eligible for the NRHP under Criterion D (information potential).	All
• Inadvertent discoveries would be handled according to Fort Campbell procedures contained within the ICRMP.	All
Traffic and Transportation	**Alternative**
• No measures would be required.	All
Hazardous and Toxic Substances	**Alternative**
• All military units and contractors that use the sites would be required to possess and have available appropriate spill response materials for the types and quantities of hazardous materials they may transport and use in proximity to any work area. All spills or releases would be reported and all appropriate remediation measures would be accomplished.	1, 2, 3, 5

Table 6-2. Proposed Mitigation

• For projects located within impact areas, a UXO site survey would be conducted, as necessary, to determine if project areas are contaminated with ordnance and to determine the correct ordnance response actions.	1, 3, 5
• If unidentified contaminated soils, drums, or unusual debris (e.g., UXO, discarded military munitions, or munitions debris) are encountered at any time on or around the work site, the contractor will stop work immediately and notify the Public Works Environmental Office.	1, 2, 3, 5
• Any project that involves the excavation or movement of soils must include field screening for petroleum (plus any other suspected contaminants). Soils that register less than the field screening levels indicated in Army policy are considered clean, and may be reused on site or transported to the post landfill. Soils that exceed regulatory levels would be remediated in accordance with state regulations.	1, 2, 3, 5
• If determined necessary, a field investigation would be performed to determine if DU is present before commencing construction activities in the areas historically used for Davy Crocket training. If DU is detected, the Army must comply with NRC regulations and standards to protect the public and the environment from exposure to radiation.	1, 2, 3, 5

AUZ = adaptable use zone; CAS = close air support; DU = depleted uranium; ESA = Endangered Species Act; HEL = highly erodible land; ICRMP = Integrated Cultural Resources Management Plan; ITAM = Integrated Training Area Management; FAA = Federal Aviation Administration; LZ = landing zone; MOUT = Military Operation in Urban Terrain; NEPA = National Environmental Policy Act; NPDES = National Pollutant Discharge Elimination System; SWPPP = Storm Water Pollution Prevention Plan; TA = training area; USFWS = United States Fish and Wildlife Service; UXO = unexploded ordnance

This page intentionally left blank

7 Acronyms

Acronym	Definition
°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
5th SFG(A)	5th Special Forces Group (Airborne)
A/D	Approach/Departure
AADT	Annual Average Daily Traffic
ACHP	Advisory Council on Historic Preservation
ACP	Access Control Point
ACUB	Army Compatible Use Buffer
ADCS	approach departure control surface
ADNL	A-weighted day-night level
AGL	Above Ground Level
AHO	Above Highest Object
AIC	Airspace Information Center
AmC2	Armour silt loam, 5 to 12 percent slopes
ANSI	American National Standard Institute
AOC	Area of Concern
AQCR	Air Quality Control Region
AQCR 47	Middle Tennessee Intrastate AQCR
AQCR 72	Kentucky-Cairo, Illinois Intrastate AQCR
AR	Army Regulation
ARNG	Army National Guard
ARTCC	Air Route Traffic Control Center
ASOS	Air Support Operations Squadron
ASR	Archive Search Report
ASV	Armored Security Vehicle
ATC	Air Traffic Control
AUZ	Adaptable Use Zone
AVN	aviation
B.P.	Before Present
BA	Biological Assessment
Ba	Sengtown gravelly silt loam, 5 to 12 percent slopes
BACT	Best available control technology
BASH	bird air strike hazard
BCC	Birds of Conservation Concern
BCT	Brigade Combat Team
Be	Sengtown gravelly silt loam, 12 to 20 percent slopes
BeB2,HxC	Hammack silt loam, 5 to 12 percent slopes
BeC2	Hammack silt loam, 2 to 12 percent slopes
BMP	best management practice
BNA	Nashville International Airport
BrC3	Brandon silt loam, 5 to 12 percent slopes
BrD3	Brandon silt loam, 12 to 20 percent slopes
CAA	Clean Air Act
CAAF	Campbell Army Airfield
CAB	Combat Aviation Brigade
CAS	Close Air Support
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality

Acronym	Definition
CFR	Code of Federal Regulations
CO	carbon monoxide
COA	Certificate of Airworthiness/Authorization
COF	Company Operations Facility
CrA	Crider silt loam, 0 to 2 percent slopes
CrB	Crider silt loam, 2 to 5 percent slopes
CRMP	Cultural Resources Management Program
CSH	Combat Support Hospital
CTS	Clarksville Transit System
CWA	Clean Water Act
CX	Categorical Exclusion
D	deemed in need of management
DA	Department of the Army
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DBH	diameter at breast height
de minimis	of minimal importance
DFC	desired future conditions
DHS	Department of Homeland Security
DkB2/DsC	Dickson silt loam/silty clay loam, 2 to 6 percent slopes
DNL	day-night level
DoD	Department of Defense
DOJ	Department of Justice
DONSA	Day of no significant activity
DPTM	Directorate of Plans, Training, Mobilization
DsB	Dickson silt loam/silty clay loam, 0 to 2 percent slopes
DsC2	Dickson silt loam/silty clay loam, 6 to 12 percent slopes
DU	Depleted uranium
DZ	drop zone
E	endangered
EA	Environmental Assessment
Ec	Ocana gravelly silt loam
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Group
ERMP	Extended Range Multipurpose
ESA	Endangered Species Act
ESMC	Endangered Species Management Component
FAA	Federal Aviation Administration
FARP	Forward Arming and Refueling Point
FAF	Final Approach Fix
FBI	Federal Bureau of Investigations
FAARP	Forward Area Arming and Refueling Point
FL	Flight Level
FLS	Flight Landing Strip
FM	Field Manual
FMP	Forest Management Plan
FORSCOM	U.S. Army Forces Command
FSO	full spectrum operations
FTX	Field Training Exercises
FY	Fiscal Year

Acronym	Definition
GBSAAS	Ground-Based Sense and Avoid System
GCR	General Conformity Rule
GCS	Ground Control Station
geoBD	geodatabase
GHG	greenhouse gas
GIS	geographic information systems
GPS	Global Positioning System
GSA	General Services Administration
GSF	General Support Force
Gu	Guthrie silt loam
HAHO	High Altitude High Open
HALO	High Altitude Low Open
HAP	Hazardous air pollutant
HEL	highly erodible land
HITS	Home Station Instrumented Training System
HMMWV	High Mobility Multipurpose Wheeled Vehicles
HuB	Humphreys gravelly silt loam, 2 to 5 percent slopes
IAF	Initial Approach Fix
IBCT	infantry brigade combat teams
ICM	Improved Conventional Munitions
ICRMP	Integrated Cultural Resources Management Plan
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMCOM	Installation Management Command
IMP	Integrated Management Practices
INRMP	Integrated Natural Resources Management Plan
IONMP	Integrated Operational Noise Management Plan
IPBC	Infantry squad battle courses
IR	Instrument route
ISA	International Standard Atmosphere
ISBC	Infantry squad battle courses
ISR	Intelligence, Surveillance and Reconnaissance
ITAM	Integrated Training Area Management
JAAT	Joint Army Air Force Training
JLUS	Joint Land Use Study
JO	Job Order
JTAC	Joint Terminal Attack Controller
KAR	Kentucky Administrative Rules
KDEP	Kentucky Department of Environmental Protection
KDFWR	Kentucky Department of Fish and Wildlife Resources
KDOW	KDEP Division of Water
KEPPC	Kentucky Exotic Pest Plant Council
kV	kilovolt
KY	Kentucky
KYDEP	Kentucky Department of Environmental Protection
KYDOT	Kentucky Department of Transportation
LaB	Lax silt loam, 2 to 5 percent slopes
LaC	Lax silt loam, 5 to 12 percent slopes
LAWS	light anti-armor weapons
Leq	equivalent sound level
LID	Low Impact Design
Ln	Lindside silt loam

Acronym	Definition
LOS	Level of Service
L/R	Landing/recovery
LRAM	Land Rehabilitation Area Maintenance
LUPZ	land use planning zone
LZ	Landing Zone
m	meter
MACT	Maximum Achievable Control Technology
MBF	thousand board feet
MBMS	Migratory Bird Management Strategy
MBTA	Migratory Bird Treaty Act
METL	Mission Essential Task List
MG	Machine gun
MILCON	military construction
MOA	Military Operations Areas
MoB	Hammack silt loam, 2 to 5 percent slopes
MOU	Memorandum of Understanding
MOUT	Military Operation in Urban Terrain
MPRC-H	multipurpose range complexes-heavy
MPRC-L	multipurpose range complexes- light
MRAP	Mine Resistant Ambush Protected
MS4	municipal separate storm sewer system
MSL	Mean Sea Level
MTR	Military Training Route
MW	megawatt
NAAQS	National Ambient Air Quality Standard
NAS	National Airspace System
NAVAIDS	Navigational Aids
Ne	Newark silt loam
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
Next Gen	Next Generation Air Transportation System
NFZ	No-Fly-Zone
NHPA	National Historic Preservation Act
NM	Nautical Miles
No	Nolin silt loam
NNSR	Nonattainment New Source Review
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOE	Nap-of-the-Earth
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	non-point source
NRC	Nuclear Regulatory Commission
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSA	Noise Sensitive Area
NSPS	New Source Performance Standards
NVG	night vision goggles
NWI	National Wetland Inventory
NZ	Noise Zone

Acronym	Definition
O_3	ozone
O&E	ordnance and explosive
OPSEC	operations security
PA	Programmatic Agreement
PAM	Army Pamphlet
PBN	Performance Based Navigation
PCBs	Polychlorinated biphenyls
PeB	Pembroke silt loam, 2 to 5 percent slopes
PEIS	Programmatic Environmental Impact Statement
PM_{10}	particulate matter
$PM_{2.5}$	fine particulate matter
POE	port of embarkation
POL	Petroleum, oil and lubricants
ppb	parts per billion
ppm	parts per million
PPOC	Pollution Prevention Operation Center
PSD	Prevention of Significant Deterioration
PTE	Potential to emit
PZ	pick-up zone
RA	Restricted Area
RCA	Radiation Control Area
RCMP	Range Complex Master Plan
RCR	Runway Condition Rating
RCRA	Resource Conservation and Recovery Ac
REC	Record of Environmental Consideration
Rf	Sengtown gravelly silt loam, 20 to 60 percent slopes
RLOS	Radio Line of Sight
ROCA	Range Operations Control Area
ROD	Record of Decision
ROI	Region of Influence
RONA	Record of Non-Applicability
ROTC	Reserve Offices' Training Corps
ROZ	Raven Operational Zone
RTLA	Ranges and Training Lands Assessment
RTLP	Range and Training Land Program
S	special concern
SaF	Saffell gravelly loam, 20 to 60 percent slopes
SAHP	Sabre Army Heliport
SDZ	surface danger zone
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SME	subject matter expert
SO_2	sulfur dioxide
SOAR	Special Operations Aviation Regiment
SOH	Safety and Occupational Health
SOP	standard operating procedure
SO_x	oxides of sulfur
SPPCP	Spill Pollution Prevention and Countermeasure Plan
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
STRAC	Standards in Training Commission
STX	Situational Training Exercises

Acronym	Definition
SUA	Special Use Area
SWMU	Solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
T	threatened
TA	Training Area
Ta	Taft silt loam
TALS	Tactical Aircraft Landing System
TC	Training Circular
TDACP	Tennessee Division of Air Pollution Control
TDEC	Tennessee Department of Environment & Conservation
TDY	Temporary Duty
TEMF	Tactical Equipment Maintenance Facility
TG	Trainer's Guide
TL	Technical Letter
TMDL	total maximum daily load
TMMSA	Training Mission and Mission Support Activities
TN	Tennessee
TNANG	Tennessee Air National Guard
TNDEC	Tennessee Department of Environment and Conservation
TNDOT	Tennessee Department of Transportation
TNEPPC	Tennessee Exotic Pest Plant Council
tpy	tons per year
TrA	Trace silt loam, 0 to 2 percent slopes
TRACON	Terminal Radar Approach Control
TrB	Trace silt loam, 2 to 5 percent slopes
TRI	Training Requirements Integration
TTP	tactics, techniques, and procedures
TUAS	Unmanned Aerial System Training Area
TUAV	Tactical Unmanned Aerial Vehicle
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
U.S.	United States
UAS	Unmanned Aircraft System
Ud	Udarents – Urban Land
Uf	Udorthents – clayey
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USAF	U.S. Air Force
USASOCOM	U.S. Army Special Operations Command
USAR	U.S. Army Reserve
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	US Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USLE	Universal Soil Loss Equation
UXO	unexploded ordnance
V	Victor
v/c	volume to capacity ratio
VEC	valued environmental component
VFR	Visual Flight Rules

Acronym	Definition
VOCs	Volatile organic compounds
VOR-DME	Very High Frequency Omni-directional Range–Distance Measuring Equipment
VORTAC	Very High Frequency Omni-Directional Range-Tactical Aircraft Controller
vpd	volume per day
vph	peak hour volume
VR	Visual route
WP	Way Point
WPC	Division of Water Pollution Control (Tennessee)
WQA	Water Quality Act of 1987
WWC	wet weather conveyance

This page intentionally left blank

8 References

Aerostat Environmental Services Inc. 2011a. Final Report: Total Maximum Daily Load for sediment in Fletchers Fork within the boundary of Fort Campbell, Kentucky. Contract Number W912QR-08-D-0009. Project Number 0110-470-20 June 2011.

Aerostat Environmental Services Inc. 2011b. Final Report: Total Maximum Daily Load for sediment in Jordan Creek within the boundary of Fort Campbell, Kentucky. Contract Number W912QR-08-D-0009. Project Number 0110-470-20 December 2011.

AirNav. 2013. Airport Information. Accessed 1/28/13 at http://www.airnav.com/airport/KBNA.

Amtrak. 2013. Amtrak Station Look-Up. Accessed January 2013 at http://www.amtrak.com/find-train-bus-stations.

Anderson, David G. 1995. Paleoindian Interaction Networks in the Eastern Woodlands. In Native American Interaction: Multiscalar Analyses and Interpretations in the Eastern Woodlands, ed. Michael S. Nassaney and Kenneth E. Sassaman, 1–26. Knoxville, Tennessee: University of Tennessee Press.

Anderson, David G. 1996. Models of Paleoindian and Early Archaic Settlement in the Southeast. In The Paleoindian and Early Archaic Southeast, ed. David G. Anderson and Kenneth E. Sassaman, 29–57. Tuscaloosa, Alabama: University of Alabama Press.

Anderson, David G., and Robert C. Mainfort. 2002. An Introduction to Woodland Archaeology in the Southeast. In The Woodland Southeast, ed. David G. Anderson and Robert C. Mainfort, 1–20. Tuscaloosa, Alabama: University of Alabama Press.

Anderson, David G., Lisa D. O'Steen, and Kenneth E. Sassaman. 1996. Environmental and Chronological Considerations. In The Paleoindian and Early Archaic Southeast, ed. David G Anderson and Kenneth E. Sassaman, 3–15. Tuscaloosa: University of Alabama Press.

Army National Guard (ANG). 2000. Tactical Vehicle Noise Levels (dBA) at Distance from Specified Equipment. National Guard Training Center at Fort Indiantown Gap (NGTC-FTIG). December 13, 2000.

American National Standard Institute (ANSI). 2003. American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound. Part 3: Short-term measurements with an observer present. ANSI S12.9-1993 (R2003)/Part 3.

Aircraft Owners and Pilots Association (AOPA), 2009. Safety Advisor; Airspace for Everyone. Diagram for Classes and Communication Requirements/Weather Minimums. AOPA Air Safety Foundation, 2009.

Bagwell, Jane. 2011. Stewart County. In The Tennessee Encyclopedia of History and Culture. Online. Version 2.0. Knoxville, TN: The University of Tennessee Press, February 28.

Beach, Ursula S. 1988. Montgomery County. Tennessee County History Series 63. Memphis: Memphis State University Press.

Bense, Judith A. 1994. Archaeology of the Southeastern United States: Paleoindian to World War I. San Diego: Academic Press.

Bergman, Christopher A., and Charley Comiskey. 2006. The Historic Context Statement for Prehistory at Ft. Campbell, Kentucky. Cincinnati, Ohio: BHE Environmental, Inc.

Binford, Lewis R. 1980. Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. American Antiquity 45, no. 1: 4–20.

Brandt, Robert. 1995. Touring the Middle Tennessee Backroads. Winston-Salem, NC: John F. Blair Publisher.

The Brookings Institution. 2013. The Davy Crockett. http://www.brookings.edu/about/projects/archive/nucweapons/davyc. Site accessed March 1, 2013.

Brose, David S. 1979. A Speculative Model on the Role of Exchange in the Prehistory of the Eastern Woodlands. In Hopewell Archaeology, ed. David S. Brose and N. Greber, 3–8. Kent, Ohio: Kent State University Press.

Brown, Ian W. 1994. Recent trends in the archaeology of the southeastern United States. Journal of Archaeological Research 2: 45–111.

Center for Plant Conservation. 2013. National Collection Plan Profile. http://www.centerforplantconservation.org/Collection/NationalCollection.asp Site Accessed January 11, 2013.

City of Clarksville. 2013. City of Clarksville Planning Team, Smart Growth Plan 2030. Accessed February 2013 at http://www.clarksvillesmartgrowth.com/Sec3-TransportationAnalysis.htm.

Clarksville Transit System (CTS). 2013. Route 1 Map and Hours Servicing Fort Campbell. Accessed January 2013 at http://www.ridects.com/routes/route-1-fort-campbell/.

Cleland, Charles Edward. 1976. The Focal-Diffuse Model: An Evolutionary Perspective on the Prehistoric cultural Adaptations of the Eastern United States. Midcontinental Journal of Archaeology 1: 59–76.

Corlew, Robert E. 1993. Tennessee: A Short History. 2nd ed. Knoxville, TN: The University of Tennessee Press.

Council on Environmental Quality (CEQ). 2010. Memorandum for Heads of Federal Departments and Agencies on Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. Accessed November 2012 at http://ceq.hss.doe.gov/nepa/regs/Consideration_of_Effects_of_GHG_Draft_NEPA_Guidance_FINAL_02182010.pdf. Council on Environmental Quality, Washington, DC. 18 February. 12 pp.

CEQ. 2007. Instructions for Implementing Executive Order 13423. A Notice by the Council on Environmental Quality on 6/18/2007.

Delcourt, Hazel R., Paul A. Delcourt, Gary R. Wilkins, and E. Newman Smith Jr. 1986. Vegetational History of the Cedar Glades Regions of Tennessee, Kentucky, and Missouri during the Past 30,000 Years. Association of Southeastern Biologists Bulletin 33, no. 4: 128–137.

Department of Defense (DoD). 2010. Installations Practice Energy Conservation. Accessed November 2012 at http://www.defense.gov/releases/release.aspx?releaseid=13276.

eFloras. 2013. Flora of North America. http://www.efloras.org/flora_page.aspx?flora_id=1. Site Accessed January 11, 2013.

Eastern Kentucky University Department of Biological Sciences. 2013. Kentucky Bat Working Group. http://biology.eku.edu/bats.htm. Site Accessed January 11, 2013

Federal Writers Project, ed. 1939. The WPA Guide to Tennessee. New York: Viking Press.

Fort Campbell. 2013a. Forestry. Why is Controlled Burning Necessary? Accessed 1/11/13 at http://www.campbell.army.mil/campbell/directorates/DPW/envdiv/Pages/Forestry.aspx.

Fort Campbell. 2013b. Fort Campbell Gate Information. Fort Campbell, Kentucky.

Fort Campbell. 2013c. Biological Assessment of Effects to Indiana Bats and Gray Bats From the Training Mission and Mission Support Activities at Fort Campbell Kentucky and Tennessee. Prepared by The McDonald Company under subcontract to Potomac-Hudson Engineering, Inc.

Fort Campbell. 2012a. Range and Training Land Program - Development Plan Supplemental Environmental Assessment. 2012.

Fort Campbell. 2012b. Copy of Air Pollutant Emissions Survey. January 25, 2012.

Fort Campbell. 2012c. Integrated Natural Resources Management Plan (INRMP) 2013-2017 Fort Campbell, Kentucky. Prepared by: Gene A Zirkle Directorate of Public Works Environmental Division, Conservation Branch. April 2012.

Fort Campbell. 2012d. Fort Campbell 2012 Range Book. Fort Campbell, Kentucky.

Fort Campbell, 2012e. *Geospatial Digital Datasets for Fort Campbell Military Installation, Kentucky*. Received October 2012 and January 2013.

Fort Campbell, 2012f. Integrated Cultural Resources Management Plan Fort Campbell, Kentucky

Fort Campbell. 2011. Construction and Operation of Unmanned Aerial System Complexes and Rotary Aircraft Maintenance Hangars at Sabre Army Heliport, Fort Campbell, Kentucky.

Fort Campbell. 2010. Environmental Guidance Handbook. http://www.campbell.army.mil/campbell/directorates/DPW/envdiv/Pages/default.aspx. Site accessed March 4, 2013.

Fort Campbell. 2009. Joint Land Use Study Update. October.

Fort Campbell 2008. Range and Training Land Program-Development Plan Supplemental Environmental Assessment.

Fort Campbell. 2007. Integrated Natural Resource Management Plan, Appendix M- Fire Management Plan.

Fort Campbell. 2006a. Final Environmental Assessment: Aerial Refueling Training Routes, 160th Special Operations Aviation Regiment, Fort Campbell, Kentucky.

Fort Campbell. 2006b. Final FNSI/EA for the Construction and Operation of 2nd BCT and 159th CAB Complexes.

Fort Campbell. 2005a. Final Programmatic Environmental Assessment in Support of the Fort Campbell Range and Training Land Program-Development Plan.

Fort Campbell. 2005b. Policy for Storm Water Erosion and Sediment Control at Construction Projects.

Fort Campbell. 2004a. Environmental Assessment to Analyze Standard Practices for Construction Projects in the Cantonment Area, Fort Campbell, Kentucky.

Fort Campbell. 2004b. Environmental Assessment: Force Structure Modularity Transformation, Fort Campbell, Kentucky.

Fort Campbell. 1981. Final Environment Impact Statement: 101st Airborne Division (Air Assault) and Fort Campbell, Kentucky Installation Ongoing Mission.

Francisco, Ed, Jiménez Nava, and Glenn Griffith. 2011. North American Terrestrial Ecoregions—Level III. Commission for Environmental Cooperation, Montreal, Canada.

Freeman, Andrea K.L., Edward E. Smith Jr., and Kenneth B. Tankersley. 1996. A Stone's Throw from Kimmswick: Clovis Period Research in Kentucky. In The Paleoindian and Early Archaic Southeast, ed. David Anderson and Kenneth E. Sassaman, 385–403. Tuscaloosa, Alabama: University of Alabama Press.

Fried, Morton Herbert. 1967. The Evolution of Political Society: An Essay in Political Anthropology. Vol. 7. Studies in Anthropology. New York: Random House.

Gramly, Richard Michael, and Carl Yahnig. 1991. The Adams Site (15Ch90) and the Little River, Christian County, Kentucky, Clovis Workshop Complex. Southeastern Archaeology 10, no. 2: 134–145.

Griffin, James B. 1964. The Northeast Woodland Area. In Prehistoric Man in the New World, 223 – 258. Chicago, Illinois: University of Chicago Press.

Griffin, James B. 1967. Eastern North American Archaeology: A Summary. Science 156, no. 3772: 175 –191.

Harris, C.M. 1998. Handbook of Acoustical Measurement and Noise Control. Acoustical Society of America. Sewickley, PA.

Idcide, 2013. Climate and Weather for Fort Campbell, Kentucky. Accessed January 2013 at http://www.idcide.com/weather/ky/fort-campbell-north.htm.

Intergovernmental Panel on Climate Change (IPCC). 2007. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom, 1000 pp. Accessed 11/28/12 at http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1.

Institute of Transportation Engineers (ITE). 2003. Transportation Engineers Trip Generation Manual. 7th Edition. Institute of Transportation Engineers, Washington, DC.

Jefferies, Richard W. 1995. Late Middle Archaic Exchange and Interaction in the North American Midcontinent. In Native American Interaction: Multiscalar Analyses and Interpretations in the Eastern Woodlands, ed. M.S. Nassaney and Kenneth E. Sassaman, 73–95. Knoxville, Tennessee: Univ. of Tennessee Press.

Joint Munitions Command and U.S. Army Corps of Engineers (USACE) St. Louis. 1998. Installation Specific Archive Search Report on the use of Cartridge, 20MM Spotting M101 Davy Crockett Light Weapon M28 at Fort Campbell Kentucky. Annex 5. June 2008, Revised.

Kentucky Department of Environmental Protection (KDEP). 2012. Division of Air Quality, Final Title V, Construction/Operating Permit for a National Security Facility at Fort Campbell, Kentucky. June 8, 2012.

Kentucky Department of Transportation (KYDOT). 2013. Annual Average Daily Traffic for Christian and Trigg Counties. Accessed January 2013 at http://transportation.ky.gov/planning/pages/count-maps.aspx.

Kentucky Energy and Environment Cabinet, Division of Water (KDOW). 2011. Final 2010 Integrated Report to Congress on the Condition of Water Resources in Kentucky. Section 303(d) list of Surface Waters.

Kentucky Environmental and Public Protection Cabinet. 2005. Kentucky Best Management Practices for Construction Activities.

Kentucky Fish and Wildlife. 2013. Kentucky's Species of Greatest Conservation Need and Their Statuses. http://fw.ky.gov/kfwis/stwg/2010Update/Aves/Aves.htm. Site Accessed January 11, 2013.

Kentucky Geological Survey, University of Kentucky. 2013. Karst Land in Kentucky. Online at http://www.uky.edu/KGS/water/general/karst/index.htm. Accessed on 01/15/2013

Leary, Christopher G., Lori Stahlgren, Jay Stottman, Sarah Miller, Kim McBride, and Steven McBride. 2008. The Historic Context Statement for Historic Archaeology at Fort Campbell, Kentucky-Tennessee. Cincinnati, Ohio: BHE Environmental, Inc.

Lewis, R. Barry. 1996. Kentucky Archaeology. University Press of Kentucky.

Mason, Ronald J. 1962. The Paleo-Indian Tradition in Eastern North America. Current Anthropology 3, no. 3: 227–278.

Meltzer, David J. 1988. Late Pleistocene Human Adaptations in Eastern North America. Journal of World Prehistory 2: 1–52.

Muir, Malcolm. 2010. Fort Campbell. The Tennessee Encyclopedia of History and Culture. Version 2.0. Knoxville, TN: The University of Tennessee Press.

Natural Resources Conservation Service (NRCS). 2013. United States Department of Agriculture. Official Soil Series Descriptions. Available online at http://soils.usda.gov/technical/classification/osd/index.html. Accessed January 13, 2013.

NRCS. 2012a. Soil Survey Geographic (SSURGO) database for Christian County Kentucky. U.S. Department of Agriculture, Natural Resources Conservation Service. Texas. 2012.

NRCS. 2012b. Soil Survey Geographic (SSURGO) database for Lyon and Trigg Counties Kentucky. U.S. Department of Agriculture, Natural Resources Conservation Service. Texas. 2012.

NRCS. 2012c. Soil Survey Geographic (SSURGO) database for Montgomery County Tennessee. U.S. Department of Agriculture, Natural Resources Conservation Service. Texas. 2012.

NRCS. 2012d. Soil Survey Geographic (SSURGO) database for Stewart County Tennessee. U.S. Department of Agriculture, Natural Resources Conservation Service. Texas. 2012.

NatureServe Explorer. 2013. Plants and Animals. Comprehensive Species Reports. http://www.natureserve.org/explorer/servlet/NatureServe?init=Species. Site accessed January 11, 2013.

NRC. 2009. Fact Sheet: License Application for Depleted Uranium at U.S. Army Sites. http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-license-app-du.html. Site accessed March 1, 2013.

Prince George's County (PG CO), MD, Department of Environmental Resources, Programs and Planning Division. 1999. Low Impact Development Design Strategies.

Smith, Bruce D. 1986. The Archaeology of the Southeastern United States: From Dalton to De Soto, 10,500-500 BP. Advances in New World Archaeology 5: 1–92.

Smith, Bruce D. 1992. The Flood Plain Weed Theory of Plant Domestication in Eastern North America. In Rivers of Change: Essays on Early Agriculture in Eastern North America, 19–34. Washington, D.C.: Smithsonian Institute Press.

Smith, Edward E., and Andrea K.L. Freeman. 1991. The Archaeological Investigation of a Series of Paleoindian (Clovis) Sites in the Little River Region of Christian County, Kentucky. Current Research in the Pleistocene 8: 41–43.

Smith, Kevin E., and Michael C. Moore. 1996. Mississippian Settlement Patterns on the Cumberland River, Tennessee: Recent Investigations of Small Mississippian Settlements. Ed. Richard Walling, C. Wharey, and C. Stanely. Proceedings of the 14th Annual Mid-South Archaeological Conference Special Publications No. 1: 49–68.

South Coast Air Quality Management District (SCAQMD). 1993. CEQA Air Quality Handbook. April 1993.

Steponaitis, Vincas P. 1986. Prehistoric Archaeology in the Southeastern United States, 1970-1985. Annual Review of Anthropology 15: 363–404.

Tankersley, Kenneth B. 1996. Ice Age Hunters and Gatherers. In Kentucky Archaeology, ed. R. Barry Lewis, 21–38. Lexington, Kentucky: University Press of Kentucky.

Tennessee Department of Environment and Conservation (TDEC). 2012. Tennessee Air Pollution Control Board, HQ 101st Airborne Division (Air Assault) and Fort Campbell Operating Permit (Title V). September 25, 2012.

TDEC. 2012. Division of Water Pollution Control. DRAFT Year 2012 303(d) list.

TDEC. 2010. Division of Water Pollution Control. 2010. Final Year 2010 303(d) list.

Tennessee Division of Archaeology (TDOA). 2011. State Site Files. Site Files. Nashville, Tennessee: Tennessee Division of Archaeology.

Tennessee Department of Transportation (TNDOT). 2013. Annual Average Daily Traffic for Stewart and Montgomery Counties. Site accessed January 2013 at http://www.tdot.state.tn.us/projectplanning/adt/2011ADTBOOK.pdf.

Tennessee Valley Authority (TVA). 2013. Tennessee and Cumberland River Directory. Site accessed January 2013 at http://www.tva.gov/river/navigation/pdf/terminal_list.pdf.

Tennessee Wildlife Resources Agency. 2013. Tennessee's Watchable Wildlife. http://tnwatchablewildlife.org/search.cfm. Site accessed January 11, 2013.

Terracon Consultants, Inc. (Terracon). 2013. Infrastructure Assessment Report, Fort Campbell, Kentucky. March 15, 2013.

U.S. Army (U.S. Army). 2008. Environmental Protection and Enhancement. Army Regulation 200-1. U.S. Army Headquarters, Washington, DC.

U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM). 2003. Memorandum Re: Updated Health Hazard Assessment Report on the Shadow 200, Tactical Unmanned Aerial Vehicle (TUAV), Block I, Project No. 69-37-7732-02. U.S. Army Center for Health Promotion and Preventive Medicine.

U.S. Army Corps of Engineers (USACE). 2001. Subduing the Cumberland: A History of the "Old" Locks and Dams on the Cumberland River. Nashville, TN: U.S. Army Corp of Engineers.

USACE 1994. Environmental Assessment Rear Area Master Plan, Fort Campbell, Kentucky. U.S. Army Corps of Engineers, Nashville District, and Lose & Associates.

U.S. Air Force (USAF). 2007. SELCalc2 Aircraft Noise Model, Version 1.0.3.

USAF. 1998. Consultative Letter, AL-OE-BR-CL-19984052, Noise Assessments of the Predator Unmanned Aerial Vehicle (UAV). Indian Springs AFAF, NV.

U.S. Army Environmental Command (USAEC). 2012. Programmatic Environmental Assessment for Modernizing and Operating Training Ranges on Previous or Existing Range Sites for Army Training Areas.

USAEC. 2008. Programmatic Environmental Assessment for Use of the M1117 Armored Security Vehicle at Army Installations in the United States.

USAEC. 2007. Final Environmental Impact Analysis for Army Growth and Force Structure Realignment.

USAEC. 2006. Programmatic Environment Assessment for Standard Targetry Replacement.

U.S. Census Bureau (USCB). 2013. State and County Quickfacts for Kentucky and Tennessee. Accessed February 2013 at http://quickfacts.census.gov/qfd/states/47/47161.html.

USCB. 2010. United States Census 2010. http://www.census.gov/2010census/

U.S. Department of Agriculture (USDA). 2013. http://soils.usda.gov/technical/handbook/contents/part622.html Downloaded on February 6, 2013.

U.S. Environmental Protection Agency (USEPA). 2013a. Attainment Status. Accessed January 2013 at http://www.epa.gov/airquality/greenbook/anay_tn.html and http://www.epa.gov/airquality/greenbook/anay_ky.html.

USEPA. 2013b. AirData Web Site. Accessed January 2013 at http://www.epa.gov/airdata/ad_rep_con.html.

USEPA. 2013c. Climate Change – Human Health Impacts and Adaptation. Accessed January 2013 at http://epa.gov/climatechange/impacts-adaptation/health.html.

USEPA. 2013d. State Implementation Plans Overview. Accessed January 2013 at http://www.epa.gov/airquality/urbanair/sipstatus/overview.html.

USEPA. 2013e. State Implementation Plans. Accessed January 2013 at http://www.epa.gov/reg5oair/sips/.

USEPA. 2012. Water Quality Assessment and Total Maximum Daily Loads Information. http://www.epa.gov/waters/ir/index.html

USEPA. 2005a. *User's Guide for the Final NONROAD2005 Model*. EPA420-R-05-013. Prepared with assistance from Cimulus, Inc. and ENVIRON International Corp. December 2005.

USEPA. 2005b. Methodology to Estimate the Transportable Fraction (TF) of Fugitive Dust Emissions for Regional and Urban Scale Air Quality Analyses. Prepared by Thomas G. Pace (USEPA). August 3, 2005 Revision.

USEPA. 1999. Consideration of Cumulative Impacts in EPA Review of NEPA Documents. Office of Federal Activities. EPA 315-R-99-002. May 1999.

USEPA. 1995. AP 42, Fifth Edition, Volume I: Stationary Point and Area Sources. Accessed 12/4/12 at http://www.epa.gov/ttn/chief/ap42/.

USEPA. 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. Washington, DC: s.n., Publication NTID300.1.

United States Fish and Wildlife Service (USFWS). 2013. Personal Communication with James Gruhala, Wildlife Biologist (predevelopment consultation). 502-695-0468, ext. 116. February 25, 2013.

USFWS. 2011. Revised Indiana Bat Mitigation Guidance for the 17 Commonwealth of Kentucky. http://www.fws.gov/frankfort/pdf/Jan2011%20Indiana%20bat%20Mitigation%20Guidance.pdf. Site accessed December 10, 2012.

USFWS. 2007. Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, MN. 258 pp.

USFWS. 1982. The Gray Bat Recovery Plan. Prepared by the USFWS in Cooperation with the Gray Bat Recovery Team. July 1, 1982.

Unified Facilities Criteria (UFC). 2004. Manual: Low Impact Development Manual. UFC 3-210-10. 25 October, 2004. http://www.lowimpactdevelopment.org/lid%20articles/ufc_3_210_10.pdf

U.S. Geological Survey (USGS). 2012. National Hydrography Dataset. Reston, Virginia. USGS (in cooperation with the U.S. EPA). Accessed online January 2013 at http://nhd.usgs.gov/data.html

Walthall, John. 1980. Prehistoric Indians of the Southeast archaeology of Alabama and the Middle South. Tuscaloosa, Ala. University of Alabama Press.

Willey, Gordon R., and P. Phillips. 1958. Method and Theory in American Archaeology. Chicago, Illinois: The University of Chicago Press.

Yarnell, Richard A., and M. Jean Black. 1985. Temporal Trends Indicated by a Survey of Archaic and Woodland Plant Food Remains from Southeastern North America. Southeastern Archaeology 4: 93–106.

9 List of Preparers

Potomac-Hudson Engineering

Cornwell, Camilla
M.S. Soil Science
B.S. Conservation of Soil, Water and Environment
Years Experience: 12

DiPaolo, Paul
B.S. Environmental Science and Policy
Years Experience: 5

Naumann, Robert
M.S. Environmental Management
B.S. Resource, Ecology and Management
Years Experience: 16

Secor, Melissa
B.S., Meteorology
B.S. Business Management
Years Experience: 7

Shinkle, Deborah
B.A. Environmental Studies
Years Experience: 10

Spangenberg, Rachel
B.S. Biology
Years Experience: 25

LPES

Lavallee, Timothy
M.S. Civil/Environmental Engineering
B.S. Mechanical Engineering
Years Experience: 22

New South Associates

Joseph, J.W., PhD, RPA
Ph.D. Historical Archaeology
M.A. American Civilization
B.A. Anthropology
Years Experience: 36

Gregory, Danny, M.A., RPA
M.A. Anthropology
B.A. Anthropology
Years Experience: 16

Rexroad APG

Rexroad, Joe
B.A. Architecture & Urban Design
Years Experience: 26

This page intentionally left blank

APPENDICES

APPENDIX A	**PUBLIC INVOLVEMENT**
APPENDIX B	**FORT CAMPBELL PROJECT CHECKLIST**
APPENDIX C	**ALTERNATIVE 1 SITE SPECIFIC PROJECTS**
APPENDIX D	**ALTERNATIVE 2 AUZ PROJECTS**
APPENDIX E	**ALTERNATIVE 3 ROUTINE TRAINING AND RANGE PROJECTS**
APPENDIX F	**ALTERNATIVE 3 ENVIRONMENTAL STEWARDSHIP**
APPENDIX G	**AIR SUPPORTING DOCUMENTATION**

This page intentionally left blank

Appendix A – Public Involvement

This page intentionally left blank

Appendix A.1 – Notice of Intent

This page intentionally left blank

Federal Register Notice of Intent

Federal Register / Vol. 78, No. 13 / Friday, January 18, 2013 / Notices 4135

specific NEPA analysis may be required at some installations, depending on the size of the force realignment.

DATES: Submit comments on or before February 19, 2013.

ADDRESSES: Written comments should be sent to: Public Comments USAEC, Attention: IMPA–AE (Army 2020 PEA), 2450 Connell Road (Bldg 2264), Fort Sam Houston, Texas 78234–7664; or by email to *USARMY.JBSA.AEC.MBX@mail.mil.*

FOR FURTHER INFORMATION CONTACT: (210) 466–1590 or email: *USARMY.JBSA.AEC.MBX@mail.mil.*

SUPPLEMENTARY INFORMATION: Implementation of Army force realignment will occur over the course of several years to arrive by 2020 at an optimally configured force, reduced from an FY 2012 authorized end strength of 562,000 to 490,000. Reductions in Army Soldiers will also be accompanied by some reduction in civil service employees. These actions are being undertaken to reshape the Army's forces to meet more effectively national security requirements while reducing the Army's end-strength. Force realignment and some level of force reduction will impact most major Army installations. The implementation of this force rebalancing is necessary to allow the Army to operate in a reduced budget climate, while ensuring the Army can continue to support the nation's critical defense missions.

The PEA, upon which the draft FNSI is based, evaluates the largest potential force reduction scenarios, as well as growth scenarios from BCT restructuring, that could occur at select installations as a result of Army force restructuring. This range of potential installation reduction and growth (ranging from maximum losses of 8,000 military personnel to maximum increases of 3,000 at the Army's largest installations) was chosen for the environmental analysis to provide flexibility as future force structure realignment decisions are made; the specific locations where changes will occur have not been decided.

The PEA provides information to decision makers concerning potential environmental impacts, to include socioeconomic impacts, associated with stationing actions as these decisions are made in the coming years. The PEA analyzed the direct, indirect, and cumulative environmental impacts that may occur at 21 installations. These stationing sites were included in the PEA as they are sites that could experience a change in Soldiers and civilians that exceeds a total of 1,000 military personnel. The PEA analyzes the environmental impact of two Action alternatives to implement force reduction and realignment: Alternative 1: Implement Army force reductions and restructuring of BCTs, combat support units, and civilian support between FY 2013 and FY 2020; and Alternative 2: Implement Alternative 1, inactivate additional BCTs and also restructure remaining BCTs by adding an additional combat maneuver battalion and/or an engineer battalion. Force reductions that may occur as part of the proposed action include the inactivation of BCTs and combat support and combat service support units at Army and joint base installations. This reduction would include the inactivation of at least eight BCTs. In addition to these alternatives, the Army also evaluated a No Action alternative. The No Action alternative continues current force structure, and retains the active Army at the FY 2012 authorized end strength of 562,000. The No Action alternative allows for a comparison of baseline conditions with the environmental impacts of each of the two Action alternatives.

Environmental impacts associated with implementation of the two Action alternatives include impacts to air quality; airspace; cultural and biological resources; noise; soil erosion; wetlands; water resources; facilities; socioeconomics; energy demand; land use; hazardous materials and waste; and traffic and transportation. No significant environmental impacts are anticipated as a result of implementing either alternative associated with the proposed action, with the exception of socioeconomic impacts. Socioeconomic impacts are of particular concern to the Army because they affect communities around Army installations. Therefore, the PEA has a comprehensive analysis of the socioeconomic impacts to inform the decision makers and communities. Impacts could include reduced employment, income, regional population, and sales, and some of these impacts could be significant. An EIS is not required, however, when the only significant impacts are socioeconomic.

The draft FNSI finds that there are no significant environmental impacts with either Action alternative. Final decisions as to which alternative will be implemented or which installations will see reductions or unit realignments have not been made. Those decisions will be made based on mission-related criteria and other factors in light of the information contained in the PEA.

An electronic version of the PEA and draft FNSI is available for download at: *http://aec.army.mil/usaec/nepa/topics00.html.*

Brenda S. Bowen,
Army Federal Register Liaison Officer.

[FR Doc. 2013–01009 Filed 1–17–13; 8:45 am]
BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army

Programmatic Environmental Impact Statement for the Training Mission and Mission Support Activities at Fort Campbell, KY

AGENCY: Department of the Army, DoD.

ACTION: Notice of Intent.

SUMMARY: The Department of the Army announces its intent to prepare a Programmatic Environmental Impact Statement (PEIS) to evaluate the impacts of current and future training and mission-related activities at Fort Campbell, Kentucky (portions of Fort Campbell are also located in Tennessee). The PEIS is being completed to meet the requirements of the National Environmental Policy Act (NEPA) to evaluate the environmental impacts of proposed alternatives for implementing the training and mission support activities at Fort Campbell, Kentucky. The PEIS will assess range construction, associated training and land management activities, and adjustments to military airspace to support Fort Campbell's training requirements. This PEIS analyzes portions of the Range Complex Master Plan which has been developed to address training and training facility requirements over the next 10 years.

ADDRESSES: Please send written comments to Mr. Gene Zirkle, NEPA/Wildlife Program Manager, Environmental Division, Building 2159 13th Street, Fort Campbell, KY 42223; or by email to *gene.a.zirkle.civ@mail.mil.*

FOR FURTHER INFORMATION CONTACT: Mr. Gene Zirkle at (270) 798–9854, during normal working business hours Monday through Friday, 7:30 a.m. to 4:00 p.m. C.S.T.; or by email to *gene.a.zirkle.civ@mail.mil.*

SUPPLEMENTARY INFORMATION: Fort Campbell must provide modernized live-fire ranges, quality maneuver training areas, the airspace necessary for the training of Army aviation units and unmanned aerial systems (UAS), and modern training facilities. The requirement to provide quality training support to Soldiers and units will continue into the future as mission requirements, military preparedness,

and Soldier/unit training requirements change. Fort Campbell must be prepared to meet future training requirements by providing modern training facilities and ranges.

As technology changes, new weapons, weapons systems, and unmanned systems are incorporated into tactical units. These technological advances dictate changes to how the Army trains, the space needed for maneuver training to include airspace, and new ranges to accommodate the live-fire training on new weapon systems. In addition, the installation must support training of other military services as well as training of various federal organizations.

Fort Campbell's ranges and training lands require routine maintenance, modernization, and in some cases construction of new facilities to continue to provide Soldiers with a high quality training environment. These types of activities will continue into the future as mission requirements, military preparedness, and Soldier training requirements change.

A range of reasonable alternatives will be analyzed in the PEIS. Five alternatives have been identified to meet the requirements of the proposed action. Alternative 1 would provide for site-specific range construction projects needed to support the live-fire training on the installation. Alternative 2 would create adaptable use zones (AUZ) to facilitate future range modernization and construction. Alternative 3 would implement routine range and training land actions to maintain and sustain the installation range and training land complex in an environmentally sound manner. This includes the formalization of environmental stewardship best management practices (BMPs). Alternative 4 would restructure and expand the current controlled airspace to accommodate the Army aviation units, UAS, and joint training with the U.S. Air Force. Alternative 5 would implement the above 4 alternatives as one consolidated alternative.

The PEIS will also consider a No Action alternative. Under the No Action alternative, none of the action alternatives would be implemented. Range use and training land management would continue under the status quo. Other reasonable alternatives identified during the scoping process will be considered for evaluation in the PEIS.

The proposed action would allow future development of Fort Campbell's training infrastructure that could have significant impacts to airspace, natural and cultural resources, water resources, and other environmental resources. Mitigation measures will also be identified for adverse impacts.

Scoping and public comments: Federally recognized Indian Tribes, federal, state, and local agencies, organizations, and the public are invited to be involved in the scoping process for the preparation of this PEIS by participating in meetings and/or submitting written comments. The scoping process will help identify possible alternatives, potential environmental impacts, and key issues of concern to be analyzed in the PEIS. Written comments will be accepted within 30 days of publication of the Notice of Intent in the **Federal Register**. Public meetings will be held in Clarksville, Tennessee and Hopkinsville, Kentucky. Notification of the times and locations for the scoping meetings will be published locally.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. 2013–01002 Filed 1–17–13; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Notice of Intent To Prepare an Environmental Impact Statement for the Missouri River Recovery Management Plan, Missouri River, United States

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: Pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended, the U.S. Army Corps of Engineers (USACE), Kansas City and Omaha Districts, intend to prepare the Missouri River Recovery Management Plan (Plan) with integrated Environmental Impact Statement (EIS).

FOR FURTHER INFORMATION CONTACT: For further information and/or questions about the proposed Plan, please contact Ms. Lisa Rabbe, Project Manager, by telephone: (816) 389–3837, by mail: 601 E. 12th Street, Kansas City, MO 64106, or by email: *Lisa.A.Rabbe@usace.army.mil,* or Mr. Randy Sellers, Project Manager, by telephone: (402) 995–2689, by mail: 1616 Capitol Avenue, Omaha, NE 68102–4901, or by email: *Randy.P.Sellers@usace.army.mil mailto:Gwyn.M.Jarrett@usace.army.mil.* For inquiries from the media, please contact the USACE Kansas City District Public Affairs Officer (PAO), Mr. David Kolarik by telephone: (816) 389–3486, by mail: 601 E. 12th Street, Kansas City, MO 64106, or by email: *David.S.Kolarik@usace.army.mil.*

SUPPLEMENTARY INFORMATION: Through preparation of the Plan and EIS, USACE will develop a range of alternatives for the purposes of Missouri River recovery and mitigation. This federal action includes activities on the Missouri River and is designed to assist in the recovery of Missouri River species protected under the Federal Endangered Species Act (ESA). Mitigation actions address USACE's requirements pursuant to the 1958 Fish and Wildlife Coordination Act (Pub. L. 85–624), section 601(a) of the Water Resources Development Act (WRDA) of 1986, and section 334(a) and (b) of the WRDA of 1999, and Section 3176 of the WRDA 2007.

Section 3176 of WRDA 2007 expanded the USACE's authority to include recovery and mitigation activities on the Missouri River in the upper basin states of Montana, Nebraska, North Dakota, and South Dakota. The combination of recovery and mitigation activities is commonly referred to as the Missouri River Recovery Program.

In accordance with 40 CFR 1502.4 (c), this EIS will evaluate all proposals or parts of proposals similar in nature such that, in effect, they represent a single course of action. The Missouri River Recovery Management Plan EIS will assess and, where appropriate, supplement or update prior analysis made pursuant to the requirements listed above. The EIS will assess the cumulative effects and alternatives to accomplish the purposes of the ESA, the 1958 Fish and Wildlife Coordination Act (Pub. L. 85–624), section 601(a) of the Water Resources Development Act (WRDA) of 1986, and section 334(a) and (b) of the WRDA of 1999, and Section 3176 of the WRDA 2007. The federal actions which implement those authorities have been combined into one program and are being assessed together to effectively and efficiently carry out the multiple goals associated with the authorizations. Additionally to be addressed in this EIS, the USACE has received a proposal from the Missouri River Recovery Implementation Committee, recommending the agency perform an effects analysis and adaptive management of potential management actions on ESA listed species. Addressing this proposal will result in an analysis of management alternatives and adaptive management actions to benefit these species, and thus requires supporting environmental effects analyses which will be included in this Environmental Impact Statement.

Appendix A.2 – Agency Comments on the November 2014 Draft PEIS and Army Responses

This page intentionally left blank

Fort Campbell Training Mission and Mission Support Activities
Programmatic Environmental Impact Statement
Public Comments on the November 2014 Draft PEIS

ID: 1	**Date:** 2/20/15	**Name:** Joyce A. Stanley, MPA Regional Environmental Protection Specialist	**Affiliation:** U.S. Department of the Interior Office of Environmental Policy and Compliance	**Method:** Email (attached letter)

Comment	**Response**
The United States Department of the Interior (Department) has reviewed the above-referenced Draft Environmental Impact Statement (DPEIS). Fort Campbell has been coordinating with our office regarding federally listed species and the intent to prepare the EIS since early 2013. Based on our review, it appears that federally listed species have been adequately addressed. However, we do offer the following minor comments for your consideration.	Thank you for your comments.
• Table S-2 states that, in order to avoid direct impacts to Indiana bats, trees will only be removed from October 1 to March 31; however, Section 4.7 Biological Resources (page 19, lines 8-9), states that trees will only be removed from November 15 to March 15. In order to be most-protective and avoid impacting Indiana bats that could be roosting in the area, we recommend that the removal dates in Table S-2 be implemented for Alternatives 2-5.	The 15 March – 15 November dates were negotiated through the U.S. Fish and Wildlife Service Cookeville Field Office and approved in our Endangered Species Management Component of the Integrated Natural Resources Management Plan. The dates should remain in the document so Fort Campbell does not create confusion over two published dates for endangered species management. Final PEIS Table S-2 will be adjusted accordingly.
• Section 4.7 Biological Resources states that the same tree clearing restrictions that are implemented for the Indiana bat will likely be used for the Northern long-eared bat (NLEB), as well (page 23, lines 25-27). We believe these dates would avoid direct impacts, but request that the draft EIS incorporate the likelihood that NLEBs tend to use smaller roost trees (3" dh) than the Indiana bat, which should be available in the biology section of the final listing rule.	Text has been added to Section 4.7.1.3.1: “Fort Campbell is conducting surveys for the presence of maternity roosts on the installation. All located roosts will be protected in accordance with the Programmatic Informal Consultation on the northern long-eared bat with the USFWS under Section 7 of the ESA. The Programmatic Informal Consultation identified criteria under which construction projects would be considered "Not Likely to Adversely Affect” northern long-eared bat (Informal Conference & Management Guidelines on the Northern Long-eared Bat [*Myotis septentrionalis*] for Ongoing Operations on Installation Management Command Installations, USAEC, May 2015). Fort Campbell will use the Army's Programmatic Informal Consultation for northern long-eared bat when screening each upcoming construction project, and will conduct local Section 7 Consultation for any project that does not meet the criteria for "Not Likely to Adversely Affect”.
Thank you for the opportunity to provide comments on this project. If you have questions or concerns, please contact Carrie Allison on (502) 695-0468 ext. 103. I can be reached via email at joyce_stanley@ios.doi.gov or at (404) 331-4524.	

ID: 2	**Date:** 3/9/15	**Name:** Larry O. Gissentanna DoD and Federal Facilities, Project Manager	**Affiliation:** U.S. Environmental Protection Agency/ Region 4 National Environmental Policy Act (NEPA) Program Office	**Method:** Email (attached letter)
Comment			**Response**	
Pursuant to Section 309 of the Clean Air Act (CAA) and Section 102(2)(C) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the U.S. Army Garrison Fort Campbell, KY Training Mission and Mission Support Activities Draft Programmatic Environmental Impact Statement. Under Section 309 of the CAA, EPA is responsible for reviewing and commenting on major federal actions significantly affecting the quality of the human environment. Background: A Fort Campbell installation-wide mission evaluation was last performed in 1981 and documented in the EIS. It was titled *101st Airborne Division (Air Assault) and Fort Campbell, Kentucky Final Environmental impact Statement Installation Ongoing Mission* (Fort Campbell, 1981). Since then, there have been numerous advances to the type of Soldier training, equipment, and units that train at Fort Campbell. Recent Army-wide mission changes (i.e., Army Transformation, Modularity, Grow the Army) have occurred at Fort Campbell, which has resulted in various stationing actions (growth) since 2004. These specific actions have been analyzed in previous NEPA documentation. Although these evolutions have occurred in compliance with federal regulations, statutes, and Executive Orders (EOs), Fort Campbell is conducting an update to the 1981 Installation Ongoing Mission EIS. This update looks at the environmental effects of continuing the ongoing mission of Fort Campbell, efforts to modernize and improve facilities, as well as proposed enhanced environmental procedures aimed at increasing efficiency. The following are Fort Campbell's five primary objectives: 1. Help meet the primary range complex objectives outlined within the RCMP through the creation of modern facilities or upgrades to existing training infrastructure. 2. Help meet the primary training land objectives outlined within the RCMP through the creation of training infrastructure or upgrades to existing training infrastructure.			Thank you for your comments.	

3. Streamline the review of routine range and training land actions. 4. Provide the airspace necessary to train units at Fort Campbell and to reduce scheduling conflicts. 5. Meet requirements of the Sustainable Range Program (SRP) and foster environmental stewardship. EPA understands that under this Draft PEIS, the 5 alternatives or proposed action presented, including the no action alternative, will have no significant impacts to geology, topography, soils, air, wetlands or groundwater supplies. EPA's Concerns: Noise impact is EPA's primary concern. The preferred alternative 5, involves the construction and operation of the facilities. There is a potential to generate noise during the construction and operational phase. Also alternative 4 would increase the potential for noise generation beneath the restructured and expanded airspace. Both alternatives 4 and 5 have the potential to significantly affect the noise environment of sensitive receptors. EPA recommends Best Management Practices (BMP) for construction noise. The Federal Aviation Administration (FAA) determines noise exposure at or above 65 DNL to be incompatible with residential land use. According to the DPEIS, significant change in noise exposure to local residents is predicted for some alternatives. EPA recommends Fort Campbell conduct a comprehensive noise modeling survey where necessary to determine the specific impacts. EPA recommends the Final Programmatic EIS (FPEIS) discuss mitigation to address residential noise exposure and the prospective Record of Decision should provide commitment targets for residential mitigation. Recommendations include: 1) residential mitigation (soundproofing) starting with those residences located in the highest (noisiest) contours; 2) greater use of other available airfield runways and range firing points as weather and airfield operations permit.	BMPs for construction noise were discussed under Alternative 1. These BMPs have also been referenced to the other alternatives that involve construction in the Final PEIS document. Under Alternative 4, the restructured airspace is primarily confined to areas directly over the installation and not over any off-post residential areas. The total amount of aircraft activity within and associated noise under the restructured airspace is expected to be less than the existing conditions, and would not generate noise above 65 dBA DNL. The most common aircraft utilizing the airspace will be UAS and rotorcraft such as the CH-47 and the UH-60, the loudest of which is the CH-47. The A-weighted Sound Exposure Level (ASEL) of a CH-47 at 1,000 feet Above Ground Level (AGL) is 87.8 dBA. This information can be used to determine the DNL. The SEL is sound normalized to one second. If there is only one flight per day, the DNL can be calculated by subtracting a constant representing 10 times the logarithm of the 86,400 seconds in a 24 hour day, which is 49.4 dB. So, for one CH-47 flyover at 1,000 feet (87.8 dB ASEL), the DNL would be 38.4 dBA DNL. The DNL increases 3 dB for every doubling of operations, so the DNL for 2 flights would be 41.4 dB ADNL, 4 flights per day would equal 44.4 dBA DNL, and 8 flights per day would equal 47.4 dBA DNL. By continuing these calculations, it would take 512 CH-47 flights occurring 1,000 feet AGL over one location within a 24-hour period to achieve a 65 dBA DNL.

EPA is particularly concerned over noise impacts to children per Executive Order 13045: *Protection of Children from Environmental Health Risks and Safety Risks.* E.O. 13045 recognizes children may suffer disproportionately from environmental health risks and safety risks. Because their smaller ear canals magnify the sounds entering the ear canals, children's hearing may be particularly sensitive. For example, a 20-decibel difference can exist between adult and infant ears[1] www.childrenshearing.org_custom_hearing_health.html. All five alternatives analyzed in the DPEIS, including the no action alternative, indicate no noise impacts to children. While the DPEIS alternatives analysis discussed schools, (including day-care centers) potentially impacted at or greater than 65 DNL, it did not discuss the actual number of potential children, e.g., students, residents, etc., exposed to noise impacts or identify mitigation measures to diminish the noise impacts. Consequently, the FPEIS should identify the population of children, analyze potential noise impacts upon them, and identify mitigation alternatives if necessary. After all public and agency comments are considered, explore and objectively evaluate all reasonable alternatives. In summary, EPA has environmental concerns regarding this project, as proposed, and rates this draft EIS as "EC-2" (i.e., environmental concerns with additional information requested in the final EIS). EPA is requesting our comments be addressed and additional information in the FPEIS as stated in the paragraph above. Thank you for the opportunity to review and provided comments. If you wish to discuss this matter further, please contact Larry O. Gissentanna (404-562-8248 or gissentanna.larry@epa.gov) of my staff.	Based upon the projected operational parameters and the limited number of aircraft utilizing the airspace, 65 dBA DNL would not be generated under the restructured and expanded airspace. These levels of noise would be fully compatible with all land uses including residential land uses; therefore, no residences would be exposed to noise levels above 65 dBA DNL. The proposed actions would occur in the rear training areas which are rural and unoccupied, no noise impacts to children would occur. Additionally, specific flight routes over the cantonment area would be maintained which are in place to avoid noise impacts to cantonment area populations, including children. Comprehensive noise modeling surveys would not be necessary, and no mitigation (e.g., soundproofing or runway use restrictions) would be required. Aircraft noise within the restricted airspace would be either inaudible, or perceived as faint and distant to off-post residences. New artillery firing points in TAs to the south directly associated with the proposed change in airspace restrictions could cause noise complaints along the border. But the EIS does not state that noise impacts would be significant. The EIS states “Although the exact location of the proposed firing points is unknown, in the final planning stages, firing points would be located at least 3,500 feet (1,067 meters) from the installation boundary, to ensure they would not appreciably affect the overall noise at the installation, and the effects would be less than significant under NEPA. If firing points were to be established within 3,500 feet (1,067 meters) of the installation boundary, subsequent NEPA analysis and comprehensive noise modeling would be conducted." The 3,500 feet threshold was specifically calculated to avoid generating levels of noise off-post that would be incompatible with residential uses. Artillery training noise would be either quiet enough or infrequent enough to be fully compatible with all off-post land uses including residential uses. Therefore, comprehensive noise modeling surveys would not be necessary, and no mitigation (e.g., soundproofing or firing point use restrictions) would be required. As stated above, under Alternative 4, the restructured airspace is primarily confined to areas directly over the installation and not over any off-post residential areas. The total amount of aircraft activity within and associated noise under the restructured airspace is expected to be less than the existing conditions, and no off-post residences, schools, day-cares, or any individual or child whatsoever would be exposed to overall noise greater than 65 dBA DNL. Aircraft noise within the restricted airspace would be either inaudible, or faint and distant, to off-post areas. Artillery training noise would be either quiet enough or infrequent enough to be fully compatible with all off-post land uses including schools, day-cares, and residential uses.

Appendix A.3 – Public Comments on the November 2014 Draft PEIS and Army Responses

This page intentionally left blank

Fort Campbell Training Mission and Mission Support Activities

Programmatic Environmental Impact Statement

Public Comments on the November 2014 Draft PEIS

ID: 1	**Date:** 1/13/15	**Name:** Jean Public	**Method:** Email
Comment			**Response**
Subject: Fw: mpublic [sic] comment on federal register - army destroys the american environ they destroy and pollute everything i dameric [sic] not support expansion of contamination by the us army in this fott campbell ky [sic] site. it is clear that every base in teh [sic] usa is full of pollution and contamination by this military force. they dont [sic] have to destroy the environment to train. they can make sure that pollution is minimized. they have failed to do anything to stop the pollution and contamination. this pan [sic] is attempting to further destroy and contaminate the american [sic] environment. this comment is for the public record.			Thank you for your comment.

This page intentionally left blank

Appendix B – TMMSA Project Checklist

This page intentionally left blank

Programmatic Environmental Impact Statement
for the Training Mission and Mission Support Activities at Fort Campbell

CHECKLIST

PROJECT TITLE:

WORK ORDER NUMBER:

DESCRIPTION AND LOCATION:

Enter project grid coordinates or attach a location map: Enter acreage of footprint disturbance: Name the Watershed where the project is located: Describe type of activity (construction): Describe type of activity (use): Describe any other relevant project components:

FORM COMPLETED BY: _____ **DATE:** _____

This checklist is intended to provide a framework for identifying any NEPA requirements beyond this PEIS for: the construction, modernization, and maintenance of ranges; routine actions to maintain and sustain ranges and training lands; and, projects undertaken in the Fort Campbell Adaptable Use Zones (AUZs). This checklist also will certify that both the installation staff and proponent understand and support the requirements and discussions in this PEIS, particularly the site conditions, the Proposed Action, and any required mitigations. If the conditions of the checklist in this Appendix are met, and if the procedures and mitigations are adopted by the installation proponent, a Record of Environmental Consideration (REC) may be prepared, referencing this PEIS, and construction or the specific action can proceed.

If some checklist conditions are not met, the installation does not adopt the provisions of this PEIS, or the installation environmental office finds this PEIS inadequate, a separate NEPA analysis (Supplemental EIS or EA) will be required. That NEPA analysis will culminate in either a separate Finding of No Significant Impact (FNSI), or if significant effects are identified a Notice of Intent (NOI) to prepare an Environmental Impact Statement. If further NEPA analysis is required it can supplement this PEIS, addressing only those topics or issues that require further evaluation.

To use the attached checklist during the evaluation of a Proposed Action, answer each question with a “yes,” “no,” or “N/A” as appropriate. Use the “Comments” location to provide any additional explanation or justification to support answers 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 completion of this checklist should be directed to the installation environmental staff. Document any outside coordination and describe all BMPs or other mitigating actions.

When completing this questionnaire, the proponent is encouraged to consult with the appropriate environmental division staff sections. Consultation should also be conducted with the NEPA program manager.

Once the checklist is completed, and the Proposed Action meets the provision of this PEIS, the proponent of the action will initiate a Record of Environmental Consideration (REC). Once the REC is signed, the proponent will file and retain the REC and the completed checklist.

NEPA Review: Based on the information contained within this Checklist and an independent assessment of potential impacts to the environment, it is determined that the Proposed Action is not sufficient to warrant preparation of a separate NEPA analysis. The Proposed Action would not degrade the existing environment, is not environmentally controversial, nor would it adversely affect environmentally sensitive resources. Anticipated impacts associated with this project are comparable with those addressed in the Fort Campbell TMMSA PEIS.

Form Reviewed by: _____

Signature:_____ **Date:**_____

Note: No other NEPA Review Form is required to supplement the above certification.

Project Eligibility for PEIS Tiering

Check All Which Apply

- ☐ The project is listed in Appendix C (Site-Specific Project Reference Number) of the Fort Campbell TMMSA PEIS.
- ☐ The project is listed in Appendix E (Routine Range Project Title) of the Fort Campbell TMMSA PEIS.
- ☐ The project is located within an AUZ (Appendix D) as part of Alternative 2 of the Fort Campbell TMMSA PEIS.

Air Quality

Yes	No	
☐	☐	Is the project in a nonattainment or maintenance area and substantially different than those described in the Fort Campbell TMMSA PEIS?
☐	☐	Could impacts to air quality from the proposed project be greater than those described in Section 4.4, Air Quality of the Fort Campbell TMMSA PEIS?
☐	☐	Was "yes" answered to any of the above questions? *If "yes", subsequent NEPA analysis and/or an applicability analysis under the General Conformity Rule may be necessary to determine the impacts.*

Comments:_____
_____
_____

Airspace

Yes	No	
☐	☐	Would the proposed project cause an increase to airspace use or change airspace use patterns?
☐	☐	Would the proposed project cause a violation of Federal Aviation Administration regulations that undermines the safety of military, civil, or commercial aviation?
☐	☐	Would the proposed project infringe on current military, private, or commercial flight activity and flight corridors?
☐	☐	Could impacts to airspace from the proposed project be greater than those described in Section 4.2, Airspace of the Fort Campbell TMMSA PEIS?
☐	☐	Was "yes" answered to any of the above questions? *If "yes", refer to Fort Campbell TMMSA PEIS, Appendix F –Environmental Stewardship Range Construction Guidelines for airspace management and protocols.*

Comments:_____
_____
_____

Biological Resources

Yes	No	
☐	☐	Is the project site in the potential habitat of a federal or state listed TES or candidate for species listing? (see Tables 4.7-2 and 4.7-3 of the TMMSA PEIS for species and habitats).
☐	☐	Could the project significantly contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area (EO 13112)?
☐	☐	Will the project involve vegetation removal (deforestation/habitat fragmentation or conversion)? If "yes", indicate the acres of vegetation impact: Temporary Permanent

☐ ☐ If the project involves greater than 20 acres of forest removal, does it occur within a watershed recognized by Fort Campbell for protection due to Indiana and gray bat foraging habitat (i.e., Casey Creek, Fletcher's Fork Creek, Jordan Creek, Piney Fork Creek, or Saline Creek)?

☐ ☐ Will the project involve removal of trees to the west of Indian Mound and Grant roads during potential Indiana bat roosting season (April 1 to September 31) or removal of suitable roosting trees elsewhere within the installation?

☐ ☐ Will the project involve vegetation clearing during the migratory bird nesting season (1 April through 15 July) for forest nesting species and (15 April through 31 August) for ground nesting species?

☐ ☐ If "yes", does the project fall outside of the definition of a "military readiness activity" as defined by the DoD Migratory Bird Treaty Act (MBTA) Final Rule (30 March 2007)?

☐ ☐ Could impacts to biological resources resulting from the project be greater than those described in Section 4.7 Biological Resources of the Fort Campbell TMMSA PEIS?

☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to Fort Campbell TMMSA PEIS, Appendix F –Environmental Stewardship Range Construction Guidelines for biological resource protection measures.*

Comments:_____
_____
_____

Cultural Resources

Yes No

☐ ☐ Does the area contain sites or structures of cultural or tribal significance (requires consultation with the Fort Campbell Cultural Resources Manager to determine the answer)?

☐ ☐ Would this project alter the characteristics of a property that may qualify for inclusion on the National Register?

☐ ☐ Would this project violate the provisions of ARPA or NAGPRA?

☐ ☐ Would this project result in the unmitigated loss of a cultural resource?

☐ ☐ Could the project involve disturbance of previously undisturbed ground?

☐ ☐ Does the area require a cultural resource survey (i.e., no previous surveys exist)?

☐ ☐ Could impacts to cultural resources resulting from the project be greater than those described in Section 4.8, Cultural Resources of the Fort Campbell TMMSA PEIS?

☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for cultural resource protection measures.*

Comments:_____
_____
_____

Energy

Yes No

☐ ☐ Would the project require an energy demand that could not be supported by the existing electrical grid or through renewable energy options (e.g., solar panel)?
If "yes", coordination would be required with Fort Campbell DPW regarding capacity and Fort Campbell Environmental regarding placement (siting) of any new electrical connections.

☐ ☐ Would the project require any new stationary sources such as generators?
If "yes", a General Conformity Analysis may be required.

☐ ☐ Could impacts to energy from the project be greater than those described in Table 4.2-1 of the Fort Campbell TMMSA PEIS?

☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for impact avoidance and conservation measures.*

Comments:_____
_____
_____

Facilities

Yes No

☐ ☐ Would the project require the need for additional facilities other than described as part of the action (e.g., water/wastewater connections, fiber optics, stormwater, new road access or upgrades)?
If "yes", coordination would be required with Fort Campbell DPW regarding capacity and Fort Campbell Environmental regarding placement (siting) of any new facility construction or upgrades.

☐ ☐ Would the project produce solid waste that could not be recycled or repurposed?

☐ ☐ If yes to the above, would the solid waste generated from either construction or operations exceed any thresholds for disposal at existing landfills?

☐ ☐ Could impacts to facilities resulting from the project be greater than those described in Table 4.2-1 of the Fort Campbell TMMSA PEIS, of the *Fort Campbell TMMSA PEIS*?

☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix D – Environmental Stewardship Range Construction Guidelines for impact avoidance and conservation measures.*

Comments:_____
_____
_____

Hazardous Materials/Hazardous Waste (Hazardous and Toxic Substances)

Yes No

☐ ☐ Would the project result in the generation of hazardous waste?

☐ ☐ Would the project have the potential for creating a POL spill?

☐ ☐ Would construction or operation cause the installation to violate laws or regulations governing hazardous material/waste management and/or violate the installation's hazardous waste permit?

☐ ☐ Would the impacts resulting from the project be greater than those described in Section 4.10, Hazardous and Toxic Substances of the Fort Campbell TMMSA PEIS?

☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for hazardous materials and waste management and spill prevention measures.*

Comments:_____
_____
_____

Land Use

Yes No

☐ ☐ Would the project pose a conflict to land use on post or adjacent land uses off post? This includes the SDZ of adjacent ranges.

☐ ☐ Would the project reduce public access or recreation?
☐ ☐ Would the proposed project adversely reduce and/or alter training land uses?
☐ ☐ Could impacts to land use resulting from the project be greater than those described in Table 4.2-1 of the Fort Campbell TMMSA PEIS?
☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix D – Environmental Stewardship Range Construction Guidelines for impact avoidance and conservation measures.*

Comments:_____
_____
_____

Noise

Yes No

☐ ☐ Does the project include increase in live fire training or fixed wing aircraft operations in the proposed AUZs?
☐ ☐ Could impacts to noise resulting from the project be greater than described in Section 4.3, Noise, of the Fort Campbell TMMSA PEIS?
☐ ☐ Was "yes" answered to any of the above questions? *If "yes", subsequent NEPA analysis and/or comprehensive noise modeling may be necessary to determine the impacts.*

Comments:_____
_____
_____

Socioeconomics and Environmental Justice

Yes No

☐ ☐ Would the proposed project cause substantial changes to the sales volume, income, employment, tax base, or population of the surrounding ROI?
☐ ☐ Could the proposed project cause a public health hazard?
☐ ☐ Does the proposed project have the potential to create a disproportionate environmental, economic, social, or health impact on minority or low-income populations (EO 12898)?
☐ ☐ Could the Proposed Action adversely affect housing, schools, or community services? (e.g., law enforcement, fire services, medical services)?
☐ ☐ Does the proposed project have the potential to create a disproportionate environmental health or safety risk to children?
☐ ☐ Could impacts to socioeconomics resulting from the project be greater than those described in Table 4.2-1 of the Fort Campbell TMMSA PEIS?
☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for impact avoidance and conservation measures.*

Comments:_____
_____
_____

Soil Erosion

Yes No

☐ ☐ Would construction or operation cause a substantial increase in soil compaction resulting in decreased re-vegetation potential?
☐ ☐ Is the proposed project located on Highly Erodible Land (HEL) or steep slopes?

☐	☐	Would construction or operation cause a substantial increase in soil erosion and/or loss of productivity due to soil mineral leaching?
☐	☐	Could impacts to soils resulting from the project be greater than those described in Section 4.5, Soils, of the Fort Campbell TMMSA PEIS?
☐	☐	Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for soil conservation measures and to the Installation Dust Control Plan.*

Comments:_____
_____
_____
_____

Traffic and Transportation

Yes	No	
☐	☐	Would the proposed project cause an increase in traffic volumes or delays to levels that impair a roadway's handling capacity or increase traffic safety hazards?
☐	☐	Could the proposed project cause road failure resulting in rutting, cracking, or other pavement problems that requires substantial maintenance or construction activities?
☐	☐	Could impacts to traffic and transportation resulting from the project be greater than those described in Section 4.9, Traffic and Transportation of the Fort Campbell TMMSA PEIS?
☐	☐	Was "yes" answered to any of the above questions? *If "yes", subsequent NEPA analysis may be necessary to determine the impacts.*

Comments:_____
_____
_____
_____

Water Resources

Yes	No	
☐	☐	Is the project located within a known floodplain (EO 11988)?
☐	☐	Is any part of the project footprint close enough (typically within 100 feet) to open water bodies or sinkholes so as to require a buffer?
☐	☐	Would the project result in ground disturbance of 1 acre or greater or would the project result in increased impervious surfaces? *If "yes", coordination with the State will be necessary and may require a Construction General Permit and preparation of a stormwater pollution prevention plan (SWPPP).*
☐	☐	Will the project involve either direct or indirect discharge (or runoff) of sediment into a waterway or storm sewer?
☐	☐	Is the project located within proximity to an impaired water listed on State 303d lists (i.e., Casey Creek, Dry Fork East Creek, Fletcher's Fork Creek, Little West Fork Creek, Noah's Spring Branch, or Skinner Creek)?
☐	☐	Could the project result in potential impacts to surface water or groundwater quality?
☐	☐	Will the project result in diversion or obstruction of stream flow?
☐	☐	If the project is a range, would operation of the proposed range result in spent rounds landing in a surface water body (e.g., stream, creek, pond, lake)?
☐	☐	If the project is a range, do site characteristics of the range and proximity to surface waters potentially allow for migration of lead or other munitions constituents (MC) into surface waters?

☐ ☐ Could impacts to waters resulting from the project be greater than those described in Section 4.6, Water Resources, of the Fort Campbell TMMSA PEIS?

☐ ☐ Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for protection of water resources.*

Comments:_____
_____
_____

Wetlands

Yes	No	
☐	☐	Does the project site exhibit any identifying characteristics of a wetland?
☐	☐	If "yes", has a wetland delineation been performed?
☐	☐	Will the project involve dredging, disposal of dredged material, excavation, or filling of a jurisdictional waterway or wetland requiring a permit under Section 404 of the Clean Water Act? If "yes", indicate the extent (linear feet) or waterway impact and acres of wetland impact: Temporary Permanent
☐	☐	Could the project result in modifications (such as clearing) or adverse effects to wetlands (such as trampling of vegetation or compaction of soils by heavy equipment)? If "yes", indicate the acres of wetland impact: Temporary Permanent
☐	☐	Could impacts to wetlands resulting from the project be greater than those described in Table 4.2-1, of the Fort Campbell TMMSA PEIS?
☐	☐	Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for wetland protection measures.*

Comments:_____
_____
_____

Wildland Fire Management

Yes	No	
☐	☐	Could the project interfere with local jurisdiction or military firefighting efforts?
☐	☐	Could the project increase the chance of unintentional fire starts?
☐	☐	Would the project not be covered within the existing fire break system or fire management protocols as identified in the installation wildland fire management plan?
☐	☐	Would the project adversely impact fire management?
☐	☐	Does the project involve development of new facilities or firing ranges that could pose a fire risk?
☐	☐	Was "yes" answered to any of the above questions? *If "yes", refer to the Fort Campbell TMMSA PEIS, Appendix F – Environmental Stewardship Range Construction Guidelines for wildland fire prevention and reduction measures.*

Comments:_____
_____
_____

Cumulative Effects

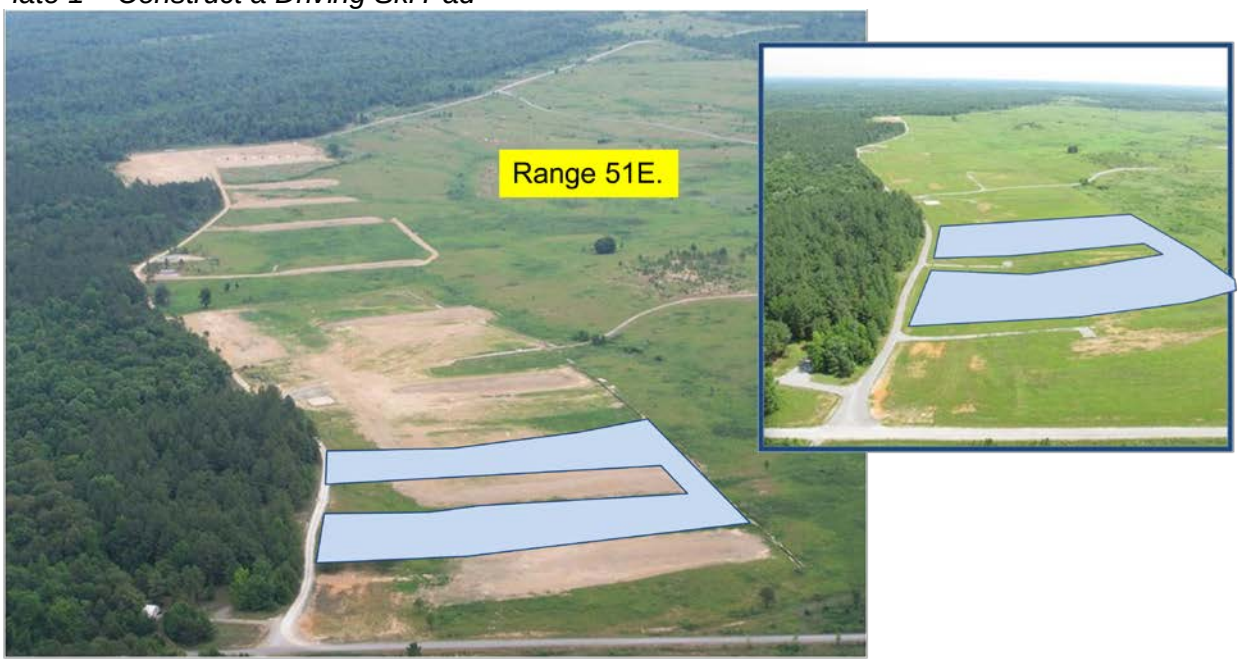
Yes	No	
☐	☐	Would this project, in combination with past projects tiered off this PEIS, cause any resource-specific significance threshold to be exceed? Comments:_____ _____ _____

This page intentionally left blank

Appendix C – Alternative 1 Site Specific Projects

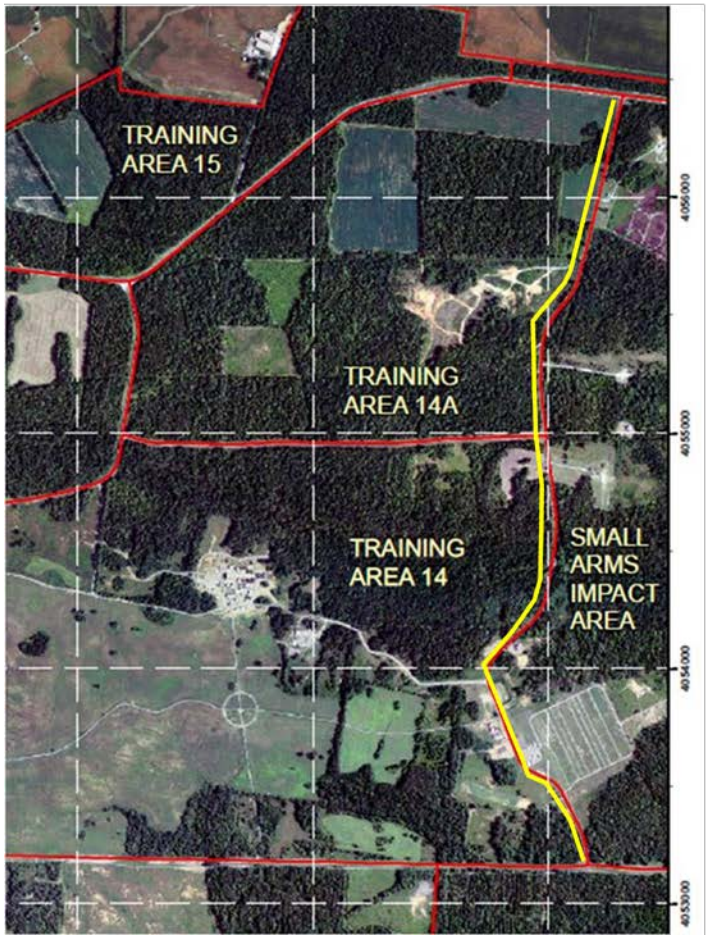
This page intentionally left blank

Plate 1 – Construct a Driving Ski Pad



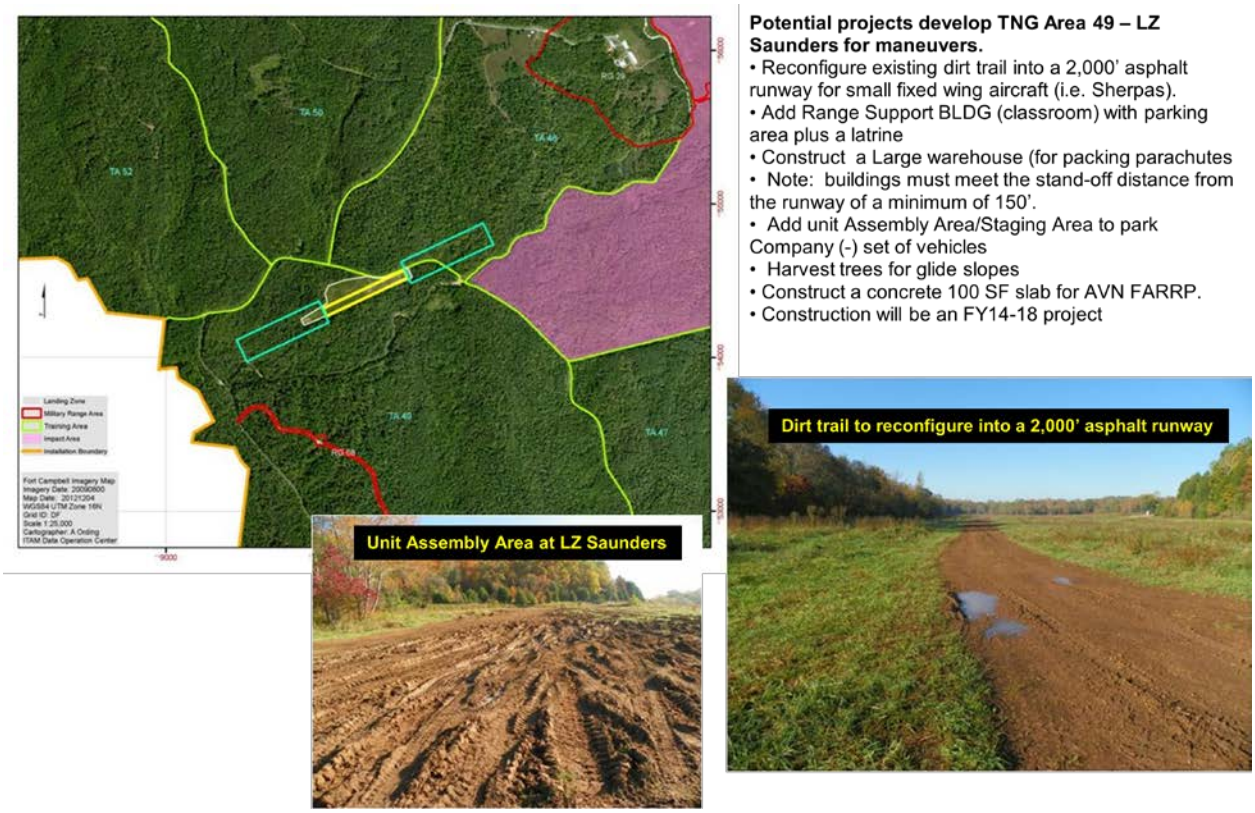
5th SFG has proposed the construction of an asphalt skid pad to support on-installation training of tactical driving techniques with commercial vehicles. Currently, this training is conducted as a TDY endeavor. They requested an asphalt pad approximately 750'x200'. A tentative site for this Driving Skid Pad has been identified around the firing berms on the rear of Range 51E (Known Distance). The 5th SFG has not yet developed a Statement of Work to identify all the capabilities for this skid pad (i.e. ponding of water, LFX capability, etc). Consequently, this is a long range project (FY14-FY18) pending the development of a SOW.

Plate 2 – Construct a Gravel Foot March Trail Along On-The-Line road



ITAM constructed a 17.7 mile gravel walking trail around the Small Arms Impact Area to provide a foot march trail that was off-set from traffic. This is a follow-on project to construct an 11,880' gravel foot march trail along On-The-Line road. The gravel foot march route will remove walking soldiers from vehicle traffic as they foot march to Ranges 26, 27, 35, and 36. This trail will be approximately 12' wide. It is an FY15-FY18 project.

Plate 3 – Construct an asphalt runway with glide slopes for small fixed-wing aircraft – LZ Saunders

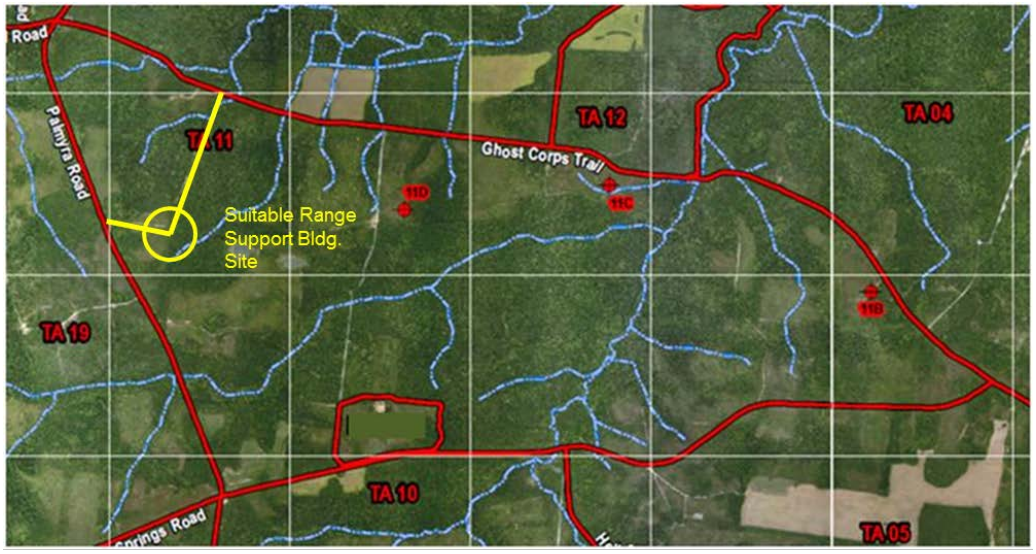


This page intentionally left blank

Appendix D – Alternative 2 AUZ Projects

This page intentionally left blank

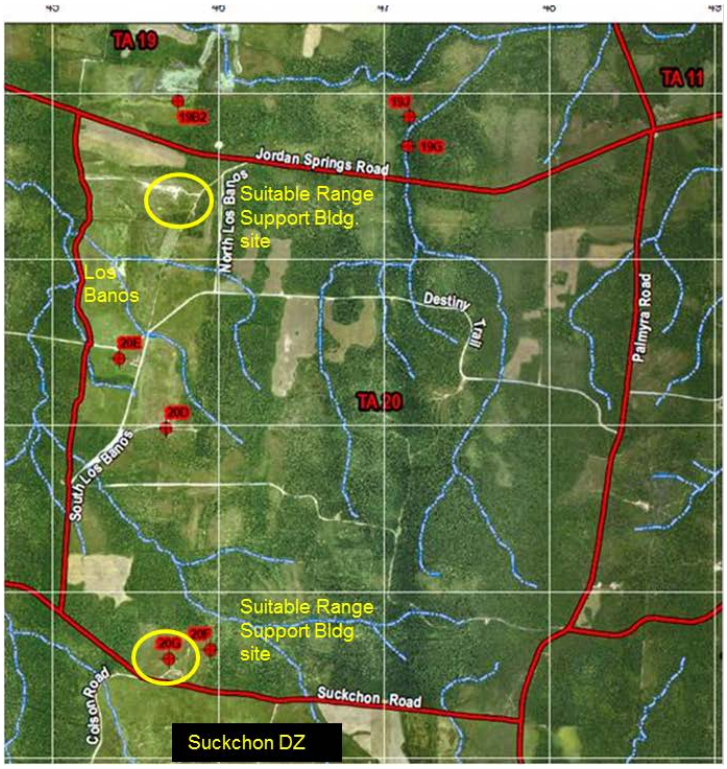
Plate A – Training Area 11 AUZ



Suitable projects to develop TNG Area 20 for maneuvers.

- Range support buildings (e.g., classroom; storage facility; latrine; parking area)
- Maneuver trails
- Tree harvesting to open areas for maneuver
- Development within AUZ likely to occur between FY14-19

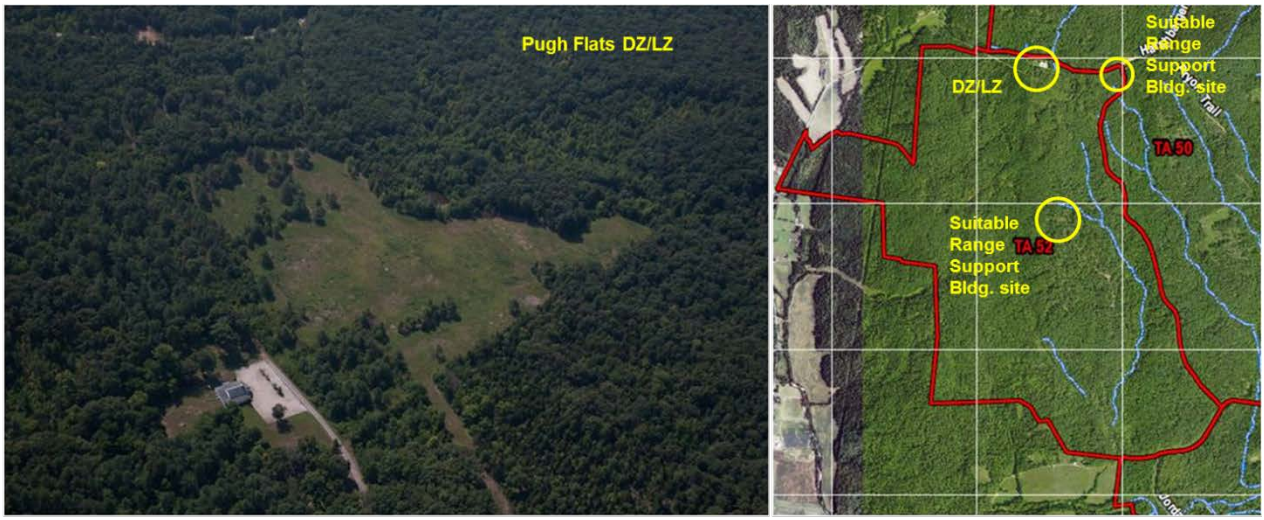
Plate B – Training Area 20 AUZ



Suitable projects to develop TNG Area 20 for maneuvers.

- Range support buildings (e.g., classroom; storage facility; latrine; parking area)
- Maneuver trails
- Tree harvesting to open areas for maneuver
- Development within AUZ likely to occur between FY14-19

Plate C – Training Area 52 AUZ



Suitable projects to develop TNG Area 52 for maneuvers.

- Range support buildings (e.g., classroom; storage facility; latrine; parking area)
- Maneuver trails
- Tree harvesting to open the area
- Develop a drop zone
- Development within AUZ likely to occur between FY14-19

Plate D – LZ Aardvark AUZ

Suitable projects to develop TNG Area 31 – Aardvark LZ for maneuvers.

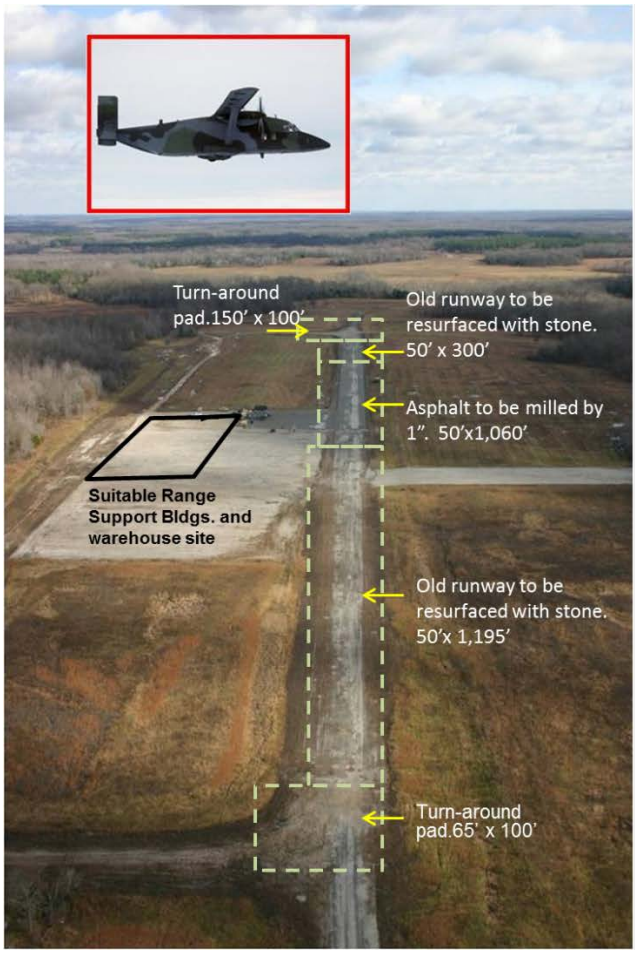
- Range support buildings (e.g., classroom; storage facility; latrine; parking area)
- Gravel maneuver trail with parking area for unit vehicles
- Development within AUZ likely to occur between FY14-19

Plate E – Golden Eagle Flight Landing Strip

Suitable projects to develop TNG Area 8A - Golden Eagle FLS for maneuvers.

- Additional buildings to the urban training site (Range 66)
- Range support building (classroom) with parking area and a separate large warehouse building (for packing parachutes)
- Development within AUZ likely to occur between FY14-19

Plate F – Indian Mound LZ AUZ



Suitable projects to develop TNG Area 28 – Indian Mound LZ for maneuvers.

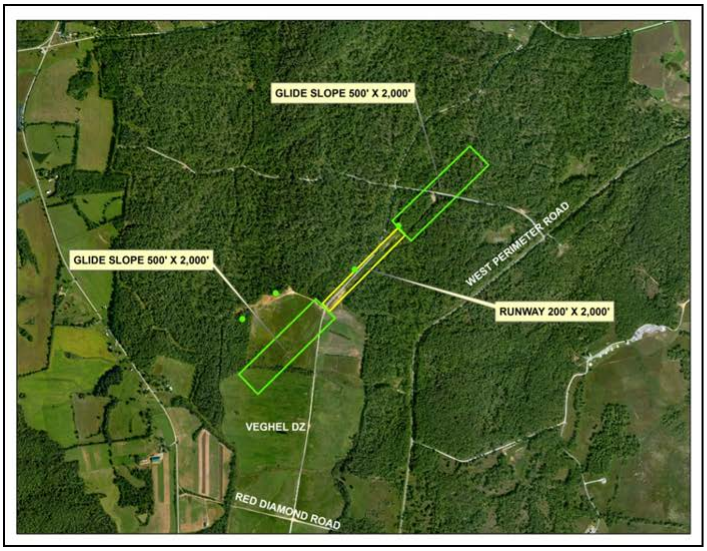
- Reconfigure existing gravel/asphalt runway into a 2,000' asphalt runway for small fixed wing aircraft (i.e. Sherpas).
- Range Support range support buildings (e.g., classroom; storage facility/warehouse for packing parachutes; latrine; parking area *Note: buildings must meet the stand-off distance from the runway of a minimum of 150'*.
- Development within AUZ likely to occur between FY14-19

Plate G – Suckchon DZ AUZ

Suitable projects to develop TNG Area 21 – Suckchon DZ for maneuvers.

- Range support buildings (e.g., classroom; storage facility; latrine; parking area)
- Replace temporary maintenance tent with three UAS operations/maintenance hangers.
- Development within AUZ likely to occur between FY14-19

Plate H – Proposed Fort Campbell Adaptable Use Zones - Veghel DZ



Suitable projects to develop TNG Area 44A – Veghel DZ for maneuvers.

- Reconfigure existing gravel/asphalt runway into a 2,000' asphalt runway for small fixed wing aircraft (i.e. Sherpas)
- Development within AUZ likely to occur between FY14-19

This page intentionally left blank

Appendix E – Alternative 3 Routine Training and Range Projects

This page intentionally left blank

Appendix E, Routine Range and Training Land Actions

E.1 Routine Actions

E.1.1 Culvert Installation/Maintenance

Wetland or Drainage Culverts: This corrugated metal pipe (culvert) is installed in areas where drainage requires passage under a road or access surface and are associated with ditching and other hydraulic features that enhance or maintain area hydrology.

Size: Corrugated metal pipe (CMP) is installed in a variety of lengths and diameters, ranging from 10-to-40-foot length and variable diameters. Long runs of CMP (+30 feet) require the use of connecting bands. Generally, the width of the stream will designate the diameter of the culvert. CMPs footprints are excavated approximately 3-to-4-foot wide and 4-to-6 inches below sub-base elevation and backfilled with D1 (Road Surfacing Aggregate) or equivalent bedding material. CMPs are installed with pipe inverts at road or pad sub-base elevation with a slight (-2 percent) slope from inlet to outlet. CMPs are covered with a minimum of 1 foot of compacted fill material.

Culverts are required at most Integrated Training Area Management (ITAM) construction sites as part of the storm water management. ITAM is using concrete culverts on all new projects that will need to be able to support the Mine Resistant Ambush Protected (MRAP) family of vehicles since the CMP lack the structural rigidity.

The ITAM crew identified all the CMP culverts on the training area and range roads that are 36 inches and larger. Many of these CMP culverts will need to be replaced with concrete culverts to support the MRAP family of vehicles. Occasionally, these CMP culverts are destroyed by storm water flooding and need to be replaced in an expeditious manner. Other CMP culverts will need to be replaced as part of routine maintenance.

Figure E.1. Locations of all CMP culverts in the training areas and ranges that are 36 inches and larger (as of April 2012).

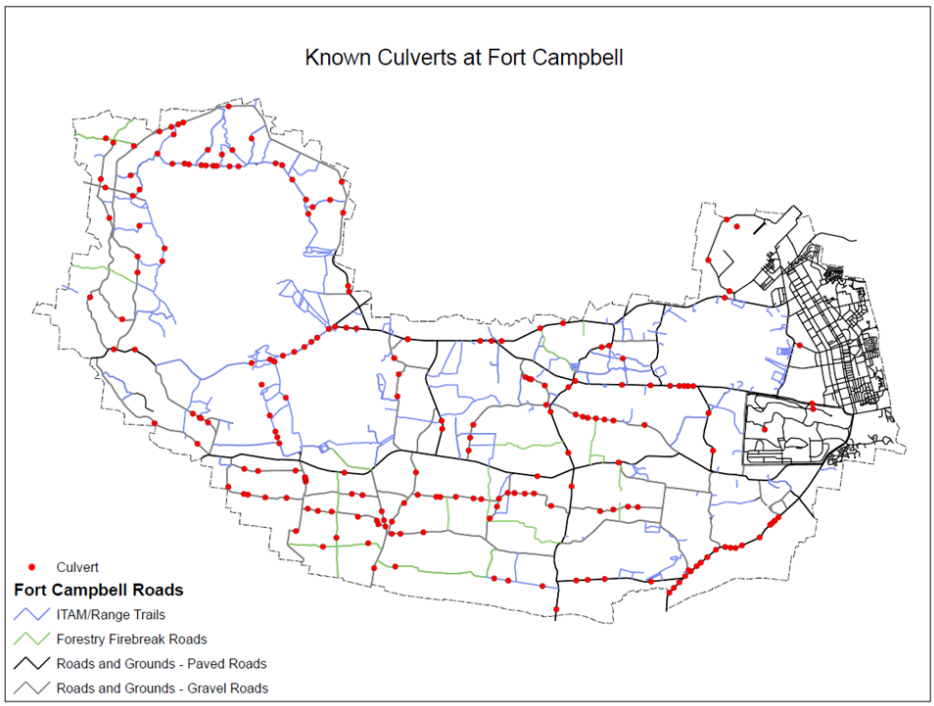


Figure E.2. Typical CMP culverts that need to be replaced by concrete culverts.

E.1.2 Low Water Crossing Site Creation and Maintenance

Twenty-one Cabled Concrete low water crossings were installed adjacent to bridges in the training areas. These crossings are inspected annually with emphasis following flood events. Occasionally, these cabled mats need to be replaced or repaired. The simplest repairs are to place shot rock adjacent to the downstream side of the crossings to reduce the effect of the water undercutting the cabled-concrete mats. These repairs are completed by the ITAM crews after all necessary permits are obtained. Replacement of the broken cabled-concrete mats is contracted through Fort Campbell Directorate of Public Works (DPW).

Figure E.3. Cabled concrete that has been undercut by heavy water flow. Placing Shot Rock on the downstream side prevents the water from undercutting the concrete mats. Instead, the water will undercut the shot rock.

Figure E.4. Cabled concrete properly installed.

E.1.3 Maneuver Damage Repair

LRAM projects recover degraded areas in a timely manner, thereby minimizing future damage and ensuring the continued availability of lands to support training. Heavy vehicle use, troop concentrations, and defilade excavations can significantly impact the environment. LRAM strives to stabilize degraded areas and offset future adverse impacts through the use of standard soil and water conservation techniques. Actions may include grading rutted or bermed areas, reestablishing vegetation on exposed soils, and hardening high-use areas. All training activities that involve excavation are evaluated by the Range and Training Land Assessment (RTLA) coordinator for residual damage and prioritized by LRAM for rehabilitation. LRAM utilizes revegetation methods that were developed in-house and by other installations to accomplish limited revegetation actions. This allows LRAM to rectify damage in an early stage, and thereby minimize adverse environmental impacts. The scope of work may include any of the following actions:

- Grade, rake, and compact the site as needed.
- Apply lime and/or fertilizer.
- Apply grass seed using a broadcast seeder, no-till seed drill, and hydro-seeder.

Maneuver damage repair that exceeds ITAM in-house capability is accomplished through the Fort Campbell Memorandum of Agreement (MOA) with the Natural Resource Conservation Service (NRCS). The scope of work for NRCS revegetation projects typically includes application of liquid manure, and may stipulate planting fescue or tree seedlings to stabilize areas. Precipitation patterns preclude the need for post-planting watering. The LRAM Coordinator may program follow-up fertilizer applications, if deemed necessary.

Figure E.5. LRAM personnel use a tractor-towed rock disk to rehabilitate training-related ground disturbance.

E.1.4 Maneuver Trail Creation, Hardening, & Maintenance

ITAM has responsibility for the maintenance of more than 129 miles of gravel maneuver trails in the training areas. By their nature, gravel trails require ongoing maintenance to remove potholes and to regrade the trail driving surface. ITAM needs an ongoing Programmatic NEPA – Categorical Exclusion so that this work can be completed in a timely manner. The ITAM crew has a road grader to perform this task.

E.1.5 Removal of Target Residue

Range Control periodically contracts for the removal of UXO and target residue from the impact area. The contractor is responsible for clearing the target area of unexploded ordnance, extracting the target residue from the impact area and certifying that the scrap from the target residue is clear of all UXO. The contractor is also responsible for removing the residue from the installation and submitting it to salvage yards as scrap waste for recycling.

Figure E.7. Target Residue Removal.

E.1.6 Maintenance of Open Fields, Drop Zones, and Firing Points

There are 19,000 (+) acres of open fields in the maneuver training areas. Approximately 5,600 of these acres are leased to area farmers for agricultural production. The Drop Zones are only eligible to be used for hay. The non-drop zone (DZ) fields may be used for hay and/or row crop production (primarily beans and corn). These fields are not off-limits for training. Farmers are not compensated for any training damage. However, the ITAM and AGLEASE program mitigate damage by providing managed grass fields adjacent to the fields that are much more conducive for unit training than row crop fields. These grass fields are mowed and training damage is remediated with gravel entry trails, water drainage, and disking (when needed). Even though the Drop Zones are managed by the farming hay production, ITAM still has the requirement to remove the woody growth along the storm water drainage areas to reduce hazards to paratroopers.

Mowing is performed on areas with woody vegetation less than 2 inches in diameter. Areas are mowed with a tractor pulled brush mower. Mowing allows for residue to remain on site and perform as a mulch layer. Mowing is performed on roadside clearings, drop zones, and helicopter landing zones. Mowing is also conducted on live fire ranges to maintain line-of-sight from the firing lines to the down range targetry.

Firing Points, Drop Zones, and Landing Zones. All actions related to these special Use Facilities are done in the same manner as for Open Fields and Observation Points.

E.1.7 Observation Point (OP) Creation

OPs are locations from which to observe the geographic impact of mortar and artillery rounds and can also serve as the location from which mortar and artillery rounds are fired. Maintenance of the observation points will consist of repairing and replacing the existing erosion control structures and adding additional erosion control structures where necessary to control erosion, regrading of gravel surfaces and adding additional classified material, mechanical and hand clearing of vegetation around the observation point to maintain line of site and snow removal.

This page intentionally left blank

Appendix F – Alternative 3 Environmental Stewardship

This page intentionally left blank

The following is a list of environmental stewardship guidelines being considered under Alternative 3. Environmental stewardship guidelines have been grouped by general management principles which govern numerous resource areas and by resource-specific topics.

Additional information related to the overall management of Fort Campbell lands can be found within the Integrated Natural Resource Management Plan (INRMP) and Integrated Training Area Management (ITAM) Plan. The INRMP contains further information regarding standard procedures and practices for the monitoring and management of natural resources in the areas of watershed management (e.g., soils, vegetation, wetlands, water resources), forestry and wildfire management, fish and wildlife management and outdoor recreation management. The ITAM Plan contains further information regarding land rehabilitation standard practices and management practices. The Fort Campbell Integrated Cultural Resource Management Plan (ICRMP) contains standard procedures for management of cultural resources. Additional documents containing environmental stewardship guidelines include the Fort Campbell Installation Operational Noise Plan (IONP), the US Army Sustainable Range Program (SRP) Land Rehabilitation and Maintenance (LRAM) Best Management Practices on the SRP web site, and recent Fort Campbell NEPA documents.

Fort Campbell would intend to implement these mitigations to the maximum extent possible as appropriate, applicable, subject to the availability of resources (funding and manpower).

General Resource Management	Overall resource management at the project planning phase considers of a broad spectrum of Fort Campbell's resources and chains of communication. The actions below provide general guidance in the planning for and actual execution of construction, modernization, or maintenance projects and routine actions.

- Fort Campbell will continue implementing INRMP and ICRMP principles during design, construction and operation of range projects to help maintain natural resource sustainability and maintain cultural resource integrity.
- If the checklist at Appendix B indicates that the project may not fall within the scope of this PEIS, Fort Campbell Environmental (NEPA) staff would determine what appropriate level of NEPA analysis should be performed prior to funds being spent on construction.
- Each proposed action will incorporate the following environmental priorities:

  1) <u>Implement Avoidance:</u> Avoid adverse impacts on natural resources by not performing activities that would result in such impact. Confine construction to areas where no significant impact would occur to the environment.

  2) <u>Limit the action:</u> Reduce the extent of an impact by limiting the degree or magnitude of the action. Minimize impacts of construction projects by arranging timing, location, and magnitude of actions so that they have the least impact on the environment.

  3) <u>Restore the environment:</u> Restore the environment to its previous condition or better. This could involve reseeding and/or replanting an area with native plants after it has been impacted by construction projects.

  4) <u>Maintenance operations:</u> Design the action to reduce adverse environmental effects. This could involve actions such as monitoring and controlling pollution, contamination, disturbance, or erosion caused by construction projects that would affect the environment.

  5) <u>Replace the Resource:</u> Replace the resource or environment that will be impacted by construction projects. Replacement can occur on-site or at another location. This could involve creation of the same type or better quality habitat for a particular impacted fish or wildlife species or creation of habitat for another species.

- Fort Campbell will continue management and monitoring of its rangelands including natural and cultural resources as outlined in the INRMP, ITAM Plan, and ICRMP to eliminate or control environmental degradation resulting from training, operations, maintenance, repair, or construction of real property facilities owned, leased, or supported by Fort Campbell.
- Fort Campbell will continue to comply with Army Regulation (AR) 200-1 *Environmental Protection and Enhancement,* and all applicable state and local environmental quality laws, regulations, and other requirements.

Air Quality	The Federal Clean Air Act (CAA) gives each state the authority to establish air quality rules and regulations through a U.S. Environmental Protection Agency (USEPA) approved state implementation plan (SIP). The SIP helps to attain and maintain compliance with National Ambient Air Quality Standards (NAAQS) established for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, sulfur dioxide (SO_2), lead, and particulate matter smaller than 10 microns in diameter (PM_{10}).

- Fort Campbell will continue to operate in accordance with regulations set forth in the installation's Title V permits to minimize adverse impacts to air quality.
- Fugitive dust emissions will be controlled or minimized by using standard construction practices such as:
  1) periodically wetting the area of construction,
  2) covering open equipment used to convey materials likely to create air pollution,
  3) promptly removing spilled or tracked dirt from roads,
  4) reseeding areas with bare soils.
- The Army and any contractor would maintain all excavations, stockpiles, access roads, waste areas, and all other work areas free from excess dust to such a reasonable degree as to avoid causing a hazard or nuisance. In addition, air pollution restrictions do not allow materials to be burned on the installation.
- In addition, Kentucky Administrative Rules (KAR) and Tennessee Division of Air Pollution Control (TDACP) outline requirements with which the developer must comply when constructing the new facilities, such as controlling fugitive dust and open burning. These requirements include the following:
  1) Open burning (401 KAR 63-005)
  2) Fugitive emissions (401 KAR 63-010)
  3) Asphalt paving operations (401 KAR 63-025)
  4) Open burning certification process (TDACP Chapter 1200-3-4)
  5) Visible emission regulations (TDACP Chapter 1200-3-5)
  6) Fugitive dust (TDACP Chapter 1200-3-8)

Airspace	The Fort Campbell restricted airspace has a high density of aircraft, ranges, and artillery firing points. The airspace is used by units stationed at Fort Campbell including the 5th Special Forces Group (Airborne), 160th Special Operations Aviation Regiment (ABN), 19th Air Support Operation Squadron (ASOS) and the Detachment 4 18 Weather Squadron.

General Project Planning:

- Carefully evaluate the placement and orientation of future development projects within Fort Campbell to maximize the use of airspace and training land assets and to avoid congestion through further limiting the quantity and quality of airspace training.

Operations:

- Range control will continue to deconflict all airspace conflicts by reducing airspace congestion and conflicts through careful scheduling, aircraft control or limitation of usage of training assets.
- Aviation units will coordinate training schedules internally and with Range Control to deconflict airspace requirements.
- Airspace Mangers will continue to receive handoffs of commercial and private aircraft from the Memphis Air Route Traffic Control Center (ARTCC) as they traverse the controlled airspaces surrounding the tri-airport region as well as between each other.
- All training activities including unmanned aerial system (UAS) operations affecting airspace will continue to operate in accordance with Fort Campbell and Federal Aviation Administration (FAA) guidelines.

Biological Resources	Vegetation provides erosion control, stormwater detention, biofiltration, habitat for wildlife and aesthetic values to a site during and after construction activities. Areas of preserved vegetation can also process higher quantities of storm water runoff than newly seeded areas, does not require time to establish, has a higher filtering capacity than newly planted vegetation, reduces storm water runoff by intercepting rainfall, promotes infiltration, lowers the water table through transpiration, provides buffers and screens against noise and visual disturbance, provides a fully developed habitat for wildlife, and usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation. Retention of vegetation can be managed through project design and during construction staging. Monitoring of ongoing operations and site restoration helps maintain vegetative cover and overall health. Terrestrial and aquatic resources are abundant within Fort Campbell's range lands. Biological resources are also regulated through the Migratory Bird Treaty Act (MBTA) and Endangered Species Act (ESA). Wildlife and fisheries management can be considered during project design and during the timing of construction staging. Monitoring of ongoing operations and site restoration helps maintain overall sustainability and health of these resources.

General Project Planning:

- Construction projects and routine actions will be coordinated with the Installation Natural Resources management staff in the planning/siting stages of the project to identify the potential for adverse impacts to biological resources.
- Construction and routine action projects will utilize all best management practices (BMPs) outlined in Fort Campbell's INRMP and ITAM Plan to reduce or avoid impacts to biological resources.

- Sensitive areas and monitoring station areas are marked with OFF LIMITS signs and/or Seibert Stakes, and shall be avoided to avoid impact to these resources.
- Avoid siting projects in higher functioning habitats such as riparian zones or those containing rare or sensitive species.
- Use site fingerprinting, which involves clearing and grading only those areas necessary for building activities and equipment traffic, could be used during site planning and could concentrate development in areas where past development has occurred.
- Retain as much vegetation as possible to provide cover, concealment, and realism for training.

Terrestrial Habitat and Vegetation Management:

- Projects involving any habitat modification must be addressed by Fort Campbell Environmental Division. Personnel responsible for land clearing will be notified via environmental protection plans to follow design plans, to stay within flagging, and to minimize impacts to wildlife and the environment.
- Signage and fencing will be used to control access to rehabilitation areas.
- Clearly mark trees and areas for preservation and protect from ground (root) disturbances around the base of the tree. Priority for protection should include 1) Tree vigor: Preserve healthy trees that will be less susceptible to damage, disease, and insects. 2) Tree age: Older trees are more aesthetically pleasing as long as they are healthy and provide greater habitat structure. 3) Tree species: Preserve tree species well-suited to present and future site conditions. 4) Wildlife benefits: Choose tree species that are preferred by wildlife for food, cover, and nesting. 5) Drainage patterns: Following natural contours and maintaining preconstruction drainage patterns would prevent alteration of hydrology and the potential die-off of preserved vegetation.
- Restrict nailing of objects (signage) to trees during building operations.
- Avoid placement of fill dirt within the limit of preserved areas and during final site cleanup, barriers around preserved areas and trees should be removed.
- During forest management activities, leave all snags and trees with active cavities, except where they are hazardous to humans.

Aquatic Habitat Management:

- Vehicles must not cross streams except at bridges or designated, hardened fords. These measures also serve to protect bat foraging habitat.
- Do not apply pesticides, fertilizers, and other chemicals into, or within 100 feet of perennial and intermittent streams, sinkholes, and other karst features. These measures also serve to protect bat foraging habitat.
- Refuel vehicles and conduct other activities with potential for pollutant spills at least 100 feet from sinkholes. These measures also serve to protect bat foraging habitat.
- Maintain vegetative cover on side slopes of sinkholes, and 100-foot vegetated buffers around sinkholes. These measures also serve to protect bat foraging habitat.
- Pesticide procurement, handling, storage, and disposal will strictly adhere to guidelines established by Federal laws, and Department of Defense (DoD) and Army guidance, which are described in the Installation Pest Management Plan (IPMP).
- Around the circumference of agricultural outlease fields maintain a 15-foot wide strip of mowed vegetation. Vegetated buffers minimize run-off of soil and pesticides.

- Standards for safety and health described in AR 200-1 will be met for each pest management activity conducted by in-house staff or under contract, as described in the IPMP.

Site Restoration:

- Revegetate areas disturbed during project construction as soon as possible with native grass or other appropriate vegetation, preferably in the same growing season as the disturbance to prevent erosion and maintain habitat integrity.
- The Range and Training Land Assessment (RTLA) component of the ITAM program will continue to conduct systematic inventories in areas where vegetation management has occurred to determine the effectiveness of LRAM vegetation management actions.
- Monitor mitigation efforts to ensure goals are reached, and initiate additional measures required to meet restoration goals.
- The Natural Resources staff will monitor forests, vegetation and wildlife on the installation to evaluate management techniques.

Operations:

- Restrict vehicle traffic trails and roads as practical and still meet training mission requirements.
- Continue development and implementation of an information and education program for personnel using Fort Campbell lands.
- Continue compliance with federal and state laws and regulations relating to fish and wildlife conservation or management.

Protected Species Management:

- Access into, and disturbance of, nesting and breeding grounds of species at risk birds will be restricted during critical periods. A layer in the geographic information system (GIS) will identify the restricted areas and time periods of restrictions.
- Other than clearcuts prescribed for management of forest pests or sanitation cuts, clearcuts in the Casey Creek, Saline Creek, Fletcher's Fork, Jordan, and Piney Fork Creek subwatersheds will be minimized to blocks no larger than 20 acres. These subwatersheds lie between foraging areas and roost caves used by gray bats.
- To the maximum extent practicable, projects proposed within the Casey Creek, Saline Creek, Fletcher's Fork, Jordan, and Piney Fork Creek subwatersheds will be sited in previously disturbed, non-forested areas.
- Do not enter caves on Fort Campbell, unless the Fish and Wildlife Program has authorized the activity. All personnel entering caves must adhere to the U.S. Fish and Wildlife Service (USFWS) white-nose syndrome (WNS) decontamination policy.
- Restrict removal of trees to times of the year when the Indian bat is not present (1 October through 31 March), to avoid harm to roosting Indiana bats. The Fish and Wildlife Program will evaluate tree removal activities proposed anywhere on the installation. Consultations are required for all timber removal activities determined as "may affect" actions.
- If a cave entrance occurs within a prescribed burn area, the Fish and Wildlife Program must review proposed activities to determine the potential for effects to rare, threatened, or endangered species.
- Maintain riparian zones to improve water quality and provide foraging habitat for gray bats and Indiana bats. The area within 100 feet along each side of perennial streams

(first-order and larger) must be kept vegetated, with the 50 feet nearest the stream forested. The area within 50 feet of perennial and intermittent streams must be forested. For first- and second-order streams, the buffer area is measured from the center of the stream. For larger streams (third-order and higher) and rivers, the 100-foot buffer is measured from the stream bank.

- Avoid removing trees and other vegetation in these areas during training and natural resource management activities.
- Encourage development of forest within 50-100 feet of streams by planting trees, and/or avoiding actions that inhibit natural succession to forest.
- Limit training activities within the buffer zone to foot travel; tracked and wheeled vehicles should be kept outside the buffer zone.
- No timber harvest will occur within 100 feet of perennial streams, ponds or lakes.
- Skid trails for timber harvest will be established outside these zones.
- Timber stand improvement and prescribed fire, when used in riparian zones, will be carefully planned to maintain overstory canopy cover at 70 percent or greater.
- Trees >9 inches diameter breast height (dbh) should be retained in riparian zones to the maximum extent practicable.

Invasive Species Management:

- Implement invasive species prevention measures during construction activities such as washing of construction equipment prior to on-site construction activities and require gravel pits to be free of invasive species to prevent introduction and spread of invasive species.
- For invasive species that are already present, military maneuvers should not be conducted in such a way to further their spread.
- To prevent the introduction of species, invasive species are not to be used in landscaping or land rehabilitation and management projects.
- DoD requires personnel and equipment to be cleaned and inspected prior to returning to the U.S. from overseas to prevent the introduction of nonnative organisms. Agricultural specialists from the U.S. Customs and Border Protection inspect shipments of military equipment destined for the U.S. prior to loading on ships or other transportation and upon arrival in the US.
- Monitor to determine extent of invasive species presence on Army lands and continue collaborative invasive species management efforts with local area agencies and entities.

Cultural Resources	Fort Campbell contains a variety of cultural resources, such as archaeological sites, architectural resources, and an historic landscape. Cultural resources are managed by the Fort Campbell Cultural Resources Management Program (CRMP)

- Continued implementation of the ICRMP which helps maintain cultural resource sustainability and provides guidance on the best methods for compliance with cultural resources management responsibilities.
- Further development of Army Alternate Procedures to further identify methods of maintaining cultural resource sustainability into the future.
- Continue to curate discovered artifacts with Federally-certified museums in accordance with the NHPA.
- Continued coordination with the Fort Campbell Cultural Resources program during site planning.

- Fort Campbell CRM coordination and consultation with the Kentucky and Tennessee SHPOs, the Advisory Council and Native American consultation partners, in accordance with Section 106 of the NHPA, the American Indian Religious Freedom Act and the Native American Graves Protection and Repatriation Act (NAGPRA), to identify any adverse impacts and mitigation requirements.
- Continue notifications to the Fort Campbell Cultural staff in the event of inadvertent discovery of cultural resources (artifacts, etc.) during range construction or range operations. Upon such discoveries, ground-disturbing operations in the area will be ceased.
- Survey unsurveyed areas and evaluate resources identified during survey prior to construction. Those resources determined to be National Register of Historic Places (NRHP) eligible will be treated according to NRHP and the Secretary of the Interior's Standards for Archaeological Documentation and Preservation, as well as applicable state standards for archaeology. This would not apply in areas that have not been previously surveyed, except in those areas which fall under Army-wide exemptions for undertakings due to an imminent threat to human health and safety as presented in the Army Alternative Procedures (AAP; Section 4.1, Army Wide Exempted Undertakings) which include:
    - In-place disposal of unexploded ordinance.
    - Disposal of ordinance in existing open burning/open detonation units.
    - Emergency response to releases of hazardous substances, pollutants, and contaminants.
    - Military activities in existing designated SDZs.
- Sites that are currently identified, but have not been evaluated for NRHP eligibility will be treated as NRHP eligible sites; until such time that they are evaluated for NRHP eligibility. Once evaluated, sites determined to be NRHP eligible will be treated according to NRHP and the Secretary of the Interior's Standards for Archaeological Documentation and Preservation, as well as state standards for archaeology.
- Avoid cultural sites during design utilizing information gathered from the Fort Campbell cultural geoDB and on-the-ground surveys.
- Protected cultural properties including all historic cemeteries and their marked boundaries are surrounded by a 30 meter buffer. Within this area no excavation, demolition, or tracked/wheeled vehicle traffic will be allowed. Adverse effects to cultural resources by these or other destructive activities can result in violation of Federal Law and the necessity for costly mitigation measures.
- All ground disturbing activities that alter a property or landscape, such as machine aided excavations, earth moving projects, and/or training activities with ground disturbing implications undertaken by the Army will be designed to avoid damage to archeological sites or other historic properties that are eligible for listing on the NRHP.
- Curate artifacts and associated records in accordance with 36 CFR 79.
- Continued development and implementation of an information and education program for personnel using Fort Campbell lands and the public. This would enhance the conservation of cultural resources on Fort Campbell lands.
- Continued evaluation of NRHP eligibility of archaeological sites potentially impacted by placing ranges in use.
- Continued coordination with the Fort Campbell Cultural Resources program during changes of range operations.

- Fort Campbell CRM staff would review all repairs and other projects planned for historic structures and buildings.
- Fort Campbell CRM staff will monitor all historic cemeteries in accordance with ICRMP SOP #6.4.2.
- Fort Campbell CRM staff shall coordinate and communicate activities to federally recognized Native American tribes in accordance with ICRMP SOP #6.2.6.
- Inadvertent discovery of archaeological materials shall be reported to the Fort Campbell CRM and managed in accordance with ICRMP SOP #6.3.1.
- Inadvertent discovery of human remains shall be reported to the Fort Campbell CRM and managed in accordance with ICRMP SOP #6.3.1.4.

Energy	Energy involves the use of electrical or gas utilities for operations of Fort Campbell facilities and ranges. Electrical needs can be supplied in the form of hard-wired (buried cable or electrical line) or through the use of generators in more remote locations.

Project Design:

- Completion of the Fort Campbell TMMSA PEIS Project Checklist to determine increases of energy requirements on a project-by-project basis. Where increases of energy demand is likely, have project planners incorporate measures to reduce or offset emissions during project planning, construction and operations in compliance with EO 13693, *Planning for Federal Sustainability in the Next Decade*.
- Encourage sustainable building and development practices (e.g., implementation of the Leadership in Energy and Environmental Design rating system as a guide for projects).
- Limit the use of generators which could adversely impact air quality through operational emissions.
- Energy requirements to support individual ranges operations will be provided in accordance with federal and state construction guidelines.

Operations:

- Continue to educate Soldiers on the importance of energy conservation measures.

Facilities	Facilities encompass all aspects of real property management. Army real property includes lands, facilities, and infrastructure. Facilities are the buildings, structures, and other improvements to support the Army's mission.

Project Design:

- Standard range buildings and structures as specified in Training Circular 25-8, *Army Ranges* will be constructed on new or modernized ranges.
- Completion of the Fort Campbell TMMSA PEIS Project Checklist to determine increases facility requirements on a project-by-project basis.
- Encourage sustainable building and development practices (e.g., implementation of the Leadership in Energy and Environmental Design [LEED] rating system as a guide for projects).
- Prior to new construction, project planners should coordinate with other construction managers of new projects and notify users and operators of existing utilities if an existing utility system needs to be temporarily out of service during construction activities.
- During construction, limit the shut-off of existing utilities to off-peak usage period.
- Incorporate, where feasible, low impact design to manage stormwater runoff.

- Utilities to support individual ranges operations will be provided in accordance with federal and state construction guidelines.

Operations:

- Continue to educate Soldiers on water conservation, waste minimization, and recycling measures.

Hazardous Materials/Waste	Hazardous materials are any substance with physical properties or ignitability, corrosivity, reactivity, or toxicity that may cause an increase in mortality, a serious irreversible illness, incapacitating reversible illness, or pose substantial threat to human health or the environment. Hazardous waste is any solid, liquid, contained gaseous, or semi-solid waste, or any combination of wastes that possess a substantial present or potential hazard to human health or the environment.

- Continue to implement the best management practices outlined in the Spill Prevention, Control, and Countermeasure Plan Update, Installation Spill Contingency Plan, and Hazardous Waste Management Plan.
- As necessary, at the earliest time during or after the project planning charrette, an unexploded ordnance (UXO) site survey will be conducted to determine the extent of the ordnance contamination to aid in the design of the range and minimize intrusive work in portions of the range which are highly contaminated with ordnance and to determine the correct ordnance response actions.
- During pre-design site studies and investigations, if ordnance contamination is suspected, UXO safety support for UXO avoidance becomes mandatory during topographic surveying, geotechnical investigation, and other on-site operations that require gathering design data.
- Hazardous waste generation associated with building demolition should be identified in advance, and proper abatement planned as part of the project. These hazards include, but are not necessarily limited to asbestos, lead (primarily in paint), polychlorinated biphenyls (PCBs), and glycol.
- If unidentified contaminated soils, drums, or unusual debris (i.e., unexploded ordnance, discarded military munitions, or munitions debris) are encountered at any time on or around the work site, the agency or contractor shall stop work immediately and notify the Directorate of Public Works (DPW), Environmental Division.
- Asbestos, lead-based paint and PCBs would not be used for the construction of any new facilities.
- Dumping Petroleum, Oil and Lubricant (POL) products or hazardous wastes along roads or in the field is a violation of federal law. Criminal Investigation Department and the Federal Attorney's Office actively investigate such cases.
- All re-fueling operation locations (i.e., tank pump units, fuel tanks, bladders, 5 gal cans, etc.) require a REC.
- Construction, modernization, and maintenance projects require that spill kits will be on site to include: clear plastic bags, shovels and absorbent pads/materials.
- Re-fueling points and fuel blivets shall be located at least 150 meters away from wells and surface waters of any type.
- Ground storage for POLs (i.e., fuel tanks, bladders, etc.) requires a polyethylene lined earthen berm great enough to contain 110% of all fluids or installation approved containment device (REC required).

- All POL spills are reportable no matter what size or volume. Drips and weeps are considered a spill and shall be reported immediately to the Fire Department or through Range Control.
- Store and use all hazardous materials (e.g., paint, solvents, fuel, etc.) in such a manner as to prevent spills and releases. Storage areas are subject to inspection by DPW Environmental Office.
- Lead contaminated soils will be used on the new range construction project and not removed from the range site unless deemed necessary. For contaminated soils that are to be removed from the range site, appropriate documentation and remediation will be accomplished.

Land Use	Effects on land use have been identified as issues of concern related to modernization of Army installations. These effects take form by requirements for additional lands for training, changes to land use based on changing training doctrine and range requirements, and limitations to the recreational use of installation lands. Army Regulation (AR) 210-21, *Army Ranges and Training Land Program*, and the associated *Generic Methodology for the Range and Training Land Program*, dated September 1998, guide overall range planning for establishing current requirements and utilization levels for available training assets and provides a near- and long-term project plan for training, public works, and environmental planners. Land use compatibility should be considered during project site selection and project design.

General Project Planning:

- Planning of proposed new facilities and upgrades should follow AR 210-20, *Real Property Master Planning for Army Installations*.
- Siting of facilities and activities (including ground maneuver) to avoid sensitive areas as much as possible and take into account adjacent land uses both on and off the installation. This includes activities that generate noise, dust, and other nuisance factors.
- Siting of ranges will take into account the safety danger zones of adjacent ranges and off post and on post sensitive receptors.
- Areas open to the public would be separated from active mission areas (using appropriate buffers, fencing, designated access restrictions or recreational use tracking procedures).
- Project planners will avoid placing permanent facilities or ground disturbing activities in sensitive habitats or ecological areas, when practicable.
- Project planners will site facilities in a manner that maximizes the use of existing utility infrastructure.
- Minimize adverse environmental and health impacts while maximizing readiness and strategic preparedness through land use planning with local governments.
- Increased use of signs and other public notification measures to increase public awareness of dangers of military training.
- Continued implementation of recreation policies, per the INRMP. The INRMP outlines specific actions to maintain and improve public access and recreation opportunities on Fort Campbell lands.

Noise	Noise control is regulated under the Noise Control Act of 1972. To assess military-related noise effects, the U.S. Army Public Health Command has developed noise zones which consider noise levels along with sociological considerations and compatible land uses. Noise control can be considered during both the planning and construction phases for range activities.

- Noise generation of the planned use of any given project would consider siting based on the Installation Noise Management Plan noise contours and compatible noise zones.
- Any activity generating a new type of noise source (i.e., new equipment or technologies) which could change existing noise contours or be in conflict with Installation Noise Management Plans would undergo PHC noise modeling to detect any potential changes to existing noise conditions.
- Continue to maintain an active noise management program to protect present and future operational capabilities of range land training. This includes continual evaluation of noise impacts that may be produced by ongoing and proposed Army actions/activities, maintenance of a noise complaint management program and minimization of noise impacts and annoyance to the greatest extent practicable.
- Achieve compatibility between operations and private property interests through the IONMP and the Incompatible Use Zone (ICUZ) Program component of the IONMP.
- Identify land areas that are exposed to generally unacceptable levels of noise and aircraft accident potential.
- Continue to assess the noise impacts to off post communities as missions change and/or new ranges are constructed on the installation.
- Continue the noise education and awareness with local zoning and planning boards and civilian populations.
- Provide local governments with recommendations for land uses that are compatible with the noise levels created by military training and operations.
- Adjust construction schedules within areas of sensitive noise receptors to reduce impacts.
- To reduce noise disturbance during non-daylight hours, the construction of proposed facilities would only occur during normal working hours.
- Ensure construction equipment with internal combustion engines have mufflers which are well maintained.
- Operate construction equipment at lower speeds and increase spaces between equipment.
- Set-up noise barriers or enclosures such as plywood or lead-vinyl curtains for particularly noisy operations near very sensitive receptors.
- Fort Campbell will ensure that the environmental justice philosophy is embraced in the management of noise from its activities. The location and use of training activities, such as firing ranges, is always based on the operational, safety, and environmental considerations of both the installation and civilian community.
- Ensure that all reasonable, economical, and practical measures are taken to reduce or control the impact of noise-producing activities so as to minimize the exposure of populated areas.
- Explore new mitigation techniques for feasibility.

Socioeconomics and Environmental Justice	Military installations are vital components to regional economies. An influx or decrease in Soldiers or on-post activity (e.g., construction, maintenance) can directly affect socioeconomic conditions surrounding installations including school capacities, housing, public services and the economy. Various federal policies including Executive Orders (EOs) 12898 *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations* and EO 13045 *Protection of Children from Environmental Health Risks and Safety Risks* serve to protect the socioeconomic environment.

General Project Planning:

- Siting of ranges will take into account the safety danger zones of adjacent ranges and off post and on post sensitive receptors.
- Areas open to the public would be separated from active mission areas (using appropriate buffers, fencing, designated access restrictions or recreational use tracking procedures).
- Minimize adverse environmental and health impacts while maximizing readiness and strategic preparedness through land use planning with local governments.
- Increased use of signs and other public notification measures to increase public awareness of dangers of military training.

Soil Erosion	Soil stability is important for maintaining sustainable range use for Soldier training and for protecting surface water resources, wetlands, fisheries, vegetative cover and wildlife habitat. Soil stability can be managed through project design and construction staging, site restoration and ongoing monitoring of operations.

General Project Planning:

- During the project planning phase, Fort Campbell reviews project site soil types to determine: 1) constructability and suitability of soils for intended uses, 2) presence of highly erodible soils, 3) the potential need for structures or practices to prevent erosion (i.e., grading or reshaping the ground to lessen steep slopes, shoring excavated areas).
- Fort Campbell would continue to implement Dust Control Plans which includes BMPs for reducing wind erosion and promoting site stabilization during and after demolition, construction, earthmoving, excavating, stockpiling and transport activities (e.g., pre-grading planning, pre-grading watering, chemical stabilizers, wind fencing/sheltering, wind awareness, cover haul vehicles, reduced speed limits/vehicular trips during construction)
- Avoid highly erodible soils whenever possible.
- Maximize footprint disturbances within areas of existing or previously disturbed soils.
- Create an Erosion Control Plan for all construction projects.

Construction Staging:

- Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark, must be permanently stabilized at the earliest practicable date.
- Erosion control measures at construction sites will be inspected within 24 hours after a rain event and checked once per week. Erosion controls will be maintained or removed as needed.

Site Restoration:

- Seed and fertilize, as necessary, the area immediately following construction to aid in the establishment of protective vegetative cover. Manual planting or geotextiles, as

necessary, would be used in areas susceptible to higher wind erosion to aid in the establishment of protective vegetative cover.

- Adequate sedimentation and erosion control management measures, practices and devices, such as phased construction, vegetated filter strips, geotextile silt fences or other devices, shall be installed and properly maintained to reduce erosion and retain sediment on-site during and after construction. The sediment collected by these devices shall be removed and placed at an upland location, in a manner that will prevent its later erosion into a waterway or wetland.
- Restoration of disturbed areas by implementing industry standard BMPs and techniques as detailed in the ITAM program.
- Monitoring and rehabilitation efforts of RTLA and LRAM components of the ITAM Program to determine effects of training on soils and adjust training use.
- Soil disturbance caused by vegetation management activities will be repaired by LRAM using in-house resources through the use of standard soil and water conservation techniques.
- Continue the use of signage and fencing to control access into rehabilitation areas.
- Minimize impacts caused by off-road vehicle use by timing, as much as is practical, and schedule training activities to coincide with the times of the year during which the lands are more resilient.
- Improve existing trails and roadways to increase the resiliency and capacity for the land to absorb traffic. Improvements would include stormwater management controls such as incorporation of vegetated swales adjacent to improved trails and roadways to manage sediments and runoff.

Operations:

- Create hardened bivouac areas to achieve surface stabilization of habitually used areas.
- Repair / maintain tank trails in maneuver training areas to contain and control soil erosion.
- Continue to encourage trainers to site intensive land-disturbing activities, when possible, on the least erodible lands. The potential erodibility of a site as determined from existing soil types (avoidance of highly erodible land [HEL]), slopes, and vegetative cover, as well as location of adjacent wetlands/surface waters should be considered in order to minimize impacts on these resources.
- For mission-essential training activities (i.e. excavation of force protection structures), the ITAM program will continue to coordinate with trainers to integrate soil conservation BMPs into 100 percent of action plans.
- For natural resources activities (e.g. timber harvest) that result in soil disturbance, soil conservation BMPs will continue to be incorporated into 100 percent of project plans and contracts (e.g.,. protective vegetative cover left undisturbed to the maximum extent practicable, especially on slopes; application of gravel, fabrics, mulch, riprap, or other materials that are environmentally safe and compatible with the location to control erosion in problem areas).
- Enforce restrictions described in the Forest Management Plan regarding timber harvest, installation of skid trails, and revegetation of fire control lines in riparian zones.
- As necessary, a comprehensive sedimentation control plan would be developed and implemented to prevent soil erosion on drop zones, ranges, roads, streams and firing positions.

- Continue to map areas of potential and known sites of erosion and input information into GIS.
- Continue to maintain a list of projects necessary to stabilize, cover, or otherwise rehabilitate damaged soils in cooperation with the Conservation Branch and ITAM. Projects may include installation of erosion control structures appropriate for the site (e.g., check dams, wind breaks, diversions), seeding, application of mulch or gravel, streambank stabilization, or revegetation of riparian zones.
- Continue to restore sites where firebreaks have crossed perennial and intermittent streams, use bioengineering techniques to restore stream banks and beds to natural condition.

Traffic and Transportation	Effects on traffic and transportation from military activities continue to be a concern for many installations. These effects include roadway infrastructure load and volume capacities both on and off the installation. Fort Campbell Vehicle Regulations (CAM Regulation 190-5) and Training Directive Formations and Routes (CAM Regulation 350-1) establish policies and procedures for individuals, units, and agencies using transportation resources on the installation.

General Project Planning:

- All individuals would be required to obtain the proper access passes from the installation's bag-and-pass office.

Construction:

- Effects on traffic and transportation would be minimized by avoiding vehicle movement during peak traffic hours, and placing staging areas where they would least interfere with traffic. All construction vehicles would be equipped with backing alarms, two-way radios, and Slow Moving Vehicle signs when appropriate. All vehicles associated with construction activities would follow Fort Campbell Vehicle Regulations (CAM Regulation 190-5) and Training Directive Formations and Routes (CAM Regulation 350-1) which establish policies and procedures for individuals, units, and agencies using transportation resources on the installation. In general, these requirements include:
    - Complying with all posted speed limits and traffic signs;
    - Complying with all on-post traffic and safety policies and procedures;
    - Coordinating delivery of equipment and supplies with range operations;
    - Coordinating construction operational activities with range operations; and
    - Avoiding operating motor vehicles on foot paths.
- The listing above is not all-inclusive; the Army and any contractors would comply with current applicable traffic and transportation requirements.

Operations:

All vehicles associated would follow CAM Regulations 190-5 and 350-1.

Water Resources	Section 404 of the Clean Water Act (CWA) regulates activities which directly affect surface water resources and National Pollution Discharge Elimination System (NPDES) regulates activities affecting surface water quality. Surface water quality and floodplain integrity can be managed through project design. Buffer zones reduce the velocity of storm water runoff, provide an area for the runoff to permeate the soil, contribute to ground water recharge, and act as filters to catch sediment both during construction and from ongoing operations.

General Project Planning:

- Fort Campbell will comply with EO 11988 Protection of Floodplains to minimize adverse Section 404 resources and floodplains impacts during project siting and range

operations. For future projects not identified in this PEIS, the Army will prepare a supplement to this programmatic document in the event of a proposal to locate the project within a floodplain or a wetland. The supplemental document will include a Finding of No Practicable Alternative (FNPA).

- Maintain stream riparian zones for protecting and preserving water quality (including bat habitat):
  - 100 feet buffer[1] zone at perennial streams (first order or larger) with at least 50 feet forested nearest stream.
  - 50 feet forested buffer zone at intermittent streams.
- To protect groundwater quality, Fort Campbell maintains 100-foot vegetated buffers around karst features to minimize run-off into groundwater via these features. Within the 100-foot buffers, Fort Campbell prohibits commercial timber harvest, development of skid trails, haul roads, and fire control lines, and creation of forest openings.
- Restrain (when possible) intensive land-disturbing activities to least erodible soils to prevent the potential for erosion and sedimentation into adjacent waterways.
- Application of pesticides, fertilizers, and other chemicals, as well as refueling and other potentially polluting activities are limited near karst features. Erosion control and spill prevention and control techniques in karst areas are developed in Fort Campbell's Compliance Program.
- Certify all applicators of pesticides near water, sinkholes, and wetlands and inspect for correct application to reduce the potential for water resource contamination and require the handling and application of pesticides according to the Integrated Pest Management Plan to avoid contamination of water supplies and surface waters.
- A Stormwater Pollution Discharge Elimination System (SPDES) permit must be obtained for all projects requiring one. At a minimum, projects covered by SPDES will require a Storm Water Pollution Prevention Plan (SWPPP) that addresses sediment and erosion control plan with appropriate BMPs. Fort Campbell will prepare and adhere to Storm Water Prevention Plans per Code of Federal Regulations (CFR) 40 Part 122 National Pollutant Discharge Elimination System (NPDES).
- Fort Campbell will prepare grading plans for projects involving earthmoving and grading activities that establish drainage patterns and how runoff velocities affect receiving waters. Components of this plan will be used to manage runoff and sedimentation from construction sites by identifying proximity to surface water resources and erosion and sediment control measures to prevent runoff and sediments from reaching receiving waterbodies.
- Work within open waters of the U.S. (WOTUS) shall be performed during periods of low-flow or no-flow.
- Preserve natural vegetation as a permanent control measure to minimize erosion potential and protect water quality especially in areas characterized by floodplain, wetland, stream banks, steep slopes, and other areas where erosion controls would be difficult to establish, install, or maintain.

[1] Riparian buffers help shade and partially protect a stream from the impact of adjacent land uses. They act to intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. They can also be key in reducing erosion by providing stream bank stabilization.

- Avoid designing roads and trails in the general direction of preferential water and maintain raised trailbeds to minimize concentrated surface water flows during flooding events.
- Design drainage to accommodate snowmelt runoff and rainfall potential to prevent erosion and formation of gullies.
- Design, construct, and maintain bridges to allow unrestricted flow.
- Maintain natural drainage patterns by the installation of culverts of adequate number and size (to prevent ponding or concentrating surface runoff waters).
- Use trenchless utility crossing technology (i.e., directional drilling) below streams and set back from the stream bank by at least 100 feet.
- POL spills entering a water source will be reported immediately to the Fire Department or via Range Control and Environmental Division.
- Consider nonpoint source pollution abatement in construction, installation operations, and land management plans and activities.
- Ensure that timber sales contracts require forestry BMPs for reducing impacts to surface waters (e.g., avoidance of tree clearing and skid trails within riparian buffers, restrict heavy equipment from sensitive areas such as steep slopes or mucky soils).
- Restrict training activities (including vegetation clearing and refueling) inside riparian zones.

Construction Staging:

- Avoid placing litter, construction materials and debris, and construction chemicals within proximity (typically 100 feet) to surface waters or flood-prone areas to prevent pollutant discharges.
- Keep all construction staging, fueling, and servicing operations at a minimum of 100 feet from surface waters to prevent unintentional contamination and keep spill kits on hand in case of spills to reduce response time.
- Avoid placement of temporary material storage piles within the 100-year floodplain during the rainy season unless the following conditions are met: (1) storage does not occur when flooding is imminent; and (2) if storage piles consist of erosive material, they would be covered with plastic tarps (or something similar) and surrounded with compost berms or other erosion control devices.
- Work excavation equipment from an upland site (e.g., the top of the bridge or culverted road crossing) to minimize adding fill into waters of the U.S.
- Install culverts during low flow periods. Where significant flow is present, acceptable techniques to isolate the construction site from stream flow include channel bypasses, temporary flumes, sheet pile or sandbag walls, water filled coffer dams, or pumping the stream flow around the work site.
- For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.
- Spoil, debris, piling, cofferdams, construction materials, and any other obstructions resulting from or used during construction shall be removed upon project completion.
- Water crossing or bridging operations are prohibited unless conducted at approved areas.

Sediment Management:

- All exposed soil and other fills, as well as any work below the ordinary high water mark, must be permanently stabilized at the earliest practicable date.
- BMPs shall be capable of preventing erosion, of collecting sediment, suspended and floating materials, and of filtering fine sediment, and shall be removed upon completion of work, and the disturbed areas stabilized. The sediment collected by these devices shall be removed and placed at an upland location, in a manner that will prevent its later erosion into a waterway or wetland.
- Control sediment transport and prevent sedimentation into surface waters during construction through slope stabilization, maintaining vegetative buffers, revegetation, use effective filters or barriers such as filter fabric fences and straw bales, fiber matting, stormwater retention/detention basins and settling ponds, drainage control, trenches and water bars, waterproof covers over material piles and exposed soils, avoiding work during heavy precipitation, use of fill free from fine material, and other appropriate measures.
- Pump sediment laden water resulting from construction activities into a settling basin or an area where it can be naturally filtered, before it reenters the stream.
- Closely monitor all construction sites to evaluate sediment control and stormwater and pollution management practices, inspect for potential damage, and to detect and correct future changes in drainage patterns to prevent impairment of surface waters and alternation of surface hydrology.
- If sediment escapes the construction site, off-site accumulations of sediment would be removed at a frequency sufficient to minimize off-site impacts.

  Construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner).

Stormwater/Surface Water Flow Management:

- Place velocity dissipation devices at discharge locations and along outfall channels to provide a non-erosive flow velocity and maintain the hydrological regime of the receiving water.
- Continue the revegetation of surface soils disturbed by the Land Rehabilitation and Maintenance component of the ITAM program to control or eliminate runoff and erosion that could affect surface waters.
- Continue the use of grass to line channels to stabilize the soil and to reduce water velocity.
- Continue the use of gradient stabilization structures across a stream channel to control the flow down the channel slop to reduce channel erosion.
- Use of land shaping techniques to change the grade of flow paths to create a dispersion of runoff flow over a larger area.
- Continue the use of culverts under roads as a means to provide for crossing streams or narrow bodies or water without impeding the flow of traffic.
- Establish hardened stream crossings where vehicles habitually cross streams to minimize erosion and sediment movement in the stream channel.
- Structures, pipes, or associated fill should not impede flood or surface water flows.
- Incorporate stormwater management retention devices in the development of parking lots to decrease amount of runoff and to filter out oil and other potential hazardous substances which could occur within parking runoff.

Post Construction Riparian Restoration:

- Restored stream bank, lake shore, or coastline affected by the work to pre-existing contours and stabilize.
- Restoration and revegetation of streambank and shoreline habitat should utilize the most up-to-date bioengineering techniques and use of biodegradable materials when feasible and practicable. Techniques may include, but are not limited to, brush layering, brush mattressing, live siltation, and use of jute matting and coir logs to stabilize soil and re-establish native vegetation.

Operations:

- Employ Spill Pollution Prevention and Countermeasure Plan (SPPCP) measures including proper handling and disposal of substances to prevent spills and effectively address cleanup strategies before potential spill contaminants could reach water resources by measures such as keeping spill kits nearby sites using these substances.
- Ensure maintenance contracts have standards for minimizing water pollutant inputs to reduce potential for site runoff and pollution during land disturbing maintenance activities and from use of construction equipment.
- Follow BMP guidance contained within the Army Small Arms Training Range Environmental Best Management Practices (BMPs) Manual to support the selection and implementation of management methods for erosion or lead migration issues from munitions (bullets) based on site-specific use and environmental characteristics to improve the environmental quality and insure the long-term sustainability of essential training areas.
- Continue to minimize training activities in and around streams and other water bodies on Fort Campbell.
- Comply with AR 200-1 which establishes the following objectives for water resources on Army lands:
    - Control or eliminate sources of pollution to surface or ground waters through conventional or innovative treatment systems.
    - Demonstrate leadership in attaining the national goal of zero discharge of water pollutants.
    - During prescribed fire activities, water must be drawn from approved sources for use in fire suppression. Unused water must be disposed of within the same watershed as extracted.
    - During prescribed fire activities, potable water is not used for fire suppression to avoid the release of chlorinated water into natural ecosystems.
- Restrict vehicles crossings of streams at bridges or designated, hardened fords to maintain streambank and streambed integrity.
- Vehicle washing in any open body of water is strictly prohibited.

Wetland Resources	Wetlands resources occur throughout Fort Campbell and are vital in maintaining water quality, aid in flood control, and provide wildlife habitat. These resources are also regulated by Section 404 of the Clean Water Act. Wetland impacts can be avoided through project design, during construction staging, and from ongoing monitoring of operations. Temporary impacts to wetlands can be addressed through site restoration.

General Project Planning:

- Obtain CWA Section 404 permits when necessary for construction, modernization, or routine actions that may impact wetlands.
- Continue review by the Wetlands Management Program for all proposed actions that involve proposed filling of wetlands or elimination of wetland vegetation.
- Preparation of a FNPA to justify unavoidable impacts to wetland resources and submitted with the Section 404 permit.

Project Design:

- Conduct a functional assessment of wetlands within the project study area to provide a means of rating wetlands and to facilitate the prioritization of impact avoidance and minimization measures. The functional assessment would be used to identify appropriate mitigation during the Section 404 permitting process to replace wetland functions lost from unavoidable impacts.
- Site facilities and road alignments in upland, disturbed habitat whenever possible to avoid impacts to wetlands.
- Narrow/confine trail widths in sensitive wetland habitats or when possible, widen trails to the upland direction to avoid wetland impact.
- Maintain natural drainage patterns by the installation of culverts of adequate number and size to prevent flooding or excessive drainage of adjacent wetlands.
- Use trenchless utility crossing technology (i.e., directional drilling) below wetlands.
- Place targets on ranges to avoid wetlands where possible.
- When an activity or project is deemed to have a potential impact on regulated wetlands based on National Wetland Inventory or in-house data, the wetland ecosystem in that project area must be delineated.
- Minimize unavoidable impacts to wetlands and open waters through engineering designs.
- Continue to target neighboring parcels of land which could be utilized for compensatory wetland projects through the Army Compatible Use Buffer (ACUB) program.
- Avoid wetland impacts from development and training and maintain wetland vegetated buffers of at least 100 feet (depending on wetland value) to protect wetland resources from sedimentation and wetland disturbance.

Construction Staging:

- Clearly identify project limits in the field (e.g., staking, flagging, silt fencing, use of buoys, existing footprint for maintenance activities, etc.) prior to clearing and construction to ensure avoidance of impacts to waters of the U.S. (including wetlands) beyond project footprints.
- Limit construction staging and extra work areas at least 50 feet away from wetlands.

- Place temporary fill in wetlands on geotextile fabric laid on top the existing wetland grade, especially during non-frozen conditions.
- Separately stockpile wetland topsoil and organic surface material such as root mats from overburden and return material to the surface of restored wetland sites.
- Sensitive Wetlands and Mitigation project areas are marked with OFF LIMITS signs and/or Seibert Stakes, and shall be avoided. Besides prohibiting vehicular traffic, further restrictions apply to these areas: no clearing or cutting of vegetation; no earthmoving, grading, excavating, ditching, or filling activities; and no placement of refuse, wastes, sewage, other debris or any hazardous substances is allowed.
- No vegetation cutting or herbicide application within 100 feet (30 meters) of a state wetland without a permit.
- Heavy equipment operation will be avoided in obvious wetland areas. There will be no operation of machinery within 100 feet (30 meters) of a state designated wetland without a permit.
- Woody debris will be chipped in place using towed wood chippers to avoid fill of any wetlands.

  Continue implementation of sediment and erosion control strategies during construction activities as detailed in the *Fort Campbell Policy for Storm Water Erosion and Sediment Control at Construction Projects*.

Operations:

- Stabilizing of all disturbed areas resulting from project construction using native vegetation to minimize erosion and subsequent sedimentation of wetlands and streams.
- Restore temporarily disturbed wetlands to original grades using stockpiled wetland topsoils and plant native vegetation.
- Continue to limit and minimize activities in and around wetlands, including training and maneuvers.

Wildfire Management	Range projects and operations have the potential to cause unintentional wildfire starts. Wildfire prevention can be administrated during operations through adherence to existing management plans and agreements and management of the landscape.

Operations:

- Compliance with wildfire prevention measures contained within the Integrated Wildland Fire Management Plans.
- Continue on-going actions to prepare the landscape for potential wildland fires (i.e., prescribed burns and thinning to restore ecosystem functions to fire and to reduce future fire severity).
- Continue to utilize the fire danger rating system to reduce the likelihood of a fire by limiting military activities when certain thresholds of wildfire risk are reached.
- Have available an Initial Attack Response Team during military training activities during high and extreme fire danger to provide a rapid initial response to potential wildfires in the area.
- Continue to implement INRMP and IWFMP.

  Prepare a burn plan and detailed parameters for when burning can take place.

Appendix G - Air Supporting Documentation

This page intentionally left blank

RECORD OF NON-APPLICABILITY
In Accordance with the Clean Air Act- General Conformity Rule For
The Proposed Training Mission and Mission Support Activities at Fort Campbell, KY

October 9, 2015

The Army proposes to take necessary actions to include range construction, modernization, and maintenance, as well as land management activities, to support high quality training at an environmentally sustainable Fort Campbell. The alternatives under the Proposed Action were developed in accordance with Fort Campbell's training mission requirements and criteria objectives. Activities include site specific range construction projects (Alternative 1); a description of the proposed AUZs (Alternative 2); implementation of routine land and range actions and environmental stewardship actions (Alternative 3); a modification of the controlled airspace at Fort Campbell (Alternative 4); and, the combination of these four collective alternatives as one alternative (Alternative 5).

Alternative 1 – Site-specific Construction, Modernization, and Operations in Support of Soldier Training. This action would include the construction of a driving skid pad, gravel foot march trail, and a 2000' asphalt light landing strip. The action would generate new direct emissions from the construction and operation of the facilities. General Conformity under the Clean Air Act, Section 176 has been evaluated according to the requirements of Title 40 of the Code of Federal Regulations Part 93, Subpart B. The requirements of this rule are not applicable because the total emissions from Alternative 1 have been estimated at 1.5 tons of NO_x and 0.1 tons of VOC, which would be below the applicability threshold values of 100 tons per year. In addition, the requirements of this rule would not be applicable if the area were to be designated nonattainment for the $PM_{2.5}$ NAAQS because the total emissions from Alternative 1 have been estimated at 0.2 tons of $PM_{2.5}$ and 0.1 tons of SO_2, which would be below the applicability threshold values of 100 tons per year. Notably, the driving skid pad and the asphalt light landing strip would be within either Trigg or Stewart County, which are in full attainment for the NAAQS; therefore, because of their location the General Conformity Rule (GCR) would not apply to these projects.

Alternative 2 – Create Adaptable Use Zones (AUZs) to Facilitate Future Modernization and Range Facility Construction. This action would include the creation of AUZs associated with Fort Campbell's training facilities and training areas. This action would include the construction of additional buildings to the urban training site, three 2,000' asphalt light runways, and three (3) UAS operations/maintenance hangers. The action would generate new direct emissions from the construction and operation of the facilities. The requirements of the GCR are not applicable because the total emissions from Alternative 2 have been estimated at 21.5 tons of NO_x and 15.6 tons of VOC, which would be below the applicability threshold values of 100 tons per year. In addition, the requirements of this rule would not be applicable if the area were to be designated nonattainment for the $PM_{2.5}$ NAAQS because the total emissions from Alternative 2 have been estimated at 5.3 tons of $PM_{2.5}$ and 3.5 tons of SO_2, which would be below the applicability threshold values of 100 tons per year. Notably, AUZs C, D, F, and H are within either Trigg or Stewart County, which are in full attainment for the NAAQS; therefore, because of their location the GCR would not apply to any projects in these AUZs. Future development activities within these AUZs not outlined within this PEIS would require review to determine the applicability of the GCR.

Alternative 3 – Implementation of Routine Range and Training Land Actions and Environmental Stewardship Practices. This action would include both the range and training land routine actions designed to maintain and sustain range and training lands, and the SOPs

and BMPs the installation has implemented in various plans and programs to ensure that range construction, modernization, maintenance, and routine actions are executed in an environmentally sound and compliant manner. These activities are outlined on the table below.

Table 1. Routine Range and Training Land Actions

Activities with Emissions Below the Applicability Thresholds	
Culvert Installation	Maneuver Trail Creation, Hardening, & Maintenance
Drop Zone Creation	Low Water Crossing Site Creation
Activities with a Clearly De Minimis Increase in Emissions	
Culvert Maintenance	Maneuver Trail Maintenance
Drop Zone Maintenance	Observation Point Maintenance
Landing Zone Maintenance	Low Water Crossing Site Maintenance

The requirements of the GCR are not applicable because the total annual emissions from all these activities have been estimated at 0.2 tons of NO_x per year and <0.1 tons of VOC per year, which would be below the applicability threshold values of 100 tons per year, or would meet one of the following exemptions for which the general conformity does not apply:

- Routine maintenance and repair activities, including repair and maintenance of administrative sites, roads, trails, and facilities (40CFR93.153(2)(c)(iv)),
- The routine, recurring transportation of material and personnel (40CFR93.153(2) (c)(vii)),
- Actions, such as the following, with respect to existing structures, properties, facilities, and lands where future activities conducted will be similar in scope and operation to activities currently being conducted at the existing structures, properties, facilities, and lands (40CFR93.153(c)(xix)),
- Planning, studies, and provision of technical assistance (40CFR93.153(2) (c)(xii)),
- Routine operation of facilities, mobile assets and equipment (40CFR93.153(2) (c)(xiii)), or
- Actions which implement a decision to conduct or carry out a conforming program such as prescribed burning actions which are consistent with a conforming land management plan (40CFR93.153(4)).

In addition, the requirements of this rule would not be applicable if the area were to be designated nonattainment for the $PM_{2.5}$ NAAQS because the total emissions from Alternative 3 have been estimated at 0.1 tons of $PM_{2.5}$ and 0.1 tons of SO_2, which would be below the applicability threshold values of 100 tons per year. Trigg and Stewart Counties are in full attainment for the NAAQS; therefore, the GCR would not apply to any routine range and training land actions in these counties.

Alternative 4 – Restructure and Expand Installation Controlled Airspace. This action would reactivate the airspace previously designated as the R3703 A, B, and C restricted airspace. There would be no construction or changes in the types of aircraft or the number of operations at the installation. The requirements of the GCR are not applicable because there would be no increase in emissions of any criteria pollutant.

Alternative 5 – Implement All Four Proposed Action Alternatives Collectively. This alternative would entail implementing the previously described four alternatives as one consolidated alternative. The actives are scheduled to be implemented over a 4-6 year period. The emissions for activities not specifically exempt from the GCR have been estimated to be 27.8 tons of NO_x and 2.1 tons of VOC over a 4 to 6 year period. The requirements of the GCR are not applicable to the collective actions because the total annual emissions from these

activities would be below the applicability threshold values of 100 tons per year, or would meet one of the exemptions for which the GCR does not apply outlined in Alternative 3. In addition, the requirements of this rule would not be applicable if the area were to be designated nonattainment for the $PM_{2.5}$ NAAQS because the total annual emissions from Proposed Alternative 5 have been estimated to be 3.7 tons of $PM_{2.5}$ and 5.5 tons of SO_2 over a 4 to 6 year period, which would be below the applicability threshold values of 100 tons per year.

For purposes of analysis, it was assumed that all construction activities would be combined and compressed into one 12-month period. Therefore, regardless of the ultimate implementation schedule, annual emissions would be less than those specified herein. Small changes in facilities site and ultimate design, and moderate changes in quantity and types of equipment used would not substantially change these emission estimates, and would not change the determination under the GCR.

Supported documentation and emission estimates:

(X) Are attached

( ) Appear in the National Environmental Policy Act documentation

( ) Other (not necessary)

_____
Signature

_____
Date

_____
Title

Methodology

The Army has considered project-related direct emissions from demolition and construction activities including the use of non-road equipment (e.g., bulldozers, backhoes), worker vehicles, transport of material and supplies, and fugitive particles from surface disturbance, and storage piles. This section briefly outlines the calculations made to derive these construction emission estimations.

Heavy Construction Equipment. Demolition and construction would involve such activities as demolition of existing taxiways, and construction of new taxiways and pads. Pieces of non-road equipment to be used for these activities would include backhoes, loaders, excavators, dozers, and pavers. Emission factors in mass of pollutant per hour were multiplied by the estimated running time to calculate total amount of pollutant from each piece of equipment. The following formula was used to calculate emissions from non-road engine sources (USEPA 2005a):

$M_i = (N \times EF_i)$

where: M_i = mass of emissions of ith pollutant

N = source population (units)

EF_i = average emissions of ith pollutant per unit of use (e.g., grams per hour)

Construction Worker Vehicle Operations and Emissions from Materials Transport. Emissions due to on-road vehicle use were included in the analysis. Emission factors for vehicles were multiplied by the expected mileage to determine motor vehicle emissions. The analysis assumed conservatively that worker vehicles and delivery and transport of material would drive 30 miles per day at an average speed of 35 miles per hour. The following formula was used to calculate emissions from on-road vehicle use.

$M_i = (N \times EF_i)$

where: M_i = mass of emissions of ith pollutant

N = number of miles traveled

EF_i = average emissions of ith pollutant per unit of use (e.g., grams per mile)

Surface Disturbance. The quantity of dust emissions from surface disturbance and storage piles is proportional to the area of land being worked and to the area of the piles. The following formula was used to calculate fugitive dust emissions from surface disturbance and materials storage (USEPA1995; USEPA 2005b).

E = area x EF x PM_{10}/TSP x $PM_{2.5}/PM_{10}$ x capture fraction

where: open area = number of acres open or of storage piles)

EF = 80 lb TSP/acre

PM_{10}/TSP = 0.45 lb PM_{10}/lb TSP

TSP = total suspended particulates

$PM_{2.5}/PM_{10}$ = 0.15 lb $PM_{2.5}$/lb PM_{10}

Capture fraction = 0.5

A sample calculation is provided below:

Disturbed area = 100 acres

E = 100 ac x 80 lb TSP /acre x 0.45 lb PM_{10}/lb TSP x 0.15 lb $PM_{2.5}$/ lb PM_{10} x 2,000 lb/ton

= 1.35 tons

Emissions from Architectural Coatings. Emission factors relating emissions to total square footage to be built were used to estimate VOC emissions from architectural coating activities—primarily painting activities. The area to be painted was assumed approximately twice the heated area of the facility, and the dry film thickness was assumed three (3) millimeters (mm). The following formula was used to calculate emissions from the painting of the facilities (SCAQMD 1993):

E = [(*F* x *G*) / 1000] x *H*

where: *E* = emissions of VOCs from architectural coatings

F = pounds of VOC emissions per gallon

G = total area to be coated (floor area x 2)

H = paint coverage.

A sample calculation for architectural coating VOC emissions during construction of an example facility is provided below:

Floor area = 100,000 ft^2

E = [(0.83 [lb/gallon] / 400 [ft^2/gallon] x [(100,000 [ft^2] x 2)]]/2,000 [lb/ton]

= 0.208 tons

Asphalt Curing Emissions. Asphalt paving would generate emissions from (1) asphalt curing, (2) operation of onsite paving equipment, and (3) operation of motor vehicles, including paving material delivery trucks and worker commuting vehicles. Because the emissions resulting from the operation of onsite paving equipment, trucks, and vehicles were included in the previous section, only asphalt curing-related emissions are discussed in this section. The following assumption was used in VOC emission calculations for asphalt curing (SCAQMD 1993):

E = area paved x 2.62 lb VOC/acre

A sample calculation is provided below:

Paved area = 100 acres

E = 100 acres x 2.62 lb VOC/acre/2,000 lb/ton

= 0.131 ton

Due to the minimal paving anticipated for all proposed alternatives, negligible off gas emissions are anticipated.

Table A-1 Project Parameters for Emission Calculations

Activity	Duration	Site Area [ft2]	Total Building Area [ft2]	Paved Area [ft2]
A1-Construct a Driving Skid Pad, Grading	180	150000	0	0
A1-Construct a Driving Skid Pad, Paving	60	0	0	150000
A1-Construct a Gravel Foot March Trail ,Grading	180	142560	0	0
A1-Construct a Runway with Glide Slopes, Grading	230	1080000	0	0
A1-Construct a Runway with Glide Slopes, Paving	230	0	0	720000
A1-Construct a Runway with Glide Slopes, Building	230	0	25000	0
A2-Construct a Range Support Bldg (classroom) with parking area, Grading	60	1600	0	0
A2-Construct a Range Support Bldg (classroom) with parking area, Building	180	0	800	0
A2-Construct maneuver trails, Grading	180	1267200	0	0
A2-Tree harvesting to open areas for maneuver, Grading	180	435600	0	0
A2-Develop a drop zone, Grading	90	435600	0	0
A2-Construct Classroom, Building	30	0	800	0
A2-Construct Storage Building/Warehouse, Building	90	0	800	0
A2-Add additional buildings to the urban training site, Grading	90	95832	0	0
A2-Add additional buildings to the urban training site, Building	230	0	25000	0
A2-Construct an additional gravel maneuver trail with parking area ,Building	90	0	633600	0
A2-Construct 2,000' asphalt runway, Grading	180	2522124	0	0
A2-Construct 2,000' asphalt runway, Paving	90	0	0	2017699
A2-Construct 3 UAS operations/maintenance hangers, Grading	90	139392	0	0
A2-Construct 3 UAS operations/maintenance hangers, Building	180	0	69696	0
A3-Culvert Installation, Grading	60	43560	0	0
A3-Drop Zone Creation ,Grading	30	435600	0	0
A3-Install and Maintain Public Address Systems ,Building	30	0	200	0
A3-Low Water Crossing Site Creation, Grading	30	43560	0	0

Table A-2 Paving Off-gas Emissions

Project	Paved Area [Acres]	EFVOC [lbs/acre]	VOC
A1-Construct a Driving Skid Pad, Paving	3.45	2.62	0.0045
A1-Construct a Runway with Glide Slopes, Paving	16.56	2.62	0.0217
A2-Construct 2, 000' asphalt runway, Paving	46.41	2.62	0.0608

Source: SQAQMD1993

Table A-3 Heavy Equipment Emissions

Project	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A1-Construct a Driving Skid Pad, Grading	0.2689	0.5888	0.0324	0.0315	0.1202	0.0298
A1-Construct a Driving Skid Pad, Paving	0.0398	0.0811	0.0048	0.0047	0.0141	0.0048
A1-Construct a Gravel Foot March Trail , Grading	0.2556	0.5596	0.0308	0.0299	0.1142	0.0283
A1-Construct a Runway with Glide Slopes, Grading	2.4741	5.4172	0.2985	0.2896	1.1055	0.2742
A1-Construct a Runway with Glide Slopes, Paving	0.7327	1.4924	0.0892	0.0866	0.2604	0.0878
A1-Construct a Runway with Glide Slopes, Building	1.7374	0.3749	0.0164	0.0159	0.0576	0.0579
A2-Construct a Range Support Bldg (classroom) with parking area, Grading	0.0010	0.0021	0.0001	0.0001	0.0004	0.0001
A2-Construct a Range Support Bldg (classroom) with parking area, Building	0.0435	0.0094	0.0004	0.0004	0.0014	0.0014
A2-Construct maneuver trails, Grading	2.2718	4.9744	0.2741	0.2659	1.0151	0.2518
A2-Tree harvesting to open areas for maneuver, Grading	0.7809	1.7100	0.0942	0.0914	0.3490	0.0866
A2-Develop a drop zone, Grading	0.3905	0.8550	0.0471	0.0457	0.1745	0.0433
A2-Construct Classroom, Building	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
A2-Add additional buildings to the urban training site, Grading	0.0859	0.1881	0.0104	0.0101	0.0384	0.0095
A2-Add additional buildings to the urban training site, Building	1.7374	0.3749	0.0164	0.0159	0.0576	0.0579
A2-Construct an additional gravel maneuver trail with parking area , Building	17.2303	3.7183	0.1625	0.1576	0.5709	0.5737
A2-Construct 2, 000' asphalt runway, Grading	4.5217	9.9006	0.5456	0.5293	2.0204	0.5012
A2-Construct 2, 000' asphalt runway, Paving	0.8035	1.6365	0.0979	0.0949	0.2855	0.0963
A2-Construct 3 UAS operations/maintenance hangers, Grading	0.1250	0.2736	0.0151	0.0146	0.0558	0.0138
A2-Construct 3 UAS operations/maintenance hangers, Building	3.7907	0.8180	0.0358	0.0347	0.1256	0.1262
A3-Culvert Installation, Grading	0.0260	0.0570	0.0031	0.0030	0.0116	0.0029
A3-Drop Zone Creation , Grading	0.1302	0.2850	0.0157	0.0152	0.0582	0.0144
A3-Low Water Crossing Site Creation, Grading	0.0130	0.0285	0.0016	0.0015	0.0058	0.0014

Source: USEPA 2005a; SQAQMD1993

Table A-4 Architectural Coating Emissions

Project	Heated Area	Wall Surface	EFVOC [lbs/1000 Square Feet]	VOC
A1-Construct a Runway with Glide Slopes, Building	25000	50000	55.5	0.05
A2-Construct a Range Support Bldg (classroom) with parking area, Building	800	1600	55.5	0.00
A2-Construct Classroom, Building	800	1600	55.5	0.00
A2-Construct Storage Building/Warehouse, Building	800	1600	55.5	0.00
A2-Add additional buildings to the urban training site, Building	25000	50000	55.5	0.05
A2-Construct an additional gravel maneuver trail with parking area , Building	633600	1267200	55.5	1.32
A2-Construct 3 UAS operations/maintenance hangers, Building	69696	139392	55.5	0.15

Source: SQAQMD 1993

Table A-5 Fugitive Dust Emissions

Project	Duration [days]	Cleared Area [acres]	PM_{10}	$PM_{2.5}$
A1-Construct a Driving Skid Pad, Grading	113.42	3.45	0.35	0.05
A1-Construct a Gravel Foot March Trail , Grading	113.42	3.28	0.33	0.05
A1-Construct a Runway with Glide Slopes, Grading	144.93	24.84	3.24	0.49
A2-Construct a Range Support Bldg with parking area, Grading	37.81	0.04	0.00	0.00
A2-Construct maneuver trails, Grading	113.42	29.15	2.98	0.45
A2-Tree harvesting to open areas for maneuver, Grading	113.42	10.02	1.02	0.15
A2-Develop a drop zone, Grading	56.71	10.02	0.51	0.08
A2-Add additional buildings to the urban training site, Grading	56.71	2.2	0.11	0.02
A2-Construct 2, 000' asphalt runway, Grading	113.42	58.01	5.92	0.89
A2-Construct 3 UAS operations/maintenance hangers, Grading	56.71	3.21	0.16	0.02
A3-Culvert Installation, Grading	37.81	1	0.03	0.01
A3-Drop Zone Creation , Grading	18.9	10.02	0.17	0.03
A3-Low Water Crossing Site Creation, Grading	18.9	1	0.02	0.00

Source: USEPA1995; USEPA 2005b

Assumes: PM_{10}/TSP = 0.45, $PM_{2.5}$/PM_{10}=0.15, EFTSP = 80 [lbs/acre/day, Capture Fraction = 50%

Table A-6 Worker Trip Emissions

Project	Trips	Average Trip [miles]	Duration [days]	VMT	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A1-Construct a Driving Skid Pad, Grading	4	30	113	14674	0.07	0.01	0.00	0.00	0.00	0.00
A1-Construct a Driving Skid Pad, Paving	4	30	38	4891	0.02	0.00	0.00	0.00	0.00	0.00
A1-Construct a Gravel Foot March Trail , Grading	4	30	113	13946	0.06	0.00	0.00	0.00	0.00	0.00
A1-Construct a Runway with Glide Slopes, Grading	31	30	145	135004	0.60	0.05	0.00	0.00	0.00	0.04
A1-Construct a Runway with Glide Slopes, Paving	21	30	145	90002	0.40	0.03	0.00	0.00	0.00	0.03
A1-Construct a Runway with Glide Slopes, Building	18	30	145	78263	0.35	0.03	0.00	0.00	0.00	0.03
A2-Construct a Range Support Bldg (classroom) with parking area, Grading	0	30	38	52	0.00	0.00	0.00	0.00	0.00	0.00
A2-Construct a Range Support Bldg (classroom) with parking area, Building	1	30	113	1960	0.01	0.00	0.00	0.00	0.00	0.00
A2-Construct maneuver trails, Grading	36	30	113	123969	0.55	0.04	0.00	0.00	0.00	0.04
A2-Tree harvesting to open areas for maneuver, Grading	13	30	113	42614	0.19	0.01	0.00	0.00	0.00	0.01
A2-Develop a drop zone, Grading	13	30	57	21307	0.09	0.01	0.00	0.00	0.00	0.01
A2-Construct Classroom, Building	1	30	19	327	0.00	0.00	0.00	0.00	0.00	0.00
A2-Add additional buildings to the urban training site, Grading	3	30	57	4688	0.02	0.00	0.00	0.00	0.00	0.00
A2-Add additional buildings to the urban training site, Building	18	30	145	78263	0.35	0.03	0.00	0.00	0.00	0.03
A2-Construct an additional gravel maneuver trail with parking area , Building	456	30	57	776151	3.46	0.27	0.01	0.01	0.01	0.25
A2-Construct 2, 000' asphalt runway, Grading	73	30	113	246736	1.10	0.09	0.00	0.00	0.00	0.08
A2-Construct 2, 000' asphalt runway, Paving	58	30	57	98695	0.44	0.03	0.00	0.00	0.00	0.03
A2-Construct 3 UAS operations/maintenance hangers, Grading	4	30	57	6818	0.03	0.00	0.00	0.00	0.00	0.00
A2-Construct 3 UAS operations/maintenance hangers, Building	50	30	113	170753	0.76	0.06	0.00	0.00	0.00	0.05
A3-Culvert Installation, Grading	1	30	38	1420	0.01	0.00	0.00	0.00	0.00	0.00
A3-Drop Zone Creation , Grading	13	30	19	7102	0.03	0.00	0.00	0.00	0.00	0.00
A3-Low Water Crossing Site Creation, Grading	1	30	19	710	0.00	0.00	0.00	0.00	0.00	0.00

Source: USEPA 1995

Table A-7 Estimated Emissions For Alternative 1, Construction Components of AUZ Project, and Land Management Projects

Project 1	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A1-Construct a Driving Skid Pad, Grading	Heavy Equipment	0.2689	0.5888	0.0324	0.0315	0.1202	0.0298
A1-Construct a Driving Skid Pad, Grading	Worker Trips	0.0700	0.0100	0.0000	0.0000	0.0000	0.0000
A1-Construct a Driving Skid Pad, Grading	Fugitive Dust	0.0000	0.0000	0.3500	0.0500	0.0000	0.0000
A1-Construct a Driving Skid Pad, Paving	Heavy Equipment	0.0398	0.0811	0.0048	0.0047	0.0141	0.0048
A1-Construct a Driving Skid Pad, Paving	Worker Trips	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000
A1-Construct a Driving Skid Pad, Paving	Paving Off-gas	0.0000	0.0000	0.0000	0.0000	0.0000	0.0045
	Project Total	0.3987	0.6799	0.3872	0.0862	0.1343	0.0391
Project 2	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A1-Construct a Gravel Foot March Trail , Grading	Heavy Equipment	0.2556	0.5596	0.0308	0.0299	0.1142	0.0283
A1-Construct a Gravel Foot March Trail , Grading	Worker Trips	0.0600	0.0000	0.0000	0.0000	0.0000	0.0000
A1-Construct a Gravel Foot March Trail , Grading	Fugitive Dust	0.0000	0.0000	0.3300	0.0500	0.0000	0.0000
	Project Total	0.3156	0.5596	0.3608	0.0799	0.1142	0.0283
Project 3	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A1-Construct a Runway with Glide Slopes, Building	Heavy Equipment	1.7374	0.3749	0.0164	0.0159	0.0576	0.0579
A1-Construct a Runway with Glide Slopes, Building	Worker Trips	0.3500	0.0300	0.0000	0.0000	0.0000	0.0300
A1-Construct a Runway with Glide Slopes, Building	Architectural Coatings	0.0000	0.0000	0.0000	0.0000	0.0000	0.0500
A1-Construct a Runway with Glide Slopes, Grading	Heavy Equipment	2.4741	5.4172	0.2985	0.2896	1.1055	0.2742
A1-Construct a Runway with Glide Slopes, Grading	Worker Trips	0.6000	0.0500	0.0000	0.0000	0.0000	0.0400
A1-Construct a Runway with Glide Slopes, Grading	Fugitive Dust	0.0000	0.0000	3.2400	0.4900	0.0000	0.0000
A1-Construct a Runway with Glide Slopes, Paving	Heavy Equipment	0.7327	1.4924	0.0892	0.0866	0.2604	0.0878
A1-Construct a Runway with Glide Slopes, Paving	Worker Trips	0.4000	0.0300	0.0000	0.0000	0.0000	0.0300
A1-Construct a Runway with Glide Slopes, Paving	Paving Off-gas	0.0000	0.0000	0.0000	0.0000	0.0000	0.0217
	Project Total	6.2942	7.3945	3.6441	0.8821	1.4235	0.5916
	Alternative 1 Total	7.7	9.5	5.0	1.2	1.9	0.7
	Alternative 1 Total - Maintenance Area Only	1.0	1.5	1.0	0.2	0.3	0.1

Source: SCAQMD 1993; USEPA 1995; USEPA 2005a, USEPA 2005b; USEPA 2012a

Table A-8 Estimated Emissions For Project Component for AUZ

Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Add additional buildings to the urban training site, Building	Heavy Equipment	1.7374	0.3749	0.0164	0.0159	0.0576	0.0579
A2-Add additional buildings to the urban training site, Building	Worker Trips	0.3500	0.0300	0.0000	0.0000	0.0000	0.0300
A2-Add additional buildings to the urban training site, Building	Architectural Coatings	0.0000	0.0000	0.0000	0.0000	0.0000	0.0500
A2-Add additional buildings to the urban training site, Grading	Heavy Equipment	0.0859	0.1881	0.0104	0.0101	0.0384	0.0095
A2-Add additional buildings to the urban training site, Grading	Worker Trips	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000
A2-Add additional buildings to the urban training site, Grading	Fugitive Dust	0.0000	0.0000	0.1100	0.0200	0.0000	0.0000
	Component Total	2.1933	0.5930	0.1368	0.0460	0.0960	0.1474
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Construct 2, 000’ asphalt runway, Grading	Heavy Equipment	4.5217	9.9006	0.5456	0.5293	2.0204	0.5012
A2-Construct 2, 000’ asphalt runway, Grading	Worker Trips	1.1000	0.0900	0.0000	0.0000	0.0000	0.0800
A2-Construct 2, 000’ asphalt runway, Grading	Fugitive Dust	0.0000	0.0000	5.9200	0.8900	0.0000	0.0000
A2-Construct 2, 000’ asphalt runway, Paving	Heavy Equipment	0.8035	1.6365	0.0979	0.0949	0.2855	0.0963
A2-Construct 2, 000’ asphalt runway, Paving	Worker Trips	0.4400	0.0300	0.0000	0.0000	0.0000	0.0300
A2-Construct 2, 000’ asphalt runway, Paving	Paving Off-gas	0.0000	0.0000	0.0000	0.0000	0.0000	0.0608
	Component Total	6.8652	11.6571	6.5635	1.5142	2.3059	0.7683
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Construct 3 UAS operations/maintenance hangers, Building	Heavy Equipment	3.7907	0.8180	0.0358	0.0347	0.1256	0.1262
A2-Construct 3 UAS operations/maintenance hangers, Building	Worker Trips	0.7600	0.0600	0.0000	0.0000	0.0000	0.0500
A2-Construct 3 UAS operations/maintenance hangers, Building	Architectural Coatings	0.0000	0.0000	0.0000	0.0000	0.0000	0.1500
A2-Construct 3 UAS operations/maintenance hangers, Grading	Heavy Equipment	0.1250	0.2736	0.0151	0.0146	0.0558	0.0138
A2-Construct 3 UAS operations/maintenance hangers, Grading	Worker Trips	0.0300	0.0000	0.0000	0.0000	0.0000	0.0000

Table A-8 Estimated Emissions For Project Component for AUZ

Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Construct 3 UAS operations/maintenance hangers, Grading	Fugitive Dust	0.0000	0.0000	0.1600	0.0200	0.0000	0.0000
	Component Total	4.7057	1.1516	0.2109	0.0693	0.1814	0.3400
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Construct a Range Support Bldg with parking area, Building	Heavy Equipment	0.0435	0.0094	0.0004	0.0004	0.0014	0.0014
A2-Construct a Range Support Bldg with parking area, Building	Worker Trips	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000
A2-Construct a Range Support Bldg with parking area, Building	Architectural Coatings	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2-Construct a Range Support Bldg with parking area, Grading	Heavy Equipment	0.0010	0.0021	0.0001	0.0001	0.0004	0.0001
A2-Construct a Range Support Bldg with parking area, Grading	Worker Trips	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2-Construct a Range Support Bldg with parking area, Grading	Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Component Total	0.0545	0.0115	0.0005	0.0005	0.0018	0.0015
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Construct an additional gravel maneuver trail with parking area , Building	Heavy Equipment	17.2303	3.7183	0.1625	0.1576	0.5709	0.5737
A2-Construct an additional gravel maneuver trail with parking area , Building	Worker Trips	3.4600	0.2700	0.0100	0.0100	0.0100	0.2500
A2-Construct an additional gravel maneuver trail with parking area , Building	Architectural Coatings	0.0000	0.0000	0.0000	0.0000	0.0000	1.3200
	Component Total	20.6903	3.9883	0.1725	0.1676	0.5809	2.1437
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
A2-Construct Classroom, Building	Heavy Equipment	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
A2-Construct Classroom, Building	Worker Trips	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2-Construct Classroom, Building	Architectural Coatings	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Component Total	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	PM2.5	SO_2	VOC
A2-Construct maneuver trails, Grading	Heavy Equipment	2.2718	4.9744	0.2741	0.2659	1.0151	0.2518
A2-Construct maneuver trails, Grading	Worker Trips	0.5500	0.0400	0.0000	0.0000	0.0000	0.0400
A2-Construct maneuver trails, Grading	Fugitive Dust	0.0000	0.0000	2.9800	0.4500	0.0000	0.0000
	Component Total	2.8218	5.0144	3.2541	0.7159	1.0151	0.2918
Project Component for AUZ	Activity	CO	NO_x	PM_{10}	PM2.5	SO_2	VOC
A2-Develop a drop zone, Grading	Heavy Equipment	0.3905	0.8550	0.0471	0.0457	0.1745	0.0433
A2-Develop a drop zone, Grading	Worker Trips	0.0900	0.0100	0.0000	0.0000	0.0000	0.0100
A2-Develop a drop zone, Grading	Fugitive Dust	0.0000	0.0000	0.5100	0.0800	0.0000	0.0000
	Component Total	0.4805	0.8650	0.5571	0.1257	0.1745	0.0533
Project Component for AUZ	Activity	CO	NO_x	PM10	PM2.5	SO_2	VOC
A2-Tree harvesting to open areas for maneuver, Grading	Heavy Equipment	0.7809	1.7100	0.0942	0.0914	0.3490	0.0866
A2-Tree harvesting to open areas for maneuver, Grading	Worker Trips	0.1900	0.0100	0.0000	0.0000	0.0000	0.0100
A2-Tree harvesting to open areas for maneuver, Grading	Fugitive Dust	0.0000	0.0000	1.0200	0.1500	0.0000	0.0000

Source: SCAQMD 1993; USEPA 1995; USEPA 2005a, USEPA 2005b; USEPA 2012a

Table A-9 Estimated Emissions For Alternative 2

	Project Component for AUZ	CO	NO_x	PM10	PM2.5	SO_2	VOC
	Construct a Range Support BLDG (classroom) with parking area	0.0545	0.0115	0.0005	0.0005	0.0018	0.0015
	Construct maneuver trails	2.8218	5.0144	3.2541	0.7159	1.0151	0.2918
	Tree harvesting to open areas for maneuver	0.9709	1.7200	1.1142	0.2414	0.3490	0.0966
A – Training Area 11	AUZ Total	22.9962	14.3401	7.3388	1.7166	2.7210	1.7221
	Construct a Range Support BLDG (classroom) with parking area	0.0545	0.0115	0.0005	0.0005	0.0018	0.0015
	Construct maneuver trails	2.8218	5.0144	3.2541	0.7159	1.0151	0.2918
	Tree harvesting to open areas for maneuver	0.9709	1.7200	1.1142	0.2414	0.3490	0.0966
B – Training Area 20	AUZ Total	22.9962	14.3401	7.3388	1.7166	2.7210	1.7221
	Range Support BLDG (classroom) with parking area	0.0545	0.0115	0.0005	0.0005	0.0018	0.0015
	Maneuver trails	2.8218	5.0144	3.2541	0.7159	1.0151	0.2918
	Tree harvesting to open the area	0.9709	1.7200	1.1142	0.2414	0.3490	0.0966
	Develop a drop zone	0.4805	0.8650	0.5571	0.1257	0.1745	0.0533
C - Training Area 52	AUZ Total	23.4767	15.2051	7.8959	1.8423	2.8955	1.7754
	Add Range Support BLDG (classroom) with parking area	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
	Construct an additional gravel maneuver trail with parking area for unit vehicles	2.8218	5.0144	3.2541	0.7159	1.0151	0.2918
D – Aardvark LZ (TA 31)	AUZ Total	3.4153	5.1926	3.3023	0.7338	1.0444	0.3707
	Add additional buildings to the urban training site	2.1933	0.5930	0.1368	0.0460	0.0960	0.1474
	Range Support BLDG	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
	Reconfigure former gravel taxiway into a 2, 000’ asphalt runway for small fixed wing aircraft (i.e. Sherpas)	6.8652	11.6571	6.5635	1.5142	2.3059	0.7683
E – Golden Eagle Flight Landing Strip (TA 8A)	AUZ Total	9.0658	12.2517	6.7004	1.5603	2.4021	0.9159
	Add Range Support BLDG (	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
	Reconfigure former gravel taxiway into a 2, 000’ asphalt runway for small fixed wing aircraft (i.e. Sherpas)	6.8652	11.6571	6.5635	1.5142	2.3059	0.7683
F – Indian Mound LZ (TA 28)	AUZ Total	6.8743	11.6591	6.5636	1.5143	2.3062	0.7686
	Add Range Support BLDG (classroom) with parking area						
	Replace temporary maintenance tent with three UAS operations/maintenance hangers.	4.7057	1.1516	0.2109	0.0693	0.1814	0.3400
G – Suckchon DZ (TA 21)	AUZ Total	4.7075	1.1520	0.2109	0.0693	0.1815	0.3401

Table A-9 Estimated Emissions For Alternative 2

	Project Component for AUZ	CO	NO_x	PM10	PM2.5	SO_2	VOC
	Reconfigure historic runway area into a 2, 000' asphalt runway for small fixed wing aircraft (i.e. Sherpas)	6.8652	11.6571	6.5635	1.5142	2.3059	0.7683
	Add Range Support BLDG	0.0073	0.0016	0.0001	0.0001	0.0002	0.0002
H – Veghel DZ (TA 44A)	AUZ Total	6.8743	11.6591	6.5636	1.5143	2.3062	0.7686
	Alternative Total	21.5	26.9	15.6	3.5	5.3	2.0
	Alternative Total - Maintenance Area Only	4.3	5.4	3.1	0.7	1.1	0.4

Source: SCAQMD 1993; USEPA 1995; USEPA 2005a, USEPA 2005b; USEPA 2012a

Table A-10 Estimated Emissions For Alternative 3

Project	Activity	CO	NO_x	PM10	PM2.5	SO_2	VOC
A3-Culvert Installation, Grading	Heavy Equipment	0.0260	0.0570	0.0031	0.0030	0.0116	0.0029
A3-Culvert Installation, Grading	Worker Trips	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000
A3-Culvert Installation, Grading	Fugitive Dust	0.0000	0.0000	0.0300	0.0100	0.0000	0.0000
A3-Drop Zone Creation , Grading	Heavy Equipment	0.1302	0.2850	0.0157	0.0152	0.0582	0.0144
A3-Drop Zone Creation , Grading	Worker Trips	0.0300	0.0000	0.0000	0.0000	0.0000	0.0000
A3-Drop Zone Creation , Grading	Fugitive Dust	0.0000	0.0000	0.1700	0.0300	0.0000	0.0000
A3-Low Water Crossing Site Creation, Grading	Heavy Equipment	0.0130	0.0285	0.0016	0.0015	0.0058	0.0014
A3-Low Water Crossing Site Creation, Grading	Worker Trips	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A3-Low Water Crossing Site Creation, Grading	Fugitive Dust	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000
	Alternative Total	0.2	0.4	0.2	0.1	0.1	0.0

Source: SCAQMD 1993; USEPA 1995; USEPA 2005a, USEPA 2005b; USEPA 2012a

Table A-11 Estimated Emissions For Stationary Sources

Stationary Sources	**Existing HP**	**Highest Horse Power**	**Hours of Operation**				
Emergency Back-up Generator	550	1000	100				
Remote Generator	49	100	3500				
Emission Factor [lb/hp-hr]	**NO_x**	**VOC**	**$PM_{2.5}$**	**SO_x**	**CO_2**		
Large Diesel Engine	0.024	0.000705	0.0007	0.0081	1.16		
Small Diesel Engine	0.031	0.00247	0.0022	0.0021	1.15		
			Emissions (tpy)				
Generator Rating [kW]	**Run Time (hr/yr)**	**Annual Power Output [kW-hr/yr]**	**NO_x**	**VOC**	**PM2.5**	**SO_2**	**CO_2**
1000	100	100000	2.08	0.17	0.15	0.14	77.11
100	3500	350000	7.27	0.58	0.52	0.48	269.88
		Total Emissions	**9.35**	**0.75**	**0.66**	**0.62**	**346.98**

Source: USEPA 1995