

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
MILITARY ENGINEERING
FORT RILEY, KANSAS

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The U.S. Army's success on the battlefield depends upon fully trained military engineer units. Engineer units perform combat engineering at the battlefield to enhance war-zone capabilities. Examples of combat engineering include digging trenches and building temporary works. A second function of engineer units is to provide strategic support in communication zones behind the battlefield. Examples of strategic support include building or upgrading airfields, ports, roads, and railways.

Engineer units typically train at U.S. military installations. The Army frequently calls upon engineer units to construct facilities that allow other military units or services to train also. Engineer units often expend effort on products that have little residual value such as fighting positions, defilades, tank ditches, and complex obstacles; and on products built for a single training exercise such as landing strips, temporary quarters, and site preparation for relocatable structures. There are situations when engineer support must precede or follow other unit activities in order to permit the training of those supported units. Engineer units must train with other members of the combined arms to develop team skills, but also must train alone to develop engineer skills and the skills of their secondary mission, fighting as infantry.

This Programmatic Environmental Assessment (PEA) analyzes the anticipated effects of all facets of military engineer training at Fort Riley, which includes combat and strategic engineering on maneuver lands; and facilities construction or maintenance that is often in the cantonments. The proposed action would shift Fort Riley's National Environmental Policy Act (NEPA) review and documentation process for military engineering from a case-by-case method to a means more programmatic.

1.1. Scope of the Analysis

Analysis of the Proposed Action to execute military engineering programmatically constitutes the scope of this PEA. The PEA will identify, discuss, and analyze:

- The Proposed Action to execute military engineering programmatically,
- Positive and negative environmental effects of the Proposed Action and the No Action alternative, and
- The anticipated cumulative environmental effect of each alternative course of action.

The discussion in this PEA includes the Proposed Action to execute military engineering programmatically; a No Action alternative; the local and regional environment as affected by each alternative; and results to facilitate informed decision-making. Fort Riley analyzes the potential effect of the Proposed Action alternative to natural and cultural resources, human health and safety, land use, the sociological environment, and the military mission. The PEA will analyze the potential implementation effects of each alternative, and will then analyze each

alternative in relation to other reasonably foreseeable actions to examine potential cumulative effects.

This military engineering PEA provides a comprehensive, programmatic analysis that is broad enough in scope to assist in the evaluation of future military engineering actions at Fort Riley. This PEA was prepared as a programmatic National Environmental Policy Act (NEPA) review applicable to future projects, or for use as a base from which NEPA analyses or decision documents could tier. That tiering approach could help minimize the need for repeated analyses of potential future military engineering actions. Fort Riley would use this PEA to evaluate any future changes to military engineering operations. If it were determined that a need for additional environmental analysis and documentation exists, this PEA would serve as a base document to reduce the level of effort required to prepare future decision documents.

This PEA documents the anticipated environmental effects at a basic level, because Fort Riley's proposed military engineering operations would be subject to continuous evaluation and adaptive change as new military engineering tactics and equipment are identified in the future. Recognizing the changing nature of military doctrine and technology, this PEA enables a process that Fort Riley can use to make decisions regarding military engineering well into the future.

This document cannot provide a quantitative analysis of the potential site-specific effects for all future military engineering projects. Staff of the Environmental Division, Directorate of Public Works (DPW), Fort Riley, would consider site-specific effects at a second level of decision-making. Consistent with the NEPA and other applicable statutes and regulations, Fort Riley would make an independent determination of the scope and level of additional documentation necessary.

1.2. Issues and Public Concerns

A team of Fort Riley civilians and military personnel prepared the proposal to execute military engineering programmatically. The team developed the Proposed Action alternative during a series of planning sessions. Those sessions helped identify the alternative's environmental issues and potential public concerns, which Fort Riley analyzed in detail during the writing of this PEA. Sources included Army trainers and Command, Department of Defense (DoD) civilian employees, published literature, stakeholders, and customers.

The identified issues include:

- The potential for the Proposed Action to affect migratory birds and other wildlife, including threatened and endangered species,
- The potential for the Proposed Action to adversely affect water resources,
- The potential for the Proposed Action to adversely affect cultural resources, and
- The potential for the Proposed Action to adversely affect operational noise.

1.3. Regulatory Compliance

As required by law, the purpose of this PEA is to evaluate positive and negative environmental effects of the Proposed Action to execute military engineering. This PEA complies with the National Environmental Policy Act (NEPA), Council of Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations (CFR) 1500 et seq.), and 32 CFR 651, *Environmental Analysis of Army Actions*.

The NEPA of 1969, as amended (Public Law 91-190, 42 United States Code 4321 et seq.) and implemented by the CEQ regulations, was created to prevent, eliminate, or minimize negative environmental effects from federal projects and activities during the planning stages through mitigation, avoidance, or both. Any action that could have an effect on human health, any natural system (air, water, soil, plant, animal, or other resources) or any social or economic system, upon which there is an expenditure of federal funds, must receive some level of environmental analysis to determine the effects of that action.

2.0 ALTERNATIVES CONSIDERED

2.1. Introduction

This section includes the following elements:

- A description of the process used to formulate the alternatives that were analyzed in detail,
- A description of the Proposed Action alternative and the No Action alternative, and
- The identification of the preferred alternative.

An interdisciplinary Fort Riley team formulated feasible alternatives based on: the garrison's commitment to the military mission and sustainment of the environment; guidance provided by military personnel and DoD civilians; and input from staff of the Environmental Division, DPW, Fort Riley. Other critical factors taken into account during the development of alternatives included public concerns and issues.

2.2. Alternative 1 – Execute Military Engineering Programmatically

Under the Proposed Action, the NEPA review and documentation for many military engineering projects at Fort Riley could occur more quickly, which would enable engineer units to execute more engineer training projects in step with tactical units.

The Proposed Action analyzes all manner of military engineering projects at Fort Riley. While not limited to projects or products listed below, examples of military engineering include:

- field landing strips (for piloted aircraft or unmanned aerial vehicles),
- roads and tactical vehicle trails,
- military training lanes,
- small ranges,
- site preparation for relocatable structures,
- mock villages,
- forward operating bases,
- temporary quarters,
- storage buildings and other facilities,
- physical training sites,
- sidewalks and recreation trails,
- trenches,
- ponds,
- repair of existing facilities,
- berms,
- mine plow fields,

- fighting positions,
- defilades,
- tank ditches,
- target installations,
- complex obstacles, and
- soil borrow sites.

This PEA defines military engineering as projects or products planned or executed by military engineer units. Engineer units, principally of the 1st Infantry Division (ID) stationed at Fort Riley, would regularly plan or execute military engineering at the installation. Engineer units from off-post could also execute military engineering as part of annual or special training assignments at Fort Riley. Proposed military engineering projects at Fort Riley would often involve partnerships with Army civilians or private contractors. An engineer unit may wholly plan and execute a project, or that unit might enlist Army civilian or contracted partners to assist with planning or execution. In some cases, the garrison at Fort Riley would serve as the proponent for a project and coordinate with a military engineer unit to perform some or all of the project tasks.

Fort Riley anticipates that most military engineering projects would occur in the installation's maneuver and training areas. Figure 2-1 shows Fort Riley's maneuver and training areas in relation to the cantonments and controlled range areas. Projects completed in maneuver or training areas could be long-term facilities (e.g., mock villages, trench training complexes), or single training-event products (e.g., fighting positions, tank ditches, berms) that are typically reclaimed or allowed to regenerate naturally. Some military engineering projects could occur in the cantonments and at range facilities. Generally, those projects would be long term in nature.

2.3. Alternative 2 – No Action

Under the No Action alternative, Fort Riley would not execute military engineering using a programmatic approach for the environmental review of proposed actions, which would not enable engineer units to execute more engineer training projects in step with tactical units. Thus military engineering would remain at current, or baseline, levels. The No Action alternative serves to define the existing condition of Fort Riley, and contributes to the description of the environmental baseline as is required by the CEQ.

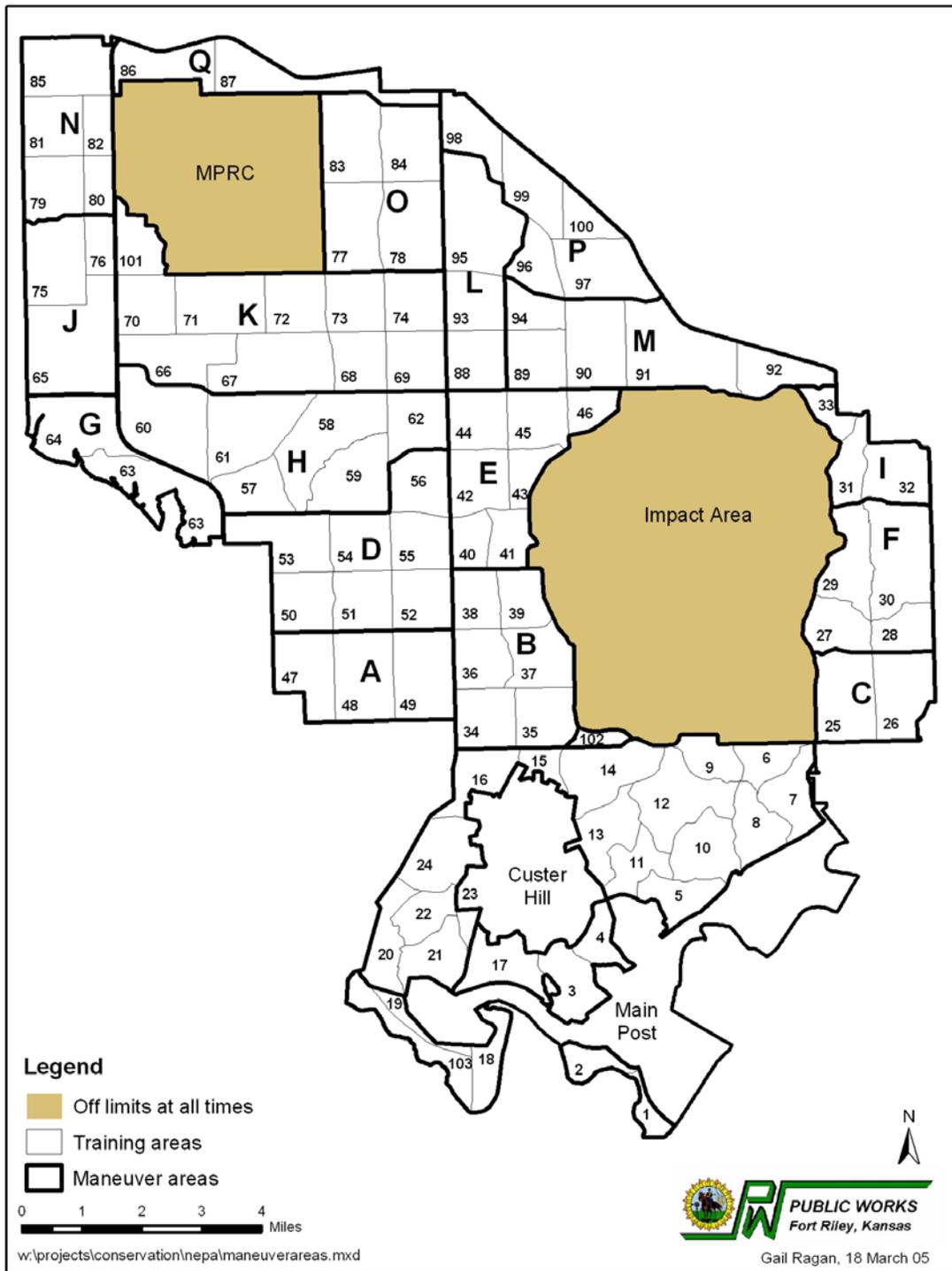


Figure 2-1 Maneuver and Training Areas

3.0 DESCRIPTION OF FORT RILEY

This section describes those Fort Riley attributes that the Proposed Action would not affect. These are physical attributes such as location, setting, geology, and climate.

3.1. Location

Fort Riley is an Army garrison located in Geary, Riley, and Clay counties of northeastern Kansas (Figure 3-1) approximately 135 miles west of Kansas City and 130 miles north-northeast of Wichita.

3.2. Setting

The general character of the area surrounding Fort Riley is rural with small farm communities. Lands north of Fort Riley support row crop and cereal grain production. Lands to the south are predominantly rangeland. The Republican, Smoky Hill, and Kansas rivers form part of the southern boundary of the garrison. Milford Lake, a 15,000-acre impoundment of the Republican River, forms part of the garrison's west boundary. Fort Riley is adjacent to one sizeable community to the southwest (Junction City) and lies near another sizeable community to the east (Manhattan).

The ecoregional province in which Fort Riley lies is Prairie Parkland (temperate) (Bailey, 1995). Fort Riley's parkland system is maintained primarily by anthropogenic (human-produced) influences and, secondarily, by natural factors. The grasslands are interspersed by linear communities of woodlands, highly variable in width, that are associated with streams, other woodland plantings, relatively small, man-made water impoundments, and structures. The closer the tributary streams are to the Republican or Kansas rivers, the greater their influence on flora and fauna. The flora and fauna in some locations are further influenced by their proximity to Milford Lake.

3.3. Topography and Geology

Fort Riley lies within the Osage Plains section of the Central Lowlands physiographic province. It is bordered by the Great Plains on the west and the Ozark Plateau on the east. Elevations on Fort Riley vary from 1,025 to 1,365 feet above mean sea level. Terrain varies from alluvial bottomlands along the Republican and Kansas rivers on the southern portion of the garrison, through the hilly to steep lands in the central and east portions, to the high uplands in the north and west portions.

Fort Riley consists of three types of topographical-physiographic area: 1) high upland prairies; 2) alluvial bottomland flood plains; and 3) broken and hilly transition zones. The high upland prairies consist of alternating layers of very gently dipping (less than one degree) Permian limestone and shale. The uplands often contain various shale units that cover the escarpment-forming limestones. The cutting action of streams on the thick shale units has sculpted much of the area into a rolling plateau. Two types of alluvial bottomlands exist at Fort Riley: wide meandering floodplains of major rivers, with associated terraces; and areas created by smaller creeks and streams that cut the uplands. The transitional areas, extending from the uplands down to the valley floors are broken, sloping to steep country composed of alternating limestones and shales.

Fort Riley and Vicinity

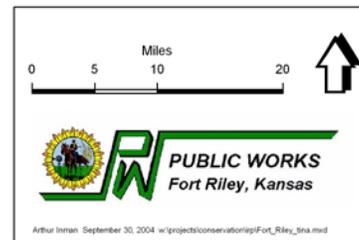
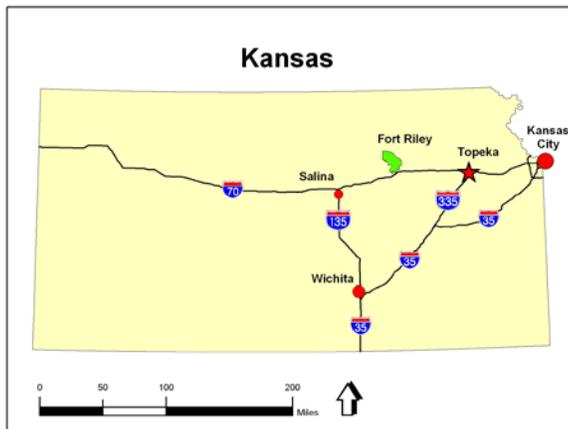
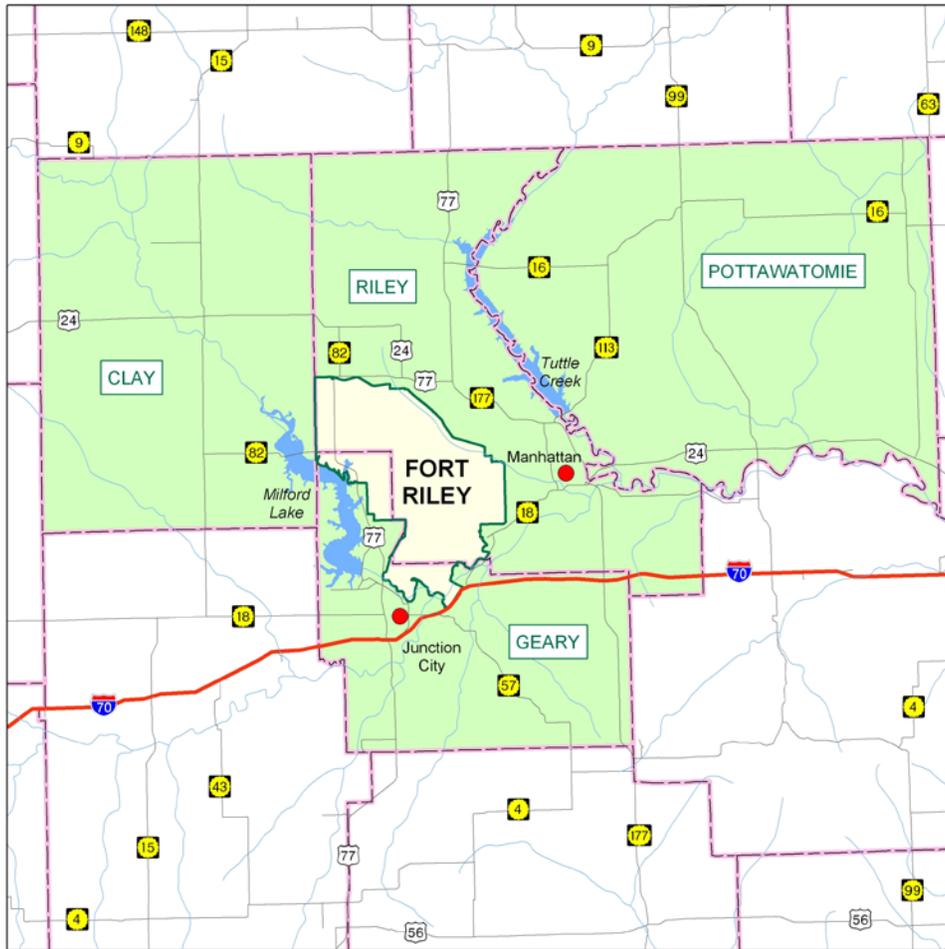


Figure 3-1 Location of Fort Riley

Fort Riley is located within an area that has the possibility of earthquakes producing moderate structural damage. A small fault located northeast of Fort Riley near Tuttle Creek Lake appears to be inactive. No other identified geologic hazards exist in the Fort Riley area.

3.4. Climate

The description of Fort Riley's climate is taken from the U.S. Department of Agriculture (USDA) soil survey for Riley County (USDA, 1975) and is based on 60- to 100-year data. Although these data were published in 1975, they continue to be reflective of the Fort Riley region. Fort Riley has a temperate continental climate characterized by hot summers, cold, dry winters, moderate winds, low humidity, and a pronounced peak in rainfall late in the spring and in the first half of summer. Prevailing winds are from the south to southwest during most of the year. During February and March, the prevailing winds are from the north.

Temperatures in the Fort Riley area vary widely and often fluctuate abruptly throughout the year. July and August are the hottest months, averaging 80° F. January is the coldest month, averaging 26° F. The average date of the last killing frost in spring is 22 April, and the average date of the first killing frost of the fall is 17 October. The area has an average of 180 frost-free days per year.

Average yearly precipitation is 31.64 inches (in.) and most of the precipitation (75%) falls within the six-month period from April through September. The three highest rainfall months (May, June, and July) each average more than 4 in. per month. Much of this precipitation occurs during severe thunderstorms, when 2 in. or more of rain may fall in one storm. December, January, and February are the driest. An average of about 22 in. of snowfall occurs annually.

Insufficient precipitation is one of the major limiting factors to plant growth at Fort Riley. Spring rains normally are adequate to recharge soil moisture before the summer months when evapotranspiration rates typically exceed precipitation rates. This is especially the case during the latter half of the summer. Soil moisture in the upper soil levels is depleted, which stresses shallow rooted plants during years of below average rainfall.

4.0 AFFECTED ENVIRONMENT

Pursuant to 32 CFR 651, this section focuses on those elements of the environment that could potentially sustain an effect from the Proposed Action. For this analysis, these environmental elements include land use; safety; operational noise; air quality; soils; water resources; flora and fauna, including threatened and endangered (T&E) species; pest management; cultural resources; contaminated sites; the sociological environment; and the military mission.

For many elements of the environment, Fort Riley anticipates no effect to the baseline condition from the proposed alternatives. Anticipated unaffected elements of the Fort Riley environment include airspace, protection of children, and environmental justice. Thus, this PEA does not describe or analyze those elements.

4.1. Land Use

Fort Riley consists of 101,733 acres (Plans, Analysis, and Integration Office, FY14). Military maneuver and training activities at Fort Riley use 92,144 acres of training and range area or about 91 percent of the total garrison land area. Fort Riley uses its training areas and firing ranges extensively, throughout the year, to train Soldiers. Users include Army units assigned to Fort Riley as well as active Army units from other garrisons; and U.S. Army Reserve, National Guard, and Air Force units. Military field training occurs within 102 designated training areas. Seventy-eight of these training areas are combined into 17 larger Maneuver Areas north of Vinton School Road comprising 72,653 acres. Figure 2-1 shows the Maneuver Areas and the Training Areas.

4.2. Safety

The Army provides service-wide oversight for safety through its Army Safety Office (ASO), commanded by the Director of Army Safety (DASAF). For all safety matters, the DASAF is the principal advisor to the Secretary of the Army (SA), the Chief of Staff, Army (CSA), and Headquarters, Department of Army (DA) unified staff. Additionally, the DASAF directs the Army Safety Program and serves as the Army's primary advocate for Composite Risk Management (CRM).

The Army Safety Program encompasses several spheres of mission support: military training, work-related activities, and recreation associated with the Army or its lands. Aspects of the program often apply to personnel while on- or off-duty, or on- or off-post. Thus, the Army Safety Program regulates safety not only for Soldiers, but for government employees, contractors, and the public as well. To ensure safety, the Army uses the CRM process to identify, assess, and control risk arising from operational factors, and to make decisions that balance risk cost with mission benefits.

Fort Riley implements the Army Safety Program through its Garrison Safety Office (GSO). The Fort Riley GSO provides Army safety policy, programs, and expertise to military units and garrison organizations on post. The garrison follows safety guidelines established by Army Regulation (AR) 385-10, *The Army Safety Program* and DA Memo 385-3, *HQDA MACOM Safety Program*.

4.3. Operational Noise

The noise environment created by operations at Fort Riley is similar to the noise environment at many other Army garrisons. Noise falls in two basic categories: noise from community activities and noise from military training. Community noise typically does not create annoyance concerns off the garrison, whereas noise from military training has the potential to cause annoyance in nearby off-post communities. Thus, Army noise programs focus on training noise. Fort Riley training noise with the potential to cause annoyance off post most often results from large caliber weapons firing, demolitions, and rotary-wing aircraft operations. Generally, noise from small arms firing at Fort Riley has little potential to cause annoyance off post.

The Army uses computer models to assess training noise because labor, equipment, and time constraints usually render infeasible the gathering of actual noise measurements. Thus, the Army uses modeled (or predicted) training noise levels to assess operational noise. Model inputs at a given garrison include the type of weapons systems fielded, the projected frequencies of their use, and firing locations. Noise modeling for Army training involves the use of basic sound-level metrics, and the calculation of predicted average noise levels, predicted peak noise levels, or sometimes both. The PEA describes those concepts below.

The following metrics are used to quantify training sounds:

- The decibel (dB) is a unit used to represent the acoustic energy of sound on a logarithmic scale. Humans can detect sound levels of approximately 0 dB and begin to feel discomfort or pain as levels approach 120 dB.
- A-weighted sound levels are adjusted levels of measured or predicted sound that correspond to the frequency sensitivity of the human ear. A-weighted levels of sound are measured in dB, often expressed as dBA, and are used to measure community response to noise. The Army uses dBA to assess the effects of aviation noise.
- C-weighted sound levels are adjusted levels of measured or predicted sound that correspond to frequencies perceived by more than the human ear. Impulsive sounds that may rattle windows or cause vibrations that are felt by humans are measured this way. C-weighted levels of sound are measured in dB, often expressed as dBC, and are used to assess the effects of large caliber weapons firing, explosions, or impacts.

Predicted average noise levels express the average daily noise projected for training operations over the period of one year. Periods of projected quiet are averaged with periods of projected loud noise. While a predicted average noise level represents the “mean” or “normal” noise level for projected training sounds at a garrison, the predicted average underestimates the severity of single noise events. The following metrics are used to quantify predicted average sound levels:

- Day-night average sound level (DNL) is a prediction of noise that accounts for the intrusive nature of sound at night. For a given day, DNL is calculated by applying a 10-dB penalty to noise events predicted between 10:00 pm and 7:00 am, and then calculating the average of all predicted noise events over the 24-hour period. For this PEA, DNL represents a one-year period.
- A-weighted DNL (ADNL) is the predicted day-night average sound level computed for A-weighted noise created by projected garrison activities. The Army uses ADNL to assess community and aviation noise.

- C-weighted DNL (CDNL) is the predicted day-night average sound level computed for C-weighted noise that results from projected large caliber weapons firing, explosions, or impacts.

To assess firing noise from small arms, the Army uses a sound level metric known as PK15(met). PK15(met), expressed in dBs, is a peak sound level from multiple identical noise sources that accounts for weather-related variations in perceived noise. PK15(met) is the predicted peak sound level expected to be exceeded by only 15 percent of all single noise events from an identical source. In other words, factoring in the effect of weather, PK15(met) characterizes the predicted maximum sound level of 85% of single noise events from an identical source. For non-identical weapons fired from one location, and for weapons firings from multiple locations, PK15(met) uses the loudest sound level that occurs at each noise receptor site.

Noise levels decrease with increasing distance from a noise source (Minnesota Pollution Control Agency, 1999). That property of noise allows its classification into Noise Zones (NZs). NZ III, the area of the highest level of noise closest to its source, is so intense that noise-sensitive land use in that zone is strongly discouraged. NZ II, the middle noise-level category, contains an area of noise less intense than NZ III that extends farther from the noise source. Significant exposure to noise is encountered in NZ II, and thus, recommended land uses include industrial production, manufacturing, transportation, and resource production. In NZ II, residential land use is discouraged. NZ I, the area of the lowest level of noise around a noise source, is least intense and extends farthest from the noise source. Within NZ I, there is no recommendation to control or limit land use. Table 4-1 shows NZ limits for three typical Army noise sources.

Table 4-1 Noise Limits for Noise Zones

Noise Zone	Sound Source		
	Aviation [ADNL (dBA)]	Large Caliber Weapons ¹ [CDNL (dBC)]	Small Arms [PK 15(met)]
I	Less than 65	Less than 62	Less than 87
II	65-75	62-70	87-104
III	Greater than 75	Greater than 70	Greater than 104

¹Includes large caliber weapons firing, and explosions and impacts.

Source: U.S. Army Center for Health Promotion and Preventive Medicine, 2005

4.4. Air Quality

The subsequent discussion of air quality at Fort Riley includes the following subsections: National Issues, Regulatory Compliance and Classification, Air Quality Permits, Emission Sources, and Notices of Violation.

4.4.1. National Issues

The Clean Air Act (CAA), as amended in 1990 authorizes the U.S. Environmental Protection Agency (USEPA) to develop and implement programs to protect human health and enhance air quality. One program is the National Ambient Air Quality Standards (NAAQS), which set specific acceptable concentrations for six criteria pollutants (sulfur dioxide, carbon monoxide,

ozone, nitrogen oxides, lead, and inhalable particulate matter). Ambient air is defined as the portion of the atmosphere, external to buildings, to which the public has access (40 CFR 50.1). Table 4-2 lists the current NAAQS. For each of the six criteria pollutants, USEPA has set health-based or “primary” standards to protect public health, and welfare-based or “secondary” standards to protect the environment (crops, vegetation, wildlife, buildings and national monuments, visibility, etc.).

The CAA Amendments of 1990 (CAAA) defined air pollutant nonattainment areas and control requirements, expanded the list of Hazardous Air Pollutants (HAPs) to the current list of 188 pollutants, introduced technology-based control standards, established a new federal operating permit program, and addressed mobile source emissions, acid rain, and stratospheric ozone.

4.4.2. Regulatory Compliance and Classification

Congress has stated that the prevention and control of air pollution belongs at the state and local level, thus the USEPA has delegated enforcement of Prevention of Significant Deterioration, New Source Performance Standard and Title V programs to the Kansas Department of Health and Environment (KDHE). The KDHE has adopted the NAAQS by reference, thereby requiring the use of the standards shown on Table 4-2 within the State of Kansas. The KDHE implemented the Title V Operating Permit program through Article 28-19-500. The State of Kansas is divided into six Air Quality Control Regions (AQCRs). Fort Riley is located within the North Central Kansas Intrastate AQCR. An area that meets the NAAQS for a pollutant is classified as an “attainment” area for that pollutant, whereas an area that does not meet the NAAQS for a pollutant is classified as a “nonattainment” area for that pollutant. Ambient air quality for North Central Kansas is better than national standards for all six criteria pollutants.

4.4.3. Air Quality Permits

Fort Riley has a Title V Permit (Permit #1610001) issued on February 1, 2010. Fort Riley is not a heavily industrialized facility, nor in a heavily industrialized region, and problems obtaining additional air permits, as needed, are not anticipated. The surrounding areas are primarily rural, with little or no heavy industry.

4.4.4. Emission Sources

A comprehensive stationary source identification and emissions summary for Fort Riley was prepared in conjunction with the Title V operating permit application. The inventory portion of the project identified air emission sources, gathered information pertaining to material consumption and process operations, and obtained pertinent information for calculation of air pollution emissions. Source-specific emissions were derived from field data involving a variety of methodologies including emission factors, mass balance calculations, and computer models. The emission inventory only addressed stationary sources (no mobile sources). The sources identified during the inventory include those listed on Table 4-3. Tank activities are conducted primarily at the Douthit Multi-Purpose Range Complex (MPRC), with some use of Range 18. These activities consist of tactical tank movements in combination with weapons fire, or fire potential, to simulate battlefield conditions. Other activities, including cross-country training movements, are conducted within the Training and Maneuver Areas. Emissions of particulate matter result from driving/training on unpaved roads.

Table 4-2 National Ambient Air Quality Standards

Air Pollutant	USEPA Standard	Concentration	Remarks
Particulate Matter (PM ₁₀)	Primary and Secondary Standard	50 micrograms per cubic meter	Annual arithmetic mean. The standard is attained when the expected annual arithmetic mean is less than or equal to 50 micrograms per cubic meter.
	Primary and Secondary Standard	150 micrograms per cubic meter	24-hour average concentration. The standard is attained when the expected number of days per calendar year, with a 24-hour average above 150 micrograms per cubic meter, is equal to or less than one.
Sulfur Dioxide	Primary Standard	80 micrograms per cubic meter (0.03 ppm ¹)	Annual arithmetic mean.
	Primary Standard	365 micrograms per cubic meter (0.14 ppm)	Maximum 24-hour concentration not to be exceeded more than once per year.
	Secondary Standard	1,300 micrograms per cubic meter (0.5 ppm)	Maximum 3-hour concentration not to be exceeded more than once per year.
Carbon Monoxide	Primary Standard	10 milligrams per cubic meter (9 ppm)	8-hour average not to be exceeded more than once per year.
	Primary Standard	40 milligrams per cubic meter (35 ppm)	1-hour average not to be exceeded more than once per year.
Ozone	Primary and Secondary Standard	235 micrograms per cubic meter (0.12 ppm)	The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1. It should be noted that the one-hour standard would no longer apply to an area once USEPA determines that the area meets the one-hour standard. Instead, a new eight-hour standard would apply.
Nitrogen Dioxide	Primary and Secondary Standard	100 micrograms per cubic meter (0.053 ppm)	Annual arithmetic mean not to be exceeded.
Lead	Primary and Secondary Standard	1.5 micrograms per cubic meter	Maximum arithmetic mean averaged over a calendar quarter.
¹ ppm = parts per million			
Source: 40 Code of Federal Regulation 50			

Table 4-3 Fort Riley Emission Sources

Boilers/Heaters	Stationary Internal Combustion Engines	Abrasive Blasting
Surface Coating	Ozone Layer Depleting Substances	Degreasing
Woodworking	Landfills	Firing Range
Welding	Pesticide / Herbicide Application	Water Treatment
Wastewater Treatment	Road Dust	Structural and Road Painting
Open Burning / Open Detonation	Miscellaneous Chemical Usage	Earth Borrowing
Wildfires and Prescribed Burning	Fuel Storage and Dispensing	
Road Paving	Graphite/Smoke Generators	
<i>Source: Fort Riley</i>		

Kansas air regulations require Fort Riley to submit an annual air emissions inventory to KDHE by June 1 for the prior calendar year. The inventory summarizes stationary air pollution sources and emissions at the garrison. Source descriptions, emission calculation techniques, and sample calculations are provided for each source category. Based upon the emissions inventory, total hazardous air pollutant (HAP) emissions and volatile organic compound (VOC) emissions from both stationary and fugitive sources are within established standards.

4.4.5. Notices of Violation

Fort Riley is under the jurisdiction of USEPA Region VII and the KDHE. The KDHE conducts annual compliance inspections – the most recent was September 14, 2015. No violations were observed at the time of the inspection. In addition, Fort Riley regularly performs internal Army Environmental Performance Assessment System audits each year. Based on these two audit mechanisms, the garrison has implemented the required programs to maintain compliance with federal and state air regulations.

4.5. Soils

Fort Riley is part of the Great Plains Winter Wheat and Range Soil Resource Region. This region is covered with a foot or less of windblown material or loess. The loess rests upon alternating layers of weathered limestone and shale. Most soils are friable, silty loam 6 to 12 inches thick, overlying nearly impervious clays. Fort Riley's soils developed residually from parent materials and from other parent materials carried by water or wind and deposited at the garrison. The permeability of garrison soils varies from excessively drained sandy lowland soils to tight clays with very slow permeability. Bedrock depths under these soils vary from less than one foot in upland areas to 40 to 60 feet in many areas of Main Post.

The USDA Natural Resources Conservation Service (NRCS) (1996) mapped 36 soil series on Fort Riley and taxonomically categorized them into six soil associations. Figure 4-1 shows a simplified soil type map of Fort Riley.

4.6. Water Resources

Waters on Fort Riley are surface water in rivers, other perennial and intermittent streams, ponds and lakes, and groundwater aquifers. The Republican and Kansas rivers form the southern boundaries of Fort Riley. With the exception of oxbow lakes, the 174 lakes and ponds on Fort Riley are constructed impoundments. Aquifers receive water through alluvial deposits of streams and rivers, porous surface deposits, and fissured limestone in uplands by means of infiltration of rain and seepage from rivers into limestone and shale. Surface waters and nearby off-post waters are shown in Figure 4-2.

4.6.1. Groundwater

Groundwater aquifers occur in the alluvial deposits of the major streams and rivers, in the porous surface deposits, and in the fissured, near-surface limestone of the upland areas. Saturated, water-bearing sediments in the Kansas River valley range from zero to 90 feet in thickness. Well yields of 300 to 1,000 gallons per minute are obtained from aquifer thicknesses of 20 to 40 feet, and yields in excess of 1,000 gallons per minute can be obtained where aquifer thicknesses exceed 40 feet.

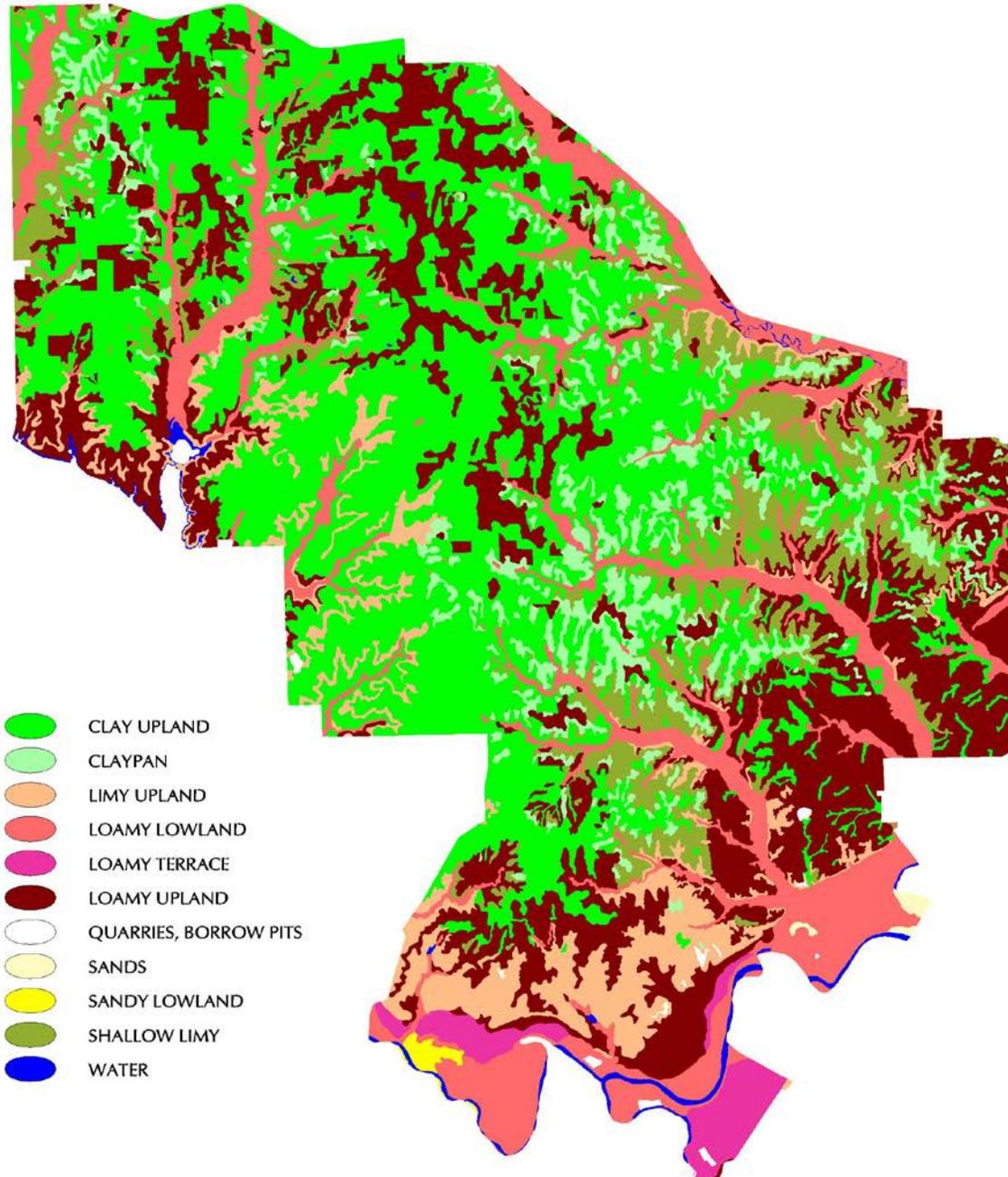
Moderate quantities of groundwater occur in the bedrock formations of the area, in particular the Fort Riley and Florence Limestone Formations. Where these limestones are fractured and/or contain solutioned cavities, well yields of 100 gallons per minute or more can be obtained. Wells that penetrate shales in the upland area will generally yield up to several gallons per minute.

Discharge from the valley-fill sediments, the major water-bearing deposits, is by seepage to major streams, evapotranspiration, and withdrawal by wells. Recharge of these deposits is by direct infiltration of precipitation, seepage from streams and ponds, return flow from irrigation, and seepage from the bedrock formations that border and underlie the valley.

4.6.2. Surface Water

Surface waters at Fort Riley are located within the Kansas River basin and consist of rivers, perennial and intermittent streams, ponds, and lakes. Nearly 145 miles of rivers and streams, consisting of 14 miles of rivers and 131 miles of streams, are present on Fort Riley. All 14 streams are intermittent except for Wildcat, Sevenmile, Madison, and Timber Creeks. Streams in the southern portion of Fort Riley drain to the south to the Republican or Kansas rivers, which form the garrison's southern boundary. Streams in the western portion of Fort Riley drain toward the southwest to Milford Lake on the Republican River. Streams in the northeastern portion of Fort Riley drain to Wildcat Creek, a perennial stream that runs along the northeastern boundary of the garrison. Wildcat Creek ultimately drains to the Kansas River south of Manhattan.

Simplified Soil Classifications, Fort Riley, KS.



SOURCE: Soil Survey Geographic (SSURGO),
USDA Natural Resources Conservation Service, 1996.

1 June 2000

Figure 4-1 Fort Riley Soil Types

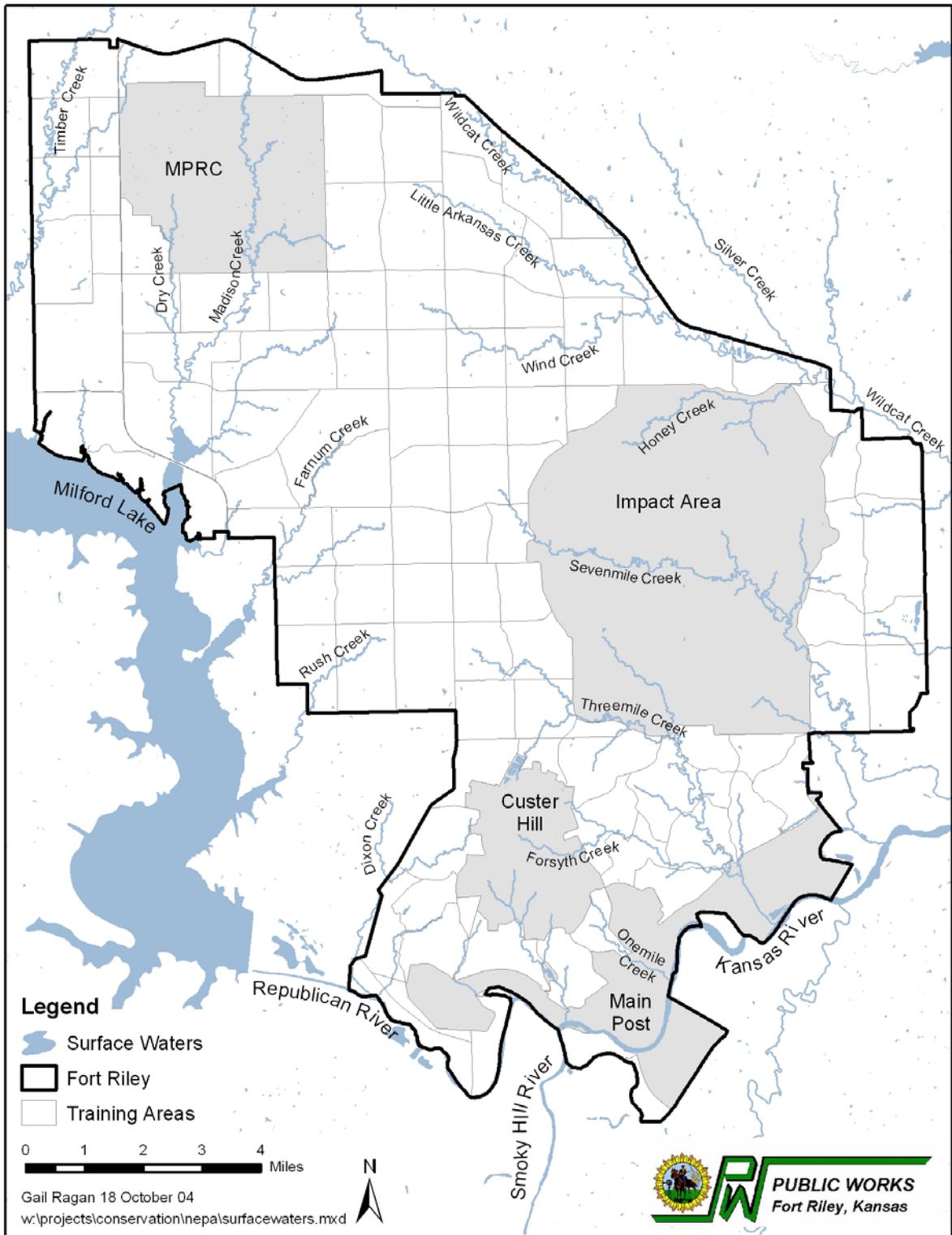


Figure 4-2 Fort Riley Surface Waters

4.6.3. Wetlands

Wetlands are defined as “those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR Part 328.3 (b); 40 CFR Part 230.41 and Part 230.3).

Wetland areas on Fort Riley include springs and seeps, streams, rivers, ponds and lakes, low areas behind terraces in abandoned crop-fields, and emergent marshes along the periphery of waterbodies, such as those within the Madison Creek and Farnum Creek arms of Milford Lake. In 1991, the U.S Fish and Wildlife Service (USFWS) documented approximately 1,449 acres of wetlands. Approximately another 84 acres have been constructed since the inventory (total 1,533 acres in 2002). Of this total, 972 acres are considered permanently inundated. Fort Riley has 145 miles of riverine habitat that encompasses 748 acres.

4.7. Flora and Fauna

DoD and Army Policies are to manage natural resources through an ecosystems approach that emphasizes the maintenance and integrity of native biodiversity. The management of entire flora and faunal communities is the core of ecosystems management. Thus, the PEA describes biotic resources in terms of communities.

4.7.1. Floral Communities

This region consisted of tall- and mixed-grass prairies dominated by big bluestem, indiangrass, and switchgrass under natural conditions (Kuchler, 1974). The pre-settlement prairie was maintained through recurring wildfires and grazing by herbivores. Woodlands were present within moist bottomlands of floodplains and along perennial stream corridors. However, past and current land management practices, such as the suppression of wildfires, the introduction of agriculture and stock grazing, and the construction and expansion of military facilities, have resulted in the establishment and expansion of several vegetation classes at Fort Riley. Figure 4-3 shows the coverage of four broad categories of land cover type on the garrison. These categories are grassland, woodlands and forests, water, and urban areas.

The results of a 2004 Kansas Biological Survey (KBS) study of the vegetation of Fort Riley indicate that more than 80 families and nearly 520 species of plants are present on the garrison (Freeman and Delisle, 2004).

4.7.1.1. *Grasslands*

Approximately two-thirds of Fort Riley is grassland that conforms to one of two basic types: native prairie or “go-back” grasslands. Areas designated as “go-back” are grasslands established on lands that were once cultivated. It is estimated that about 40% of Fort Riley grassland is native prairie, and that the remaining 60% is “go back” grassland (or highly disturbed grassland).

The native grasslands of Fort Riley consist primarily of tallgrass prairie. Some elements of the mixed-grass prairie exist because Fort Riley is located near the transition zone between the tallgrass prairie and the mixed-grass prairie to the west (Kuchler, 1974).

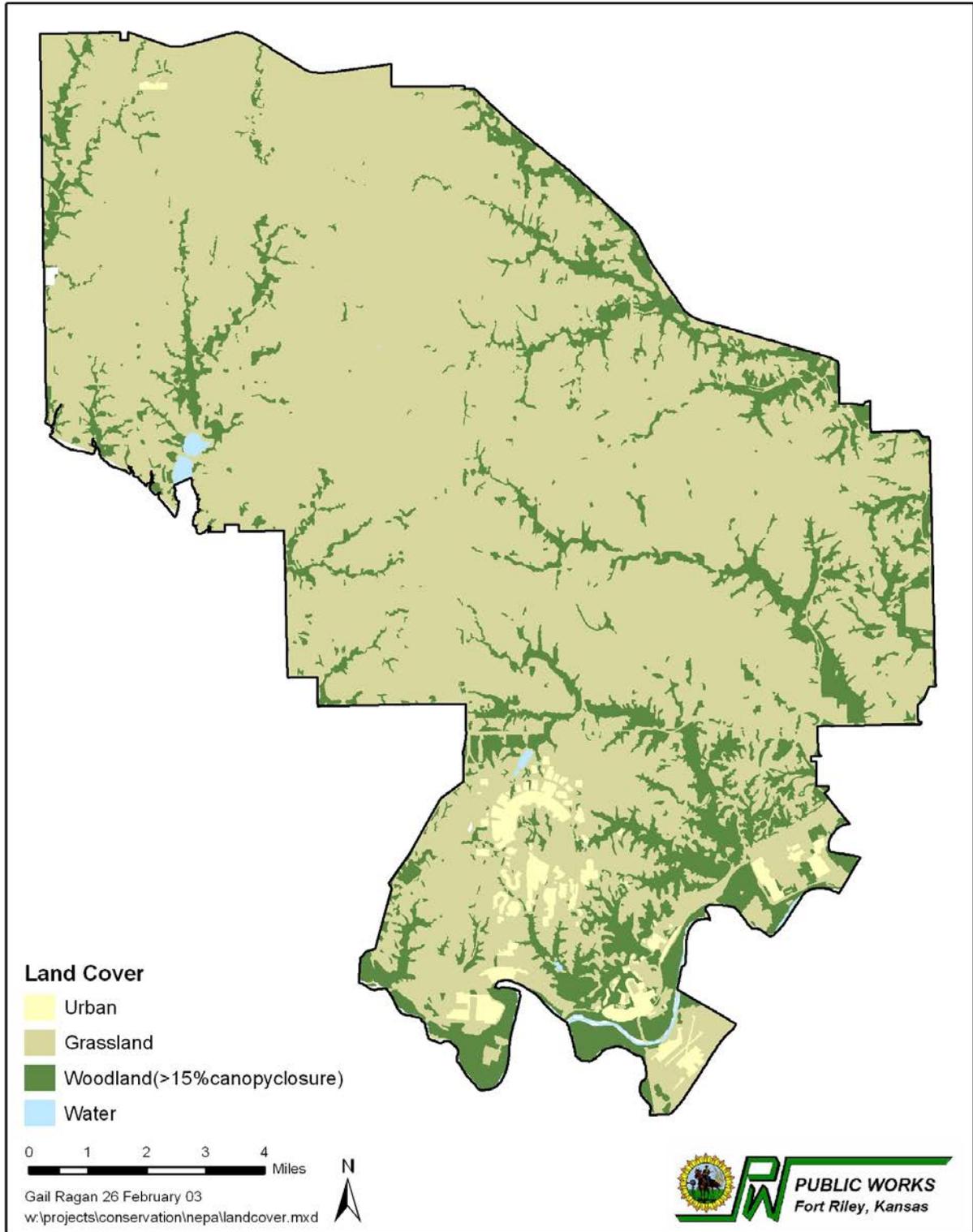


Figure 4-3 Fort Riley Land Cover Types

The native grasslands on Fort Riley generally do not exhibit dominance patterns of big bluestem, indiagrass, switchgrass, and mid-grasses, such as little bluestem and sideoats grama. Past land use and management, and military training exercises have produced native grasslands intermixed with woody species. Grasses, such as tall dropseed, tall witch grass, and foxtail, increase as a result of disturbance. The grasslands with the least soil disturbance contain the highest percentages of native warm-season grasses, such as those mentioned above, and associated forbs (U.S. Army Corps of Engineers, 1991).

Some of the “go-back” grassland areas on Fort Riley ceased to be cultivated prior to their acquisition by the Army. Most ceased to be cultivated after acquisition. The “go-back” lands are in various stages of ecological succession. Early seral stages consist of annual grasses (prairie threeawn, green bristlegrass, Japanese brome). Forbs (Missouri goldenrod, daisy fleabane, snow-on-the-mountain, western ragweed) are present in areas that continue to have frequent vehicular traffic (e.g., parts of Maneuver Areas A, D, B and E).

Other “go-back” grassland areas not as frequently or intensively affected by military vehicles are in slightly further developed seral stages. Dominant species in these areas are those typically occurring in the post's native grasslands or cool season perennial “tame” grasses (mainly smooth brome and lesser amounts of tall fescue) or mosaics of native tallgrass prairie species and perennial cool season “tame” grasses. More than 75% of Maneuver Area O consists of “go-back” and disturbed, but not previously cultivated, grasslands. In addition, Maneuver Areas D, H, and K each have more than 2,500 acres of “go-back” land primarily in their eastern portions.

4.7.1.2. *Shrublands*

Extensive areas of shrubland are not a historic feature of the prairie environment. The reduction in wildfires and grazing practices employed prior to the garrison's acquisition by the federal government, as well as the abandonment of cropfields upon the area's acquisition and subsequent fire suppression efforts, has contributed to the establishment of shrublands on Fort Riley. Nevertheless, shrublands remain a minor component of the garrison's landscape, covering no more than 2 to 5 percent of the post.

Shrublands are located along the edges of woodlands, and in isolated patches along the smaller intermittent drainages and ravines, and sheltered areas within grasslands. The vegetation represents a successional stage between grassland and young woodland. The most common species include American plum, rough-leaved dogwood, smooth sumac, buckbrush, eastern red cedar, Arkansas rose, and smaller individuals of hackberry, American elm, and other trees.

4.7.1.3. *Forestlands*

Approximately 16,400 acres of Fort Riley is forestland. Most of this acreage is associated with the bottomland forests along the Republican and Kansas rivers and the woodlands within the drainages of Threemile, Sevenmile and Wildcat Creeks. The bottomland forests along the Republican and Kansas rivers have a tall canopy formed by cottonwood, hackberry, green ash, red mulberry, sycamore, American elm, red elm, bur oak, chinquapin oak, and black walnut. The understory of these woodlands consists of woody shrubs or herbaceous cover.

Forests within higher elevations in smaller stream valleys and ravines are dominated by bur oak and chinquapin oak, American elm, red mulberry, bitternut hickory, black walnut, green ash, and honey locust on the lower slopes with the upper regions of some of these sites producing savanna

type vegetation. The understory consists of grasses, forbs, shrubs, and young canopy species with varying densities and dominance patterns. Pole-size stands at higher elevations near the heads of drainages and in isolated patches are dominated by hackberry and American elm mixed with shrubs, forbs, and grasses. Upland forests are more extensive in the north and east aspects than in the south or west.

Twenty-eight tree species have been recorded on Fort Riley. A Forest Inventory conducted 1997-1998 showed the most common species were (in descending order) American elm (21.6%), hackberry (19.4%), and chinquapin oak (9.1%). The median forest tree was eleven inches Diameter at Breast Height (DBH) and was just less than 40 feet tall and about 40 years old. Most stands had a considerable number of pole size trees and were relatively young; only five of the 292 trees aged were more than 100 years old. Twenty percent of the trees were saleable, but they fell predominantly in the 16-20 inch DBH class. A significant portion (7.4%) of the standing trees in forest plots were snags, and nearly a quarter of the post's woodlands had excessive basal area (over 100 square feet per acre), which would require some form of thinning to maintain forest health.

Most areas contain mixed species, but some have primarily chinquapin oak or hackberry. The most common species of woody regeneration are American elm (24%) and hackberry (18%). Species composition, however, is generally shifting from an oak and hickory composition to nearly pure stands of hackberry. Although the regenerating hackberry is less abundant than American elm, hackberry is generally present in larger size classes than elm. The primary factor for the species change is lack of disturbance in forest stands. This allows shade tolerant hackberry to rise from the understory to codominance.

The most common non-tree plants in the understory are rough-leaved dogwood (19%), Virginia creeper (12%), buckbrush (9%), and poison ivy (8%), and the average height of understory plants is just over three feet. Approximately one percent of the understory vegetation in woodland plots is listed by Kansas as a noxious weed, the principal one being sericea lespedeza.

Most stands (83%) have minimal fuel-loading levels. The remaining stands have a moderate fuel loading level (fuels would burn from 1-10 hours).

4.7.1.4. *Savannas*

Fort Riley's ecosystem has natural components that are not unlike those in savannas, which are often considered ecotones between forests and grasslands. Savannas are areas that have tree canopy coverage from 5-15%, are 1 acre or more in size, have associations with typical prairie vegetation, and have canopies that are typical of open-grown trees. Savanna vegetation composition and density are mainly determined by fire. Consequently, the pattern and extent of present savannas depend on recent fire histories and the land's geomorphology. Most sites on Fort Riley meeting the above criteria for a savanna are in Maneuver Areas A, D, J, and N (Figure 4-4). The total area of savanna sites on Fort Riley is approximately 450 acres.

A survey of Fort Riley's savannas was completed in 1999, and it showed more than one-fourth of the plots surveyed have significant visible fire indicators on the trees. Fort Riley's savannas have an average of 25 trees per acre. Thirteen tree species were recorded. The most common are hackberry (33%), American elm (22%) and green ash (12%). Sixty-two species of understory plants exist in Fort Riley's savannas; the most common are smooth brome grass

(37%), big bluestem (12%), Japanese brome grass (5%), and little bluestem grass (5%). Notably, noxious weeds are very rare on the savanna sites (0.1%).

4.7.1.5. *Croplands*

Croplands are a minor component of the Fort Riley ecosystem. Approximately 1,422 acres are located along much of east, north, and west boundaries and are leased to local farmers. Approximately 500 additional acres of croplands serve as wildlife foodplots throughout the garrison.

4.7.2. Faunal Communities

Fort Riley habitat supports at least 43 species of mammals, 223 species of birds, 44 species of reptiles and amphibians, and 51 species of fish (U.S. Army, DES, 2001; Pitts et al., 1987; U.S. Army Corps of Engineers, 1991; U.S. Fish & Wildlife Service, February 1992; Busby, et al., 1994; Quist, 1999). Many of these species are year-round residents although most of the birds are seasonal migrants.

4.7.2.1. *Game Animals and Furbearers*

Fort Riley supports viable populations of all of the typical game species found in this region of Kansas, as well as a huntable elk population (1998 to present). Upland game birds include bobwhite quail, ring-necked pheasant (the only exotic terrestrial game species on Fort Riley), prairie-chicken, turkey, mourning dove, and woodcock. In addition, a variety of ducks is common. Fox squirrels and cottontail rabbits are common; gray squirrels are uncommon; and jackrabbits are rarely seen. Those species on Fort Riley that the state defines as “big game”, are white-tailed deer, mule deer (rarely present), and elk. Furbearer species are badger, bobcat, mink, muskrat, opossum, raccoon, red fox, gray fox, striped skunk, coyote, and beaver. Principle game species and furbearers are described below.

4.7.2.2. *Non-Game Animals*

Twenty-four species of non-game mammals have been documented to occur on Fort Riley. Thirty-seven species of reptiles and amphibians (19 species of snakes, 9 lizards, and 9 amphibians) have been observed on Fort Riley. The most common species are the ringneck snake and the western chorus frog. Fort Riley has seven species of turtles (of the group Chelonia).

Numerous inventories conducted have documented 51 species of fish in Fort Riley’s streams, lakes, and ponds. Thirty-four species have been found in the Kansas, Smoky Hill and Republican rivers. Fish assemblages in ponds and lakes are largely represented by species managed for recreational fishing. Inventories of aquatic insects and mussels have been conducted in Fort Riley’s perennial streams. Nineteen orders/families of aquatic insects and evidence of 17 species of mussels have been documented. Seven of these mussel species were found extant (still existing) on the garrison. The other 10 mussel species have apparently been extirpated (no longer existing) on the garrison.

4.7.2.3. *Migratory Birds*

Numerous inventories of birds have been conducted on Fort Riley, resulting in the observation of 223 species, most of which are migrant, non-game passerines. Many of these species are

Neotropical Migrant Birds (NTMBs). Birds occupy a wide range of habitats on the garrison, from riverine sandbars to interior woodlands.

Grassland birds have experienced the most severe decline in population of any type of land bird in North America. Fort Riley's predominant cover type is grassland, and provides habitat for some grassland species in decline throughout their range. Fort Riley also contains substantial woodland habitat. These woodlands have been found to attract NTMBs that are characteristic of interior woodland tracts. Many species of interior woodland NTMBs have experienced population declines throughout their ranges. Historically, little effort has been directed toward specific management of nongame birds that are not protected by federal or Kansas endangered species laws. However, the DoD and the Army place special emphasis on protecting NTMBs through participation in the Partners in Flight program, and strongly advocates their management.

The DoD has an authorization to take migratory birds, with limitations, that results from DoD military readiness activities. The 2003 National Defense Authorization Act strictly defines a "military readiness activity": all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Military readiness activities do not include the routine operation of garrison support facilities such as administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; morale, welfare, and recreation activities; shops; mess halls; industrial facilities; or the construction or demolition of garrison support facilities.

The take or possession of migratory birds by the Environmental Division, DPW and U.S. Department of Agriculture-Wildlife Services (USDA-WS) is conducted under federal and state permits. The USDA-WS possesses a federal "Special Purpose" permit that allows the take of migratory birds (except bald or golden eagles and threatened or endangered species). The permit also authorizes retrieval and possession of injured migratory birds "including eagles". The USDA-WS also possesses a State of Kansas Scientific, Education or Exhibition Permit that allows the collection of all native Kansas species, including any sick, injured, or otherwise incapacitated migratory bird species, or body parts and carcasses thereof. The Environmental Division, DPW possesses a State of Kansas Scientific, Education or Exhibition Permit as well.

4.7.3. Threatened and Endangered or Rare Species

Numerous systematic surveys conducted since 1990 have documented the presence of federally and/or state-listed T&E species, and rare species (Table 4-4). Other listed or rare species have never been observed but could possibly occur on Fort Riley. Rare species are those designated by the Kansas Department of Wildlife and Parks (KDWP) as "Species in Need of Conservation" (SINC) or by the Army as "Species at Risk" (SAR). The SINC and SAR designations confer no legal protection under the Endangered Species Act or the Kansas Nongame and Endangered Species Conservation Act (KNESCA). Federally listed species receive legal protection under the Endangered Species Act (ESA).

Table 4-4 Federally- and State-listed Species and Other Rare Species That Occur or Could Occur on Fort Riley

Species	Federal	State	Possibility on Fort Riley
Common shiner, <i>Luxilus cornutus</i>		SINC	Resident
Southern redbelly dace, <i>Phoxinus erythrogaster</i>		SINC	Resident
Johnny darter, <i>Etheostoma nigrum</i>		SINC	Resident
Bobolink, <i>Dolichonyx oryzivorus</i>		SINC	Migrant
Black rail, <i>Laterallus jamaicensis</i>		SINC	Migrant
Black tern, <i>Chlidonias niger</i>		SINC	Migrant
Eskimo curlew, <i>Numenius borealis</i>	E	E	Possible
Ferruginous hawk, <i>Buteo regalis</i>		SINC	Migrant - possible winter resident
Golden eagle, <i>Aquila chrysaetos</i>		SINC	Transient
Henslow's sparrow, <i>Ammodramus henslowii</i>	SAR	SINC	Summer resident
Least tern, <i>Sterna antillarum</i>	E	E	Migrant – possible nesting
Piping plover, <i>Charadrius melodus</i>	T	T	Migrant – possible nesting
Rusty Blackbird, <i>Euphagus carolinus</i>	SAR		Migrant
Short-eared owl, <i>Asio flammeus</i>		SINC	Resident
Snowy plover, <i>Charadrius alexandrinus</i>		T	Migrant
Eastern Whip-poor-will, <i>Antrostomas vociferous</i>		SINC	Summer resident
Long-billed Curlew, <i>Numenius americanus</i>		SINC	Possible
Whooping crane, <i>Grus Americana</i>	E	E	Possible
Yellow-throated Warbler, <i>Dendroica dominica</i>		SINC	Possible
Southern bog lemming, <i>Synaptomys cooperi</i>		SINC	Resident
Eastern spotted skunk, <i>Spilogale putorius</i>		T	Possible
Franklin's Ground Squirrel, <i>Spermophilus franklinii</i>		SINC	Possible
Northern Long-eared bat, <i>Myotis septentrionalis</i>	T	SINC	Possible
Eastern hognose snake, <i>Heterodon platirhinos</i>		SINC	Possible
Timber rattlesnake, <i>Crotalus horridus</i>		SINC	Possible
Western hognose snake, <i>Heterodon nasicus</i>		SINC	Resident
Texas horned lizard, <i>Phrynosoma cornutum</i>	SAR		Resident
Blue sucker, <i>Cycleptus elongatus</i>		SINC	Resident
Highfin Carpsucker, <i>Carpodes velifer</i>		SINC	Possible
Plains minnow, <i>Hybognathus placitus</i>		T	Confirmed
Silver chub, <i>Macrhybopsis storeriana</i>		E	Possible
Sturgeon chub, <i>Macrhybopsis gelida</i>		T	Resident
Topeka shiner, <i>Notropis Topeka</i>	E	T	Resident

Species	Federal	State	Possibility on Fort Riley
American burying beetle, <i>Nicrophorus americanus</i>	E	E	Possible
Prairie mole cricket, <i>Gryllotalpa major</i>		SINC	Resident
Regal fritillary butterfly, <i>Speyeria idalia</i>	SAR	NA	Resident
Western prairie fringed orchid, <i>Platanthera praeclara</i>	T	NA	Possible
<p>E = Endangered, In danger of extinction throughout all or a significant portion of its range.</p> <p>T = Threatened, Likely to become endangered within the foreseeable future.</p> <p>SAR = Species at Risk, US Army designation for priority species in need of conservation on installations.</p> <p>SINC = Species in Need of Conservation, Questionable ability to be self-sustaining species in Kansas.</p> <p>Possible = Habitat is present and species range overlaps the area but the species is not documented on FRK.</p>			

4.7.3.1. Plant Species

The only plant species federally listed as threatened or endangered that possibly may exist on Fort Riley is the western prairie fringed orchid. However, it has not been found despite systematic surveys.

4.7.3.2. Animal Species

Three animals found on Fort Riley are federally listed species. Two are birds: the least tern and piping plover, neither of which are year-around residents (they are uncommon migratory transients). When present, those two species generally use the major rivers and reservoir areas around the periphery of the post.

The Topeka shiner, a small fish, is the third species and the only federally listed species on Fort Riley year-round (Quist, 1999). It has been found in Wildcat, Sevenmile, Wind, Little Arkansas, Honey, and Silver Creeks, all of which are streams on the east side of the garrison, though not since 2011 despite annual, systematic surveys of those streams conducted since then. It has not been found in other Fort Riley streams despite systematic surveys of them.

The bald eagle was removed from the federal list (June 28, 2007) and the state list (June 25, 2009) of T&E species. Bald eagles winter on Fort Riley, often roosting or foraging along the Republican and Kansas rivers, and Milford Lake as well. In recent years, nesting has occurred on and near the garrison. Even though the bald eagle has been de-listed, Fort Riley's management of the species will remain largely unchanged, because the garrison will comply with the Bald and Golden Eagle Protection Act (amended 1962) and the USFWS management guidelines released on the bald eagle's delisting date (June 28, 2007).

Details pertaining to the management of the three federally listed and recently delisted species present on Fort Riley are contained in the garrison's Integrated Natural Resources Management Plan (INRMP).

4.7.3.3. *Listed Habitats*

There is no federal threatened and endangered species critical habitat on Fort Riley. However, the state has designated critical habitat on post for five species: Topeka shiner, piping plover, least tern, sturgeon chub, and plains minnow. All waters within the corridor along the main stem of the Kansas River have been listed as state-designated critical habitat for the least tern and piping plover. State-designated critical habitat for the sturgeon chub and plains minnow is the main stem of the Kansas River from its confluence with the Republican and the Smoky Hill rivers to its confluence with the Missouri River. Stretches along Wildcat, Little Arkansas, Wind, Honey, Seven Mile and Silver Creeks are state-designated critical habitat for the Topeka shiner.

4.8. Pest Management

To control pests, Fort Riley continuously implements an Integrated Pest Management Plan (IPMP). In accordance with that IPMP, Fort Riley employs the principles of Integrated Pest Management (IPM), an ecosystem-based approach that focuses on the prevention of pests or their damage through a combination of methods such as habitat manipulation, modification of cultural practices, and biological control. The IPM philosophy prescribes the use of pesticides only after monitoring indicates the need according to established guidelines. Fort Riley's IPMP includes several key priorities: control of disease vectors and public health pests; control and prevention of household and stored food pests; control of invasive plants; control of animal pests; and control of pests in the natural environment.

4.9. Cultural Resources

Cultural resources include any prehistoric or historic district, site, building, structure, or object significant in American history, architecture, archeology, engineering, or culture that is listed in or potentially eligible for listing in the National Register of Historic Places (NRHP). Cultural Resources include artifacts, records, and material remains related to such a property or resource. Fort Riley is responsible for identifying and protecting significant archeological and architectural resources in order to comply with the National Historic Preservation Act (NHPA) of 1966, as amended, and the Archaeological Resources Protection Act (ARPA) of 1979. A number of cultural resource surveys inventorying and documenting archeological and architectural resources have been conducted on Fort Riley.

Fort Riley's Main Post area was listed as a National Register Historic District in the NRHP in 1974. Nearly 300 historic buildings and structures are present in the district. These include officer and enlisted soldiers quarters, barracks, historic hospitals, stables, headquarters, supply buildings, garages, and pump houses. In addition to the standing structures listed on the NRHP, the Main Post Historic District (MPHD) also includes 101 archeological sites and numerous historic landscapes. The first Territorial Capitol Building of Kansas is located near the Kansas River on Fort Riley and is independently listed on the NRHP. The locations of 281 prehistoric, 470 historic, 31 military, and 29 multi-component (prehistoric/historic combination) sites have been identified on Fort Riley outside of the MPHD.

A Programmatic Agreement (PA) among the DA, Fort Riley, the Kansas State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP) addresses activities at the garrison that affect historic properties included in or potentially eligible for inclusion in the NRHP (U.S. Army, Environmental Division, DPW, 2012). The PA ties together the more specific management practices and activities that the garrison had been

accomplishing under several individual management plans and agreements. These other plans and agreements include the following:

- The garrison's Integrated Cultural Resources Management Plan (ICRMP), which provides a programmatic basis and guidance for the management and preservation of cultural resources in accordance with the Archeological Collections Management Recommendations (CERL, 1996).
- The Comprehensive Agreement Regarding Inadvertent Discovery and Intentional Excavation of Native American Human Remains and Cultural Items for which the (Kaw or Pawnee) Nation May Have Priority of Custody Within Lands Owned or Controlled by the U.S. Army at Fort Riley, Kansas. This agreement covers the treatment of Native American Human Remains and Cultural Items as defined by the Native American Graves Protection and Repatriation Act (NAGPRA).
- The Historic Landscape Inventory for the Main Post at Fort Riley, Kansas (CERL, 1995), which provides the garrison with a brief analysis regarding the evaluation of eleven landscapes on Main Post and vicinity relating to the NHPA.
- The Historical and Architectural Documentation Report (CERL, 1993), which was produced to assist in the effective management of historic structures present at Fort Riley. The report includes: the Historic American Buildings Survey Level IV inventory results; an historical overview of Fort Riley; recommendations for the establishment of NRHP districts and thematic groups within the districts at Fort Riley; and a management overview of the recommendations made.

Pursuant to Section 110 of the NHPA, Phase I archeological and architectural surveys at Fort Riley are ongoing to provide a complete inventory of prehistoric and historic cultural resources. The ICRMP also identifies and evaluates treatment or protection standards that would ensure the preservation and/or reduction of adverse effects on significant historic properties (e.g., districts, buildings, structures, objects, and archeological sites).

4.10. Contaminated Sites

Numerous environmental investigations and sampling events performed at Fort Riley have identified facilities and activity locations where suspected releases of hazardous substances into the environment have occurred. The Fort Riley Installation Restoration Program (IRP) manages these sites on the garrison.

The IRP is a program within the Defense Environmental Restoration Program (DERP) established by Section 211 of the Superfund Amendments and Reauthorization Act (SARA) of 1986. The scope of the program includes identification, investigation, research and development, and cleanup of contamination from hazardous substances and pollutants. Initial studies performed by the U.S. Army in 1984 and 1988 identified areas at Fort Riley that required further sampling and/or remedial action and formed the foundation for the Fort Riley IRP. Figure 4-4 shows contaminated sites and landfills on Fort Riley.

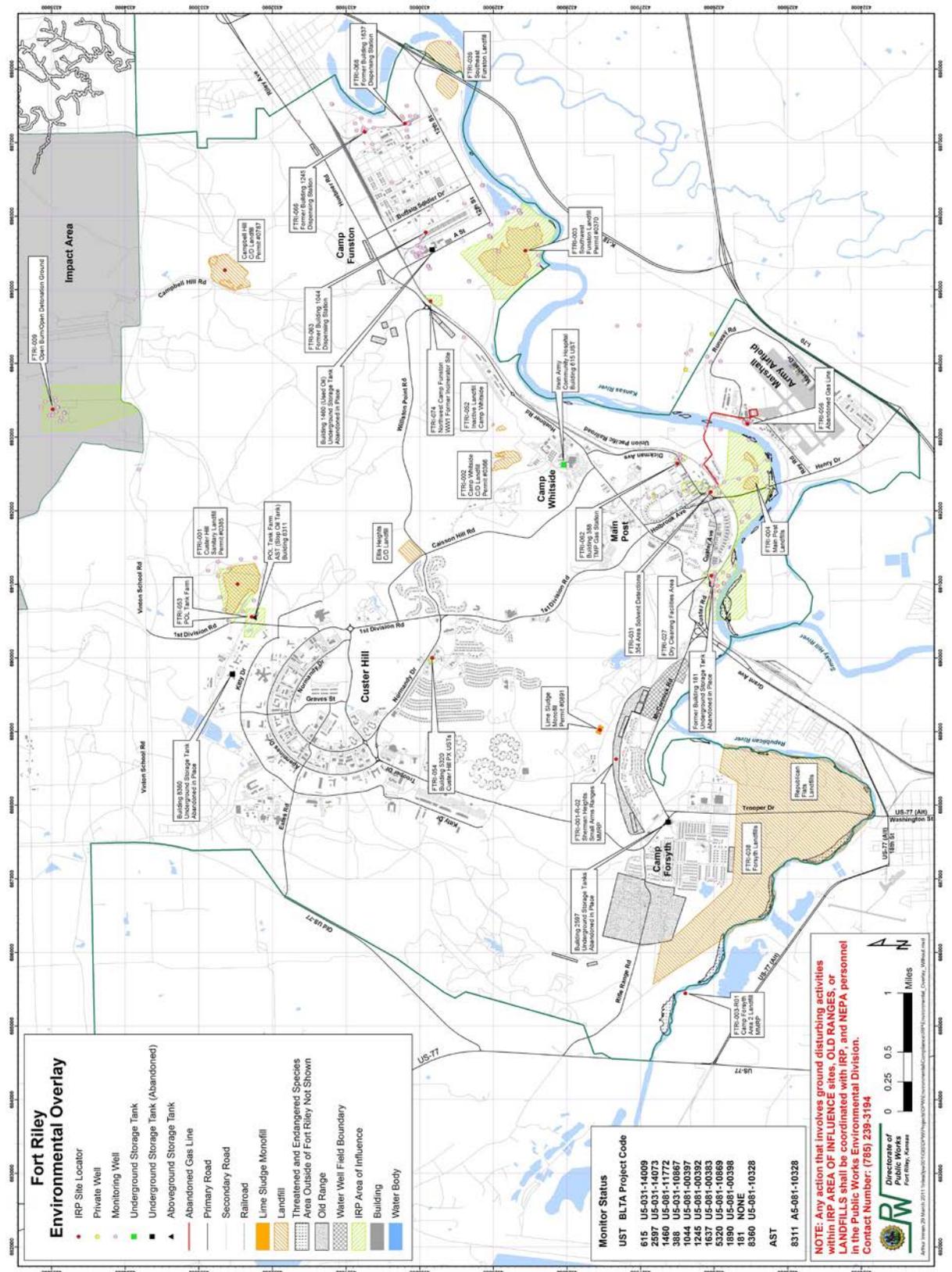


Figure 4-4 Landfills and Contaminated Sites on Fort Riley

4.11. Sociological Environment

This section considers the sociological attributes potentially affected by the Proposed Action. The PEA describes the following attributes:

- The demographics of Fort Riley and its Region of Influence (ROI)
- Economics
- Visual and aesthetic values
- Recreational activities

4.11.1. Demographics

Fort Riley lies in portions of Geary, Riley, and Clay counties. The nearest communities to the garrison are Grandview Plaza, Junction City, Manhattan, Milford, Ogden, Riley, Wakefield, Bala, and Keats. The area of socioeconomic impact, influenced by Fort Riley, extends beyond Geary, Riley, and Clay counties.

Fort Riley's presence has had a measurable effect upon the overall population and employment levels surrounding the garrison. The following sections describe the current demographics and demographic trends for Fort Riley and the surrounding area, defined as the ROI.

4.11.1.1. *Fort Riley Population*

Fort Riley supports a population of 46,636 composed of 17,522 Soldiers, 22,592 family members, and 6,522 civilian employees (U.S. Army, PAI, 2014). Another 3,817 retirees are dependent on Fort Riley services. The civilian workforce consists primarily of DA appropriated funds employees, DA non-appropriated funds employees, contractors, school employees, Army – Air Force Exchange System employees, and tenants. The majority of the military personnel residing off post live in Junction City or Manhattan.

Fort Riley processed 21,974 annual, weekend, or mobilized reserve component trainees during Fiscal Year (FY) 2014.

4.11.1.2. *Regional Population*

The area considered as Fort Riley's ROI, as defined by the U.S. Army's Economic Impact Forecasting System (EIFS), incorporates surrounding counties within an approximate 50-mile commute of the garrison. Based upon this and other criteria, the ROI for Fort Riley consists of eight counties: Clay, Dickinson, Geary, Morris, Ottawa, Pottawatomie, Riley, and Wabaunsee. Geary and Riley counties, within which Fort Riley is located, receive the majority of the direct and indirect social and economic effects from Fort Riley. For example, in 2010, almost one-half of the combined population of Geary and Riley counties consisted of Fort Riley active military personnel and family members, and civilians employed at Fort Riley.

Census records further suggest that the presence of Fort Riley contributes to local population maintenance and growth, and that the garrison exerts a stabilizing influence on the population of the ROI. For example, U.S. Census Bureau *State & County QuickFacts* indicates that during the 100-year period from 1900 to 2000, five of the eight ROI counties have declined in population, and that one county steadily lost population through the 1970s before rebounding in the year 2000 to the level of 100 years earlier. Those trends are consistent with decades-long population

declines in many rural Midwestern counties. In contrast, the populations of Geary and Riley counties have grown dramatically over the past 100 years (Geary County population has nearly tripled and Riley County population has more than quadrupled); that growth more than offsets population losses in nearby counties. Overall, the population of the eight-county Fort Riley ROI has grown by almost 35% over the past 100 years. The military mission at Fort Riley, combined with non-farm economic activities in Junction City and Manhattan, has provided a growing economic base for the ROI and its population over the last 100 years.

U.S. Census Bureau (2014) data show that five of the counties in the Fort Riley ROI experienced population increases from 2000 to 2010: Geary County (23.0%), Pottawatomie County (19.0%), Riley County (13.0%), Dickinson County (2.0%), and Wabaunsee County (2.0%). The remaining three Fort Riley ROI counties experienced decreases in population over that period: Ottawa County (-1.0%), Clay County (-3.0%), and Morris County (-3.0%). Military upsizing at Fort Riley after 2005 likely bolstered counties that exhibited population growth over the 10-year span between 2000 and 2010.

4.11.1.3. Elementary, Middle, and Secondary Schools

The total number of military and civilian personnel assigned to Fort Riley affects area schools. According to the Fort Riley Economic Impact Summary (U.S. Army, PAI, 2014), children of personnel assigned to Fort Riley comprise about 28% of the total student population of the region's schools. Children of military personnel that reside on-post attend schools in the Junction City Unified School District (USD) 475. The majority of Fort Riley military and civilian personnel that reside off-post live in or near Junction City and Manhattan, and their children attend school in Junction City USD 475 or Manhattan USD 383.

The U.S. Department of Education provides federal impact aid to school districts that have federal lands in their jurisdiction. School districts receive federal impact aid for each student whose parents live or work on federal property. Estimated federal impact aid payments to Junction City USD 475 and Manhattan USD 383 reported in 2014 were \$14,400,846 for USD 475 and \$228,658 for USD 383 (U.S. Army, PAI, 2014).

4.11.2. Economics

The capacity of a community to provide employment for its citizens is an indicator of that community's economic health. Table 4-5 summarizes the employment environment of the Fort Riley ROI. The largest work forces are found in Riley, Geary, Pottawatomie, and Dickinson counties. Residents of those four counties comprise more than 80% of the Fort Riley ROI work force, and many of those workers find employment at the economic hub of the ROI: Fort Riley, Manhattan, and Junction City; communities that are the largest in the area and that constitute a nearly contiguous urban area of economic activity. The unemployment rate in the Fort Riley ROI was 4.7% in 2012, less than the State of Kansas unemployment rate of 6.7% for that same year. According to the U.S. Census Bureau (2014), the median household income in 2012 for the Fort Riley ROI ranged from \$43,364 in Riley County to \$56,775 in Pottawatomie County. The statewide median household income was \$51,273.

As described above and in Section 4.10.1.2, the economic impact of Fort Riley to the surrounding area is substantial. Fort Riley contributed \$1,629,891,957 to the local economies in Fiscal Year 2014; i.e., October 1, 2013 through September 30, 2014 (Table 4-6).

Table 4-5 Fort Riley ROI Employment Summary (2012)

County	Work Force	Employed	Unemployed	Percent Unemployed
Clay	4,083	4,015	68	1.7
Dickinson	9,959	9,374	585	5.9
Geary	14,244	13,212	1,032	7.2
Morris	3,169	3,013	156	4.9
Ottawa	3,146	2,977	169	5.4
Pottawatomie	10,882	10,605	277	2.5
Riley	34,815	33,349	1,466	4.2
Wabaunsee	3,717	3,550	167	4.5
ROI	84,015	80,095	3,920	4.7

Source: U. S. Census Bureau, 2014

Table 4-6 Fort Riley Expenditures, Fiscal Year 2014

Activity	Amount (\$)
Payroll ¹	1,211,638,386
Contracts, Supplies, and Services	215,621,553
Construction Projects	78,363,327
Other Miscellaneous Expenditures ²	124,268,691
Total	1,629,891,957

¹Pay for military personnel, civilian employees, and Army retirees.
²Funds for education and health care.

Source: Plans, Analysis, and Integration Office, *Economic Impact Summary FY 2014 Fort Riley, Kansas*

Fort Riley operations generate substantial revenues to local economies through wage and salary payments to military and civilian employees, construction contractor payments, and operating costs such as rent and lease payments for various types of equipment, utilities, telephone, office supplies, and non-construction contracts. Purchases in the area by the 17,522 military personnel assigned to Fort Riley and their 22,592 family members make a significant contribution to the retail and service segments of the regional economy.

The positive contribution of Fort Riley to local economies can be expressed in another way – induced direct and indirect employment, or the number of jobs that are induced in the private sectors as a direct result of military troop levels and off-post expenditures. Despite the apparent

day-to-day operation of Fort Riley as a self-sustaining garrison, personnel and their dependents make considerable use of retail and service facilities, while the various groups and commands on-post annually contract or purchase millions of dollars in goods, services and equipment from area businesses. Those actions result in induced employment.

The concept of induced employment related to military garrisons was addressed in a number of studies and these studies have developed multipliers, which can be used to estimate the number of jobs that are created based upon a garrison's military population and the number of civilians employed. The multipliers to be used to estimate the induced employment associated with the number of military personnel assigned to a garrison range from 1.08 to 1.80. Put another way, this means that between 108 and 180 permanent jobs will be created in the private labor sector for each 100 military personnel assigned. The application of those multipliers reveals that between 18,924 and 31,540 jobs in the surrounding community have been created to support the 17,522 military personnel assigned to Fort Riley.

The civilian employees at Fort Riley also have an effect on private employment in the surrounding communities. They spend a high proportion of their pay in the local communities. Consequently, civilian workers at Fort Riley induce a proportionately higher number of jobs in the private sector than do the military personnel. It is estimated that the employment multiplier for civilian employees ranges between 2.5 and 3.0. This means that between 250 and 300 jobs are created for each 100 civilian employees at Fort Riley. On this basis, from 16,305 to 19,566 jobs are created because of the approximately 6,522 civilians employed on Fort Riley.

Based upon the analysis described above, the employment induced into the area around Fort Riley (from the multiplier effect of assigned military personnel and civilian employees) could range from as low as approximately 35,229 jobs to a high of around 51,106 jobs. The total civilian employment in the Fort Riley ROI totaled 80,095 in 2012. A comparison of the civilian employment in the ROI and the installation's induced employment provides a basic indication of Fort Riley's effect on employment in the surrounding communities. If the civilian employment on-post and the induced employment off-post are combined, likely more than 50% of existing nonmilitary jobs in the Fort Riley ROI can be attributed to the presence of the garrison.

4.11.3. Visual and Aesthetic Values

Natural resources enhance the aesthetic quality of Fort Riley. Located in the Flint Hills, Fort Riley contains rolling prairie hilltops with rugged riparian valleys; quality streams; and an abundance of fish and wildlife. The major stream corridors have retained much of their natural appearance and the bluffs and ridges of the Flint Hills provide panoramic views.

Aesthetically pleasing historic native limestone buildings arranged on the landscape with ample green space characterize the MPHD. Fort Riley's retention of the historical character of the MPHD provides an exceptional visual experience to residents, employees, and visitors.

The garrison's layout reflects natural features, formal or informal designs, and distinctive styles and building materials. Features such as rivers, floodplains, hillsides impose natural constraints on the physical layout of Fort Riley. Cantonment (urban) areas, particularly those in the MPHD, appear interwoven among the natural features and interconnect with one another. The use of cultivated plants in cantonment areas, combined with native plants in undeveloped areas, results in a pleasing variety of vegetative environments on post. Significant natural areas that remain relatively undisturbed include woodlands and native prairie tracts.

4.11.4. Recreational Activities

Common outdoor recreation activities at Fort Riley include organized sports (e.g., football, soccer, softball, golf), bird watching, hunting, hiking, fishing, mushroom hunting, walnut gathering, and mountain biking. The organized sports take place predominately in the Camp Forsyth area or on Custer Hill, in the southern portion of the garrison. The other activities occur throughout the garrison, except where prohibited (e.g., within the garrison's permanent impact area).

Hunting and angling in particular account for many recreational outings taken by Soldiers, their families, and the public. Fort Riley typically supports approximately 7,000 hunting trips annually. The public, including many non-residents, account for about 30% of the hunting trips. Creel censuses during past years indicate that approximately 15,000 fishing trips are taken on Fort Riley each year.

4.12. Military Mission

An element of the affected environment is Fort Riley's mission. The Army separates garrison activities from military training and readiness activities at its posts in order to ensure the constancy of management and funding priorities for each entity. The Installation Management Command (IMCOM) directs garrison activities and U.S. Army Forces Command (FORSCOM) directs the training and readiness mission. Thus, Fort Riley is composed of a garrison, and the 1st Infantry Division (ID) and its subordinate commands.

4.12.1. Fort Riley Garrison

4.12.1.1. *Overview*

Fort Riley is a permanent U.S. Army garrison that exists in support of, principally, the 1st ID. Its basic function is to ensure that the 1st ID and other mission units have the training resources and facilities needed to meet their mission requirements. Wide ranges of activities occur on a regular basis at Fort Riley to conduct and support the military mission. Many "ongoing activities" are essentially public works and commercial service functions required to allow people to live and work on the garrison. Many of these activities are similar to those conducted in any non-military community of equal size, and include the following types:

- Administrative operations;
- Facilities repair, maintenance, construction, and alteration;
- Fuel storage and dispensing;
- Grounds maintenance;
- Hospital, medical, and dental clinic operations;
- Garrison and community support services;
- Natural and cultural resources management and environmental protection;
- Recreation;
- Road and right-of-way maintenance;

- Utility operations including infrastructure maintenance, repair, construction, and alteration;
- Warehousing and supply storage; and
- Vehicle and equipment maintenance or repair.

4.12.1.2. *Garrison Objectives*

The IMCOM has established a series of objectives for Fort Riley (U.S. IMA Strategic Plan, 2003). Those objectives most pertinent to this PEA are well-being, stewardship, and mission support. Wellness on Fort Riley consists of morale, welfare, and recreation. The aspect of well-being most relevant to the Proposed Action is that the garrison will “provide...safe environment in which to live, work, train and visit”. One of the stewardship objectives is to meet all U.S. Army environmental goals. One of the critical mission support objectives of the Fort Riley garrison is to “actively participate in mission needs development”. Others are to support the 1st ID and other mission units in meeting contingency requirements, deployments, and participation in Army Transformation.

4.12.2. 1st Infantry Division

The mission of the 1st ID follows: On order, 1st ID deploys, conducts full spectrum operations as part of a Combined Joint Task Force or designated force headquarters, transitions to follow-on operations, and on order redeploys.

Two maneuver brigades: 1st Brigade, 1st ID; and 2nd Brigade, 1st ID; as well as the 1st Sustainment Brigade and the Combat Aviation Brigade (CAB), 1st ID; report to and receive guidance from the Commanding General (CG), 1st ID. They will, on order, deploy with or without equipment, build combat power, conduct military operations in support of the full range of worldwide contingency operations, and then redeploy. These organizations conduct the preponderance of their training at Fort Riley.

5.0 ENVIRONMENTAL CONSEQUENCES

During the planning and assessment phase of this project, Fort Riley developed alternative courses of action to fully investigate potential environmental effects of the Proposed Action:

- Execute military engineering programmatically (preferred alternative), and
- No Action.

This section describes probable consequences (effects) of both alternatives on selected environmental resources and associated attributes. The resources and their attributes that are assessed are those directly linked to the relevant issues listed in Section 1.0, *Purpose and Need*.

Effects are changes from the current situation. The expected changes are described in quantitative and qualitative terms to aid in evaluating and contrasting the alternatives. The degree of change is described in terms of significance, duration and magnitude. The section includes discussion of:

- Direct effects and their significance.
- Indirect effects and their significance.
- Cumulative effects and their significance.
- Long- and short-term effects.
- Unavoidable effects and any mitigation measures that would be implemented.
- Possible conflicts between the Proposed Action and the objectives of federal, regional, state, and local land use plans, policies and controls for Fort Riley.
- Any irreversible and irretrievable resource commitments.

The Environmental Consequences section is the scientific and analytical basis for comparison of the alternatives. The Army will use the information in this section to help determine which of the identified alternatives will be implemented.

Section 5.0 is organized by alternative, and the effect associated with each alternative. Resource effect assessment matrices have been included near the beginning of each subsection to summarize the effect of proposed actions and related alternatives. The reader should refer to the text narrative for information regarding the specific nature and extent of effect illustrated in these generalized summary matrices. The presence of effect, however, does not necessarily equate to significant effect. Effect can be minor and localized and not rise to the level of significance. Significance is determined based on magnitude and duration.

Each “Alternative” section is divided into subsections evaluating effects to natural resources related attributes (abiotic and biotic), cultural resources, the sociological environment, and the military mission.

5.1. Definition of Key terms

5.1.1. Direct versus Indirect Effect

The terms consequences, impact and effect are synonymous as used in this PEA. Effect may be determined to be beneficial or adverse, and may apply to the full range of natural, aesthetic, historic, cultural, and economic resources of the garrison and its environs. Where applicable, effect may be classified as direct or indirect. Definitions and examples of direct and indirect

effect as used in this document are as follows:

- **Direct Effect.** *A direct effect is caused by the Proposed Action, and occurs at the same time and place.* For example, loss of tree cover would be classified as a direct effect associated with construction of a new building on an existing woodland site.
- **Indirect Effect.** *An indirect effect is caused by the Proposed Action and is later in time or farther removed in distance, but still reasonably foreseeable.* Indirect effect may include induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and other natural and social systems. Referring to the direct effect described above, the clearing of trees for new development may have an indirect effect on area streams by increasing the amount of soil erosion and sediment that reaches these streams during construction.

5.1.2. Short-term versus Long-term Effect

In addition to indicating whether effect is direct or indirect, the environmental consequence analysis also distinguishes between short-term and long-term effect. In this context, short-term and long-term do not refer to any rigid time period and are determined on a case-by-case basis. In cases where both short-term and long-term effect is expected, the effect evaluation matrices generally illustrate the long-term consequences. Referring to the direct and indirect effect examples described above, the clearing of trees on a new construction site would be classified as a long-term effect, while erosion and siltation in nearby streams during the construction period would be classified as a short-term effect.

5.1.3. Significance

The term “significant”, as defined in Paragraph 1508.27 of the regulations for implementing NEPA (CEQ 40 CFR 1500 et seq.), requires consideration of both the context and intensity of the effect evaluated. Significance can vary in relation to the context of the Proposed Action, and thus the significance of an action must be evaluated in several contexts and this varies with the setting of the Proposed Action. For example, context may include consideration of effects on a national, regional, and/or local basis depending upon the action proposed. Both short-term and long-term effects may be relevant.

In accordance with Paragraph 1508.27 of the regulations and the CEQ implementing guidance, effect also is evaluated in terms of its intensity or severity. Factors contributing to the evaluation of the intensity of an effect include, but are not limited to:

- The degree to which the action affects public health or safety.
- Unique characteristics of the geographic area where the action is proposed such as proximity to parklands, historic or cultural resources, wetlands, prime farmlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be controversial.
- The degree to which the effects of the action on the quality of the human environment are likely to be highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
- Whether the action is related to other actions with individually insignificant but

cumulatively significant effect. Significance exists if it is reasonable to anticipate a cumulatively significant effect on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the NRHP or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species, or its habitat, that was determined to be critical under the Endangered Species Act of 1973.
- Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

An Environmental Impact Statement (EIS) would be required if it is determined, as part of this PEA, that the alternative chosen for implementation would create significant effect. The EIS would investigate effect in more detail as well as identify mitigation strategies designed to minimize effect.

5.2. Effects of Alternative 1 – Execute Military Engineering Programmatically

Fort Riley anticipates short-term and long-term beneficial effects to the sociological environment and the military mission under the Proposed Action (Table 5-1). The execution of military engineering programmatically would adversely affect several local environmental elements, but those effects would remain below threshold levels considered significant. The garrison anticipates minor adverse effects to operational noise, air quality, soils, flora and fauna, and pest management.

Implementation of the Proposed Action would support Fort Riley's mission to provide for operational readiness. The Proposed Action would not compromise the commitment of Fort Riley to maintain, protect, and improve human health and welfare; and to protect and enhance biological communities, particularly those of sensitive, rare, threatened and endangered species. Therefore, the Proposed Action is the preferred alternative. Discussion of specific resource areas and environmental consequences under the Proposed Action follows.

5.2.1. Land Use

Fort Riley anticipates no adverse effect to land use under the Proposed Action. The proposed military engineering would take place on lands designated for military training or at existing cantonments.

Table 5-1 Anticipated Effects of the Execution of Military Engineering Programmatically

	Direct Effects	Indirect Effects	Short-Term Effects	Long-Term Effects
Land Use	0	0	0	0
Safety	0	0	0	0
Operational Noise	-	-	-	0
Air Quality	-	-	-	0
Soils	-	-	-	-
Water	0	0	0	0
Flora and Fauna				
Flora	-	-	-	-
Fauna	-	-	-	-
Pest Management	-	-	-	-
Cultural Resources	0	0	0	0
Contaminated Sites	0	0	0	0
Sociological Environment	+	+	+	+
Military Mission				
1 st Infantry Division	+	+	+	+
Fort Riley Garrison	+	+	+	+
Effect expected: (+) positive (-) negative (0) none				

5.2.2. Safety

Fort Riley anticipates no adverse effect to safety under the Proposed Action. To ensure on-the-job safety, project managers would ensure that qualified personnel performed all construction activities. Only properly trained personnel would use tools and heavy equipment. Construction personnel would perform all activities in accordance with the standards specified in Occupational Safety and Health Act (OSHA) regulations; AR 385-10, *The Army Safety Program*; and all other applicable safety regulations for construction activities.

5.2.3. Operational Noise

Fort Riley anticipates minor, direct and indirect, short-term adverse effect to noise under the Proposed Action. The execution of military engineering programmatically would have no effect on military training noise, because rotary-wing aircraft operations and maneuver training would remain at the baseline level. Thus, this analysis focuses on noise emissions that would result from heavy equipment operations at construction sites.

Table 5.2 shows average noise levels of typical heavy engineering equipment when measured 50 feet from each noise source. At the time of this analysis, the precise types of heavy equipment that operators would use to perform military engineering is unknown. However, Table 5.2 demonstrates the general nature and scale of the equipment that operators would likely use, and a reasonable estimate of the anticipated noise. For the remainder of the noise analysis, the PEA uses the highest heavy-equipment noise level, which is 87 dBA for a heavy truck (Table 5.2).

Table 5-2 Noise Levels of Heavy Equipment

Source	Average Noise Level, dBA ¹
Dozer	85
Excavator	81
Loader	86
Tractor	84
Truck	87
Crane	82
Compressor	84
Generator	80
Chainsaw	75
¹ dBA measured 50 feet from the noise source.	
Source: <i>U.S. Environmental Protection Agency, 1980.</i>	

Fort Riley anticipates that most military engineering projects would happen in the interior of its training areas, and thus, a measure of distance would separate military engineering activities and residences (or other noise-sensitive receptors such as hospitals or schools). The effect of that distance would reduce the intensity of noise from heavy engineering equipment, but that noise could remain audible. Noise levels decrease by 6 dB for every doubling of the distance from a noise source (Minnesota Pollution Control Agency, 1999). Table 5.3 illustrates the effect of distance on noise, beginning with a noise level of 87 dB emitted from a single source 50 feet away. For example, if a military engineering project were to occur only 800 feet from the nearest residence, inhabitants of that residence would likely perceive heavy equipment noise at a level of 63 dB (Table 5.3); and likely very rarely would military engineering occur as close to a residence as 800 feet. A sound level of 63 dB is comparable to that of normal conversation, as shown in Table 5.4. The sound level indoors at a residence 800 feet distant from military engineering would likely be lower than 63 dB.

Table 5-3 Effect of Distance on Noise

Distance From Source (ft)	Noise Level (dB)
50	87
100	81
200	75
400	69
800	63
1,600	57
3,200	51
Source: <i>Minnesota Pollution Control Agency, 1999.</i>	

Table 5-4 Noise Levels of Common Household Sounds

Source	Noise Level, dBA ¹
Normal Conversation	55-65
Garbage Disposal	76-83
Vacuum Cleaner	84-89
Lawn Mower	88-94
Leaf Blower	95-105
Circular Saw	100-104
¹ dBA measured at the user's normal distance from the noise source. In the case of normal conversation, dBA measured at the receptor's normal distance from the speaker.	
Source: <i>Noise Pollution Clearinghouse, 2007.</i>	

Two other factors would mitigate the potential noise effects from the operation of heavy equipment at military engineering sites:

- Alternative 1 would produce heavy equipment noise temporarily. The time required to complete a given military engineering project in the future is unknown, but the construction period would likely be limited to a few weeks or months, dependent upon weather.
- Noise would likely occur during normal daytime working hours, which results in less annoyance than noise produced during the evening or overnight.

In summary, given the remoteness of anticipated military engineering projects, the short-term nature of those projects, and the absence of the potential for nighttime noise, Fort Riley anticipates little potential for community annoyance due to noise.

5.2.4. Air Quality

Fort Riley anticipates minor, direct and indirect, short-term adverse effect to air quality under the Proposed Action.

Military engineering and demolition activities such as earthmoving and materials hauling with heavy equipment would introduce particulate matter (dust) into the atmosphere. Heavy equipment and trucks would create temporary sources of exhaust emissions. Both the dust emissions and exhaust emissions that construction activities would produce would be temporary and originate primarily in a project area. However, indirect short-term adverse impacts to air quality would occur if dust or vehicle emissions generated by construction or demolition activities were to travel off-site.

Project managers would employ the following air quality related Best Management Practices (BMPs) during construction activities:

- Personnel would minimize as feasible the release of fugitive emissions. For example,

during dry weather conducive to high dust emissions, personnel would apply suppression measures to construction sites. Fugitive emissions control would conform to applicable regulations.

- Personnel would conduct open burning, if used, in accordance with applicable regulations. This PEA defines open burning as “the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney.” The only materials that might be open-burned would be trees and similar plant materials that construction personnel would remove from a project footprint. Personnel would burn those plant materials at an on-post site where the Kansas Department of Health and Environment (KDHE) has authorized that activity under the terms of a permit.

5.2.5. Soils

Fort Riley anticipates minor, direct and indirect, short-term and long-term adverse effect to soils under the Proposed Action. The proposed military engineering would require earthmoving, grading, grubbing, and in some cases soil borrowing.

Short-term soil erosion would occur during construction activities. The construction personnel would use the following Best Management Practices (BMPs) to reduce the potential for soil erosion at and near construction sites:

- Vegetation and structural erosion control practices would be employed and maintained according to standards and specifications of the State of Kansas, the USEPA document entitled *Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices* (1992), or both. The more stringent of the standards would be employed.
- Construction activities would not be conducted during periods of excessively wet weather. Performing potentially erosive earthmoving and construction activities during dry periods, and utilization of proper construction techniques would minimize possible effects to water quality.
- Erosion and sediment control measures would be maintained during construction, and afterwards until vegetation has established in a manner to ensure compliance with Clean Water Act (CWA) regulations. Fort Riley would implement erosion control measures in accordance with normal construction practices required by the USACE for all construction or repair activities (including those accomplished by civilian contractors and government personnel).

Although BMPs are not 100 percent effective in preventing sediment runoff, the garrison would attempt to ensure that construction personnel remain in compliance with established permit and BMP requirements.

5.2.6. Water Resources

Fort Riley anticipates no adverse effect to water resources under the Proposed Action. The garrison anticipates that the combined effect of stormwater controls and the filtering capacity of vegetation adjacent to construction or soil borrow footprints would filter eroded soil from surface water runoff prior to its arrival at stream channels.

The garrison would use the following BMPs to reduce the potential for water resources effects at or near construction sites:

- Standard well-head protection measures would be followed during construction activities to help preclude the introduction of pollutants into groundwater systems. Those followed, coupled with design features intended to manage the flow of surface water, should prevent effects to domestic drinking water sources.
- Mulching, silt fences, sediment traps, straw berms, temporary cover crops, or other appropriate erosion control measures would be used to reduce soil erosion at construction sites. Where applicable, NRCS Critical Areas standards for erosion control, State of Kansas requirements for storm water discharge permits for construction sites, as well as other BMPs, would be used to reduce erosion and protect the water quality of receiving streams.
- If the final design of a project indicates that its construction activities would disturb more than one acre, a stormwater construction permit would be applied for from the KDHE no later than 60 days before the project commences. Application for the permit would require preparation of a Stormwater Pollution Prevention Plan (SWP3) for the project. Compliance with the conditions of the KDHE-issued construction stormwater permit, including those for the use of BMPs, would be mandatory.

5.2.7. Flora and Fauna

This section describes anticipated effects to native flora and fauna, including T&E and rare species.

5.2.7.1. *Floral Communities*

Minor, direct, short-term and long-term adverse effects to floral communities would occur under the Proposed Action. The proposed military engineering would require earthmoving, which would disturb grasslands. Over the long term, the anticipated reclamation of some short-term military engineering sites would mitigate the effect on floral communities.

5.2.7.2. *Faunal Communities*

Fort Riley anticipates minor, direct and indirect, short-term and long-term adverse effects to faunal communities under the Proposed Action. For soil and plant resources, military engineering would have a damaging effect that would ultimately result in habitat loss. That habitat loss would displace wildlife. The anticipated reclamation of short-term military engineering sites over the long term would mitigate habitat loss. Equipment operations could injure or kill species that are not highly mobile.

Fort Riley anticipates no effect to T&E species or habitats. The garrison would ensure that project timing or site selection would avoid effects to T&E species or habitats.

5.2.8. Pest Management

Fort Riley anticipates minor, direct and indirect, short-term and long-term adverse effects to pest management under the Proposed Action. Military engineering construction projects or soil borrow activities would disturb soil and could favor the establishment of invasive weedy species. Soil transported from borrow sites to project footprints could contain invasive weed seeds. Additionally, heavy equipment used to haul fill material could introduce weeds and spread weed seed from one site to another.

5.2.9. Cultural Resources

Fort Riley anticipates no direct or indirect adverse effects to cultural resources under the Proposed Action. The garrison would site military engineering projects to avoid known cultural resources, or would ensure the protection of cultural resources if military engineering projects were collocated with cultural resources sites.

Fort Riley would implement the following BMPs designed to either reduce or eliminate effects to cultural resources:

- Compliance with Sections 106 and 110 of the NHPA prior to construction activities would ensure avoidance of effects to sites that could potentially exist within the project area. Protection of resources also would adhere to Appendix D, Standard Operating Procedures (SOPs) #1, #8, #9 of the ICRMP and AR 200-1.
- If an unexpected archaeological discovery occurs during construction activities, the Emergency Discovery of Archaeological Properties [Appendix D, SOP 10] as defined in the Fort Riley ICRMP would be followed. If archaeological properties were discovered, excavation and disturbance of the site would cease. The Cultural Resources Management Administrator (CRMA) or staff archaeologist would be notified immediately. The CRMA or staff archaeologist would evaluate the significance of the finding and issue new guidance through the Environmental Division, DPW.
- If, because of construction activities, an important archaeological site, Traditional Cultural Property (TCP), or above ground property is damaged, the incident would be reported and a reasonable effort would be made to identify the responsible parties and to repair/replace the damaged resources in an effort to mitigate the loss pursuant to SOP #5 of Fort Riley's PA with the SHPO.
- Should Native American human remains, of which the Kaw or Pawnee Nations of Oklahoma may have custody, be inadvertently discovered and unintentionally excavated, procedures as outlined in the Comprehensive Agreements between Fort Riley and the Kaw and Pawnee Nations of Oklahoma would be followed (Appendix F.1 of the ICRMP).
- If there is an inadvertent discovery of human remains determined to be Native American, of which the Kaw or Pawnee Nations of Oklahoma do not have custody, then procedures as outlined in the NAGPRA SOP #1 would be implemented (25 U.S.C. 3002, Sec. 3(d); 43 CFR 10.4; AR 200-1).
- If an intentional archaeological excavation of Native American human remains, associated funerary objects, sacred objects, and/or objects of cultural patrimony would occur, procedures as dictated by NAGPRA, Appendix F.2, NAGPRA SOPs #2 and #3 of the ICRMP would be followed (25 U.S.C. 3002, SEC. 3(c); 43 CFR 10.3; AR 200-1).

5.2.10. Contaminated Sites

Fort Riley anticipates no effect to contaminated sites under the Proposed Action. The garrison would site military engineering projects to avoid known contaminated sites, or would ensure the protection of contaminated sites if proposed military engineering projects were collocated with them.

5.2.11. Sociological Environment

Fort Riley anticipates minor, direct and indirect, short-term and long-term beneficial effect to the

sociological environment under the Proposed Action.

Fort Riley anticipates minor, direct and indirect, short-term and long-term beneficial effects to the economies of the region under the Proposed Action. Direct payments to military engineering personnel, construction contractors, and civilian personnel would contribute to regional employment, income, and sales volume in the short-term. Secondary sales, employment, and income that could flow from primary sources to communities during military engineering activities would produce indirect short-term benefits to local and regional economies. Over the long term, periodic military engineering projects would benefit the economies of the region. The Proposed Action would broaden and enhance training realism for military engineering at Fort Riley, enhance the long-term viability as a military training center, and thus, would help ensure the continuity of Fort Riley's positive effect on the regional economy.

5.2.12. Military Mission

Fort Riley anticipates minor, direct and indirect, short-term and long-term beneficial effect to the missions of the garrison and the 1st ID under the Proposed Action. The proposed execution of military engineering programmatically would improve Fort Riley's ability to support troop construction projects, which would further support integrated military training involving non-engineer units at the installation. Those outcomes would support the mission of the 1st ID, and would contribute to the viability of Fort Riley as a training center in the future.

5.3. Effects of Alternative 2 – No Action

Under the No Action alternative, Fort Riley would not execute military training programmatically. Fort Riley anticipates that the No Action alternative would yield adverse effects to the military mission (Table 5-5). The No Action alternative would fail to support fully military engineering training and its secondary benefit to non-engineer units at Fort Riley. Thus, the No Action alternative would not enhance the capability of Fort Riley to accomplish its mission. Implementation of the No Action alternative is not favored.

5.3.1. Land Use

Fort Riley anticipates no effect to land use under the No Action alternative, because garrison activities with the potential to effect land use would remain at the baseline level.

5.3.2. Safety

Fort Riley anticipates no effect to safety under the No Action alternative, because military engineering activities with the potential to affect safety would remain at the baseline level.

5.3.3. Operational Noise

Fort Riley anticipates no effect to operational noise under the No Action alternative, because military engineering activities with the potential to affect the noise environment would remain at the baseline level.

5.3.4. Air Quality

Fort Riley anticipates no effect to air quality under the No Action alternative, because military engineering activities with the potential to affect air quality would remain at the baseline level.

Table 5-5 Anticipated Effects of the No Action Alternative

	Direct Effects	Indirect Effects	Short-Term Effects	Long-Term Effects
Land Use	0	0	0	0
Safety	0	0	0	0
Operational Noise	0	0	0	0
Air Quality	0	0	0	0
Soils	0	0	0	0
Water	0	0	0	0
Flora and Fauna				
Flora	0	0	0	0
Fauna	0	0	0	0
Pest Management	0	0	0	0
Cultural Resources	0	0	0	0
Contaminated Sites	0	0	0	0
Sociological Environment	0	0	0	0
Military Mission				
1 st Infantry Division	-	-	-	-
Fort Riley Garrison	-	-	-	-
Effect expected: (+) positive (-) negative (0) none				

5.3.5. Soils

Fort Riley anticipates no effect to soil resources under the No Action alternative, because military engineering activities with the potential to affect soils would remain at the baseline level.

5.3.6. Water Resources

Fort Riley anticipates no effect to water resources under the No Action alternative, because military engineering activities that could cause erosion and sedimentation would remain at the baseline level.

5.3.7. Flora and Fauna

5.3.7.1. *Flora*

Fort Riley anticipates no effect to flora under the No Action alternative, because military engineering activities with the potential to affect plant life would remain at the baseline level.

5.3.7.2. *Fauna*

Fort Riley anticipates no effect to fauna under the No Action alternative, because military engineering activities with the potential to affect fish and wildlife would remain at the baseline level.

5.3.8. Pest Management

Fort Riley anticipates no effect to pest management under the No Action alternative, because military engineering activities with the potential to affect pest control would remain at the baseline level.

5.3.9. Cultural Resources

Fort Riley anticipates no effect to cultural resources under the No Action alternative, because military engineering activities with the potential to affect historic properties and archaeology would remain at the baseline level.

5.3.10. Contaminated Sites

Fort Riley anticipates no effect to contaminated sites under the No Action alternative, because military engineering activities with the potential to affect contaminated sites would remain at the baseline level.

5.3.11. Sociological Environment

Fort Riley anticipates no effect to the sociological environment under the No Action alternative, because military engineering activities with the potential to affect socioeconomics, recreational activities, and visual and aesthetic values would remain at baseline levels.

5.3.12. Military Mission

Fort Riley anticipates minor, direct and indirect, short-term and long-term adverse effect to the military mission under the No Action alternative. For successive military engineering proposals that would trigger Environmental Assessment (EA) requirements, Fort Riley would fail to eliminate its current NEPA review process that can require the production of project-specific EAs. That outcome could slow Fort Riley's support of military engineering projects. Consequently, trainers could at times decide not to incorporate an exercise's proposed engineering project due to the long NEPA timeline despite the military value of the incorporation of the proposed engineering project into the exercise. The No Action alternative would not enhance the capability of Fort Riley to accomplish its mission, and would not enhance the viability of Fort Riley as a training center over the long-term.

5.4. Cumulative Effects

A cumulative effect is defined as an effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place locally or regionally through time.

5.4.1. Alternative 1 – Execute Military Engineering Programmatically

The Proposed Action is consistent with Fort Riley's mission to provide training and operational readiness in defense of the Nation. Execution of military engineering programmatically would help ensure Fort Riley's capability to provide realistic military training for engineer units and non-engineer units. Fort Riley could more quickly support military engineering initiatives when proposed actions would develop through time. Those outcomes would contribute to the viability of Fort Riley as a training center over the long term.

The Proposed Action to execute military engineering programmatically; in combination with other Army actions to support, train, and deploy effective fighting forces; is expected to result in

a cumulative, long-term beneficial effect to the military mission. No other actions that would individually generate minor or moderate effects, that could combine to generate significant effects, are foreseeable.

5.4.2. Alternative 2 - No Action

The No Action alternative is inconsistent with Fort Riley's mission to provide training and operational readiness in defense of the Nation. The implementation of the No Action alternative would not enhance Fort Riley's capability to conduct military engineering, and would not fully enable the installation to reap its beneficial training effects. That outcome would not support the training mission of the 1st ID, and would not contribute to the long-term viability of Fort Riley as a military training center.

Fort Riley anticipates no additional beneficial cumulative effects under the No Action alternative. Anticipated cumulative benefits from the Proposed Action (preferred alternative) to the sociological environment and the military mission would not occur under the No Action alternative.

Cumulative adverse effects to the military mission could occur under the No Action alternative because effects from a decision of No Action could combine with other Army future actions (or no actions) to reduce the long-term sustainability of Fort Riley. The garrison anticipates no other cumulative adverse effects under the No Action alternative.

6.0 CONCLUSION

This PEA was conducted in compliance with the NEPA CEQ Regulations, 40 CFR 1500 et seq., and 32 CFR 651 (*Environmental Analysis of Army Actions*). The results of this PEA indicate the following conclusions:

The Proposed Action to execute military engineering programmatically is consistent with the garrison's mission to provide training and operational readiness in defense of the Nation. The Proposed Action does not compromise the commitment of Fort Riley to maintain, protect, and improve human health and welfare; and to protect and enhance biological communities, particularly sensitive, rare, threatened and endangered species. The anticipated absorption of minor adverse effects to operational noise, air quality, soils, flora and fauna, and pest management would enable the garrison to realize the anticipated beneficial effects to the sociological environment and the military mission. Therefore, the Proposed Action is the preferred alternative.

Under the No Action alternative, Fort Riley would not execute military engineering programmatically. That outcome would not support Fort Riley's efforts to maximize the use of military engineering to train Soldiers. Ultimately, implementation of the No Action alternative would not help support operational readiness in defense of the Nation, and would not enhance the viability of Fort Riley as a long-term military training center. The garrison anticipates that the No Action alternative would result in adverse effects to the military mission. Thus, a decision to implement the No Action alternative is not in the best interest of Fort Riley, the surrounding community, and the nation.

Fort Riley anticipates that no significant environmental effects would result from the Proposed Action, and thus, preparation of an EIS is not required. Therefore, a Finding of No Significant Impact (FNSI) and a Notice of Availability (NOA) have been prepared for this action.

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Appendix A: Acronyms Defined

ACHP	Advisory Council on Historic Preservation
ADNL	A-Weighted Day-Night Average Sound Level
AQCR	Air Quality Control Regions
AR	Army Regulation
ARPA	Archaeological Resources Protection Act
ASO	Army Safety Office
BMP	Best Management Practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendment
CAB	Combat Aviation Brigade
CDNL	C-Weighted Day-Night Average Sound Level
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CG	Commanding General
CRM	Composite Risk Management
CRMA	Cultural Resources Management Administrator
CSA	Chief of Staff, Army
CWA	Clean Water Act
DA	Department of the Army
DASAF	Director of Army Safety
dB	Decibel
dBA	A-Weighted Decibel
dBC	C-Weighted Decibel
DBH	Diameter at Breast Height
DERP	Defense Environmental Restoration Program
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DPW	Directorate of Public Works
EA	Environmental Assessment
EIFS	Economic Impact Forecasting System
EIS	Environmental Impact Statement
ESA	Endangered Species Act

FNSI	Finding of No Significant Impact
FORSCOM	U.S. Army Forces Command
FY	Fiscal Year
GSO	Garrison Safety Office
HAP	Hazardous Air Pollutant
ICRMP	Integrated Cultural Resources Management Plan
ID	Infantry Division
IMCOM	Installation Management Command
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
IRP	Installation Restoration Program
KBS	Kansas Biological Survey
KDHE	Kansas Department of Health and Environment
KDWP	Kansas Department of Wildlife and Parks
KNESCA	Kansas Nongame and Endangered Species Conservation Act
MPHD	Main Post Historic District
MPRC	Multi-Purpose Range Complex
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTMB	Neotropical Migrant Bird
NZ	Noise Zone
OSHA	Occupational Safety and Health Act
PA	Programmatic Agreement
PEA	Programmatic Environmental Assessment
PK15(met)	Single Event Peak Sound Level Exceeded by 15% of Events
ROI	Region of Influence
SA	Secretary of the Army
SAR	Species at Risk

SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Officer
SINC	Species in Need of Conservation
SOP	Standard Operating Procedures
SWP3	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
T&E	Threatened and Endangered Species
USD	Unified School District
USDA	U.S. Department of Agriculture
USDA-WS	U.S. Department of Agriculture-Wildlife Services
USEPA	U. S. Environmental Protection Agency
USFWS	U. S. Fish and Wildlife Service
VOC	Volatile Organic Compound