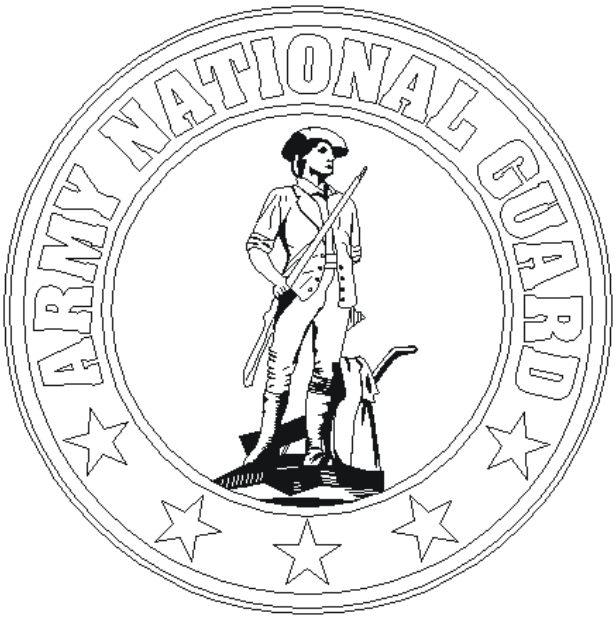
Final
Programmatic Environmental Assessment for Army National Guard Transformation Equipment Fielding



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May 2008

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Draft Finding of No Significant Impact

Programmatic Environmental Assessment for
Army National Guard Transformation Equipment Fielding

The National Guard Bureau (NGB) has conducted a Programmatic Environmental Assessment (PEA) of the potential environmental and socioeconomic effects associated with Transformation Equipment Fielding for Army National Guard (ARNG) forces. NGB prepared this PEA in accordance with the National Environmental Policy Act (NEPA, 42 USC § 4321 to 4370e), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (CEQ Regulations, 40 CFR Parts 1500-1508), and *Environmental Analysis of Army* Actions (32 CFR 651).

1. Description of Proposed Action and Alternatives

Proposed Action

Consistent with current modernization plans, the NGB proposes to field six ground and air systems to State and Territory ARNGs throughout the United States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. The six proposed systems are the M93A1 Fox Vehicle, M142 High Mobility Artillery Rocket System (HIMARS), UH-72A Lakota Light Utility Helicopter (LUH), RQ-7B Shadow Tactical Unmanned Aircraft System (TUAS), RQ-11 Small Unmanned Aircraft System (SUAS) Raven, and C27J Spartan Joint Cargo Aircraft (JCA).

Alternatives

The NGB considered two alternatives to the Proposed Action.

- *Fielding of fewer systems.* Instead of fielding six systems as proposed, the NGB could field only two, three, or four of the six systems. Fielding fewer than six systems would, however, impair the abilities of organizations to most effectively perform their missions. Moreover, fielding only some of the systems would leave portions of State and Territory ARNGs less capable of integrating seamlessly with Active Component forces in the event of mobilization.

- *Fielding of reduced numbers of systems.* Instead of fielding the various systems in the numbers proposed, the NGB could reduce some or all the systems in number (e.g., field only 80 Lakota helicopters, rather than 200). Fielding fewer system units would leave portions of State and Territory ARNGs less capable of integrating seamlessly with Active Component forces in the event of mobilization.

These alternatives were found not to support the purpose and need for the Proposed Action and, accordingly, they were not evaluated in detail in the PEA.

Consistent with guidance issued by the Council on Environmental Quality, the PEA evaluated the No Action Alternative.

2. Environmental Analysis

The PEA considered potential effects on a wide range of environmental resources and conditions, including real property, airspace, air quality, noise, water resources, geology and soils, biological

resources, cultural resources, hazardous materials and hazardous wastes, and socioeconomics (including environmental justice and protection of children).

Implementing the Proposed Action would be expected to result in a mixture of long-term minor adverse and long-term minor beneficial effects on air quality and the noise environment. Other environmental resources or conditions evaluated in the PEA would not be affected. Long-term minor adverse cumulative effects would be expected with respect to noise. No specific mitigation measures are identified. Table 1 identifies which of the systems proposed for fielding would affect air quality and noise and the nature of those effects.

Table 1
Systems' effects on air quality and noise

System	Air quality	Noise
M93A1 (Fox)	Long-term minor adverse	None
M142 (HIMARS)	Long-term minor beneficial	Long-term minor beneficial
UH-72A (Lakota)	Long-term minor adverse	Long-term minor beneficial
RQ-7B (Shadow)	Long-term minor adverse	None
RQ-11 (Raven)	None	None
C27J (Spartan)	Long-term minor adverse	Long-term minor adverse Long-term minor cumulative

State and Territory ARNGs will conduct additional analyses, as appropriate, to address potential site-specific environmental effects.

Under the No Action Alternative, no effects would be expected.

Mitigation

Implementing the Proposed Action would be expected to result in minor adverse effects on a limited number of environmental resources. To guard against circumstances developing that could in limited cases result in site-specific adverse effects, the NGB and State and Territory ARNGs will maintain their stewardship posture by ensuring those necessary measures unique to their particular cases.

Mitigation does not include legal, regulatory, or policy-driven environmental protections and best management practices, which are already part of the Proposed Action required to comply with Federal and State laws or Army and NGB policies. No mitigation measures will be required to reduce potentially significant effects to less-than-significant levels.

3. Regulations

The Proposed Action will not violate NEPA, the CEQ Regulations, 32 CFR 651, or any other Federal, State, or local environmental regulations.

4. Commitment to Implementation

The National Guard Bureau (NGB) affirms its commitment to implement this EA in accordance with NEPA. Implementation is dependent on funding. NGB will ensure that adequate funds are requested in future years' budgets to achieve the goals and objectives set forth in this EA.

5. Public Review and Comment

The draft PEA was made available for public review and comment from February 4, 2008, to March 5, 2008. One public comment was received during the comment period.

Copies of the final PEA can be obtained by writing to Major Steve Stadelman, National Guard Bureau, Army National Guard Readiness Center, 111 South George Mason Drive, Arlington, VA, 22204-1383, or by electronic mail requests to steve.stadelman@us.army.mil. The document also may be viewed at http://www.arng.army.mil. Written comments on the Proposed Action, the PEA, or this draft Finding of No Significant Impact may be submitted to the NGB at the foregoing street address. Subject to comments that might be received from individuals, organizations, or agencies, the NGB intends to execute the Finding of No Significant Impact 30 days after its release for public review and to proceed with the Proposed Action.

6. Finding of No Significant Impact

After careful review of the EA, I have concluded that implementation of the Proposed Action would not generate significant controversy or have a significant impact on the quality of the human or natural environment. Per 32 CFR Part 651, the Final EA and draft FNSI will be made available for a 30-day public review and comment period. Once any public comments have been addressed and if a determination is made that the proposed action will have no significant impact, the FNSI will be signed and the action will be implemented. This analysis fulfills the requirements of NEPA and the CEQ Regulations. An Environmental Impact Statement will not be prepared, and the National Guard Bureau is issuing this Finding of No Significant Impact.

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Date

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Programmatic Environmental Assessment for
Army National Guard Transformation Equipment Fielding

Lead Agency: National Guard Bureau

Cooperating Agencies: None

Title of Proposed Action: Programmatic Environmental Assessment for Army National Guard Transformation Equipment Fielding

Affected Jurisdictions: Various

Point of Contact: Major Steve Stadelman, National Guard Bureau, Army National Guard Readiness Center, 111 South George Mason Drive, Arlington, VA, 22204-1383

Proponent: Army National Guard Bureau

Document Designation: Programmatic Environmental Assessment

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Abstract: This Programmatic Environmental Assessment (PEA) addresses the National Guard Bureau's proposal to field six ground and air systems to ARNGs across the U.S., the District of Columbia, and Guam, Puerto Rico, and the Virgin Islands. The systems are the M93A1 Fox Vehicle, M142 High Mobility Artillery Rocket System (HIMARs), UH-72A Lakota Light Utility Helicopter (LUH), RQ-7B Shadow Tactical Unmanned Aircraft System (TUAS), RQ-11 Raven Small Unmanned Aircraft System (SUAS), and C27J Spartan Joint Cargo Aircraft (JCA). The purpose of the Proposed Action is to provide new equipment to State and Territory ARNGs in aid of their transformation to the Objective Force, the Army's future combat force. The proposed action is needed to improve the ability of the Nation to respond rapidly to the challenges of the 21st century. The PEA analyzes potential effects of the Proposed Action and a No Action Alternative. Implementation of the Proposed Action would result in long-term minor adverse and beneficial effects on air quality and the noise environment; other environmental resources would not be affected. The No Action Alternative would result in no new effects on environment resources and conditions. None of the expected impacts evaluated in the PEA would be significant; and issuance of a Finding of No Significant Impact is appropriate.

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EXECUTIVE SUMMARY

BACKGROUND

This Programmatic Environmental Assessment (PEA) evaluates the proposal of the National Guard Bureau (NGB) to field six ground and air systems in support of Army National Guard (ARNG) transformation.

PROPOSED ACTION

The NGB proposes to field six systems to ARNGs across the U.S., the District of Columbia, and Guam, Puerto Rico, and the Virgin Islands. The systems are the M93A1 Fox Vehicle, M142 High Mobility Artillery Rocket System (HIMARS), UH-72A Lakota Light Utility Helicopter (LUH), RQ-7B Shadow Tactical Unmanned Aircraft System (TUAS), RQ-11 Small Unmanned Aircraft System (SUAS) Raven, and C27J Spartan Joint Cargo Aircraft (JCA).

PURPOSE AND NEED

The purpose of the Proposed Action is to provide new equipment to State and Territory ARNGs in aid of their transformation to the Objective Force.[1]

The need for the Proposed Action is to improve the ability of the nation to respond rapidly to the challenges of the 21st century. State and Territory ARNGs are legally bound to defend the United States and its territories, support national policies and objectives, and defeat nations responsible for aggression that endangers the peace and security of the United States. To carry out these tasks, the ARNG must adapt to changing world conditions and must improve its capabilities to respond to a variety of circumstances across the full spectrum of military operations. Implementation of the Proposed Action would support the ARNG's need to maintain readiness, to develop proficiency in use of operating mission essential systems, and to integrate seamlessly with the Active Component upon mobilization in the event of war or national emergency.

ALTERNATIVES

One alternative would be to field only two, three, or four of the six different systems. Fielding of less than six systems would, however, impair the abilities of organizations to perform their missions in the most effective manner. A second alternative would be to reduce some or all the systems in number (e.g., field only 80 Lakota helicopter, rather than 200). Either of these alternatives would leave portions of State and Territory ARNGs less capable of integrating seamlessly with Active Component forces in the event of mobilization. This would not support the purpose and need for the Proposed Action and is, therefore, not feasible. These alternatives are not evaluated in detail in the PEA. A No Action Alternative is evaluated in detail.

[1] The Objective Force is the force which would achieve the Army's ultimate transformation objective. It is a future force that would be characterized as being more responsive, deployable, agile, versatile, lethal, survivable, and sustainable and would be dominant across the entire spectrum of operations.

ENVIRONMENTAL CONSEQUENCES

The PEA considers potential effects on a wide range of environmental resources and conditions, including real property, airspace, air quality, noise, water resources, geology and soils, biological resources, cultural resources, hazardous materials and hazardous wastes, and socioeconomics (including environmental justice and protection of children).

Implementation of the Proposed Action would be expected to result in a mixture of long-term minor adverse and long-term minor beneficial effects on air quality and the noise environment. Other environmental resources or conditions evaluated in the PEA would not be affected. Long-term minor adverse cumulative effects would be expected with respect to noise. No specific mitigation measures are identified. Table ES-1 identifies which of the systems proposed for fielding would affect air quality and noise and the nature of those effects.

Table ES-1
Systems' effects on air quality and noise

System	Air quality	Noise
Fox	Long-term minor adverse	None
HIMARS	Long-term minor beneficial	Long-term minor beneficial
Lakota	Long-term minor adverse	Long-term minor beneficial
Shadow	Long-term minor adverse	None
Raven	None	None
Spartan	Long-term minor adverse	Long-term minor adverse Long-term minor cumulative

CONCLUSION

Implementing the Proposed Action would not result in significant environmental or socioeconomic effects. Issuance of a FNSI would be appropriate, and an EIS need not be prepared before implementing the Proposed Action.

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SECTION 1.0
PURPOSE, NEED, AND SCOPE

1.1 INTRODUCTION

This Programmatic Environmental Assessment (PEA) evaluates the proposal of the National Guard Bureau (NGB) to field six ground and air systems in support of Army National Guard (ARNG) transformation. The six proposed systems are the M93A1 Fox Vehicle, M142 High Mobility Artillery Rocket System (HIMARS), UH-72A Lakota Light Utility Helicopter (LUH), RQ-7B Shadow Tactical Unmanned Aircraft System (TUAS), RQ-11 Small Unmanned Aircraft System (SUAS) Raven, and C27J Spartan Joint Cargo Aircraft (JCA).

In October 1999 the Secretary of the Army and the Chief of Staff of the Army articulated a vision about people, readiness, and transformation of the Army to meet challenges emerging in the 21st century and the need to be able to respond more rapidly to different types of operations requiring military action. The strategic significance of land forces continues to lie in their ability to fight and win the nation's wars and in providing options to shape the global environment. Transformation addresses the Army's need to become more strategically responsive and dominant at every point on the spectrum of operations.

In March 2002 the Army published the *Programmatic Environmental Impact Statement for Army Transformation* (the *Army Transformation PEIS*) for its proposal to conduct a multiyear, phased, and synchronized program of transformation. Over a 30-year period, the Army will conduct a series of transformation activities affecting virtually all aspects of Army doctrine, training, leader development, organizations, installations, materiel, and Soldiers. In April 2002 the Army issued a Record of Decision reflecting its intent to transform the Army. This PEA evaluates a Proposed Action by the NGB that is part of the transformation process designed to provide the nation with combat forces that are more responsive, deployable, agile, versatile, lethal, survivable, and sustainable. Consistent with current modernization plans, the NGB proposes to field the six systems to State and Territory ARNGs throughout the United States, District of Columbia, Guam, Puerto Rico, and the Virgin Islands. Details of the systems and the NGB's fielding proposal are provided in Section 2.0.

1.2 PURPOSE AND NEED

The purpose of the Proposed Action is to provide new equipment to State and Territory ARNGs in aid of their transformation to the Objective Force.[1]

The need for the Proposed Action is to improve the ability of the nation to respond rapidly to the challenges of the 21st century. State and Territory ARNGs are legally bound to defend the United States and its territories, support national policies and objectives, and defeat nations responsible for aggression that endangers the peace and security of the United States. To carry out these tasks, the ARNG must adapt to changing world conditions and must improve its capabilities to respond to a variety of circumstances across the full spectrum of military operations. Implementation of the Proposed Action would support the ARNG's need to maintain readiness, to develop proficiency in use of operating mission essential systems, and to integrate

[1] The Army Transformation PEIS defines the Objective Force as that which would achieve the ultimate transformation objective. It is a future force that would be characterized as being more responsive, deployable, agile, versatile, lethal, survivable, and sustainable and would be dominant across the entire spectrum of operations.

seamlessly with the Active Component upon mobilization in the event of war or national emergency.

1.3 SCOPE

This PEA has been developed in accordance with the National Environmental Policy Act (NEPA) and implementing regulations issued by the President's Council on Environmental Quality (CEQ) and the Army.[2] Its purpose is to inform decision makers and the public of the likely environmental consequences of the Proposed Action and alternatives.

This PEA identifies, documents, and evaluates, on a programmatic level, the effects of fielding six ground and air systems to State and Territory ARNGs. An interdisciplinary team of environmental scientists, biologists, planners, economists, engineers, archaeologists, historians, and military technicians has analyzed the Proposed Action and alternatives in light of existing conditions and has identified relevant beneficial and adverse effects associated with the action. The Proposed Action and alternatives, including the No Action Alternative, are described in Section 2.0. Existing conditions, considered to be the *baseline* conditions, are described in Section 3.0, Affected Environment and Environmental Consequences. The expected effects of the Proposed Action, also described in Section 3.0, are presented immediately following the description of baseline conditions for each environmental resource addressed in the PEA. Section 3.0 also addresses the potential for cumulative effects, and mitigation measures are identified where appropriate.

A PEA evaluates a Proposed Action in broad terms. It lays the foundation for subsequent analyses and decision making. A PEA is intended to eliminate repetitive discussions of the same issues and focus on the key issues at each level of project review. In this document, the NGB addresses potential environmental effects of equipping its organizations on a broad, programmatic scale. State and Territory ARNGs will conduct additional analyses, as appropriate, to address site-specific effects. Although in some instances preparation of an Environmental Assessment (EA) might be deemed appropriate, the NGB anticipates that State and Territory ARNGs will find preparation of Records of Environmental Consideration (RECs) to be the most appropriate course of action pursuant to Title 32 of the *Code of Federal Regulations* (CFR) Part 651 (*Environmental Analysis of Army Actions*), which states the following:

- "If the Proposed Action is adequately covered within an existing EA or EIS [Environmental Impact Statement], a REC is prepared to that effect. The REC should state the applicable EA or EIS title and date, and identify where it may be reviewed. The REC is then attached to the proponent's record copy of that EA or EIS." 32 CFR 651.12(a)(2)

- "A Record of Environmental Consideration (REC) is a signed statement submitted with project documentation that briefly documents that an Army action has received environmental review. RECs are prepared … for actions covered by existing or previous NEPA documentation. A REC briefly describes the Proposed Action and timeframe, identifies the proponent and approving official(s), and clearly shows how an action … is already covered in an existing EA… ." 32 CFR 651.19

[2] *Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, 40 CFR Parts 1500–1508, and *Environmental Analysis of Army Actions*, 32 CFR Part 651.

The proposal to field modern equipment to State and Territory ARNGs continues the Army's ongoing transformation program.[3] The description of the Proposed Action presented in this PEA is based on the NGB's present understanding of circumstances attending development of Army doctrine and NGB implementation of changes to comply with that doctrine. Information currently known concerning the Proposed Action is adequate to proceed with evaluation of potential environmental effects, with the understanding that at the time of implementation there might be a limited number of minor, *on the ground* adjustments. If future requirements should result in impacts beyond those foreseen in this analysis, the NGB or State and Territory ARNGs will undertake additional measures, as appropriate, to comply with NEPA. Any additional environmental impacts analyses will comply with 32 CFR Part 651 (*Environmental Analysis of Army Actions*) and current ARNG policy. Proponents may prepare EISs, EAs, or RECs on the basis of the nature of their Proposed Actions and the likelihood of occurrence and nature of environmental impacts.

In addition to the Army Transformation PEIS, this PEA complements the NGB's *Final Programmatic Environmental Assessment of Modularization of Army National Guard Forces* (May 2005) (Modularization PEA). The Modularization PEA evaluates conversion of State and Territory ARNGs to heavy and infantry brigade combat teams (BCTs) and support units of action (SUAs) as envisioned for the Army's transformation to the Objective Force.

The Army is a large and highly complex institution that has developed its own lexicon. For the benefit of readers who might be unfamiliar with Army doctrine and organization, explanations of key terms are provided in Appendix A.

1.4 DECISION TO BE MADE

The decision to be made upon compilation of this document is whether the Proposed Action would result in significant impacts to the environment. If significant impacts would occur, the NGB could determine appropriate measures to reduce impacts to a level below significant, issue a Notice of Intent to prepare an EIS, or abandon the Proposed Action. Ancillary to the foregoing, and having taken potential environmental effects into account, the NGB might illuminate areas of concern where mitigation measures would be appropriate and in keeping with the NGB's environmental stewardship responsibilities. The decision to proceed with fielding of ground and air systems to State and Territory ARNGs will be based on strategic, operational, environmental, and other considerations, including the results of this analysis.

1.5 PUBLIC INVOLVEMENT

The NGB invites public participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and federally recognized Native American tribes, are urged to participate in the decision-making process.

Public participation opportunities with respect to the Proposed Action and this PEA are guided by the provisions of 32 CFR Part 651 and by guidance issued by the NGB. Following announcement of the PEA's availability, the NGB will make the PEA available for 30 days for

[3] Additional information on transformation can be obtained from the *Programmatic Environmental Impact Statement for Army Transformation* (March 2002) and the related Record of Decision (April 2002). These documents are available at http://notes.tetratech-ffx.com/army_transformation_PEIS/tcppeis.htm.

public comment on the draft stage of preparation. Upon completion, the final PEA and a draft Finding of No Significant Impact (FNSI), if appropriate, will be made available for an additional 30-day comment period, during which time the NGB will consider any further comments submitted by agencies, organizations, or members of the public on the Proposed Action, final PEA, or draft FNSI. At the conclusion of the final review period, the NGB may, if appropriate, execute a final FNSI and proceed with the Proposed Action. If it is determined before issuance of a final FNSI that implementation of the Proposed Action would result in significant impacts, the NGB will do one of the following: (1) publish in the *Federal Register* a Notice of Intent to prepare an EIS, (2) commit to mitigation actions sufficient to reduce impacts below significance thresholds, or (3) not take the action.

The NGB received one public comment on the draft PEA in that an individual in Brownsville, Texas, requested a copy of the draft PEA. See Appendix F. A copy of the document was sent to him.

Throughout this process, the public may obtain information on the status and progress of the PEA through the NGB Public Affairs Office, by calling 703-607-2584.

1.6 REGULATORY FRAMEWORK

A decision on whether to proceed with the Proposed Action rests on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, the NGB is guided by relevant statutes (and their implementing regulations) and Executive Orders that establish standards and provide guidance on environmental and natural resources management and planning. These include the Clean Air Act, Clean Water Act, Noise Control Act, Endangered Species Act, National Historic Preservation Act, Archaeological Resources Protection Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, and Establishment and Management of the Snake River Birds of Prey National Conservation Area (Pub. L. 103-64). Executive Orders bearing on the Proposed Action include Executive Order 11593 (*Protection and Enhancement of the Cultural Environment*), Executive Order 11988 (*Floodplain Management*), Executive Order 11990 (*Protection of Wetlands*), Executive Order 12088 (*Federal Compliance with Pollution Control Standards*), Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), Executive Order 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*), Executive Order 13175 (*Consultation and Coordination with Indian Tribal Governments)*, and Executive Order 13423 (*Strengthening Federal Environmental, Energy, and Transportation Management*). These authorities are addressed in various sections throughout this PEA when relevant to particular environmental resources and conditions. The full text of the laws, regulations, and Executive Orders is available on the Defense Environmental Network & Information Exchange Web site at http://www.denix.osd.mil.

Additional guidance for preparation of this PEA is contained in the *NGB NEPA Handbook, Guidance on Preparing Environmental Documentation for Army National Guard Actions in Compliance with the National Environmental Policy Act of 1969* (June 2006).

SECTION 2.0
PROPOSED ACTION AND ALTERNATIVES

Consistent with current modernization plans, the NGB proposes to field six ground and air systems to State and Territory ARNGs throughout the United States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. As explained in detail in this section, these systems are generally known as the Fox, HIMARS (High Mobility Artillery Rocket System), Lakota, Shadow, Raven and Spartan.

This section presents information on the Proposed Action and alternatives. Introductory information about the ARNG is given in Section 2.1 to orient the reader to basic field and operational aspects of the organizations to which the systems would be fielded. A detailed description of the Proposed Action follows in Section 2.2. Section 2.3 discusses alternatives to the Proposed Action. Section 2.4 identifies the No Action Alternative. The Proposed Action set forth in Section 2.2 is the NGB's Preferred Alternative.

2.1 INTRODUCTION

Mission. The ARNG is structured across 50 states, 3 territories, and the District of Columbia. The 54 ARNGs have dual federal and state missions. During national emergencies, the President may mobilize the ARNG to federal status. The ARNG's federal mission is to maintain properly trained and equipped units available for prompt mobilization for war or national emergency or as otherwise needed. The ARNG's state mission is to support the needs of the state; each state governor serves as the commander-in-chief. Adjutants General are responsible for training and readiness. At the state level, the governors reserve the ability under the constitution to call up members of the ARNG in times of domestic emergencies. The ARNG's state mission is perhaps the best known because time and time again the ARNG has responded to help battle fires, floods, tornadoes, and hurricanes.

Organization. Until recently, ARNG forces have been division-centric. That is, they have been organized, equipped, and trained to conduct combat operations on a division basis. As Army transformation progresses, State and Territory ARNGs are changing to be brigade-centric to render them more responsive, deployable, and agile. Brigades are viewed as units of action (UAs), with there being heavy BCTs, infantry BCTs, and SUAs. The SUAs are organized as aviation, fires, brigade special troops (performing the sustainment function), battlefield surveillance, and maneuver enhancement. ARNG forces comprise elements of Combat Arms, Combat Support, and Combat Service Support branches and functions.

There are approximately 2,000 Table of Organization and Equipment (TOE) units and Table of Distribution and Allowances (TDA) units in the ARNG. TOE units are the Army's *go to war* operational forces. TDA units are non-tactical units such as fixed facilities, command and control headquarters, and other organizations. Approximately 75 percent of ARNG units are TOE units.

Geographic distribution of forces. The ARNG consists of approximately 360,000 Soldiers in 1,800 organizations and units at 3,300 sites in 2,700 communities across the United States, The District of Columbia, and three territories. Under the No Action Alternative, personnel in ARNG units would remain unchanged.

Training. The Army's standardized training doctrine, contained in Field Manual No. 7-0 (*Training the Force*), provides guidelines on how to plan, execute, and assess training at all levels. *Training the Force* provides an authoritative foundation for individual, leader, and unit

training. Individual training develops Soldiers who are proficient in battlefield skills, disciplined, physically tough, and highly motivated. Leader training, an imperative for every echelon, is an investment in the Army of today and tomorrow. Unit training, also known as *collective* training, prepares forces for the rigors of the battlefield.

Training the Force applies to leaders at all levels and to every type of organization. Unit commanders from corps to company publish a list, approved by the next higher wartime commander, of mission essential tasks that their units must perform in wartime. A mission essential task is a collective task in which an organization must be proficient to accomplish an appropriate portion of its wartime missions. An organization's mission essential task list (METL) is a compilation of collective tasks that must be successfully performed if an organization is to accomplish its wartime mission. For each mission essential task, conditions and standards are established or referred to in training publications. Leaders use the METL and associated conditions and standards to achieve battle focus in unit training. Leaders assess their unit's ability to perform mission essential tasks and then determine the best training strategy to build and sustain proficiency in each task. Each time that training is planned, leaders adjust their assessment of unit proficiency in mission essential tasks and consider the best training strategy to build and sustain proficiency in each task.

The most common form of collective instruction is the training exercise. The ARNG uses several types of training exercises. Depending on the type used, only a few dozen personnel from one unit might be involved at a single location, or many thousands of personnel from multiple units might be involved at multiple locations. Individual training occurs at State and Territory ARNG armories, readiness centers, maintenance shops, and training sites regularly. Collective training of troops in the field occurs at numerous locations. The amount of land required to support collective training depends on the type of unit being trained and the mission essential tasks to be accomplished. Training Circular 25-1 (*Training Land*) identifies minimum land maneuver areas for various types of exercises and training events involving all major types of combat units. Table C-3 (referenced in the discussion of real property in Section 3) shows the amount of land required for collective training of selected units.

Most training time and effort develops and reinforces the skills of individuals in their military occupational specialties and to provide crew and squad training. Collective training of platoons, companies, and larger units occurs in accordance with Army Readiness and Training Evaluation Program (ARTEP) directives. The steady-state goal of the ARNG is to train on a 6-year capabilities cycle that progresses from the individual, crew, and squad levels to the brigade level. ARNG force generation involves the following stepwise progression for training activities.

- *ARNG Force Generation Year 1.* Train at individual level.
- *ARNG Force Generation Year 2.* Achieve individual, crew, and squad proficiencies through platoon maneuver training for more than 64 percent of all crew and squad tasks that support METLs and conduct Table VIII gunnery.
- *ARNG Force Generation Year 3.* Achieve individual, crew, and squad proficiencies through platoon maneuver training for more than 70 percent of all crew and squad tasks that support METLs and conduct Table VIII gunnery.
- *ARNG Force Generation Year 4.* Achieve platoon proficiencies, conduct company and battery maneuver, and conduct Table VIII gunnery.

- *ARNG Force Generation Year 5*. Attain platoon validation and company proficiency through battalion maneuver and Table VIII gunnery.

- *ARNG Force Generation Year 6*. Deploy force and sustain proficiency at level deployed; for non-deployed force, sustain proficiency through company maneuver (because of limitations concerning sufficient combat training center resources).

The majority of training occurs at local armories, readiness centers, organizational maintenance shops, and consolidated maintenance shops. Weapons training occurs at Local Training Areas, Major Training Areas, and Active Component maneuver and firing ranges. Most major weapons systems (e.g., tanks, Bradley Fighting Vehicles, Paladin artillery, and Multiple Launch Rocket Systems) are stored and maintained at Maneuver and Training Equipment Sites (MATES) and Unit Training Equipment Sites (UTES).

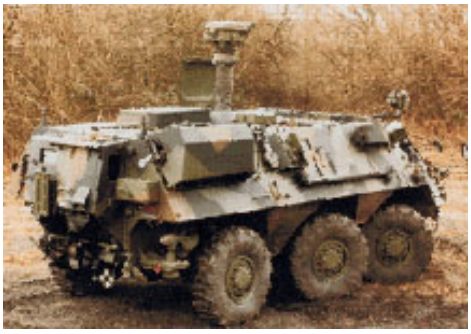
Weapons systems, vehicles, and other equipment. State and territory ARNGs use a wide variety of weapons systems, vehicles, and other equipment. Many heavy vehicles and equipment are stored, maintained, and repaired primarily at MATES and UTES at numerous locations across the United States. State and territory ARNGs recapitalize (modernize) weapons systems and vehicles as dictated by mission requirements, and within the constraints of budgetary resources. Additional and new weapons systems and vehicles are periodically fielded to State and Territory ARNGs on the basis of acquisition procedures and military needs. Appendix B identifies major weapons systems, vehicles, and other equipment currently used by State and Territory ARNGs.

2.2 PROPOSED ACTION

The NGB proposes to field two ground systems (Fox and HIMARS) and four air systems (Lakota, Shadow, Raven and Spartan). This section describes each system, identifies receiving ARNG locations, and when fielding is proposed to occur. Some variance in the proposed fielding schedule for each system could occur because of manufacturers' production schedules or needs of the State and Territory ARNGs.

2.2.1 M93A1 (Fox)

System description. The M93A1 Nuclear, Biological, and Chemical Reconnaissance System (NBCRS) (Fox) is a rolling laboratory that takes air, water, and ground samples and immediately analyzes them for signs of weapons of mass destruction. The Fox is intended to improve the survivability and mobility of Army ground forces by providing increased situational awareness and information superiority to headquarters and combat maneuver elements. With the ability to provide rapid, accurate chemical and radiological contamination information to these elements, the NBCRS vehicle forms a key portion of the full-dimensional protection concept.



The mission of the lightly armored, wheeled NBCRS is to detect, identify, mark, sample, and report chemical and radiological contamination on the battlefield.[4] The NBCRS crew

[4] Notwithstanding the system's nomenclature, the Fox's mission and capabilities do not include detecting biological hazards and contaminants.

accomplishes these missions by using a sophisticated suite of nuclear and chemical alarms and detectors that have been integrated within the vehicle chassis. The onboard M21 Remote Sensing Chemical Agent Alarm allows the crew to detect chemical agent clouds as far as 5 kilometers away. During normal vehicle operations, there is no need for the crew to wear chemical protective gear or masks.

Nuclear, Biological, and Chemical (NBC) defense encompasses three major functions: contamination avoidance, protection, and decontamination. Contamination avoidance is the concept of avoiding contamination whenever possible and is the focal point of U.S. NBC defense doctrine. It enables units to operate without incurring the degradation caused by individual or collective protection and time, labor, and logistics intensive decontamination operations. When it is not possible to avoid contamination, the spread of contamination is limited so that it presents the minimum possible hazard to personnel, has the minimum impact on operations, and allows the rapid resumption of normal operations. Contamination avoidance explicitly includes NBC reconnaissance, detection, sampling, identification, and warning. The NBCRS is a key system used to perform these functions.

When NBC hazards are located, they must be marked on a near-real-time basis. This allows units to avoid the hazard, or to protect themselves to minimize casualties if they cannot avoid it. Commanders must also be made aware of the absence of NBC hazards in their areas of immediate operational concern. This allows them to lower their protective posture and minimize degradation. Samples of unidentified contaminants must be collected and evacuated for laboratory analysis to maintain a current understanding of enemy capabilities and their impact.

The M93A1 contains an enhanced NBC sensor suite consisting of an M21 Remote Sensing Chemical Agent Alarm, MM1 Mobile Mass Spectrometer, Chemical Agent Monitor/Improved Chemical Agent Monitor, AN/VDR-2 Beta Radiac Set (for ground radiological surveys), and M22 Automatic Chemical Agent Detector/Alarm. The NBC sensor suite is digitally linked with the communications and navigation subsystems by a dual-purpose central processor system, which fully automates NBC warning and reporting functions and provides the crew commander with full situational awareness of the Fox's NBC sensors, navigation, and communications systems. The M93A1 Fox is also equipped with an advanced position navigation system (Global Positioning System and the Autonomous Navigation System) that enables the system to accurately locate and report agent contamination. It has an over-pressure filtration system that permits the crew to operate in a shirt-sleeve environment that is fully protected from the effects of NBC agents and contamination outside the vehicle. The automated features of the M93A1 reduce the crew requirements to three Soldiers from the four required to operate the system's predecessor, the M93 Fox.

NBC contamination information collected by the NBCRS is provided to command and control systems in real time to aid in NBC battle management, allowing commanders to obtain the NBC picture and maintain the required operational tempo. NBC reconnaissance applies to low-intensity conflict situations to reduce vulnerability to insurgent or terrorist use of chemical or biological weapons. Forces provided an NBC threat assessment for potential theaters of operations deploy with and use a tailored force protection package for NBC defense.

The NBCRS detects and identifies nuclear and chemical contamination. It warns units of NBC contamination, reports the location of NBC hazards, marks areas of contamination, locates and marks clean bypass routes, and collects and transports samples of NBC materiel for later analysis. The NBCRS accomplishes these functions by performing the following missions:

- Route reconnaissance obtains information as to the presence or absence of NBC contamination on a specified route and all adjacent terrain. The emphasis is on persistent NBC hazards along the route.

- Area reconnaissance is conducted when a commander needs information on the presence or absence of NBC hazards in a specified area, such as a proposed forward area rearming and refueling point for helicopters, or a proposed area for maneuver operations. The emphasis is on persistent NBC hazards within the area.

- Zone reconnaissance is a detailed, thorough, and time-consuming NBC reconnaissance of all dominant terrain within specified boundaries. The emphasis is on persistent NBC hazards within the zone.

A crew of three NBC specialists (military occupational specialty 54B) operates the NBCRS. While one chemical officer or one NBC specialist platoon sergeant serves as a fourth crew member in two of six vehicles, operation of the NBCRS requires no more than three Soldiers. Maintenance of NBCRS subsystems (e.g., detectors, navigational devices) does not require more than one Soldier. Maintenance tasks performed on the NBCRS chassis do not exceed those associated with similar vehicles currently fielded to NBC reconnaissance units.

The Fox vehicle weighs 17 tons and is 22.25 feet long and 8.1 feet high. Its maximum on-road speed is 65 miles per hour; the vehicle is fully amphibious, with swimming speeds up to 6 miles per hour. The Mercedes-Benz OM 402A V-8 diesel engine provides the Fox vehicle 320 horsepower.

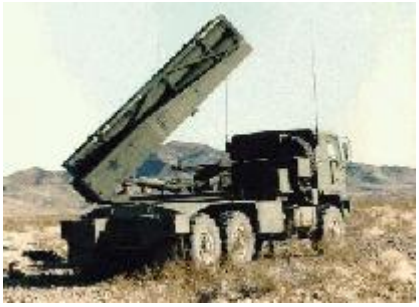
Fielding proposal. All State and Territory ARNG BCTs and chemical companies may be slated to receive the Fox systems. The fielding locations and schedule for the Fox systems that have been announced to date are shown in Table 2-1.

Table 2–1
Proposed fielding of Fox systems

Receiving unit	Location	No. of systems	Fielding date
SpecTrpsBn, 30th Heavy BCT	Fayetteville, NC	2	November 2008
SpecTrpsBn, 81st Heavy BCT	Seattle, WA	2	December 2008
SpecTrpsBn, 278th Heavy BCT	Knoxville, TN	2	To be determined

2.2.2 M142 (HIMARS)

System description. The M142 High Mobility Artillery Rocket System (HIMARS) is a lightweight, C–130 transportable version of the M–270 multiple launch rocket system (MLRS) launcher. Mounted on a 5–ton family of medium tactical vehicles truck chassis, it fires any rocket or missile in the MLRS family of munitions. HIMARS launchers have some commonality with the older and heavier tracked MLRS, the M270 and M270A1 launcher systems. The HIMARS includes launcher module, fire control, and digital command and control systems and a



self-reload capability. The HIMARS uses the same command, control, and communications, as well as the same crew as the MLRS launcher but carries only one rocket or missile pod. It can roll on and off a C–130 transport aircraft and, when carried with a combat load, can be ready to operate within 15 minutes of landing. The HIMARS fires either six MLRS rockets or one Army Tactical Missile. Because of the lighter weight of using one pod rather than two, it has a faster time, compared to the current M270, from when the fire mission is received to actual munitions firing.

HIMARS reflects the Army's need for a lighter weight, more deployable MLRS that can be sent anywhere in the world to provide the maneuver commander lethal, long-range fires at the very beginning of a conflict. HIMARS was designed and produced by the Army to support its early entry contingency forces and its light/airborne/air assault divisions with long-range, general support rocket and missile indirect fires. HIMARS battalions consist of three platoons, each having six launchers.

The purpose of HIMARS is to engage and defeat tube and rocket artillery, air defense concentrations, trucks, light armor and personnel carriers. It also supports troop and supply concentrations. Deployment of HIMARS makes it very difficult for an enemy force to launch a counter attack. HIMARS is able to launch its weapons and move away from the area at high speed before enemy forces are able to locate the launch site.

The HIMARS (launcher) consists of a carrier and a fire control system that computes all fire mission data and a launcher-loader module portion that performs all operations necessary to complete a fire mission. The HIMARS also conducts reload operations with the use of a reload arm assembly. HIMARS retains the same self-loading and autonomous features installed on the MLRS. The HIMARS fire control system, electronics, and communications units are inter-changeable with the MLRS M270 A1 launcher, and the crew and training are the same. The launcher unit is equipped with an onboard land navigation system, which allows the crew to remain within the safety of the armored cabin while accurately monitoring their position.

While HIMARS is operated by a crew of three (driver, gunner, and section chief), the computer-based fire control system enables a crew of two or even one Soldier to load and unload the system. The fire control system includes video, keyboard control, a gigabyte of program storage and global positioning system. The fire control computer allows firing missions to be carried out in automatic or manual mode.

The HIMARS is mounted on the Army's new family of medium tactical vehicles 6x6 all-wheel drive 5-ton truck. The automatic transmission vehicles use a 330 horsepower engine that operates on JP8 fuel. In contrast to the M270 MLRS, which is mounted on a tracked vehicle, the HIMARS uses a wheeled transport vehicle. The HIMARS vehicle carries a single six-pack of rockets and weighs approximately 24,000 pounds, as compared to the 12 rockets and more than 44,000 pounds for the MLRS M270 launcher. HIMARS uses the standard Army Logistical Support System.

The HIMARS can fire a variety of munitions.

- The M26 rocket, 227 millimeters in diameter and about 13 feet long, is the basic rocket for HIMARS use. It is a tube-launched, spin-stabilized, free-flight projectile used against personnel, soft, and lightly armored targets. Each rocket, having a range of 10 to 32 kilometers, dispenses 644 M77 dual-purpose improved conventional munitions and submunitions over the target area.

- The M28A1 rocket (reduced range) is available for live firing at Army training installations. This practice rocket has a relatively uniform and predictable trajectory and a reduced range of 10 to 15 kilometers, thus allowing it to be fired on many tube artillery firing ranges.

- The M30 is a relatively new guided rocket for use with the HIMARS. It carries either 404 bomblets or a single 200-pound high explosive warhead. Both variants use an inertial measurement unit guidance system that is aided by the Global Positioning System. Its range extends to 70 kilometers.

- The M39 is an Army Tactical Missiles Systems missile. It is a ballistically launched and inertially guided missile. Each missile dispenses a cargo of approximately 950 anti-personnel and anti-materiel M74 grenades over the target area. The missile's range extends from 25 to 165 kilometers.

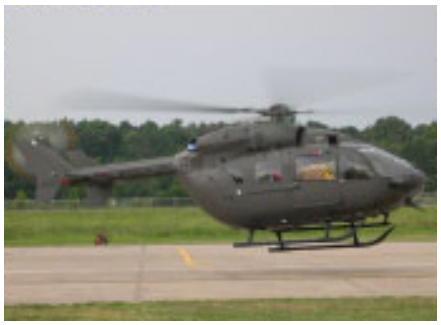
Ammunition resupply for HIMARS is provided by the M985 truck and M989A1 trailer.

- The M985 is a 10-ton, 8-wheel or 8-wheel-drive truck with a 5,400-pound lift capacity materiel handling crane. When the vehicle carries four launch pods (24 rockets or 4 M39 missiles), it has a gross vehicle weight of 59,000 pounds.

- The M989A1 trailer can also carry four launch pods. Fully loaded, it has a gross weight of 31,000 pounds. The trailer can be towed by a launcher in an emergency.

Fielding proposal. The NGB proposes to field 18 HIMARS (launcher and resupply vehicle with trailer) to the 115th Fires Brigade in Wyoming in fiscal year 2008 and 18 HIMARS to 197th Fires Brigade in New Hampshire in fiscal year 2009. Fielding of HIMARS to the 197th Fires Brigade would result in turn-in or redistribution of current M198 towed 155 mm howitzers upon fielding of the HIMARS system to that organization.

2.2.3 UH-72A (Lakota)



System description. The UH-72A LUH (Lakota) is a commercial aircraft, modified and equipped for Army use, designed to conduct light general support tasks in permissive, noncombat environments. Those tasks include civil search and rescue, personnel recovery, evacuation, counter-drug, limited civil command and control operations in the conduct of homeland security, and deployment outside the United States to permissive (non-combat) environments. The fielding of the Lakota is part of an ongoing Army-level effort to transform its aviation capability through the deliberate reinvestment of funds from the Comanche program which was cancelled in 2004. The ARNG will receive the majority of the 322 new aircraft.

The aircraft's manufacturer, EADS North America, officially delivered the U.S. Army's first Lakota on December 11, 2006, marking the beginning of the major defense program requiring up to 322 rotary-wing aircraft. The initial UH-72A was received by the Army during a delivery and

naming ceremony in Columbus, Mississippi, where the twin-engine helicopter will be produced.[5] Forty more Lakotas are in the production cycle for delivery to the Army during 2007 and 2008.

The primary mission for the Lakota is to provide aerial transport of staff and liaison elements, air messenger service, air movement of supplies, maintenance support, and limited command and control. Through its speed and agility, the Lakota will meet time-sensitive transport requirements for urgently needed documents, supplies and equipment, or limited number of forces that are not already available through an existing ground transportation network. The Army needs an LUH that can provide reliable, administrative-type aerial support at reduced operating and support costs.

The Lakota is intended to replace Vietnam era UH-1H (Iroquois, often referred to as the *Huey*) and OH-58A/C (Kiowa) aircraft. The LUH meets program needs to fill the niche missions in which the UH-60 (Blackhawk) capability is more than required and much less cost effective. The Lakota will be supportable and maintainable within the current aviation force structure. The Lakota will require an increase in manpower when compared to the Kiowa; however, the Lakota manpower requirement is the same as the Iroquois. No increase in manpower is envisioned for Maintenance and Support personnel requirements.

The requirement for a Huey-sized LUH remains. The noncombat LUH or TDA missions required by organizations of the Active Component (e.g., National Training Center and Joint Readiness Training Center) will continue after the Army retires the Huey fleet. As part of each Security and Support Battalion, the Lakota will support Drug Enforcement Agency operations that are now performed by the ARNG with 144 Kiowas. In addition to these missions are helicopter support requirements (yet to be determined) for homeland defense. The aircraft will operate in permissive, nonhostile, noncombat environments to satisfy light general support mission requirements of TOE and TDA units within both Active and Reserve Components, to include the ARNG.

The Army currently uses a mix of rotary wing aircraft to accomplish a wide range of administrative and logistical missions as well as supporting the homeland security role assigned to selective units of the ARNG. These aircraft provide general support at various posts, camps, and stations both in and outside the continental United States and, in some homeland security missions, are also deployed outside the continental United States In most instances, the aircraft now assigned to these missions have reached their serviceable life and must be replaced. In other cases, the aircraft used in this role are much more capable than required for the role and, consequently, expensive to operate and maintain. The Lakota will provide an airlift capability that will be able to conduct light general support missions and will replace aging and costly to operate rotary wing aircraft currently performing in this role.

When the operational need arises, the Lakota will facilitate the commander's ability to conduct disaster relief operations, civil search and rescue, augmentation of UH-60 medical evacuation aircraft, counter drug operations, conducting homeland security, and other mission requirements such as catastrophic emergencies and support to civilian agencies against internal threats or national emergencies, if directed by the President.

[5] At the delivery ceremony, the Army also unveiled the UH-72A's official name: Lakota, which is a Native American Indian tribe of the Great Sioux Nation. Naming the UH-72A the Lakota continues the service's long-standing tradition of naming its helicopters after Native American tribes. In the case of the Lakota aircraft, the linkage is between the Lakota legacy as stalwart defenders of their homeland and the nature of the aircraft's intended domestic missions.

Procurement of the Lakota will provide for engineering services and allocate contractor logistic support to the delivered systems to include training, procurement of parts support, and depot sustainment maintenance. State and territory ARNGs will provide field maintenance. The Army's goal is to purchase a helicopter that can provide reliable and sustainable general and administrative support at reduced acquisition and operating and support costs.

The Lakota in standard mission configuration is capable of achieving an operational range of no less than 217 nautical miles operating at 4,000 feet altitude at 95 ° Fahrenheit pressure altitude, with full crew, full mission fuel, using a 1-minute takeoff, and with 30-minute reserve. The Lakota, in basic mission configuration, is capable of a minimum of 2.8 hours of operation with a 30-minute reserve without the use of auxiliary fuel or forward arming and refueling points (FARPs).

The internal cabin and points of entry and exit of the Lakota reasonably accommodate the loading, unloading, and transport of a pilot, co-pilot, and no less than two North Atlantic Treaty Organization (NATO) standard litters (each with one patient), one medical attendant with equipment, and one crew chief. The cabin of the Lakota accommodates the seating and transport of a pilot, co-pilot, and no fewer than six passengers when not in the medical evacuation configuration.

The Lakota is VHF-AM radio compatible with International Civil Aviation Organization (ICAO) frequency and modulation schemes. The Lakota operates with extended frequency coverage for military use; compatible communications with U.S. Coast Guard; military; and law enforcement, fire, and forestry. The Lakota operates with a global navigation satellite system receiver that provides protected precise position, velocity, and time information for use in civil and military airway and non-precision approach structures. The aircraft has a Mode S transponder to operate in class B and C national airspace; this equipment enables it to operate safely in the nation's busiest airspace.

Fielding of Lakotas would provide replacement for Iroquois and Kiowa aircraft now in use at State and Territory ARNGs.[6] Table 2-2 provides a summary comparison of principal characteristics of the three LUHs.

Table 2–2
Comparison of three LUHs

Aspect	UH-72A Lakota	UH-1H Iroquois	OH-58C Kiowa
Crew	2 pilots	1–4	2 pilots
Capacity	8 troops	14 troops	0 troops
Length	42' 8"	57' 1"	32' 2"
Rotor diameter	36' 1"	48'	35' 4"
Height	11' 4"	14' 5"	9' 7"
Empty weight	3,950 lbs	5,215 lbs	1,553 lbs
Useful load	3,953 lbs	3,825 lbs	760 lbs
Maximum takeoff weight	7,903 lbs	9,500 lbs	2,313 lbs
Powerplant	2 Turbomeca Arriel IE2 turboshafts	1 Lycoming T53-L-13B turboshaft	1 Allison T63-A-700 turboshaft
Shaft horsepower (shp)	738 shp each	1,400 shp	317 shp
Maximum speed	167 mph	135 mph	137 mph
Range	426 mi	315 mi	345 mi
Service ceiling	18,000'	19,390'	20,500'

[6] In one instance, Lakotas would replace UH-60 Blackhawk helicopters (at San Juan, Puerto Rico). The Blackhawks would be redistributed to other State and Territory ARNGs.

Fielding proposal. Under the Proposed Action, 200 Lakotas would be fielded to elements of six Combat Aviation Brigades (CAB) and the Eastern ARNG Area Aviation Training Site at Fort Indiantown Gap, Pennsylvania. They would not be considered deployable for combat operations, but they would be available for deployment outside the United States to permissive (non-combat) operations. Table 2-3 shows the proposed sequence of 64 Lakota fielding actions, by fiscal year, receiving state (and location), and receiving unit. Except where noted in the right-hand column of the table, Lakotas would replace existing aircraft on a one-for-one basis.

Table 2–3
Lakota fielding plan

FY	State (location)	Unit	Qty	A/C replaced
2008	MS (Tupelo)	C Co (-), 1-114th S&S Bn, 36th CAB	4	OH-58
2008	LA (Pineville)	Det C/1-114th S&S Bn, 36th CAB	4	OH-58
2008	FL (Jacksonville)	B Co (-), 2-151st S&S Bn, 38th CAB	2	OH-58
2008	PA (Ft Indiantown Gap)	Eastern ARNG Aviation Training Site	2	UH-1
2009	FL (Jacksonville)	B Co (-), 2-151st S&S Bn, 38th CAB	2	OH-58
2009	NC (Morrisville)	Det B, 2-151st S&S Bn, 38th CAB	4	OH-58
2009	DC (Fort Belvoir, VA)	D Co, 1-224th S&S Bn, 42nd CAB	6	UH-1
2009	VT (Burlington)	Det D, 1-224th S&S Bn, 42nd CAB	2	OH-58
2009	TX (Austin)	B Co (-), 1-114th S&S Bn, 36th CAB	6	OH-58
2009	PR (San Juan)	Det B. 1-114th S&S Bn, 36th CAB	2	OH-58
2009	AR (North Little Rock)	A Co (-), 1-114th S&S Bn, 36th CAB	4	OH-58
2009	PA (Ft Indiantown Gap)	Eastern ARNG Aviation Training Site	2	UH-1
2010	AL (Birmingham)	Det A, 1-114th S&S Bn, 36th CAB	4	OH-58
2010	SC (Eastover)	A Co (-), 2-151st S&S Bn, 38th CAB	4	OH-58
2010	VA (Sandston)	Det A, 2-151st S&S Bn, 38th CAB	4	OH-58
2010	TN (Smyrna)	C Co (-), 2-251st S&S Bn, 42nd CAB	1	OH-58
2010	PA (Ft Indiantown Gap)	Eastern ARNG Aviation Training Site	2	UH-1
2011	TN (Smyrna)	C Co (-), 2-251st S&S Bn, 42nd CAB	3	OH-58
2011	GA (Dobbins AFB)	Det C, 2-251st S&S Bn, 42nd CAB	4	OH-58
2011	MS (Tupelo)	D Co (-), 1-114th S&S Bn, 36th CAB	4	None
2011	LA (Pineville)	Det D, 1-114th S&S Bn, 36th CAB	4	None
2011	CO (Aurora)	D Co (-), 3-140th S&S Bn, 40th CAB	1	None
2012	CO (Aurora)	D Co (-), 3-140th S&S Bn, 40th CAB	3	None
2012	NV (Reno)	Det D, 3-140th S&S Bn, 40th CAB	2	None
2012	CA (Sacramento)	Det D, 3-140th S&S Bn, 40th CAB	2	None
2012	SD (Rapid City)	D Co (-), 1-112th S&S Bn, 34th CAB	4	None
2012	PA (Ft Indiantown Gap)	Eastern ARNG Aviation Training Site	2	UH-1
2013	ID (Gowen Field)	Det D, 1-112th S&S Bn, 34th CAB	2	None
2013	WI (Madison)	Det D, 1-112th S&S Bn, 34th CAB	2	None
2013	PR (San Juan)	Co D (-), 2-151st S&S Bn, 38th CAB	6	UH-60
2013	VI (Virgin Islands)	Co D (-), 2-151st S&S Bn, 38th CAB	2	None
2013	NE (Grand Island)	Co (D) (-), 1-134th S&S Bn, 35th CAB	4	None
2013	OH (Columbus)	Det D, 1-134th S&S Bn, 35th CAB	4	2 OH-58s
2013	CA (Sacramento)	Co A, 3-140th S&S Bn, 40th CAB	6	OH-58
2013	HI (Hilo)	Det A, 3-140th S&S Bn, 40th CAB	2	OH-58
2013	MD (Edgewood)	Co A (-), 1-224th S&S Bn, 42nd CAB	2	OH-58
2014	MD (Edgewood)	Co A (-), 1-224th S&S Bn, 42nd CAB	2	OH-58

Table 2–3
Lakota fielding plan (continued)

FY	State (location)	Unit	Qty	A/C replaced
2014	DC (Fort Belvoir, VA)	Co A (Det 1), 1-224th S&S Bn, 42nd CAB	2	OH-58
2014	NY (Rochester)	Co A (Det 1), 1-224th S&S Bn, 42nd CAB	2	OH-58
2014	ND (Bismarck)	Co A (-), 1-112th S&S Bn, 34th CAB	4	OH-58
2014	OR (Salem)	Det A, 1-112th S&S Bn, 34th CAB	4	OH-58
2014	NE (Grand Island)	Co A (-), 1-134th S&S Bn, 35th CAB	4	OH-58
2014	IA (Waterloo)	Det A, 1-134th S&S Bn, 35th CAB	4	OH-58
2014	NM (Las Cruces)	Co C (-), 3-140th S&S Bn, 40th CAB	3	OH-58
2015	NM (Las Cruces)	Co C (-), 3-140th S&S Bn, 40th CAB	1	OH-58
2015	OK (Norman)	Det C, 3-140th S&S Bn, 40th CAB	4	OH-58
2015	MI (Grand Ledge)	Co B, 1-112th S&S Bn, 34th CAB	4	OH-58
2015	SD (Rapid City)	Det B, 1-112th S&S Bn, 34th CAB	2	OH-58
2015	UT (Salt Lake City)	Det B, 1-112th S&S Bn, 34th CAB	2	OH-58
2015	MO (Jefferson City)	Co B (-), 1-134th S&S Bn, 35th CAB	4	OH-58
2015	IL (Decatur)	Det B, 1-134th S&S Bn, 35th CAB	4	OH-58
2015	WV (Williamstown)	Co B (-), 1-124th S&S Bn, 35th CAB	4	OH-58
2015	PA (Ft Indiantown Gap)	Det B, 1-124th S&S Bn, 42nd CAB	2	OH-58
2015	ME (Bangor)	Det B, 1-124th S&S Bn, 42nd CAB	1	OH-58
2016	ME (Bangor)	Det B, 1-124th S&S Bn, 42nd CAB	1	OH-58
2016	KY (Frankfort)	Co C (-), 1-134th S&S Bn, 35th CAB	6	OH-58
2016	IN (Gary)	Co C (Det 1), 1-134th S&S Bn, 35th CAB	2	OH-58
2016	NJ (West Trenton)	Co (-), 1-224th S&S Bn, 42nd CAB	4	OH-58
2016	MA (Westfield)	Det C, 1-224th S&S Bn, 42nd CAB	2	OH-58
2016	VT (South Burlington)	Det C, 1-224th S&S Bn, 42nd CAB	2	OH-58
2016	AZ (Marana)	Co B (-), 3-140th S&S Bn, 40th CAB	4	OH-58
2016	NV (Reno)	Det B, 3-140th S&S Bn, 40th CAB	4	OH-58
2016	WA (Tacoma)	Co C (-), 1-112th S&S Bn, 34th CAB	6	OH-58
2016	MT (Helena)	Det C, 1-112th S&S Bn, 34th CAB	2	OH-58
		Total Lakotas	**200**	

S&S: Security & Support Battalion

2.2.4 RQ-7B (Shadow)

System description. The RQ-7B Shadow 200 (Shadow) is a small, lightweight TUAS designed as a ground maneuver commander's primary day or night reconnaissance, surveillance, target acquisition system.[7] Shadow employment is flexible and can be tailored to support operations down to company/squad level. The Shadow enhances force protection with its on-station loitering ability and high-resolution sensors. As a command and control

[7] The *R* is the DoD designation for reconnaissance; *Q* indicates an unmanned aircraft system. The *7* refers to the aircraft's being the seventh of a series of purpose-built unmanned reconnaissance aircraft systems.

enabler for tactical decision making, it is the commander's *dominant eye,* allowing him to shape the battlefield to ensure mission success and locating, identifying, and defeating both traditional troop formations and small, highly mobile enemy groups.

Each Shadow system consists of four air vehicles, two ground control stations, and support equipment. A platoon deploys with 29 Soldiers: 27 operators and maintenance personnel, and two command supervisors. The Shadow ground station is manned by two or three Soldiers. An air vehicle operator monitors flight instruments and can change the programmed flight path. A payload operator programs the search pattern or steers the electro-optical sensors. A mission commander communicates with air traffic control, coordinates with supporting units, and supervises the unmanned aerial vehicle operators. The Shadow system has operator training capability with terrain databases embedded in its vehicular ground control station. In heavy of infantry BCTs, Shadow assets are assigned to the Military Intelligence Company of the Brigade Special Troops Battalion. In the Stryker BCT, Shadow assets are assigned to the Surveillance Troop of the Reconnaissance, Surveillance, and Target Acquisition Squadron. Shadow equipment and personnel are deployable on four C-130 transport aircraft.

Table 2-4 shows principal characteristics of the Shadow.

Table 2–4
Shadow characteristics

Primary function	Tactical reconnaissance for ground maneuver forces
Length	11.2'
Wingspan	14'
Height	3'
Maximum gross weight	375 lbs (fueled)
Payload capacity	45 to 60 lbs (depending on mission profile)
Maximum dash speed	135 mph
Cruise speed	104 mph
Loiter speed	70 mph
Operating ceiling	15,000' (mean sea level)
Powerplant	38 horsepower Wankel Rotary Engine 741
Flight endurance	6 hrs
Data link range	78 mi
Construction	85% composite material
Launch mechanism	Pneumatic rail launch
Takeoff distance	30'
Recovery procedure	Tailhook, automated arresting gear
Landing field requirement	300' by 150' level area

Shadow operations are subject to Army Regulation (AR) 95-23 (*Unmanned Aircraft Systems Flight Regulations*, August 7, 2006). Paragraph 2-9d of the regulation provides that unless approval is granted in advance through the appropriate Department of the Army Regional Representative to the specific Federal Aviation Administration (FAA) region, all unmanned aerial systems flights/operations will be conducted in the appropriate special use airspace.[8]

[8] Special use airspace enables activities that must be confined because of their nature or require limitations on aircraft that are not a part of those activities. Prohibited and Restricted Areas are regulatory special use airspace. They are established in Federal Aviation Regulation (FAR) Part 73 through the rule-making process of the Administrative Procedure Act (Title 5 U.S.C. sections 551-702). Warning Areas, Military Operations Areas (MOAs), Alert Areas, and Controlled Firing Areas are nonregulatory special use airspace. That is, the FAA may designate these types of special use airspace without resorting to the procedures demanded of the Administrative Procedure Act.

FAA Order 7610.4H, *Special Military Operations*, establishes requirements for remotely piloted vehicles (RPV) such as the Shadow. The directive notes that because RPVs do not have *see and avoid* capability, their operations shall be confined to positively controlled airspace, within Restricted Areas, or within Warning Areas. In any other airspace, RPVs must be accompanied by a chase plane with direct communication with the controlling source facilities. FAA memorandum AFS-400 UAS Policy 05-01 (*Unmanned Aircraft Systems Operations in the U.S. National Airspace System—Interim Operational Approval Guidance*) and DoD/FAA *Memorandum of Agreement for Operation of Unmanned Aircraft Systems in the National Airspace System* (September 24, 2007) provide that military commanders may apply to the FAA for a certificate of waiver or authorization for UAS operations outside special use airspace. Such operations must include the UAS being accompanied by a chase aircraft (which must remain within one mile laterally and 3,000 feet vertically of the UAS) for an Airborne Certification of Authorization (COA), or be continuously monitored by ground observers covering the route of flight within one mile horizontally and 3,000 feet vertically for a Ground COA.

Fielding proposal. One Shadow system (consisting of four air vehicles, two ground control stations, and supporting vehicles and equipment) would be fielded in the fiscal year to each state as shown in Table 2-5.

Table 2–5
Shadow fielding plan

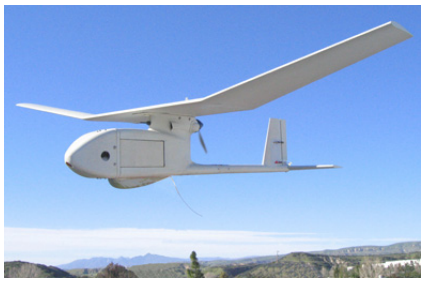
Fiscal year	Organization	State	TUAS location
2007	56th Stryker BCT	Pennsylvania	Philadelphia
2007	40th Infantry BCT	California	San Diego
2007	1st Infantry BCT, 34th Inf. Div.	Minnesota	Bloomington
2007	278th Heavy BCT	Tennessee	Knoxville
2008	81st Heavy BCT	Washington	Seattle
2008	30th Heavy BCT	North Carolina	Clinton
2009	41st Infantry BCT	Oregon	Tigard
2009	116th Heavy BCT	Idaho	Boise
2009	86th Infantry BCT, 42nd Inf. Div. (Mech)	Vermont	Montpelier
2009	155th Heavy BCT	Mississippi	Tupelo
2009	256th Infantry BCT	Louisiana	Lafayette
2009	37th Infantry BCT, 38th Inf. Div.	Ohio	North Canton
2009	2nd Infantry BCT, 34th Inf. Div.	Iowa	Boone
2010	32nd Infantry BCT	Wisconsin	Madison
2010	2nd Infantry BCT, 28th Inf. Div.	Pennsylvania	Washington
2010	33rd Infantry BCT, 35th Inf. Div (Mech)	Illinois	Decatur
2010	72nd Infantry BCT, 36th Inf. Div.	Texas	Marshall
2010	39th Infantry BCT	Arkansas	Little Rock
2010	19th Special Forces Group	Utah	Draper
2010	20th Special Forces Group	Alabama	Birmingham
2010	55th Heavy BCT, 28th Inf. Div.	Pennsylvania	Scranton
2010	53rd Infantry BCT	Florida	Tampa
2010	48th Infantry BCT	Georgia	Macon
2011	27th Infantry BCT	New York	Syracuse
2011	116th Infantry BCT	Virginia	Staunton
2011	29th Infantry BCT	Hawaii	Kalaeloa

Table 2–5
Shadow fielding plan (continued)

Fiscal year	Organization	State	TUAS location
2011	76th Infantry BCT	Indiana	Indianapolis
2011	45th Infantry BCT	Oklahoma	Oklahoma City
2011	56th Infantry BCT, 36th Inf. Div.	Texas	Fort Worth
2011	50th Infantry BCT, 42nd Inf. Div. (Mech)	New Jersey	Fort Dix
TBD	45th Fires Brigade	Oklahoma	
TBD	65th Fires Brigade	Utah	
TBD	115th Fires Brigade	Wyoming	
TBD	138th Fires Brigade	Kentucky	
TBD	142nd Fires Brigade	Arkansas	
TBD	169th Fires Brigade	Colorado	
TBD	197th Fires Brigade	New Hampshire	
TBD	58th Battlefield Support Brigade	Maryland	
TBD	67th Battlefield Support Brigade	Nebraska	
TBD	71st Battlefield Support Brigade	Texas	
TBD	207th Battlefield Support Brigade	Alaska	
TBD	219th Battlefield Support Brigade	Indiana	
TBD	560th Battlefield Support Brigade	Georgia	

2.2.5 RQ-11 Raven

System description. The RQ-11 (Raven) is a small UAS designed to provide battlefield reconnaissance at the company, troop, and battery level. Though not as large as other unmanned aerial vehicles (UAVs), the Raven provides units with timely, live-coverage capabilities.



Interim Field Manual 3-04.155 (*Army Unmanned Aircraft System Operations*) states that, among all unmanned aerial systems in use by the Army, the following are capabilities unique to the Raven:

- Day and night imagery/operations
- Low noise signature
- Portable
- Interchangeable payloads and components
- Mobile launch capable

The Raven is transportable in three small cases that fit into a rucksack. It can operate with three camera configurations in the nose of the airplane: an electro-optical camera that provides a front and side look, an infrared camera that provides a front look, and an infrared camera that provides a left side look. Powered by a lithium-ion rechargeable battery, the Raven can fly for up to 80 minutes. Raven kits include spare batteries and a charger that plugs into the 28-volt direct current outlet on a Humvee. The Raven can fly automatically, navigating by use of global positioning system technology and programmable routes and target areas, or it can be remotely flown by the operator.

The Raven is launched, by hand, into the air like a model airplane. It lands by auto-piloting to a near hover and dropping to the ground; landing gear or prepared landing strips are not required. Because of its automated features and GPS technology, the Raven is simple to operate and does not require skilled operators or in-depth flight training.

A Raven team consists of two operators from the unit that is assigned the equipment. Each Raven system consists of the following components:

- Three airplanes
- Three electro-optical payloads
- Two front look infrared payloads
- Two side-look infrared payloads
- One ground control unit
- One remote video terminal
- Rechargeable batteries
- Carry/protective cases
- Battery charger/power supply

Raven may be operated in restricted airspace subject to the same constraints as the Shadow, or in accordance with *DOD/FAA Memorandum of Agreement for Operation of Unmanned Aircraft Systems in the National Airspace System*, dated September 24, 2007, which states that DoD UAS that weigh 20 pounds or less, (includes RQ-11B Raven) may operate outside Restricted Areas and Warning Areas as follows: "Operations are conducted within Class G airspace, below 1200 feet above ground level (not applicable to airspace identified by 14 CFR 91.215 (b) (2)) over military bases, reservations or land protected by purchase, lease or other restriction [and] the UAS remains within clear visual range of the pilot, or a certified observer in ready contact with the pilot, to ensure separation from other aircraft."

Table 2-6 shows principal characteristics of the Raven.

Table 2–6
Raven characteristics

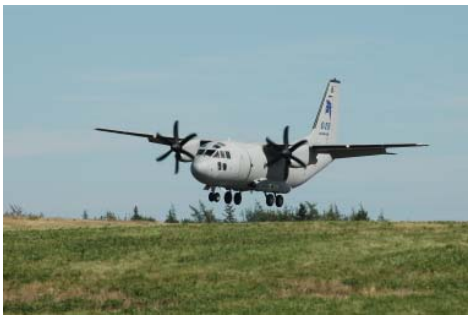
Primary function	Battlefield reconnaissance
Wing span	51"
Length	43"
Airplane weight	4.2 lbs
Ground control unit weight	17.0 lbs
Engine	Aveox 27/26/7-V electric motor
Loiter speed	26 mph
Cruise speed	34 mph
Dash speed	69 mph
Endurance	60–90 minutes (lithium-ion rechargeable battery)
Launch	Hand-launched
Recovery	Auto-pilot recovery on soft, unimproved surface
Range	6.2 mi (line of sight)
Service ceiling	1,500'
Typical operating altitude	100–1,000'
Payloads	Interchangeable electro-optical and infrared cameras

Fielding proposal. Each maneuver and special forces company, troop, and battery throughout the States and Territory ARNGs is eligible to be equipped with the Raven system. Table 2-7 shows the parent receiving organizations, number of systems to be fielded, and time frame for fielding for those organizations that have been announced to date.

Table 2–7
Raven fielding proposal

Organization (location)	No. of systems	Fielding date
27th Infantry BCT, 42nd Infantry Division (New York)	8	April 2008
37th Infantry BCT, 38th Infantry Division (Ohio)	15	May 2008
39th Infantry BCT (Arkansas)	15	December 2007
45th Infantry BCT, 35th Infantry Division (Oklahoma)	15	March 2008
76th Infantry BCT, 38th Infantry Division (Indiana)	15	February 2008
29th Infantry BCT, 40th Infantry Division (Hawaii)	15	2009
30th Heavy BCT, 29th Infantry Division (North Carolina)	15	2009
33rd Infantry BCT, 35th Infantry Division (Illinois)	15	2009
50th Infantry BCT, 42nd Infantry Division (New Jersey)	15	2009
56th Infantry BCT, 36th Infantry Division (Texas)	15	2009
56th Stryker BCT, 28th Infantry Division (Pennsylvania)	17	2009
81st Heavy BCT, 40th Infantry Division (Washington)	15	2009
32nd Infantry BCT (Wisconsin)	15	2009
41st Infantry BCT (Oregon)	15	2009
48th Infantry BCT (Georgia)	15	2009
155th Heavy BCT (Mississippi)	15	2009
2nd Infantry BCT, 28th Infantry Division (Pennsylvania)	15	2010
72nd Infantry BCT, 36th Infantry Division (Texas)	15	2010
86th Infantry BCT, 42nd Infantry Division (Vermont)	15	2010
256th Infantry BCT (Louisiana)	15	2010
278th Heavy BCT (Tennessee)	15	2010

2.2.6 C-27J (Spartan)



System description. In June 2007 the Army and Air Force announced the selection of a team led by L-3 Communications to build the JCA, designated as the C-27J *Spartan*. Beginning with two aircraft in 2008,[9] a minimum of 78 aircraft will be provided to the Services.

The Spartan is a new fixed-wing transport aircraft capable of providing the Army rapid-response intratheater missions for cargo, equipment, and Soldiers, as well as medical evacuation and airdrop delivery. The Spartan will normally operate from permanently established bases in the theater and will operate as required from forward bases, including intermediate staging bases, theater aerial ports of debarkation, and airfields near sea ports of debarkation.

[9] The first two aircraft are designated for pilot and loadmaster training, presently planned to be conducted at Warner-Robbins AFB, Georgia.

With dispersed forces operating at greater ranges in a noncontiguous battlespace, the range from the forward operating bases to the maneuver units has extended beyond the logistical resupply range of the Army's rotary wing aircraft. For aerial sustainment operations, the Spartan will perform limited organic service support directly to the tactical maneuver units or the forward support base for further movement by Army rotary wing aircraft or ground transportation. Modularity of BCTs and the logistics concept of support changing to a push system, the Army needs additional intratheater lift capability to fill the last tactical mile. Each Spartan can carry one of the following:

- Two up-armored, high-mobility, medium-wheeled vehicles (Humvees), two light trucks, or two very light tactical trucks
- Seven pallets measuring 88" by 54", three pallets measuring 88" by 108", or two pallets measuring 88" by 125"
- One OH-58 Kiowa helicopter
- Three 155 mm towed howitzer cannons
- One set of UH-60 Blackhawk rotors
- One M1A1 Abrams tank engine

The ARNG uses 43 C-23B *Sherpa* and more than 20 C-12 *Huron* aircraft for multi-mission, medium tactical transport (i.e., intratheater lift missions).[10] These airframes are old, however, and have critical limitations (i.e., the C-23B cabin is not pressurized, which precludes use of the aircraft for medical evacuation missions). As part of the Army aviation modernization strategy, the Aviation Restructuring Initiative seeks to reduce the size of the fixed wing fleet. Accordingly, the Spartan will replace both the Sherpa and Huron. Of the 78 Spartans to be manufactured, the first 48 will be delivered to the Army, with the remaining aircraft being delivered to the Air Force.

Table 2-8 provides a comparison of characteristics of the Spartan, Sherpa, and Huron aircraft.

Table 2–8
Aircraft characteristics

Aspect	C-27J Spartan	C-23 Sherpa	C-12 Huron
Length	78.48'	58'	44.75'
Wingspan	94.16'	74' 8"	54.5'
Height	31.82'	16' 3"	15'
Crew	3	3	2
Passengers	68	30	13
Takeoff weight	67,241 lbs	22,900 lbs	13,500 lbs
Maximum range	3,680 mi	1,053 mi	2,075 mi
Powerplant	(2) Rolls-Royce AE 2100-D2	(2) Pratt & Whitney PT6A-45-R turboprop	(2) PT6A-42 UC-12F/M turboprop
Shaft horsepower	4,637 each	1,198 each	850 each
Maximum speed	362 mph	218 mph	333 mph
Ceiling	30,000'	11,500'	32,800'

[10] The C-23 Sherpa is based on the Beechcraft King Air twin turboprop, and the C-12 Huron is based on the Beechcraft King Air aircraft.

The Army's procurement contract for the Spartan includes pilot and loadmaster training and contractor logistics support.

Fielding proposal. The proposed fielding of Spartan aircraft would begin in fiscal years 2009 and 2010, with four to eight aircraft being delivered per year. Table 2-9 shows the sequence, receiving locations, and number of aircraft that would be fielded. Sherpa and Huron aircraft at the receiving locations would be retired, on a one-for-one basis, upon receipt of the new aircraft.

Table 2–9
Spartan fielding plan
Fiscal years 2009–2010

Fielding Sequence	State/territory	Location	Number of Aircraft
1	Georgia	Robins ARB, Macon	4
2	Oklahoma	Will Rogers ANG Base, Oklahoma City	4
3	Oregon	Portland ANG Base International Airport	4
4a	Alaska	Elmendorf AFB, Bryant AAF, Anchorage	3
4b	Guam	*To Be Determined*	1
5	Rhode Island	Quonset Point, North Kingston	4
6	Missouri	Springfield Airport, Springfield	4
7	Indiana	Grissom ARB, Peru	4
8	Washington	Fairchild AFB, Spokane	4
9	Florida	Cecil Field, Jacksonville	4
10	California	March ARB, Riverside	4
11	Texas	Austin-Bergstrom International Airport, Austin	4
12	Kentucky	Standiford Field, Louisville	4

ARB: Air Reserve Base; ANG: Air National Guard; AFB: Air Force Base; AAF: Army Aviation Facility

2.3 ALTERNATIVES

The principal criterion for determining fielding locations and fielding schedules for the six ground and air systems is the ARNG's need to provide combat-ready forces in support of national defense. Fielding of these systems occurs as the Army is transforming to the Objective Force, as discussed in the Army Transformation PEIS. Selections for fielding locations are also dependent, in part, on the Army and NGB-driven evolution to modular BCTs, SUAs, and command and control elements.

The following specific considerations apply to each system.

- *Fox.* Evolving Army doctrine calls for assignment of Fox NBCR systems to each BCT. The ARNG continues to convert its heavy and light combat brigades to heavy BCTs and infantry BCTs, with the intent ultimately to have an end state of 26 BCTs (heavy and infantry). Each BCT will include one or more Fox systems. In addition, chemical (CM) units (which are assigned to SUAs and echelons above brigades) require modernization with the Fox system.

- *HIMARS.* The ARNG has not yet reached its complete, planned allocation of HIMARS systems. The two battalions to be fielded accomplish the planning objective. Under the

Proposed Action, the HIMARS will be fielded to organizations that are still requiring agile rocket and missile capabilities.

- *Lakota.* With fielding of the Lakota, the ARNG will be able to retire the UH-1 Huey and OH-58 Kiowa helicopters after their several decades of service. The Lakotas would replace Hueys and Kiowas on a one-for-one basis at their present locations. While this fielding plan requires additional pilot and maintenance training, it largely avoids the need for new construction of hangars, maintenance, and ramp resources, and it enables the ARNG to retain the majority of its present force structure.

- *Shadow.* Army doctrine continues to evolve toward net-centric warfare, which encompasses a system of intelligence sensors, command and control systems, and precision weapons that enable enhanced situational awareness, rapid target assessment, and distributed weapon assignment. Systems such as the Shadow need to be part of each BCT because they provide an exceptional, organic ability to monitor the battlefield and identify targets. Under the Proposed Action, the Shadow systems would be distributed to 28 BCTs and 2 special forces groups.

- *Raven.* The Raven is a relatively small system. It is designed to provide company commanders with their own, highly responsive capabilities to extend awareness of their immediate and adjacent battlespace.

- *Spartan.* With fielding of the Spartan, the ARNG will be able to retire its C-23 Sherpas and C-12 Hurons, which have been in service for several decades. The Spartans would replace Sherpas and Hurons on a one-for-one basis at their present locations. While this fielding plan requires additional pilot training, it largely avoids the need for new construction of hangars, maintenance, and ramp resources and enables the ARNG to retain the majority of its present force structure.

Other fielding plans might be devised, but doing so would not support as well the need to achieve the overall end-state requirements of trained and ready forces. Moreover, as noted in section 4.2.2 of the Army Transformation PEIS, "For the foreseeable future, the Army would expect to conduct its transformation of existing operating forces 'in place.' Relocation of units would not be anticipated." In light of the foregoing, alternative fielding schemes are not feasible and are not evaluated in detail in this PEA.

2.3.1 Fielding of Fewer Systems

Instead of fielding of six systems as proposed, the NGB could field only two, three, or four of the six systems. Fielding of less than six systems would, however, impair the abilities of organizations to perform their missions in the most effective manner. Moreover, fielding only some of the systems would leave portions of State and Territory ARNGs less capable of integrating seamlessly with Active Component forces in the event of mobilization. Such diminution of capabilities would not support the purpose and need for the Proposed Action and is, therefore, not feasible. This alternative is not evaluated in detail in the PEA.

2.3.2 Fielding of Reduced Numbers of Systems

Instead of fielding the various systems in the numbers proposed, the NGB could reduce some or all the systems in number (e.g., field only 80 Lakota helicopter, rather than 200). Fielding fewer system units would leave portions of State and Territory ARNGs less capable of integrating

seamlessly with Active Component forces in the event of mobilization. This would not support the purpose and need for the Proposed Action and is, therefore, not feasible. This alternative is not evaluated in detail in the PEA.

2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, the NGB would not field ground and air systems in support of transformation as proposed. Units would continue to operate with existing equipment. Failure to equip State and Territory ARNGs as proposed could jeopardize accomplishment of assigned domestic and national security missions. Inclusion of the No Action Alternative, prescribed in regulations issued by the CEQ, serves as a benchmark against which the potential effects of federal actions can be evaluated. The No Action Alternative is evaluated in detail in this PEA.

SECTION 3.0
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This section describes relevant environmental and socioeconomic resources and expected consequences of implementing the Proposed Action. Ten resource areas are included for evaluation: real property, airspace, air quality, noise, water resources, geology and soil resources, biological resources, cultural resources, hazardous materials and wastes, and the sociological environment. Data tables for the resources evaluated in this PEA are in Appendix C. This section also identifies potential cumulative effects and discusses potential mitigation actions.

3.2 REAL PROPERTY

3.2.1 Existing Conditions

Definition of resource. *Real property* consists of land and interests in land, leaseholds, standing timber, buildings, improvements, and appurtenances thereto.[1] *Facilities* are the buildings, structures, and other improvements placed on the land to support the Army's mission. *Land use* refers to the planned development of property to achieve its highest and best use and to ensure compatibility among adjacent uses. *Infrastructure* is the combination of supporting systems that enable use of land and facilities.

Incorporation. This PEA incorporates by reference the discussion of real property contained in the Army Transformation PEIS.[2] Specific information is provided below.

Real property. The ARNG holds real estate in every state and territory. The variety of locations provides ARNG forces a wide variety of terrain, ranging from deserts and arctic to jungles and mountains. ARNG real property also extends to lands classifiable as swamp/wetlands, forest, open woodland/savanna, grassland prairie, and semiarid shrub/steppe. In addition, ARNG forces train at Active Component installations; these, too, are immensely varied in their terrain settings. The wide array of terrain enables units to train in a variety of environments. Table C-1, *Terrain settings at select Army installations*, in Appendix C lists the terrain settings at a representative selection of ARNG and Army Component installations. Many Army and ARNG installations comprise multiple terrain settings.

The ARNG acquires land through a variety of methods that rely on either state or federal authorities. In the federal arena, the most common means for acquiring interests in real property are purchase, condemnation, donation, and exchange when specified by an authorization act. Easements are also obtained using these four methods. Leaseholds in real property, giving the government exclusive use or co-use with the owners for specific purposes, are acquired by negotiation or condemnation. The Army may obtain the following types of interests in real property.

[1] Real estate includes land, right, title, and interest therein and improvements thereon. Land includes minerals in their natural state and standing timber; when severed from the land, these become personal property. The General Services Administration (GSA) has excepted growing crops from the definition of real estate when the disposal agency designates such crops for disposal by severance and removal from the land. Rights and interest include leaseholds, easements, rights-of-way, water rights, air rights, and rights to lateral and subjacent support. Installed building equipment is considered real estate until severed. Equipment in place is considered personal property.

[2] The PEIS is available at http://notes.tetratech-ffx.com/army_transformation_PEIS/tcppeis.htm.

- *Fee.* Real estate for which an owner has all right, title, and interest. A fee estate is without condition, limitation, or restriction. Title to most U.S. real property is held in fee. This type of interest is also sometime known as *fee simple* or *fee simple absolute.*

- *Leasehold.* An estate in realty held under a lease for a fixed period of time. A lease is a contract for exclusive possession of property for a determinate period. The lessor grants a leasehold in consideration of a return of rent.

- *License.* An authority to do a specified act on the property of another without acquiring any estate or interest in that land.

- *Permit.* A temporary authority given to a government agency to use real property under the jurisdiction of another government agency.

- *Easement.* A right to use the land of another for a special purpose.

- *Option.* A right to purchase real estate at a specified price during a stipulated period of time.

The ARNG may use federal property upon validation of a military requirement and issuance of a real estate instrument issued by the Army. ARNG use of federal property is typically based on a permit or license issued by the Army. Permits to use government-owned real property are instruments issued by another government department or agency.

When acquiring property for use by State and Territory ARNGs, the Army adheres to several principal policies. Foremost, no request to acquire real estate is considered or approved unless it is established that the activity to be accommodated is essential to an assigned mission, that real property under the control of the Army is inadequate to satisfy the requirement, and that no real property under the control of any other federal agency is suitable and available for use by the Army on a permit or joint use basis.

If an activity is essential to an assigned mission and the real property need cannot be filled by the use of Army or other federal property on a permit or joint use basis, the following alternatives are considered in the order listed: donation or long-term nominal rental lease, acquisition of excess lands from the other military departments by transfer, recapture of use, withdrawal from the public domain, exercise of existing authorities for the exchange of government-owned real property for non-government-owned real property that is adaptable to the military need, acquisition of excess lands from federal agencies by transfer, and acquisition by purchase, lease, or condemnation. Specific requirements are determined in each case, and only the minimum amount of real property necessary to support the mission is to be acquired. Except in very narrowly defined circumstances, if permanent construction is to be placed on land, the government must have fee title or acquire title to the land (including all mineral rights and improvements) or have a long-term (50 year) leasehold interest. Land for use as a training site by the Reserve Component normally is not acquired when the value of the land exceeds that of rural farmland in the area.

Land use planning. Land use planning at ARNG and Army installations uses 12 general land use classifications. These classifications roughly parallel the types of designations employed by counties and municipalities in the civilian sector. The Army's 12 classifications for land use are airfields, maintenance, industrial, supply/storage, administration, training/ranges, unaccompanied personnel housing, family housing, community facilities, medical, outdoor recreation, and open

space. Like designations used in the civilian sector, the Army's land use classifications identify the principal kinds of facilities and activities to be found in particular areas of an installation.

The pattern of land uses at each installation is unique. Because of the wide array of installation missions and existing assets, there is no single, ideal land use plan. Land use planning integrates the physical elements of an installation and the human (sociocultural) activities that take place in and around the installation. Sociocultural influences shape the land use plan as much as does the physical environment. The process of implementing land use plans includes efforts to keep them relevant through annual review and periodic updates. Proactive planning with adjacent communities fosters successful project development and facilities management. Coordination with city and county planning agencies aids in achieving compatibility with nearby off-post land uses.

Integrated Training Area Management (ITAM) Program. The ITAM program is the Army's premier program for managing its training land assets. The program establishes procedures to achieve optimum, sustainable use of training lands by implementing a uniform land management program that includes inventorying and monitoring land conditions, integrating training requirements with land carrying capacity, educating land users to minimize adverse effects, and providing for training land rehabilitation and maintenance.

ITAM installations are generally characterized as active Army, Army Reserve, and National Guard installations that have a major training or testing mission. ARNG-controlled installations are eligible to receive priority with respect to resource allocations under the ITAM program.

Distinct programs and supporting technologies under ITAM enable focused management activities. Installations under ARNG control participate in the ITAM program through the following:

- *Range and Training Land Assessment (RTLA).* RTLA is the component of the ITAM program that provides for the collecting, inventorying, monitoring, managing, and analyzing of tabular and spatial data concerning training land conditions on an installation. RTLA provides data needed to evaluate the capability of training lands to meet multiple use demands on a sustainable basis. It incorporates a relational database and GIS to support land use planning decision processes. RTLA collects physical and biological resources data to relate land conditions to training and testing activities. These data are intended to effectively manage training lands. Formerly known as the Land Condition-Trend Analysis (LCTA) program, RTLA reflects a renewed focus on the sustained use of training and testing lands.

- *Land Rehabilitation and Maintenance (LRAM).* The LRAM program mitigates the environmental effects of training and testing through land maintenance and repair activities. LRAM repairs landscapes that no longer provide realistic or safe conditions in which to train. Proactive and reactive techniques are used to solve specific problems related to loss of vegetation, soil erosion, catastrophic events, and nonmilitary effects such as grazing. Restoration efforts depend on funding and the relative importance to training of a specific area.

- *Training Requirements Integration (TRI).* The objective of TRI is to guarantee adequate accessibility to training lands by integrating military training activities with the condition of training land. TRI balances decisions regarding training events with environmental considerations. It accomplishes its mission by using ATTACC methodology to quantify

the carrying capacity of training lands. Environmental and training factors considered include land condition, land rehabilitation costs, and training load (often expressed as maneuver impact miles, or MIMs). A successful TRI program accurately predicts the impacts and risks of land use and allows land managers to make informed decisions that minimize environmental damage from training.

- *Sustainable Range Awareness.* The Environmental Awareness program develops and distributes informational materials related to the sound environmental stewardship of natural and cultural resources on training lands. The Environmental Awareness program helps land users understand the effects of their activities on the environment. This program also helps to convey Command emphasis on environmental stewardship and facilitates compliance with environmental regulations on training lands. Environmental Awareness receives technical assistance from installation natural resource staff to develop site-specific informational materials. Such materials include Soldiers' field cards, posters, radio/television announcements, and articles in military periodicals. These educational materials are used to orient training land users on relevant environmental restrictions, rules, and procedures.

- *Geographic Information System.* A GIS is a mission-enabling technology that provides standard mapping and spatial analysis capabilities. The capabilities depend on RTLA data and support LRAM project planning, TRI, range modernization project planning, and range use planning and scheduling. The GIS capabilities enable what-if analysis at the installation, major command, and Headquarters, Department of the Army (HQDA) levels.

Training lands. State and Territory ARNGs require substantial real property resources to conduct training. Table C-2, *Maneuver land requirements,* in Appendix C shows the amount of land needed by units of various sizes to conduct specific types of training events.

State and Territory ARNGs satisfy their requirements for training lands by using Active Component installation lands, ARNG-controlled lands, and state-controlled lands. Table C-3, *Largest Army and ARNG installations,* in Appendix C identifies the largest installations of both the Active Component and the Reserve Component. Table C-4, *Army principal installations and other sites, by state,* in Appendix C provides a list of facilities resources and lands available to the State and Territory ARNGs on a state-by-state basis. In training for their federal missions, State and Territory ARNGs are not confined to use of resources in their respective states. Subject to budgetary constraints, distance, and availability, State and Territory ARNGs may conduct training on the more than 15 million acres of land at the Army or ARNG installations or sites shown in Table C-4. Table C-5, *Selected principal ARNG training areas,* shows selected principal training lands controlled by State and Territory ARNGs in the states. The training resources shown in Table C-5, comprising more than 2 million acres, support a considerable majority of the field training performed by State and Territory ARNGs.

Infrastructure. Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly synthetic, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. Although there is no national consensus as to what constitutes infrastructure, principal elements most often associated with the term include water systems, wastewater systems, storm water systems, solid

waste management, energy, traffic and circulation, transportation systems, and communications systems.

Framework for protection of real property and its inherent resources. The Army has long recognized that its mission is accomplished only because America entrusts it with its most precious resources—its sons and daughters. It is the Army's obligation to ensure that our Soldiers today—and the Soldiers of the future—have the land, water, and air resources they need to train; a healthy environment in which to live; and the support of local communities and the American people. The *Army Strategy for the Environment: Sustain the Mission – Secure the Future*, announced on October 19, 2004, establishes a long-range vision that enables the Army to meet its mission today and into the future. Sustainability is the foundation for this strategy and a paradigm that focuses thinking to address both present and future needs while strengthening community partnerships that improve the Army's ability to organize, equip, train, and deploy Soldiers as part of the joint force. Sustainability connects the Army's activities today to those of tomorrow with sound business and environmental practices. Simply complying with environmental regulations will not ensure the ability to sustain the mission. The NGB and State and Territory ARNGs must strive to become systems thinkers to benefit from the interrelationships of the triple bottom line of sustainability: mission, environment, and community. To sustain the future the Army must implement effective policies and practices that safeguard the environment and quality of life in a manner that the nation expects.

The *Army Strategy for the Environment* is the starting point that commits Army leaders at all levels to certain goals and challenges them to develop innovative methods to achieve these goals. The Army has adopted the following long-term goals to achieve an enduring Army enabled by sustainable operations, installations, systems, and communities.

- *Goal: Foster a sustainability ethic.* Foster an ethic within the Army that takes the Army beyond environmental compliance to sustainability.

- *Goal: Strengthen Army operations.* Strengthen Army operational capability by reducing the Army's environmental footprint through more sustainable practices.

- *Goal: Meet test, training and mission requirements.* Meet current and future training, testing, and other mission requirements by sustaining land, air, and water resources.

- *Goal: Minimize impacts and total ownership costs.* Minimize impacts and total ownership costs of Army systems, materiel, facilities, and operations by integrating the principles and practices of sustainability.

- *Goal: Enhance well-being.* Enhance the well-being of Soldiers, civilians, families, neighbors, and communities through leadership in sustainability.

- *Goal: Drive innovation.* Use innovative technology and the principles of sustainability to meet user needs and anticipate future Army challenges.

Use of the National Environmental Policy Act in managing real property. NEPA requires the analysis and documentation of potential environmental effects associated with all major federal decisions. NEPA ensures that environmental factors are considered equally with the technological and economic components of a decision and that the public is fully informed and appropriately involved in the environmental analysis process. The NGB and State and Territory

ARNGs routinely employ the NEPA process to ensure sound stewardship of real property resources.

For ARNG actions, the NEPA process consists of integrating other environmental requirements, involving the public, identifying associated effects, operating on the principle of *full disclosure*, analyzing relevant technical information, documenting analyses, summarizing technical information for the public and the decision maker, identifying a preferred course of action, and designing and implementing mitigation and monitoring. The NGB and State and Territory ARNGs prepare NEPA documents on a wide array of proposals that encompass a broad spectrum of mission-related and support actions and activities. The following are examples:

- Real property master planning
- Real property acquisition, grants of rights, and disposal
- Military construction
- Weapon systems acquisition
- Equipment modernization
- Force management
- Training
- Environmental management planning
- Installation management

3.2.2 Environmental Consequences

Proposed Action in general. No effects on real property resources would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects would be expected. Fielding of 119 FOX systems to 28 BCTs, 2 Special Forces Groups, and 25 chemical companies would not impose or create any special or new requirements on existing land uses (e.g., training ranges, maneuver areas, maintenance shops). BCTs typically operate with approximately 900 vehicles, the majority of which are humvees and trucks. The addition of two FOX systems to each brigade would be negligible relative to the size of a BCT's entire vehicle inventory. Requirements of the ITAM program's land rehabilitation and maintenance element, used to mitigate the environmental effects of training through land maintenance and repair activities, would be only negligibly increased.

Proposed Action – HIMARS. No effects would be expected. Operational training of the HIMARS would be confined to established ranges of appropriate size and configuration for rocket or missile ordnance. No changes in land use designations or ITAM program practices would be expected.

Proposed Action – Lakota. No effects would be expected. The proposed fielding of 200 Lakotas would essentially replace Huey and Kiowa aircraft now in use at existing Army Aviation Support Facilities. The Lakota is moderately larger than the Huey or Kiowa. In some instances, construction of additional (larger) hangar or maintenance space might be required. In such a case, receiving organizations would prepare appropriate NEPA analysis for the construction activities. As such construction would occur in areas designated for airfield use, no change in land use designation would be expected. No change in leases or permits would be expected where local ARNG aviation organizations operate under such real property interests.

Proposed Action – Shadow. No effects would be expected. Shadow systems, each consisting of four aerial vehicles, two ground control stations, ground vehicles, and maintenance equipment, would be fielded at 28 BCTs and 2 Special Forces Groups in 27 states and 7 fires brigades and 6 battlefield support brigades. Placing the systems at existing armories, maintenance shops, Army Aviation Support Facilities, MATES, and UTES would not affect existing land use designations. Operational training involving the aerial vehicles, which would originate from existing training ranges, maneuver areas, or airfields, would not affect land use designations.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment.

Proposed Action – Spartan. No effects would be expected. Fifty-four Spartan aircraft would be fielded at 12 states and Guam. The aircraft would replace Sherpas and Hurons at Army Aviation Support Facilities except in Guam, where new Army aviation facility assets might need to be constructed. Locating the aircraft at Army Aviation Support Facilities would not affect existing land use designations or infrastructure (e.g., fueling resources, control towers). Tactical operations training at austere airfields, which would occur at existing locations having shortened or unpaved runway facilities, would not affect land use designations. Because the Spartan is moderately larger than either the Sherpa or Huron and its height is nearly twice that of either the Sherpa or Huron, new hangar or maintenance space could be required at a limited number of locations. Such construction, occurring at existing airfields, would not be expected to change land use designations.

No Action Alternative. No effects would be expected. Continued use of existing ground and air systems would possibly affect operational efficiencies and the ability of State and Territory ARNGs to achieve their missions but would not be expected to produce any additional or different environmental effects.

3.3 AIRSPACE

3.3.1 Existing Conditions

Definition of resource. The FAA manages all airspace within the United States and the U.S. territories. Airspace is defined in vertical and horizontal dimensions and also by time. The FAA recognizes the military's need to conduct certain flight operations and training within airspace that is separated from that used by commercial and general aviation. Airspace is a finite resource and must be managed to achieve equitable allocation among commercial, general aviation, and military needs.

The FAA has established various airspace designations to protect aircraft while operating near and between airports and while operating within airspace identified for defense-related purposes. Flight rules and air traffic control procedures govern safe operations within each type of designated airspace. Most military operations are conducted within designated airspace and follow specific procedures to maximize flight safety for both military and civil aircraft.

Controlled airspace is a generic term for the different types of airspace (Classes A, B, C, D, E, and G airspace) and defined dimensions within which air traffic control service is provided to instrument flight rules (IFR) flights and visual flight rules (VFR) flights in accordance with the airspace classification. The classifications of airspace are as follows:

- Class A airspace. This airspace occurs from 18,000 feet above mean sea level (MSL) to 60,000 feet above MSL. All operations within this airspace are in accordance with regulations pertaining to IFR flights. This airspace is dominated by commercial aircraft using jet routes between 18,000 and 45,000 feet above MSL.

- Class B airspace. This airspace occurs from the surface to 14,500 feet above MSL around the nation's busiest airports. Before operating in Class B airspace, pilots must contact controlling authorities and receive clearance to enter the airspace. Aircraft operating within Class B airspace must be equipped with specialized electronics that allow air traffic controllers to accurately track the speed, altitude, and position of the aircraft.

- Class C airspace. This airspace occurs from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and meet specified levels of IFR operations or passenger enplanements. Aircraft operating within Class C airspace must be equipped with a two-way radio and an operable radar beacon transponder with automatic altitude reporting equipment. Aircraft may not operate below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class C airspace area at an indicated airspeed of more than 200 knots (230 mph).

- Class D airspace. This airspace occurs from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have a control tower. Class D airspace encompasses a 5-statute mile radius from the airport. Unless authorized otherwise by Air Traffic Control (ATC), aircraft must be equipped with a two-way radio. Aircraft may not operate below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class D airspace area at an indicated airspeed of more than 200 knots (230 mph).

- Class E airspace. This airspace is any controlled airspace not designated as Class A, B, C, or D airspace. It includes designated federal airways, portions of the jet route system, and area low routes. Federal airways have a width of 4 statute miles on either side of the airway centerline and occur between the altitudes of 700 feet above ground level (AGL) and 18,000 feet above MSL, but they may have a floor at ground level at airfields without a tower. No specific equipment is required to operate within Class E airspace.

- Class G airspace. Class G airspace (uncontrolled) is that portion of the airspace that has not been designated as Class A, B, C, D, or E airspace. ATC does not have authority over operations within uncontrolled airspace. Primary users of Glass G airspace are VFR general aviation aircraft.

- Special-use airspace. Special-use airspace enables activities that must be confined because of their nature or require limitations on aircraft that are not a part of those activities. Prohibited and Restricted Areas are regulatory special-use airspace. They are established in FAR Part 73 through the rule-making process of the Administrative Procedure Act (Title 5 of the *United States Code* [U.S.C.] sections 551-702). Warning Areas, MOAs, Alert Areas, and Controlled Firing Areas are nonregulatory, special-use airspace. That is, the FAA may designate these types of special-use airspace without resorting to the procedures demanded of the Administrative Procedure Act.

Analysis of airspace management and use involves considering many factors, including the types, locations, and frequencies of aerial operations; the presence or absence of already designated (controlled) airspace; and the amount of air traffic using or transiting through a given area. Proposed actions that are consistent with controlled airspace designations should typically be found not to present impacts on safety. Proposals for actions potentially inconsistent with airspace designations or that could pose a threat to the safety of other aircraft or persons or property require careful consideration, which often involves coordination with FAA officials. Where safety is a concern, the proponent should consult with the military representative at the FAA's regional field office.

Specific aviation and airspace management procedures and policies to be used by the Army are provided in AR 95-1, *Flight Regulations,* and AR 95-2, *Air Traffic Control, Airspace, Airfields, Flight Activities, and Navigational Aids.* Also relevant is the Army's recent publication of AR 95-23, *Unmanned Aerial Systems Flight Regulations* (August 2006) governing UAVs such as the Shadow. The Memorandum of Understanding between the FAA and the Department of Defense (DoD) Concerning Special Use Airspace Actions (October 2005) provides guidelines for compliance with NEPA and CEQ regulations without FAA and DoD duplication of effort. This document, which appears as Appendix 7 of Chapter 32 of FAA Order 7400.2, can be obtained at the FAA's Web site at http://www.faa.gov/airports_airtraffic/air_traffic/publications/at_orders/media/AIR.pdf.

The potential for a manned or unmanned aircraft collision with birds (or other wildlife) is referred to as Bird Aircraft Strike Hazard (BASH). Airfields often possess diverse natural and human-made habitats that provide food, water, shelter, and open spaces for various species of birds and mammals. Some of these species can impact aircraft safety. The potential for BASH at a particular location is mainly based on proximity of habitats, types and numbers of resident or migratory bird species, and the daily and seasonal movement patterns pf these bird species.

There are three basic strategies used in BASH management. First, land use controls discourage birds and other wildlife from using airfields. Methods include fencing, controlling drainage and storm water collection facilities, and managing vegetation. Second, active controls may be used. Methods include use of pyrotechnics, recorded bird distress calls, repellents, dogs trained to move birds, trapping, and lethal control (as last resort). Third, an airfield may use monitor bird movements with radar; this can provide pilots with real-time awareness.

The Army undertakes BASH management on an ad hoc basis. AR 95-2 (*Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids*), AR 95-23 (*Unmanned Aircraft System Flight Regulations*), and AR 385-90 (*Army Aviation Accident Prevention Program*) do not address BASH. Airfield managers for the Lakota and Spartan aircraft provide necessary measures to avoid BASH.

The Shadow and Raven systems could be launched from any suitably open area. Normal BASH counter-measures, such as those identified above, would normally not be applicable.

3.3.2 Environmental Consequences

Proposed Action in general. No effects on airspace resources would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects would be expected. Fielding and operational use of the Fox, a ground vehicle, would not affect airspace.

Proposed Action – HIMARS. No effects would be expected. Firing of HIMARS rockets or missiles would occur at ranges certified for such ordnance. Such ranges operate under Restricted Airspace or MOAs, or under Controlled Firing Area conditions. No changes to airspace designations would be expected upon fielding of HIMARS.

Proposed Action – Lakota. No effects would be expected. As the replacement for the Huey and Kiowa aircraft, fielding of the Lakotas would not require changes in airspace designations. On the basis of similarities of the new and existing aircraft, departure and approach flights routes in the vicinity of home airfields would not be expected to change. The small number of aircraft being fielded at each location and limited number of flight operations would not be expected to saturate local airspace resources.

Proposed Action – Shadow. No effects would be expected. Under FAA and Army regulations, Shadow flight operations are limited to positively controlled airspace, Restricted Airspace, or Warning Areas. In any other types of airspace, Shadow flights must be accompanied by chase aircraft. Given the Shadow's cruise speed (104 mph) and loiter speed (60 mph), helicopters would be used as chase aircraft.

The NGB has reviewed the adequacy of airspace for Shadow operations and found that 14 states lack airspace that is restricted or designated for military use. Connecticut, Delaware, Illinois, Iowa, Maine, Massachusetts, Montana, Nebraska, New Hampshire, Rhode Island, South Dakota, and Tennessee have no airspace for military use. Vermont and North Dakota have inadequate airspace for military use. The remaining 36 states have adequate airspace for military use. Two of the Shadow fielding proposals involve Illinois and Iowa, which do not have airspace that is restricted or designated for military use; both states are adjacent to states having adequate airspace for military use. (NGB, 2007.) In light of these circumstances, it is not likely that State and Territory ARNGs would need to seek changes in airspace designations. The smaller size of the Shadow aircraft would suggest a reduced BASH potential.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment. The small size of the Raven aircraft would suggest a reduced BASH potential.

Proposed Action – Spartan. No effects would be expected. Introduction of the Spartan, a cargo aircraft to replace Sherpas and Hurons, would not require changes to airspace designations. The small number of aircraft being fielded at each location and limited number of flight operations would not be expected to saturate local airspace resources.

No Action Alternative. No effects would be expected.

3.4 AIR QUALITY

3.4.1 Existing Conditions

Definition of resource. Since 1967, the Clean Air Act (CAA) has evolved from a set of principles to guide states in controlling sources of air pollution to a series of detailed control requirements that the federal government implements and the states administer. The CAA has historically regulated air pollution sources through three primary programs: (1) ambient air

quality regulation of new and existing sources through emission limits contained in state implementation plans (SIPs); (2) more stringent control technology and permitting requirements for new sources; and (3) specific pollution problems, including hazardous air pollution and visibility impairment. The 1990 amendments to the CAA not only modified these three programs, but also addressed new air pollutants and added a comprehensive operating permit program.

Incorporation. This PEA incorporates by reference the discussion of air quality contained in the Army Transformation PEIS. Specific information is provided below.

Background. The CAA, the primary federal statute regulating air emissions, applies to the Army and all its activities. The objectives of CAA are to protect and enhance the quality of air resources; initiate and accelerate a national research and development program to prevent and control air pollution; help state, tribal, and local governments develop and implement air pollution prevention and control programs; and encourage and assist the development and operation of regional air pollution prevention and control programs. The CAA categorizes regions of the United States as nonattainment areas if air quality within those areas does not meet the required ambient air quality levels set by the National Ambient Air Quality Standards (NAAQS). The NAAQS consist of primary and secondary standards for six *criteria air pollutants*: sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. Primary standards are established to protect public health; secondary standards are established to protect public welfare (e.g., plant life, cultural monuments, and wildlife).

States have the authority to establish emission source requirements to achieve attainment of the NAAQS. These requirements may be uniform for all sources or may be specifically tailored for individual sources. To be approved as federally enforceable measures in a SIP, the requirements must be consistent with the CAA. Source emission requirements in SIPs may be established for stationary and mobile sources. Implementation of CAA requirements, for purposes of achieving NAAQS, is achieved primarily through SIPs and various federal programs. The CAA requires states to develop SIPs that establish requirements for the attainment of NAAQS within their geographic areas. SIPs must identify major sources of air pollution, determine the reductions from each source necessary to attain NAAQS, establish source-specific and pollutant-specific requirements as necessary for the area, and demonstrate attainment of NAAQS by the applicable deadlines established in the CAA using any combination of tools. If a state fails to submit a plan that is sufficient to attain the NAAQS, the U.S. Environmental Protection Agency (EPA) is to impose a federal implementation plan for that region.

In addition to General Conformity and NEPA, State and Territory ARNGs have broad compliance responsibilities under the CAA. They must comply with all federal, state, interstate, and local requirements; administrative authorities; and processes and sanctions in the same manner and to the same extent as any nongovernmental entity. This compliance requirement includes any reporting, recordkeeping, permitting requirements, and payment of service charges and fees set forth in regulations or statutes. Five aspects of the CAA are particularly relevant to the Army's environmental stewardship efforts with respect to air quality. These pertain to stationary sources, mobile sources, the permit program, reduction of hazardous air pollutants (HAPs), and the ozone depletion program.

- ***Stationary sources.*** The CAA establishes a variety of requirements or standards that states apply to stationary emission sources. Requirements or standards have been established for new source performance standards (NSPS), lowest achievable emission rate, and reasonably available control technology.

- ***Mobile sources.*** Mobile sources include cars, trucks, planes, vessels, and off-road engines and vehicles. EPA generally has authority to set emission standards for these sources and related controls on their fuels. Federal mobile source requirements established by the 1990 CAA Amendments include automobile emission standards, fuel quality standards, and fleet requirements more strict than those required previously. In particular, some areas must have improved inspection and maintenance programs to ensure that vehicles continue to meet emission standards.

- ***Permit program.*** Title V of the 1990 CAA Amendments established an operating permit program similar to that of the Clean Water Act (CWA) for all major stationary sources of air pollution. The CAA permit program is generally administered by the state air pollution control agencies authorized by EPA. Each permit may include a compliance schedule, enforceable emission limits and standards, and requirements for submitting monitoring data.

- ***Reduction of HAPs.*** EPA is required to list all categories of major sources that release any of the 188 chemicals designated by Congress as HAPs in the 1990 CAA Amendments. EPA also reviews and updates the list of chemicals and promulgates emission standards for listed source categories. New and existing major sources of HAPs must comply with applicable National Emission Standards for Hazardous Air Pollutants (NESHAP), which are adopted standards for specified categories of emission sources. Compliance with NESHAP requires a level of emission reduction that can be achieved by a particular source category by implementing Maximum Available Control Technology (MACT).

- ***Ozone depletion program.*** The 1990 CAA Amendments established a new program to protect the stratospheric ozone layer. The program sets a schedule to phase out the production of most ozone-depleting chemicals such as chlorofluorocarbons (CFCs), halons, and hydrochlorofluorocarbons.

ARNG air quality management. Guidance for the Army's air program is set forth in Department of the Army (DA) Pamphlet (PAM) 200-1 (*Environmental Protection and Enhancement*) and includes activities to control emissions and cooperation with appropriate regulatory agencies. The objectives of the program are as follows:

- Identify and monitor air pollution sources, determine types and amounts of pollutant emissions, control pollutant levels to those specified in applicable regulations or to protect health.

- Procure commercial equipment and vehicles with engines that meet applicable standards and regulations and that do not present a health hazard. (Exceptions are those vehicles or engines specifically excluded or exempted by EPA regulations or agreements.)

- Ensure that each piece of military equipment is designed, operated, and maintained so that it meets applicable regulations.

- Monitor ambient air quality in the vicinity of Army activities per applicable regulations.

- Cooperate with EPA and state authorities to achieve the requirements of the CAA 1977 and applicable regulations issued according to this act, applicable state and local air pollution regulations, air pollution control provisions in other federal and state

environmental laws and regulations, including the Resource Conservation and Recovery Act (RCRA) of 1976, as amended; the Toxic Substances Control Act (TSCA) of 1976; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980; the Superfund Amendments and Reauthorization Act (SARA) of 1986; and applicable state and local environmental regulations.

- Comply with all federal, state, and local regulations concerning air quality.

State and Territory ARNGs must consider the effects that planned projects and activities would have on air quality both on- and off-post. Two independent legal requirements address air quality management: (1) NEPA and (2) the general conformity provision of CAA section 176(c), including EPA's implementation, the General Conformity Rule. Depending on the action and the air quality conformity attainment status of the installation (or other affected property), an installation might have to complete a separate conformity analysis in addition to the NEPA analysis. Applicability of the two requirements must be considered separately. Exemption from one requirement does not automatically exempt the action from the other requirement, nor does fulfillment of one requirement constitute fulfillment of the other. Although installations should integrate compliance efforts to save time and resources, the two requirements are very different, necessitating separate analyses and documentation.

Under section 176(c) of the CAA, the Army is prohibited from engaging in, supporting, providing assistance for, or approving activities (e.g., issuing a license or permit) that are inconsistent with SIP requirements. This section is known as the General Conformity Rule. According to section 176(c), activities must conform to an implementation plan's purpose of "eliminating or reducing the severity and number of violations" of NAAQS and achieving *expeditious attainment* of such standards. Such activities must not cause or contribute to a new violation; increase the frequency or severity of an existing violation; or delay timely attainment of any standard, required interim emission reduction, or other milestone. Pursuant to that rule, conformity determinations are required to ensure that state air quality standards would not be exceeded and that an action would comply fully with the SIP. The proponent compares the emission levels of the Proposed Action to current baseline emissions. Where increases in emission levels exceed thresholds established in the General Conformity Rule, a conformity determination must be prepared. In support of the conformity determination, additional air quality modeling could be required to show more precisely the action's effects on air quality in the region.

3.4.2 Environmental Consequences

Proposed Action in general. Long-term minor adverse effects on air quality would be expected. However, the Proposed Action would not generate emissions above the applicability thresholds or contribute to a violation of any federal, state, or local air regulation. The total annual direct and indirect emissions of all criteria pollutants were estimated for the operation of the systems, as well as allowances for a small facility construction or modification project to facilitate the systems' fielding (Table 3-1). The General Conformity Rule does not apply because either (1) the receiving installation would be in an attainment area, or (2) the projected emission would be below the applicability thresholds for the nonattainment area. This is true regardless of the system, location of the installation, pollutant(s) of interest, or the severity of nonattainment.

Any major construction or modification of facilities, additional support activities, or unusual increases in training intensity by State and Territory ARNGs would require site-specific analysis under NEPA and the General Conformity Rule. This might require additional emission estimations to ensure the total direct and indirect emissions from the action would not exceed the

applicability thresholds, and that the General Conformity Rules still would not apply. A Record of Non-Applicability (RONA) to the General Conformity Rule is in Appendix D. Detailed emission calculations are in Appendix E.

Table 3-1
System operational and minor construction emissions compared to applicability thresholds

	Estimated emissions (tpy)					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Construction emissions	4.78	5.32	0.88	0.01	3.53	3.52
Fox operations	0.64	0.36	0.08	0.00	0.02	0.02
Lakota operations	2.88	8.57	0.38	0.98	0.09	0.09
Shadow operations	1.33	1.25	0.14	0.09	0.17	0.17
Spartan operations	3.51	6.14	1.13	1.27	2.51	2.50
De minimis thresholds (tpy)	100	25	100	100	100	25
Would emissions exceed *de minimis* thresholds?	No	No	No	No	No	No

Sources: AP-42 sections 13.2.2 and 13.2.3; CARB 2007; FAA 2007; USAF 2002; and USAF 2006.
Notes: There are no areas in the United States designated extreme nonattainment for the 8-hour ozone.
There are no ARNG installations in nonattainment areas for lead.
HIMARS and Raven operations would result in no change or a net reduction in emissions.
tpy = tons per year

None of the systems are stationary sources of air emissions and would be neither subject to federal, nor state, air permitting regulations, including new source review, NSPS, or prevention of significant deterioration. At most installations, the systems would not be subject to air permit reporting requirements. However, each installation would review its air permits to ensure compliance.

Proposed Action – Fox. Long-term minor adverse effects would be expected. The Fox system would introduce very small amounts of additional nonroad air emissions at each installation. Annual emissions for the operation of a Fox, as well as allowances for a small facility construction or modification project to facilitate the system's fielding, are outlined in Table 3-1. The General Conformity Rule does not apply because either (1) the receiving installation would be in an attainment area, or (2) the projected emission would be below the applicability thresholds for the nonattainment area. This is true regardless of the location of the installation, pollutant(s) of interest, or the severity of nonattainment.

Proposed Action – HIMARS. Long-term minor beneficial effects would be expected. At locations that the HIMARS replaced MLRS, no changes in the types and amount of training or rocket launches would be expected. Therefore, the total amount of air pollutants would remain the same. At locations that the HIMARS replaced M198 Howitzer, the number of operations would be reduced. A corresponding reduction in the emissions of criteria pollutants would be expected. The General Conformity Rule does not apply because the proposed fielding of the HIMARS would generate a net decrease in direct and indirect emissions of criteria pollutants. This is true regardless of the location of the installation or pollutant(s) of interest.

At locations that the HIMARS replaced M198 Howitzer, additional sources of noncriteria pollutants associated with HIMARS training are products of combustion from the solid propellant and from the smoke canister at the impact point. Table 3-2 lists the species and weight fractions

of the Reduced-Range Practice Rocket (RRPR) exhaust products. Of the various materials in the exhaust gases, only two have any potentially significant hazard possibilities. Carbon monoxide and hydrogen chloride have a high toxic hazard rating when exposure is prolonged in large concentrations. Because of the open-air environment, the concentration of these pollutants would disperse rapidly with distance from the firing point. The hydrogen chloride concentrations would fall below Occupational Safety and Health Act (OSHA) ceiling values within 80 m (262 feet) of the firing point. A distance of 120 m (394 feet) would be considered far enough to prevent severe personnel harm (FLARNG 2005). Firing points are inside post boundaries a minimum safe distance greater than those required to affect individuals off-post.

Table 3-2
RRPR exhaust emissions

Chemical	Grams produced per 100 grams of propellant consumed
Aluminium Chloride ($AlCl_3$)	0.00955
Aluminum Oxyhalide (AlOCl)	0.00843
Aluminium Oxide (Al_2O_3)	33.96397
Carbon Monoxide (CO)	**21.95053**
Carbon Dioxide (CO_2)	2.83523
Chlorine (Cl)	0.19561
Iron (Fe)	0.01801
Ferrous Chloride (FeCl)	0.00327
Ferrous Chloride($FeCl_2$)	1.57580
Ferrous Hydroxide ($Fe(OH)_2$)	0.00322
Elemental Hydrogen(H)	0.01419
Hydrogen Chloride (HCl)	**20.24216**
Hydrogen (H_2)	2.07671
Water (H_2O)	8.79125
Nitric Oxide(NO)	0.00107
Nitrogen (N_2)	8.22263
Hydroxide (OH)	0.02071
Total	**100**

Source: FLARNG 2005

The RRPR contains three smoke canisters, three ballast loads, and 129 ballast weights. Upon ignition of the fuse and burster, the smoke canisters, which contain titanium tetrachloride ($TiCl_4$), are ruptured. The $TiCl_4$ reacts with moisture in the air to form a smoke-like cloud, which provides a visual marker above the target. The tracer smoke that is emitted from fired RRPRs would not adversely affect air quality because it is not toxic and is emitted in relatively small quantities (U.S. Army 1987).

Proposed Action – Lakota. Long-term minor adverse effects would be expected. Because of its smaller size and power plant, no increase in emissions at the four installations that the UH-72A Lakota would replace the UH-1 or UH-60 would be expected. A net increase in emission of criteria pollutants would be expected at installations where the UH-72 would either replace the OH-58 or not replace any rotorcraft. A bounded analysis was performed to determine if the General Conformity Rule applies. Emissions estimates for the annual operations of six helicopters, as well as allowances for a small facility construction or modification project to facilitate the system's fielding were performed. It was conservatively assumed that the Lakota

fuel throughput and exhaust emissions were similar to its larger counterpart the UH-1 (Table 3-1). The General Conformity Rule does not apply because either (1) the receiving installation would be in an attainment area, or (2) the projected emission would be below the applicability thresholds for the nonattainment area. This is true regardless of the location of the installation, pollutant(s) of interest, or the severity of nonattainment. These findings are even more evident given that the reduction in emissions due to the aircraft being replaced was not considered.

Proposed Action – Shadow. Long-term minor adverse effects would be expected. The Shadow would introduce small amounts of additional nonroad air emissions at each installation at which it was fielded. Annual emissions for the operation of a Shadow, as well as allowances for a small facility construction or modification project to facilitate the system's fielding are outlined in Table 3-1. The General Conformity Rule does not apply because either (1) the receiving installation would be in an attainment area, or (2) the projected emission would be below the applicability thresholds for the nonattainment area. This is true regardless of the location of the installation, pollutant(s) of interest, or the severity of nonattainment.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment. The Raven would not generate air emissions because it is battery powered.

Proposed Action – Spartan. Long-term minor adverse effects would be expected. A net increase in emission of criteria pollutants would be expected at installations where the C-27J Spartan would replace either the C-23 Sherpa or the C-12 Huron. A bounded analysis was performed to determine whether the General Conformity Rule applies. Emissions estimates for the annual operations of four Spartans, as well as allowances for a small facility construction or modification project to facilitate the system's fielding were performed. It was conservatively assumed that its fuel throughput and exhaust emissions were similar to its larger counterpart, the C-130 (Table 3-1). The General Conformity Rule does not apply because either (1) the receiving installation would be in an attainment area, or (2) the projected emission would be below the applicability thresholds for the nonattainment area. This is true regardless of the location of the installation, pollutant(s) of interest, or the severity of nonattainment. These findings are even more evident given that the reduction in emissions due to the aircraft being replaced was not considered.

No Action Alternative. No effects on air quality would be expected. State and Territory ARNGs would continue to use their present weapons systems and equipment. There would be neither beneficial nor adverse effects on air quality.

3.5 NOISE

3.5.1 Existing Conditions

Definition of resource. *Noise* is generally defined as unwanted sound. It can be any sound that is undesirable because it interferes with communications or other human activities, is intense enough to damage hearing, or is otherwise annoying. Human response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day.

Incorporation. This PEA incorporates by reference the discussion of noise contained in the Army Transformation PEIS. Specific information is provided below.

Background. The military noise environment consists primarily of three types of noise: transportation noise from aircraft and vehicles, noise from firing at small-arms ranges, and impulsive noise from large-caliber weapons firing and demolition operations. Three noise zones are used to define land-use compatibility concerning environmental noise for Army activities (Table 3-3):

- Zone I (compatible): Housing, schools, medical facilities, and other noise-sensitive land uses are compatible with noise levels in the zone (all areas not contained within Zone II or Zone III).

- Zone II (not recommended): Noise-sensitive land uses (e.g., housing, schools, and medical facilities) are normally incompatible with noise levels in this zone unless measures have been taken to attenuate interior noise levels.

- Zone III (incompatible): Noise-sensitive land uses (e.g., housing, schools, and medical facilities) are incompatible in this zone.

Table 3-3
Noise level zones

Noise zone	Small-arms weapons	Aircraft (ADNL)	Large-caliber weapons (> 20 mm) and demolition (CDNL)
I	< 87 PK15 (met)	< 65 dBA	< 62 dBC
II	87–104 PK15 (met)	65–75 dBA	62–70 dBC
III	> 104 PK15 (met)	> 75 dBA	> 70 dBC

Source: U.S. Army 2007
Note: dBA = A-weighted decibel; dBC = C-weighted decibel.
Large caliber impulsive noise resulting from testing and training activities may be measured in terms of a single event metric, either peak sound pressure level (PK 15(met)) or C-weighted sound exposure level (CSEL). The metric PK 15(met) accounts for statistical variation in received single event peak noise level that is due to weather. It is the calculated peak noise level, without frequency weighting, expected to be exceeded by 15 percent of all events that might occur.

The Army uses key metrics to quantify the noise environment at Army installations—the C-weighted and A-weighted day-night average sound levels (CDNL and ADNL). Day-night average sound level (DNL) is defined as the time-weighted energy average sound level over a 24-hour period; a 10-decibel (dB) penalty is added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise because (1) it averages continuous noise, such as a busy highway, and (2) it measures total sound energy over a 24-hour period. DNL is used to assess more continuous noise sources, such as aircraft noise and the ongoing components of repetitious blast noise. The metric used in defining noise zones for small-arms ranges is peak level (dBP). Peak level is the maximum instantaneous sound level that occurs during an acoustic event. In the case of small arms, it is the maximum instantaneous sound level made by a given weapon at a given distance. Peak level for small-arms weapons is strongly correlated with community annoyance.

In addition, the use of explosives and large-caliber weapons are common causes of complaints among people living near military installations. As mentioned above, community annoyance due to steady-state noise is typically assessed by averaging noise levels over a protracted period. This approach can be misleading because it does not assess community noise effects due to relatively infrequent, yet loud, impulsive noise events. For example, for a demolition range at which several hundred charges are detonated each year, peak pressure levels can exceed 140 dB in regions where annual DNL values indicate that noise is compatible with residential land use. The

peak noise contours provide the absolute maximum sound level for an individual acoustical event, not an average over several events or over a period of time like the DNL. Although not a good descriptor of the overall noise environment like the DNL for large-caliber munitions, peak levels relate well the level of concern and possibility of complaints among people living near the boundary of an installation after an individual event. Table 3-4 outlines complaint risk guidelines using peak noise levels for impulsive noise.

Table 3-4
Risk of noise complaints

Complaint risk	Large-caliber weapons (> 20 mm) and demolition
Low	< 115 PK15 (met)
Moderate	115–130 PK15 (met)
High	> 130 PK15 (met)

Source: U.S. Army 2007

Army noise management. The Army's Operational Noise Management Program (ONMP) is described in Chapter 14 of AR 200-1 (*Environmental Protection and Enhancement*). The purpose of the ONMP is to minimize the impact of operational noise on the public without impairing the mission of the installation. The primary strategy for noise management is being a responsible neighbor to surrounding communities. This includes educating both the military and civilian communities, managing noise complaints, mitigating the noise and vibration environments (consistent with mission), and coordinating with planning and zoning officials to maintain compatible land uses (both on- and off-post). The Army's ONMP implements federal law concerning environmental noise generated by ARNG activities, including aircraft operations and range firing.

The ONMP requires State and Territory ARNGs to implement environmental noise policies to identify and control noise effects. Among these policies is the requirement to make noise predictions for long-range planning purposes. As a part of the ONMP, noise contour maps are prepared. The maps delineate noise zones as outlined above. These noise contours are determined through mathematical modeling and computer simulations.

Noise occurring at Army and ARNG installations and subject to management activities can be produced by several types of activities. Often, the source of noise is an important determinant in applying suitable management actions. Noise occurring *naturally* in the environment, or ambient noise, generally is not amenable to management. This type of noise is produced by inanimate and biological components of nature such as wind, rainfall, movement of vegetation, and animal activities. Man-made noise not associated with military training activities, such as hunting, logging activities, vehicular traffic, and commercial aircraft, can often be controlled to some extent as to time and place. Noise directly attributable to military training includes activities such as weapons firing (small arms and large caliber), vehicular movements, and aircraft operations. In some instances, off-site sources of noise (timber operations, road traffic, off-road vehicles, recreational hunting, and industrial sources) contribute to elevation of natural background noise. At a given installation, all these types of noise must be taken into account when assessing and managing the noise environment.

Consideration of the noise environment could shape the manner in which ARNG activities are carried out. For instance, firing large-caliber weapons produces noise both at the firing point and in an impact area. Consequently, consideration must be given to potential noise receptors with

respect to both locations. In a similar vein, consideration must be given to flight paths for fixed-wing and rotary aircraft so that potential noise receptors are not unduly affected.

3.5.2 Environmental Consequences

Proposed Action in general. Long-term minor beneficial and adverse effects would be expected. As shown in the following analysis, either no effects or minor beneficial effects on noise would be expected to occur for the fielding of the Fox, HIMARS, Lakota, Shadow, and Raven systems. Replacement of the C-12 and the C-23 with the C-27J, however, would increase noise levels at and around the ARNG installations of interest.

Proposed Action – Fox. No effects would be expected. Noise associated with the operation of the NBCRS vehicle would be comparable to other small, armored vehicles such as Humvees and medium trucks in the field. Operations of medium-sized ground vehicles are not a primary source of noise at ARNG installations. Because of their relatively low levels of noise, they are not commonly accounted for in determining the effects of training activity noise on communities and individuals living adjacent to ARNG installation. The very small increase in the activity from ground vehicles due to the introduction of the Fox and associated personnel would translate into negligible (not distinguishable from existing) changes in the overall noise environment. This is true both for the ARNG as a whole, and at the installation level.

Proposed Action – HIMARS. Long-term minor beneficial effects would be expected. The HIMARS and MLRS are extremely similar both operationally and acoustically. In combat, the HIMARS and MLRS fire surface-to-surface rockets. The rockets can be fired individually or in ripples of 2 to 12 from the MLRS, or 2 to 6 in the case of the HIMARS. The HIMARS and MLRS launchers operate by day and night under all weather conditions. They are both far more powerful and effective weapons than the M198 155 mm Howitzer.

The basic tactical rocket warhead for both systems contains 644 M77 munitions, which are dispensed above the target in mid-air. Each launcher can deliver munitions at ranges exceeding 32 kilometers (km). Because of this large distance, training with the tactical warhead is limited to large ranges, such as are found at Fort Bliss, Texas. For more typical ranges, units train with the RRPR. The RRPR has a range of 8 to 15 km. The RRPR is equipped with a tactical rocket motor for launch realism and an inert warhead. A blunt nose profile introduces ballistic drag to slow the rocket and reduce its range. HIMARS and MLRS training are limited to the RRPR at the majority of ARNG installations. Regardless of the system, the total munitions, and therefore operations, in typical ARNG training cycle is approximately 100–150 rockets. The actual number is determined by things other than noise, such as mission demand and cost.

All HIMARS and MLRS launched rockets have four key acoustic features; rocket ignition, rocket ejection from launch tube, rocket motor noise, and ballistic shock wave. The first three features are local to the rocket launcher. The ballistic shock wave (sonic boom) propagates forward of the launch to either side of a supersonic rocket. These rockets reach supersonic speed approximately 1 second after launch (Lang et al. 1998). These four acoustical features are virtually identical in the two systems. The noise generated by the HIMARS in both level and frequency is not measurably different that of the MLRS. This is true for all types of munitions suitable for both systems.

For all installations where HIMARS would replace the MLRS, the peak sound levels, and associated level of concern and potential for noise complaints would be the same with both systems. Because the type and overall amount of operations and associated acoustical events

would remain the same at the installations currently training with the MLRS, no changes in the incompatible land use zone would be expected at these locations. The fielding of the HIMARS at these locations would constitute a no effect with respect to noise.

Being faster and with a diameter of 227 mm (wider than the 155 mm round), the HIMARS and MLRS generate a larger sonic boom than the 155 mm Howitzer. Even with the RRPR, the rocket would be supersonic for 6,000 meters (m). Sonic booms from RRPR have been measured as high as 96 to 116 dBC, as far as 4 km beyond the target point (Walsh 1999). Peak noise levels from the rocket systems would be significantly higher than from artillery near the firing point, yet lower than the artillery down range. In one study, at 4,500 m from the firing point, the average peak level was measured to be 107 dBP for the M198, and 127 dBP for a MLRS. However, at 6,500 m from the firing point, the maximum peak level was measured to be 122 dBP for the M198, and 105 dBP for the MLRS (USACHPPM 1999).

For all installations where HIMARS would replace the M198 155 mm Howitzer, the peak noise levels, and potential for noise complaints would be higher near the firing point and lower down range. There would be a dramatic decrease in the number and frequency of operations, associated acoustical events, and overall noise environment (CDNL). The fielding of the HIMARS at these locations would constitute a minor beneficial effect with respect to noise.

Introduction of HIMARS to installations not currently equipped with an MLRS or M198, any additional ranges, firing points, or unusual increase in training intensity by State and Territory ARNGs would require site-specific analysis under NEPA with respect to noise. In most cases, compliance with NEPA for such new actions could most likely be accomplished with a REC.

Proposed Action – Lakota. Long-term minor beneficial effects would be expected. At most ARNG airfields, aircraft operations are far below the levels needed to generate Zone II noise levels. On the basis of the individual overflight level of the Kiowa (at 500 feet AGL), approximately 500 operations over a one-day period would be needed to generate Zone II levels at a point directly below the flight track. However, the ARNG is cognizant that operational levels below 500 per day could lead to complaints or generate annoyance or both in surrounding communities. Therefore, even though operational levels for the UH-72A would also be too low to generate Zone II levels, individual overflight levels must be considered.

The Effective Perceived Noise Level (EPNL) is a metric that is used by the FAA and the European Union (EU) to certify that individual aircraft noise levels are compliant with governmental standards. The EPNL is used because it takes into account the variations in how different aircraft sound, factoring in the frequency components of the individual aircraft. The EPNL metric is described as a *perceived noisiness* level. Table 3-5 gives EPNL levels for the UH-1H and OH-58 that would be replaced by the UH-72A, as well as for other common Army helicopters. Individual overflight levels for the UH-72 would be lower than the UH-1H and OH-58 and any helicopters currently in the inventory.

Table 3-5
Maximum EPNLs of rotorcraft

Altitude (AGL)	UH-1H	OH-58C	UH-72A	CH-47	UH-60
150 meters (500 feet)	100.6	89.9	87.2	95	88.9

Source: USAF 2007; and EASA 2007

For all installations where Lakotas would replace existing aircraft on a one-for-one basis, a decrease in both the overall noise environment and any single overflight would be expected. This would constitute a minor beneficial effect with respect to noise at these locations.

For all installations where Lakotas would constitute additional aircraft, newly introduced individual overflight noise from Lakotas would generate distinct acoustical events having minor effects. These individual overflights would have the potential from time to time to annoy residents and other sensitive receptors directly under the flight path. However, it would be highly unlikely that the total number of operations would exceed 500 per day. Therefore, no new or changes to existing areas of incompatible land use (Zone II) would be generated from introducing the Lakotas. These changes would constitute a minor adverse effect with respect to noise at these locations.

Introduction of any additional aircraft or unusual increase in training intensity by State and Territory ARNGs would require analysis under NEPA to determine, on a site-specific basis, the effects, if any, on an area's noise environment as encompassed by the local ONMP. In most cases, compliance with NEPA for such new actions could most likely be accomplished with a REC.

Proposed Action – Shadow. No effects would be expected. The Proposed Action would introduce Shadow flight operations to positively controlled airspace, Restricted Airspace, or Warning Areas. In any other types of airspace, Shadow flights must be accompanied by chase aircraft, more than likely a rotorcraft. Comparison of Shadow run-up noise levels to other common noise sources are outlined below (Table 3-6). Typically, operations would be conducted at 8,000 feet AGL during daytime training and 6,000 feet AGL for nighttime training. Once the UAV reaches approximately 3,000 feet AGL, the Shadow would no longer be heard on the ground (Roop 2004). The Shadow climbs at a rate of 500 to 1,000 feet per minute; at 3 to 6 minutes after takeoff, the noise would not be heard on the ground. Because of the airspace restrictions and the limited levels of noise, no residences, communities, or sensitive noise receptors would experience any notable change to the overall noise environment.

Table 3-6
Comparison of noise levels of the Shadow to other common noise sources

Noise source	Distance (feet)	Noise level (dBA)
Shadow (UAV)	204	85
Shadow (UAV)	28	108
Passenger car (65 mph)	25	77
Motorcycle	25	90
Air conditioner	60	60

Sources: USACHPPM 2003

Noise associated with the operation of the Shadow support vehicles would be comparable to other small, armored vehicles such as Humvees and medium trucks in the field. Operations of medium-sized ground vehicles are not a primary source of noise at ARNG installations. Because of their relatively low levels of noise, they are not commonly accounted for in determining the effects of training activity noise on communities and individuals living adjacent to ARNG installation. The very small increase in the activity from ground vehicles due to the introduction of the Shadow systems would translate into a negligible (not distinguishable from existing) changes in the overall noise environment.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment. Because it is battery-powered, noise associated with Raven operations would be minimal.

Proposed action – Spartan. Long-term minor adverse effects would be expected. Although there is no existing noise data for the C-27J, it would likely be marginally louder that both the C-12 and the C-23 that it is replacing. The C-27J has the same engines, propellers, digital avionics, and floor strength as the C-130J. However, the C-27J has two engines, whereas the C-130J has four. A conservative assumption is that sound levels from the C-27J are approximately 3 dBA lower than that of the C-130J. Maximum noise levels for the C-130J, C-12, C-23, and C-27J are listed below (Table 3-7). In general, no perceptible change in the noise from the Spartan with respect to those being replaced would be expected.

Table 3-7
Maximum noise levels vs. slant distance for aircraft of interest

Slant distance	Maximum sound level (dBA)			
Feet	C-130J	C-12	C-23	C-27J[1]
200	99	88	89	96
300	95	80	81	92
1,000	83	73	74	80
2,000	75	67	66	72
5,000	65	57	54	62
10,000	56	50	44	53

Source: USAF 2007
1 Assumed to be 3 dBA quieter than the C-130

An installation's level of operations, fleet mix, and proximity to nearby communities, residents, and other sensitive receptors would determine the exact level of effects. Small changes in individual land use contours could be introduced with the replacements. However, the Spartan would make up only a small fraction of the existing air fleet mix at the installations, the number of replacements are relatively small (i.e., at most four aircraft), and individual overflight noise would be only marginally louder than existing aircraft. These effects can be considered minor. This conclusion is even more evident when considering the ongoing efforts of the ONMP at each of these locations.

Introduction of any additional aircraft or unusual increase in training intensity by State and Territory ARNGs would require analysis under NEPA to determine, on a site-specific basis, the effects, if any, on an area's noise environment as encompassed by the local ONMP. In most cases, compliance with NEPA for such new actions could most likely be accomplished with a REC.

No Action Alternative. No effects on noise would be expected to occur. State and Territory ARNGs would continue to use their present weapons systems and equipment. There would be neither any beneficial nor any adverse effects on the noise environment.

3.6 WATER RESOURCES

3.6.1 Existing Conditions

Definition of resource. *Water resources* include surface water, groundwater, wetlands, and floodplains, which can be described as follows:

- *Surface water*. Surface water resources consist of lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Storm water flows, which can be exacerbated by high proportions of impervious surfaces (e.g., buildings, roads, and parking lots), are important to the management of surface water. Storm water is also important to surface water quality because of its potential to introduce sediments and other contaminants into lakes, rivers, and streams.

- *Groundwater*. Groundwater consists of the subsurface hydrologic resources. It is an essential resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate.

- *Wetlands.* Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support (and that under normal conditions do support) a prevalence of vegetation typically adapted for life in saturated soil conditions.

- *Floodplains.* Floodplains are areas of low-level ground along a river or stream channel. Such lands might be subject to periodic or infrequent inundation from rain or melting snow. Risk of flooding depends on topography, the frequency of precipitation events, and the size (areal extent) of the watershed above the floodplain. Federal, state, and local regulations generally limit development in floodplains to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety.

Incorporation. This PEA incorporates by reference the discussion of water resources contained in the Army Transformation PEIS. Specific information is provided below.

Regulatory regime: Clean Water Act. ARNG activities subject to CWA regulation include activities involving the collection and discharge of effluents (e.g., discharging pollutants from a point source into waters of the United States) or construction activities near waterways or wetlands. Principal sections of the CWA that are of particular relevance to Army activities include the following:

- *CWA section 303 (Water Quality Standards and Implementation Plans).* Section 303(d) requires states to identify waters that do not meet or are not expected to meet water quality standards even after technology-based or other required controls are in place. States establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.

- *CWA section 307 (National and Local Pretreatment Standards).* Facilities that discharge to publicly owned treatment works (POTWs) are excluded from National Pollutant Discharge Elimination System (NPDES) permitting requirements but are subject to national general pretreatment standards (at 40 CFR Part 403), applicable categorical pretreatment standards (specified in 40 CFR Parts 405–471), and state or local pretreatment standards. Facilities must sample the effluent and submit reports on the results of such sampling at a frequency specified in their permits. Monitoring reports must be submitted to EPA, states, or POTWs with approved pretreatment programs. The 1992 Federal Facility Compliance Act added provisions for federally owned treatment works. These facilities have an NPDES permit and treat influent that is composed of

mostly domestic sewage. The 1992 act extends to a federally owned treatment works the so-called Domestic Sewage Exclusion from the definition of *solid waste*, provided the facility meets all specified conditions.

- *CWA section 308 (Inspections, Monitoring, and Entry).* EPA, state agencies, or their authorized representatives (e.g., contractors) have broad authority to conduct compliance inspections at any premises on which an effluent source is located or in which any records required to be maintained under the CWA are located. Inspectors may have access to any records, inspect any monitoring equipment, and sample any effluent to check compliance with NPDES permit requirements, water quality standards, pretreatment standards, effluent limitations, or toxic standards.

- *CWA section 313 (Federal Facilities Pollution Control).* Each federal agency that has jurisdiction over any facility or is engaged in activity resulting in the discharge or runoff of pollutants is subject to and must comply with all federal, state, interstate, and local requirements and administrative authorities for the control and abatement of water pollution. These requirements include adhering to any reporting, recordkeeping, or permitting requirements. If the President determines it to be in the paramount interest of the United States, he may exempt any effluent source of any department, agency, or instrumentality in the Executive Branch from compliance with any requirements of the CWA for a 1-year period, except requirements under the National Standards of Performance (CWA section 306) and the Toxic and Pretreatment Effluent Standards (CWA section 307). Exemptions are renewable annually. Furthermore, CWA section 313 waives the traditional immunity of the federal government and requires federal facilities to comply with federal, state, interstate, and local water pollution controls. Requirements include compliance with EPA or state inspections and all applicable federal, state, interstate, and local substantive and procedural requirements (including recordkeeping, reporting, payment of reasonable service charges, and permits). CWA section 313 exempts federal employees from civil penalties.

- *CWA section 402 (National Pollutant Discharge Elimination System).* Point source discharges of wastewater must comply with requirements established by an NPDES permit issued by EPA or a state agency that has an approved NPDES program. NPDES permits contain water quality-based or technology-based standards or both for effluent discharges (specified in 40 CFR Parts 405–471 or by the best professional judgment of the permit writer), monitoring requirements, analytical testing methods, and reporting requirements. Dischargers must submit Discharge Monitoring Reports that record flow measurement, sample collection data, and laboratory test results on a quarterly or monthly basis. Noncompliance reports must be submitted quarterly or monthly stating the cause of the noncompliance, period of noncompliance, and plans to eliminate recurrence of the incident. Point source storm water discharges that are associated with certain industrial activities or are designated by EPA for contributing to a violation of water quality standards also require a permit.

- *CWA section 404 (Permits for Dredged or Fill Material).* Facilities that discharge dredged or fill materials into navigable waters must apply for a permit issued by the U.S. Army Corps of Engineers (USACE). EPA may restrict or deny the dredging or filling of any site where the activity could have an adverse effect on the environment. States may apply for the authority to implement the CWA section 404 program. The USACE, however, retains authority over navigable waters within the state. Under limited circumstances, the discharge of dredged or fill materials, as part of a federal project

specifically authorized by Congress, is not prohibited by or subject to regulation under CWA section 404.

- *CWA section 405 (Permits of Sludge Management).* All works that treat domestic sewage are required to meet federal requirements for the use and disposal of sewage sludge through land application, surface disposal, or incineration. These requirements are incorporated into permits issued under CWA section 402; under the appropriate provisions of other legislation (e.g., Solid Waste Disposal Act; Safe Drinking Water Act [SDWA]; Marine Protection, Research, and Sanctuaries Act; CAA); under EPA-approved state sludge management programs; or, in the case of a treatment works that is not subject to the above requirements, in a sludge-only permit.

Regulatory regime: Safe Drinking Water Act. The SDWA mandates that EPA establish regulations to protect human health from contaminants in drinking water. The law authorizes EPA to develop national drinking water standards and to undertake joint efforts with federal, state, and tribal authorities to ensure compliance with the standards. The SDWA also directs EPA to protect underground sources of drinking water through the control of underground injection of liquid wastes.

To meet these objectives, EPA has developed primary and secondary drinking water standards under its SDWA authority. EPA and authorized states and tribes exercising delegated authorities enforce the primary drinking water standards. The standards identify contaminant-specific concentration limits that apply to certain public drinking water supplies. Primary drinking water standards consist of maximum contaminant level goals (MCLGs), which are non-enforceable health-based goals, and maximum contaminant levels (MCLs), which are enforceable limits. MCLs are set as close to MCLGs as possible, considering cost and feasibility of attainment.

Management of water resources. Historically, the nation's clean water programs have been based primarily on technology-based controls. More recently, regulators have shown a trend toward water quality-based controls implemented on a watershed basis. This shift from technology-based controls will mean that nontraditional sources of water quality impairment such as nonpoint source pollution (polluted runoff, which is acknowledged as a major source of contaminants in water) will be targeted. The ARNG has embraced this concept and is managing its lands on an ecosystem basis.

To address increasing concerns over the availability and reliability of water supplies, a number of planning and management initiatives have emerged in recent years, many of which are being implemented on Army and ARNG installations. Water efficiency measures seek the efficient use of water through behavioral, operational, or equipment changes. Water recycling, reclamation, or reuse measures include use of treated wastewater for beneficial purposes, such as landscape irrigation, industrial processes, toilet flushing, and replenishing of a groundwater basin (referred to as groundwater recharge). Water is sometimes recycled and reused on-site; for example, when a facility recycles water used for cooling processes. A common type of recycled water used for nonconsumptive purposes is water that has been reclaimed from municipal wastewater, or sewage. Drought planning and management involves major water users' developing drought contingency plans that emphasize preparedness, coordination, risk management, and mitigation measures.

Executive Order 12902, *Energy Efficiency and Water Conservation at Federal Facilities*, calls for federal agencies to implement water conservation measures. Examples of measures that the Army is increasingly adopting pertain to universal metering, water accounting and loss control,

costing and pricing, information and education programs, water-use audits, retrofits, water pressure management, landscape efficiency, reuse and recycling, water-use regulation, and integrated resource management. The Army adheres to this Executive Order and incorporates its principles into various installation plans and regulations.

Executive Order 11990, *Protection of Wetlands*, orders federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Executive Order 11988, *Floodplain Management*, requires that federal agencies take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values of floodplains. The ARNG adheres to these Executive Orders with its construction projects and as circumstances arise. In addition, wetlands and floodplain management are integral components of Integrated Natural Resources Management Plans (INRMPs) and the ITAM program.

The ARNG's natural resources management programs ensure that wetlands, floodplains, and their associated riparian areas are protected and enhanced. INRMPs provide range operators and natural resource managers with strategies and practices to improve land use on ARNG installations and to ensure the proper protection, enhancement, and management of surface water and groundwater resources. Two elements of the ITAM program support essential environmental management of installation aquatic resources—RTLA and LRAM. Through constant monitoring and evaluation of the RTLA program, land managers and trainers are able to assess the quality of wetlands and bodies of water and make decisions regarding training intensity and location. LRAM implements state-of-the-art BMPs to solve specific environmental management problems, such as loss of vegetation, soil erosion, and streambank destabilization, and to protect installation water resources. The ITAM program seeks optimum sustainable use of training lands by inventorying and monitoring land conditions, integrating training requirements with carrying capacity, educating land users so that they can minimize their adverse effects, and providing for land rehabilitation and maintenance.

The Army-wide program of completing planning level surveys (PLSs) for flora, fauna, vegetative communities, and threatened and endangered species at each installation—a program in which the ARNG participates—is another means of ensuring sound management of water-dependent natural resources. Identifying and locating unique aquatic species, aquatic habitats, wetland areas, and wetland species allows environmental managers to make decisions on training intensity and location. Knowledge of the species and aquatic habitats ensures the protection and enhancement of these resources.

The ARNG implements watershed-based management of its land resources that protects the waterbodies within each installation watershed. Watershed management incorporates analysis of land uses occurring in the watershed and evaluation of the current condition of natural resources to ensure that ongoing and planned activities are compatible with the natural environment. Watershed-based analysis identifies situations that are not sustainable for the local area and its natural resources. The integrated natural resource management program is one means of documenting these analyses and incorporating the results into management prescriptions for the installation.

3.6.2 Environmental Consequences

Proposed Action in general. No effects on water resources would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects would be expected. The Fox system and most of its operational characteristics would be similar to other systems in use and, thereby, would not directly or indirectly affect water resources to any greater extent than existing systems being used on military installations. Training areas where the equipment would be used would be monitored and rehabilitated as necessary under the ITAM program. Spills of petroleum or other liquids used during routine vehicle maintenance practices would be cleaned up in accordance with the standard operating procedures of the Oil and Hazardous Substances Spills Program or the petroleum, oils, and lubricants (POL) program.

Proposed Action – HIMARS. No effects would be expected. HIMARS would be similar to other artillery and rocket systems in use and, thereby, would not directly or indirectly affect water resources to any greater extent than existing systems being used on military installations. Training areas where the equipment would be used would be monitored and rehabilitated as necessary under the ITAM program. Spills of petroleum or other liquids used during routine vehicle maintenance practices would be cleaned up in accordance with the standard operating procedures of the Oil and Hazardous Substances Spills Program or the petroleum, oils, and lubricants (POL) program.

Proposed Action – Lakota. No effects would be expected. The Lakotas would be similar to the Huey and Kiowa aircraft being replaced. The Lakotas would not directly or indirectly affect water resources to any greater extent than existing systems being used. Spills of petroleum or other liquids used during routine aircraft maintenance would be cleaned up in accordance with the standard operating procedures of the Oil and Hazardous Substances Spills Program or the petroleum, oils, and lubricants (POL) program.

Proposed Action – Shadow. No effects would be expected. While the Shadow would represent introduction of a new system, its operational characteristics would not likely directly or indirectly affect water resources to any measurable extent. Training areas where the aircraft would be used would be relatively small and, thereby, not likely monitoring or rehabilitation under the ITAM program. Spills of petroleum or other liquids used during routine maintenance would be cleaned up in accordance with the standard operating procedures of the Oil and Hazardous Substances Spills Program or the petroleum, oils, and lubricants (POL) program.

Proposed Action – Raven. No effects would be expected. Training areas where the aircraft would be used would be relatively small and, thereby, not likely to require monitoring or rehabilitation under the ITAM program. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment.

Proposed Action – Spartan. No effects would be expected. The Spartan would be larger than the Sherpa and Huron aircraft being replaced, but that size differential would not pose a risk of effects to water resources. Spills of petroleum or other liquids used during routine aircraft maintenance would be cleaned up in accordance with the standard operating procedures of the Oil and Hazardous Substances Spills Program or the petroleum, oils, and lubricants (POL) program.

No Action Alternative. No effects would be expected.

3.7 GEOLOGY AND SOILS

3.7.1 Existing Conditions

Definition of resource. *Geological resources* consist of the earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography; soils; geology; minerals; and, where applicable, paleontology.

- *Topography*. Topography pertains to the general shape and arrangement of a land surface, including its height and the position of its natural and artificial features.

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

- *Geology*. Geology, which concerns itself with the study of the earth's composition, provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis on the basis of observations of the surface and borings to identify subsurface composition. Hydrogeology extends the study of the subsurface to water-bearing structures. Hydrogeological information helps in the assessment of groundwater quality, quantity, and movement.

- *Minerals*. In a limited number of cases, the presence, distribution, quantity, and quality of mineral resources might affect or be affected by a Proposed Action. Understanding of the Proposed Action and minerals is useful in keeping decision makers fully informed of potential socioeconomic and natural resources consequences.

- *Paleontology*. The presence of fossils and human artifacts presents an opportunity for scientists to gain a better understanding of history. In a very limited number of cases, a Proposed Action might have the potential to damage or destroy paleontological resources. Such resources must be located, quantified, and assessed for their value (including their possible value as cultural resources) before implementation of the Proposed Action.

Incorporation. This PEA incorporates by reference the discussion in the Army Transformation PEIS of geology and soils. Specific information is provided below.

General geologic settings. Table C-8, *Army and ARNG installations and corresponding ecoregion provinces*, in Appendix C identifies a representative sample of Army and ARNG installations used by ARNG forces and the ecoregions in which those installations are found. Information on general geologic settings, landforms, topography, and soils that occur in various ecoregions of the United States is provided below. Individual installations would consider surficial resource needs and effects while considering sensitive or limiting geologic features that occur in specific regions (karst regions, susceptibility to earthquakes, or soil erosion). Soil types are explained in Table C-9, *Soil types*, in Appendix C.

The following paragraphs describe the general geologic settings of selected Army and ARNG installations.

- *American Semi-desert and Desert (Fort Irwin).* The topography of this region is characterized by extensive gently undulating plains with low mountains and buttes rising abruptly. The elevations of the valleys range from 280 feet below sea level to 4,000 feet above sea level, where the mountains can reach as high as 11,000 feet. Rocky mountains rise abruptly from outwash aprons and alluvial faces. Gravel or bare rock covers the ground near the bases of some mountains. Because of heavy, violent desert rainstorms, very little soil is allowed to accumulate on the steep mountain slopes, and bare rock is often exposed at the surface. Soil types found on the older alluvial fans, terraces, and better-drained basins are entisols; throughout the rest of the region, aridisols predominate. Both of these soils are subject to erodibility by water and wind and are best maintained with natural vegetation.

- *Chihuahuan Desert Province (Fort Bliss).* Several topographic zones are identified in this region, each with characteristic relief and soil assemblages. A broad, relatively flat desert basin lies between the Organ and Franklin mountains. The surface of this intermontane basin is characterized by 1- to 12-foot-high semistabilized coppice sand dunes moderately covered with mesquite. There are several mountainous regions, including the Organ Mountains, Hueco Mountains, and Sacramento Mountains. These mountains consist of relatively low, subrounded hills that blend gently into the Otera mesa. Mostly desert, this province has very few permanent streams or rivers. The Rio Grande and Pecos rivers and a few of their larger tributaries originate in the more humid provinces and are the only perennial streams. The area consists of undulating plains with elevations near 4,000 feet, with somewhat isolated mountains rising 2,000 to 5,000 feet. Washes that are dry most of the year fill with water after rain. Basins with no outlets drain into shallow playa lakes that dry up during rainless periods. Extensive dunes of silica sand are found in parts of this province, and dunes of gypsum are notably found in southern New Mexico. Isolated buttes and small beds of blackish lava are present. There is considerable variability in soil parent material, development, texture, age, and suitability of the soils in this region, and soil types include aridisols and entisols. Soils resulting from weathering of limestone, sandstone, and igneous bedrock are found, as well as eolian materials from other areas. The soils are mostly calcareous and alkaline, have moderate permeability, and are moderately well drained, with the exception of soils having impervious caliche layers or bedrock near the surface. Certain soils have high potential for sheet and gully erosion.

- *Coastal Trough Humid Tayga (Fort Richardson).* Smooth and irregular plains surrounded by high mountains are found in this province. Cook Inlet is characterized by level to rolling topography, with areas of ground moraine and stagnant ice, drumlin fields, eskers, and outwash plains. The low-lying areas are typically less than 500 feet above sea level, with a local relief of 50 to 250 feet. The Copper River Lowland is a broad basin of rolling and hilly moraines and nearly level alluvial plains on the site of a Pleistocene glacial lake. With an altitude of 1,000 to 2,000 feet, it is cut by the Copper River and its tributaries, which form steep-walled canyons 100 to 300 feet deep.

- *Continental Eastern Broadleaf Forest (Forts Campbell, Drum, Knox, Dix, and Chaffee).* This area consists of mostly rolling hills with some flat areas and glaciated areas in the north. Low rolling hills, dissected plateaus, and basins are found throughout this region. Parts of Kentucky are characterized by karst topography with underground cave systems, sink holes, and truncated drainage basins. Sheet erosion and locally severe gully erosion have been reported in areas where the soil is disturbed. Elevations range from 80 to 1,650 feet. Soils in the north tend to be alfisols; toward the south, they grade into ultisols;

toward the interior, calcification sets in and forest soils give way to the darker soils of the grasslands (mollisols). All these soil types are moderately susceptible to soil erosion, depending on the local topography and climate conditions.

- *Great Plains Steppe and Shrub (Fort Sill).* Typical of this region are irregular plains with a relief of less than 300 feet. Elevations increase gradually from the east to the west and range from 1,600 feet to 3,000 feet. Slopes on these dissected plains range from nearly level to gently sloping, but slopes in the valleys are short and steep. The Wichita Mountains, in southwestern Oklahoma, rise as much as 1,000 feet above the surrounding plains. The soils are mostly mollisols with some alfisols.

- *Great Plains-Palouse Dry Steppe (Fort Carson, Pinon Canyon).* Characterized by rolling plains and tablelands, this region shows moderate relief with a gradual slope eastward from an altitude of 5,500 feet near the foot of the Rocky Mountains to 2,500 feet in the more central states. The area is mostly flat, with occasional valleys, canyons, and buttes. The distinctive landscape of the adjacent Pikes Peak Region is the result of the great mountain-building episode that occurred during the Laramide Period more than 60 million years ago. As a consequence, this region might be seismically active. Twenty million years later, during the Pleistocene Epoch, accelerated erosion of sediments affected by alpine glacier meltwater resulted in topographical variations along the Front Range. The most commonly occurring soil types are aridisols and entisols. Soil erodibility is moderate to severe for many of the soils in the region. Landslides caused by water transmission through shale bedrock are evident. The unstable clay formation movement generated by variations in moisture content and temperature requires special engineering design for road and building construction.

- *Hawaiian Islands (Schofield Barracks, Pohakuloa Training Area).* The Hawaiian Islands are volcanic islands in various stages of erosion. The Schofield Plateau is a saddle-shaped upland area with a basalt substrate. The topography ranges from nearly flat to hilly and mountainous; elevations range from sea level to more than 4,000 feet. Coastlines are mostly rocky and rough. The ground is highly porous, being composed of lava, so surface streams are not abundant. Soils on the islands are a complex group of leached ultisols and oxisols, inceptisols, and rocky highlands and coastlines with no soil. The oxisols are considered the most important agricultural soils of the state and generally consist of red, well-compacted volcanic ash and dark red and brown silty clays. The soils are high in volcanic matter, magnesium, calcium, and iron. Permeability is moderate with slow surface water runoff. The soil erosion hazard is very slight in level areas.

- *Intermountain Semi-desert (Orchard Training Area, Yakima Training Center).* This region covers the plains and tablelands of the Columbia-Snake River plateaus and Wyoming Basin. The plateaus, at an elevation of about 3,000 feet, are surrounded by lavas that have been folded or faulted into ridges. Toward the south, the plateaus grade into the basins and ranges of the Intermountain Desert Province. Sloping alluvial fans at the edges of the basins merge into flat plains in the center. Badlands can be found in the dissected areas along the outer edges of the region. Extensive alluvial deposits are found in the floodplains or streams and in the fans at the foot of mountains. There are numerous dry lake beds and extensive eolian deposits are present, including both dune sand and loess. Loess deposits in the Columbia River Basin are up to 150 feet thick, and soils developed from them are complex. Aridisols dominate all basin and lowland areas, and mollisols are found at higher elevations.

- *Outer Coastal Plain Mixed Forest (Forts Bragg, Polk, Stewart, and A.P. Hill; Camps Blanding and Shelby).* This province is composed of flat and irregular Atlantic and Gulf Coastal Plains down to the sea. Most of the area is gently sloping, with some local relief of less than 300 feet. There are numerous streams and lakes, most of them including sluggish marshes and swamps. Soil types in this province include ultisols, spodosols, and entisols. Most of the soils tend to be wet, acidic, and low in major plant nutrients. The soils are derived mainly from coastal plain sediments ranging from heavy clay to gravel, with sandy materials predominant. Silty soils are found on level expanses, and sands are prevalent in hilly areas. Many of the soils of this area are classified by the Natural Resources Conservation Service (NRCS) as highly erodible. Soils unprotected by vegetation are susceptible to water erosion from moderate and intense storms. Gullying is the most prevalent and prominent type of erosion, but sheet and rill erosion can be found in the early stages of an erosional event.

- *Pacific Lowland Mixed Forest (Fort Lewis).* This region lies in a north-south depression between the Coast Ranges and the Cascade Mountains. Elevations range from sea level to 1,500 feet. In the Willamette Valley, nearly level to gently sloping floodplains are bordered by dissected high terraces and hills. In the Puget Sound Valley, moderately dissected tableland is covered by glacial till, glacial outwash, and lacustrine deposits. Some isolated hills and low mountains are found. Most soils are strongly leached acid inceptisols and ultisols. A common soil characteristic is somewhat excessively drained, gravelly sandy loam up to 2 feet thick. A less commonly found soil is composed of slowly decomposing vegetative matter, forming a heavy surface deposit, where calcium, sodium, and potassium are leached out by organic acids.

- *Prairie Parkland, Temperate (Fort Riley).* Both prairie and deciduous forest are found in this region. The topography of the region is mostly gently rolling plains, but steep bluffs border some valleys. Some areas are nearly flat; others have rounded hills. Elevations range from 300 to 2,000 feet. Bedrock in this region is primarily limestone and shale. Soils of the prairies are mollisols, which have black, friable, organic surface horizons 6 to 12 inches thick, overlying nearly impervious clays. Grass roots deeply penetrate these soils. These soils can be the most productive of the great soil groups.

- *Southeastern Mixed Forest (Forts Benning, McClellan, and Pickett).* This region includes the Piedmont and the Gulf Coastal Plains, and most of the area has gentle slopes. On the Gulf Coastal Plain, local relief of 100 to 600 feet is seen; on the Piedmont, local relief varies from 300 to 1,000 feet. Numerous streams are found in the region, most of them sluggish. There are also numerous lakes, swamps, and marshes. Soils in the region include strongly leached ultisols and vertisols. The vertisols are clayey soils that form wide, deep cracks when dry. Ultisols are rich in oxides of both iron and aluminum and poor in many of the nutrients essential for successful agricultural production. Inceptisols are found on floodplains of major streams and are good agricultural soils.

- *Southwest Plateau and Plains Dry Steppe and Shrub (Fort Hood).* Found in this region are flat to rolling plains and plateaus with steep bluffs along the creeks. The Stake Plains of Texas are found in this region. Elevations range from sea level to 3,600 feet on the Edwards Plateau, to higher near the Rocky Mountain Piedmont. A mesa-and-butte landscape is characteristic of certain parts. Bedrock in this region includes interbedded limestone, sand, clay, and shale. Soils in this region are varied and include entisols in the savanna area, mollisols in the buffalo grass area, and some alfisols. Soil can be shallow to moderately deep clayey soil found in humid subtropical regions underlain by limestone

bedrock. The soils are generally plastic and calcareous. They have a relatively low permeability and high shrink-swell potential and are corrosive to ferrous metals. The plateau areas have a greater soil thickness with thinning at the ridgelines and steep slopes.

- *Laurentian Mixed Forest Province (Camp Grayling)*. The greatly varying soils include peat, muck, marl, clay, silt, sand, gravel, and boulders, in various combinations. Spodosols are dominant in New England and along the Great Lakes coast; Inceptisols and Alfisols dominate farther inland. The Alfisols are medium to high in bases and have gray to brown surface horizons and subsurface horizons of clay accumulation. Most of this province has low relief, but rolling hills occur in many places. Lakes, poorly drained depressions, morainic hills, drumlins, eskers, outwash plains, and other glacial features are typical of the area, which was entirely covered by glaciers during parts of the Pleistocene. Elevations range from sea level to 2,400 feet.

- *Eastern Broadleaf Forest (Continental) Province (Camp Ripley)*. The soils change from Alfisols in the north to Ultisols in southerly latitudes. Toward the continental interior, calcification sets in as forest soils give way to the darker soils of the grasslands (Mollisols). Most of the area is rolling, but some parts are nearly flat and in the Ozark Highlands the relief is moderate (up to 1,000 feet. Low rolling hills, dissected plateaus, and basins are found in Tennessee and Kentucky. The northern parts of the province have been glaciated, but not the southern. Elevations range from 80 to 1,650 feet.

3.7.2 Environmental Consequences

Proposed Action in general. No effects on geology and soils would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects would be expected. The Proposed Action would not create the need for any changes in geologic elements (topography, soil type, mineral resources) and fielding and use of the equipment would not be expected to adversely affect soils beyond any impact already created by using existing equipment. Any damage to soils in training areas where the wheeled vehicles are used would be rehabilitated as necessary in accordance with each installation's ITAM program.

Proposed Action – HIMARS. No effects would be expected. Fielding of the HIMARS would not create the need for any changes in geologic elements (topography, soil type, mineral resources), and fielding and use of the equipment would not be expected to adversely affect soils beyond any impact already created by using existing wheeled vehicles. Any damage to soils in training areas where the vehicles are used would be rehabilitated as necessary in accordance with each installation's ITAM program.

Proposed Action – Lakota. No effects would be expected. Fielding of the Lakota would not create the need for any changes in geologic elements (topography, soil type, mineral resources), and fielding and use of the aircraft would not be expected to adversely impact soils beyond any impact already created by the use of existing aircraft (Huey and Kiowa helicopters).

Proposed Action – Shadow. No effects would be expected. Fielding of the Shadow system (aircraft, ground stations, and transport vehicles) would not create the need for any changes in geologic elements (topography, soil type, mineral resources), and fielding and use of the aircraft

and related equipment would not be expected to adversely affect soils beyond any impact already created by using similar military equipment and vehicles.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment and not affect geology and soils.

Proposed Action – Spartan. No effects would be expected. Fielding of the Spartan would not create the need for any changes in geologic elements (topography, soil type, mineral resources), and fielding and use of the aircraft would not be expected to adversely affect soils beyond any impact already created by existing Sherpa and Huron aircraft.

No Action Alternative. No effects would be expected.

3.8 BIOLOGICAL RESOURCES

3.8.1 Existing Conditions

Definition of resource. *Biological resources* comprise naturally occurring and cultivated vegetative species and domestic and wild animal species and their habitats. Sensitive biological resources include plant and animal species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) or by a state agency pursuant to state law or regulation. Sensitive species also include species identified by the USFWS as candidates for possible listing as threatened or endangered pursuant to the ESA. Biological resources also include wetlands, which are important because they provide essential breeding, spawning, nesting, and wintering habitats for a major portion of the nation's fish and wildlife species. Wetlands are protected as a subset of the "waters of the United States" identified in section 404 of the CWA. The USACE defines wetlands as those areas that are inundated or saturated with groundwater or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Incorporation. This PEA incorporates the discussion of biological resources contained in the Army Transformation PEIS. Specific information is provided below.

Vegetation and wildlife. Discussed below are general wildlife species and vegetation types that occur in the various ecoregions in which Army and ARNG installation are located. Installation managers consider specific species that occur locally, particularly any threatened and endangered species, to identify possible adverse effects due to military activities.

- *American Semi-desert and Desert (Fort Irwin).* Vegetation is typically sparse, consisting of cacti and thorny shrubs. Thornless shrubs are also found; herbaceous plants can appear after infrequent rain. Creosote bush (*Larrea tridentata*), cholla cactus (*Opuntia* spp.), and saltbush (Atriplex spp.) can be locally abundant. Ocotillo (*Fouquieria splendens*) and Joshua tree (*Yucca brevifolia*) inhabit higher-elevation sites. Desert mountaintops are virtually devoid of vegetation. Ephemeral shallow playa lakes are found in basins. These salty lakes support several different zones of vegetation that encircle the lake, arranged by degree of salt tolerance (Bailey 1995). Desert mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and peccary (*Pecari angulatus*) survive in some desert habitats. Carnivores include the desert kit fox

(*Vulpes macrotis*) and coyote (*Canis latrans*). Predators depend on populations of nocturnal burrowing animals such as kangaroo rats (*Dipodomys* spp.), pocket mice (*Perognathus* spp.), and antelope ground squirrel (*Ammospermophilus leucurus*). Some bird species thrive in desert conditions; for example, cactus wren (*Campylorhynchus brunneicapillus*), roadrunner (*Geococcyx californianus*), loggerhead shrike (*Lanius ludovicianus*), and Gambel's quail (*Callipepla gambelii*). Many different species of snakes and lizards make the desert their home. Some species of pupfish (*Cyprinodon* spp.) are adapted to the highly saline lakes in the region.

- *Chihuahuan Desert Province (Fort Bliss).* Shrubs, cacti, and short grasses predominate in the region. Honey mesquite (*Prosopsis glandulosa*) and creosote bush can form extensive, open stands. The prickly pear cactus (*Opuntia* spp.) occurs with several different species of yucca (*Yucca* spp). Grama grass (*Bouteloua* spp.) is the dominant grass species. Cottonwood trees (*Populus* sp.) are found along perennial streams. Junipers (*Juniperus* spp.) and oaks (*Quercus* spp.) create mixed stands at the highest elevations (Bailey 1995). Large herbivores, such as mule deer, pronghorn antelope, and peccary, are distributed throughout the region. Small mammals present include blacktail jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus auduboni*), kangaroo rats, and wood rats (*Neotoma* spp). Coyote and bobcat (*Lynx rufus*) are the two main mammalian predators. A diverse bird fauna inhabits the region. One of the most common species is the black-throated sparrow (*Amphispiza bilineata*). Roadrunner, quail (*Callipepla* spp.), hawks, owls, and golden eagle (*Aquila chrysaetos*) are also widespread. Reptiles are abundant in the Chihuahuan desert. Texas horned lizard (*Phrynosoma cornutum*), common chuckwalla (*Sauromalus ater*), and several species of rattlesnakes (*Crotalus* spp.) might be encountered.

- *Continental Eastern Broadleaf Forest (Forts Campbell, Drum, and Knox).* This ecoregion is dominated by broadleaf deciduous forest. Northern reaches of this ecoregion feature forests with maple (*Acer* spp.), American beech (*Fagus grandifolia*), and basswood (*Tilia americana*) as dominant species. Tulip poplar (*Liriodendron tulipifera*), elm (*Elmus* spp.), and sweetgum (*Liquidambar styraciflua*) are often found in wetter sites (Bailey 1995). In the southern and western portions of this ecoregion, maple and beech forests grade into more drought-resistant oak-hickory (*Quercus* spp.–*Carya* spp.) forests. Oak-hickory stands also occur in drier sites with poor soils throughout the region. The understory is usually well developed and includes species such as dogwood (*Cornus* spp.), sassafras (*Sassafras albidum*) and hornbeam (*Carpinus caroliniana*). Deciduous and evergreen shrubs are also present. Wildflowers are abundant on forest edges and open oak savannas. Whitetail deer (*Odocoileus virginianus*) is the most abundant large game species. Gray squirrels (*Sciurus carolinensis*) and fox squirrels (*Sciurus niger*), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), and raccoon (*Procyon lotor*) are common in this area. Resident birds, such as the blue jay (*Cyanocitta cristata*) and wild turkey (*Meleagris gallopavo*), are found year-round. During the summer, migratory birds, such as the scarlet tanager (*Piranga olivacea*) and summer tanager (*Piranga rubra*), rose-breasted grosbeak (*Pheucticus ludovicianus*), red-eyed vireo (*Vireo olivaceus*), and ovenbird (*Seirus aurocapillus*), are common. The common map turtle (*Graptemys geographica*), box turtle (*Terrapene carolina*), black rat snake (*Elaphe obsoleta*), and eastern garter snake (*Thamnophis sirtalis*) are frequently observed in the region. Amphibians include the spring peeper (*Psuedacris crucifer*), wood frog (*Rana sylvatica*), green frog (*Rana clamitans*), and spotted salamander (*Ambystoma maculatum*). Cave salamanders (*Eurycea lucifuga*) reside near the openings of limestone caves in the southern part of the region.

Largemouth bass (*Micropterus salmoides*) and smallmouth bass (*Micropterus dolomieu*), northern pike (*Esox lucius*), channel catfish (*Ictalurus punctatus*), and black crappie (*Pomoxis nigromaculatus*) are popular game fish in the region's many lakes and rivers.

- *Great Plains Steppe and Shrub (Fort Sill).* The Great Plains Steppe and Shrub ecoregion is a transitional zone between grasslands to the west and oak-hickory forests to the east. Typical native vegetation consists of short- and tall-grass plains dissected by riparian forest corridors along perennial creeks. Dominant grass species include blue grama (*Bouteloua gracilis*), buffalo grass (*Buchloe dactyloides*), and little bluestem (*Schizachyrium scoparium*). Mesquite shrubs have invaded many pastures and roadsides. Riparian forests feature elm, persimmon (*Diospyros virginiana*), pecan (*Carya illinoinensis*), and eastern cottonwood (*Populus deltoides*). Post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) form dense stands in the Wichita Mountains. Buffalo (*Bison bison*) that once roamed the region have been reduced to small herds on wildlife refuges and private ranches. Whitetail deer are common, as are raccoon, striped skunk (*Mephitis mephitis*), coyote, and nine-banded armadillo (*Dasypus novemcinctus*). Mourning doves (*Zenaida macroura*) and bobwhite quail (*Colinus virginianus*) are year-round residents. Red-tailed hawks (*Buteo jamaicensis*) and other birds of prey are frequently observed feeding in pastures and agricultural fields. Reptiles include the western diamondback rattlesnake (*Crotalus atrox*), gopher snake (*Pituophis catenifer*), ornate box turtle (*Terrapene ornata*), and prairie lizard (*Sceloporus undulatus*). The bullfrog (*Rana catesbiana*) and the plains spadefoot toad (*Scaphiopus bombifrons*) are two amphibians known from the region. Fish species include largemouth bass, channel catfish, and Red River pupfish (*Cyprinodon rubrofluviatilis*).

- *Great Plains–Palouse Dry Steppe (Fort Carson, Pinon Canyon).* The Great Plains grasslands have scattered trees and shrubs, such as sagebrush (*Artemesia* spp.) and rabbitbrush (*Chrysothamnus* spp.), and form gradient levels of cover, from semidesert to woodland. Stands of cottonwood and willow (*Salix* spp.) are found adjacent to rivers. Vegetation is sparse in areas with rocky eroded soils, sometimes called badlands or breaks. There are numerous species of grasses and herbs. Common species include buffalo grass, locoweed (*Oxytropis* spp.), grama grass, wheatgrass (*Agropyron* spp.), and needlegrass (*Stipa* spp.). Typical wildflowers include the blazing star (*Mentzelia* spp.) and white prickly poppy (*Argemone polyanthemos*); tumbleweed (*Salsola iberica*) is abundant in certain areas (Bailey 1995). The pronghorn antelope is the most abundant large mammal; the mule deer and white-tailed deer are common in brushy areas along streams (Bailey 1995). The whitetail jackrabbit (*Lepus townsendii*) is in the northern portion of the ecoregion and the blacktail jackrabbit in the southern portion. The desert cottontail is widespread. Other small mammals, such as prairie dogs (*Cynomys* spp.) and other small rodents, are prey for coyotes, badgers (*Taxidea taxus*), and birds of prey. There are many gallinaceous bird species, including the sage grouse (*Centrocercus urophasianus*), the greater prairie chicken (*Tympanuchus cupido*), and the sharp-tailed grouse (*Tympanuchus phasianellus*). Other bird species include the horned lark (*Eremophilla alpestris*), lark bunting (*Calamospiza melanocorys*), western meadowlark (*Sturnella neglecta*), mountain plover (*Charadrius montanus*), and black-billed magpie (*Pica pica*). Gopher snake, prairie rattlesnake (*Crotalus viridis*), and painted turtle (*Chrysemys picta*) can be encountered in the region. Flathead chub (*Platygobio gracilis*), black bullhead (*Ameiurus melas*), and cutthroat trout (*Oncorhynchus clarkii*) are found in rivers and streams.

- *Hawaiian Islands (Schofield Barracks, Pohakuloa Training Area).* The Hawaiian Islands' volcanic origin and isolation from mainland areas is responsible for many unique and endemic plant species. The diversity of habitats found on Army lands in Hawaii is reflected in the diversity of native species and numbers of federally listed species found on these lands. Currently 40 percent of the federally listed endangered species are found in Hawaii. Many native plants are listed as threatened or endangered because of their restricted range. At all Army installations in Hawaii, there are numerous endangered plant species. Approximately 90 threatened and endangered species are found on Army training lands. On Oahu, vegetation varies with both altitude and position with respect to prevailing northeasterly trade winds. At low elevation on the lee sides of mountains, shrubland is the dominant cover type. Wetter windward sites and higher-elevation sites support tropical forests. Notable tree species include ohia (*Syzygium malaccense*) and koa (*Acacia koa*) trees. Ferns, mosses, and lichens are also abundant. The only bog on Army lands in Hawaii is in the Kawailoa Training Area, on the island of Oahu. The Pohakuloa Training Area on the island of Hawaii is on the plateau between two large volcanoes at 6,000 feet above sea level. The vegetation at the Pohakuloa Training Area can be characterized as subalpine dryland scrub vegetation. Isolation is also responsible for a limited but unique native flora and fauna. Many of the native land birds are listed as threatened or endangered. There is an endangered Hawaiian flycatcher at Makua and Schofield Barracks Military Reservation. The endangered Hawaiian hoary bat is known from a few installations on the islands of Hawaii and Oahu. Introduced mammals thrive in the Hawaiian Islands. Feral pigs, goats, and sheep can be found in natural areas. Introduced species threaten native ecosystems by competing with native species for resources. Introduced mammals thrive in the Hawaiian Islands and threaten native species through grazing and trampling. Many bird species have also been introduced. Reptiles are not abundant, and there are no native Hawaiian reptiles. Native and introduced snails are known from the islands. Several native tree snails (*Achatinella* spp.) occur on the island of Oahu. The endangered Oahu tree snail occurs at several Army installations on the island of Oahu.

- *Intermountain Semi-desert (Orchard Training Area, Yakima Training Center).* Sagebrush steppe, composed of sagebrush or shadscale *(Atriplex confertifolia*) mixed with short-grasses, is the dominant vegetation. Moist alkaline flats support greasewood (*Sarcobatus vermiculatus*). Along streams in and near the mountains, valleys contain willows and sedges (Bailey 1995). Pronghorn antelope are known from the Intermountain region. In the winter, elk (*Cervus canadensis*) and mule deer move down from mountains into semidesert habitats to escape severe cold. Predators include coyote, mountain lion (*Felis concolor*), and bobcat. Local small mammal fauna features whitetail prairie dog (*Cynomys gunnisoni*), deer mouse (*Peromyscus maniculatus*), jackrabbit, and porcupine (*Erethizon dorsatum*). Numerous waterfowl inhabit the ecoregion to breed and rest there during migration. Mallards (*Anas platyrhynchos*), pintail (*Anas acuta*), greenwinged teal (*Anas crecca*), gadwalls (*Anas strepera*), and Canada geese (*Branta canadensis*) are some representative waterfowl species. Sage grouse is an abundant game bird. There are many species of hawks and owls, as well. Sagebrush lizard (*Sceloporus graciosus*) and horned lizards (*Phrynosoma* spp.) are present, in addition to the prairie rattlesnake. Rainbow trout (*Oncorhynchus mykiss*) and other salmonid fishes are well known from the region.

- *Outer Coastal Plain Mixed Forest (Forts Bragg, Polk, and Stewart; Camps Blanding and Shelby).* Temperate evergreen forest is abundant in the Outer Coastal Plain. Common species are deciduous and evergreen oaks, laurels, and magnolias. Well-developed lower

strata can consist of tree ferns, small palms, ericaceous shrubs, and herbs. Epiphytes (nonparasitic plants that grow on other plants) are common; Spanish moss (*Tillandsia usneoides*) is one well-known epiphyte. Atlantic coast forested wetlands are dominated by gum (*Nyssa* spp.), red bay (*Persea borbonia*), and cypress (*Taxodium* spp.), while upland areas often support upland pine savannas of longleaf pine (*Pinus palustris*), loblolly pine (*Pinus taeda*), slash pine (*Pinus elliotii*), or pond pine (*Pinus serotina*) with diverse grass, sedge, and forb understories. Poorly drained pocosins (shrub-dominated wetlands) occur in shallow depressions in the Atlantic coastal region. Open pine savannas are maintained by wildfire; in the absence of fire, oak and other hardwood tree species become dominant. The Outer Coastal Plain is a region rich in wildlife species. Whitetail deer and feral pigs (*Sus scrofa*) are important herbivores. Some remote areas support black bears, and some locations in Florida shelter the almost extirpated (extinct) Florida panther (*Felis concolor coryi*). Typical small mammals are raccoons, opossums (*Didelphis virginiana*), flying squirrels (*Glaucomys volans*), eastern cottontail (*Sylvilagus floridanus*), bats (*Myotis* spp.), and many species of ground-dwelling rodents. Bobwhite quail and wild turkey are common ground-nesting game birds. Neotropical migrant birds are numerous, as are wintering migratory waterfowl. The American alligator (*Alligator mississippiensis*) is the largest reptile of the region (Bailey 1995). Water moccasin (*Agkistrodon piscivorus*) and snapping turtle (*Chelydra serpentina*) are other well-known reptiles. Amphibians are well represented in the region by many rare and common frog, toad, and salamander species. A broad spectrum of fish species are also known from the coastal plain. Many of these species are common in other parts of North America, while others are restricted to the warm waters of southern rivers and lakes.

- *Pacific Lowland Mixed Forest (Fort Lewis).* Coniferous forest is the dominant indigenous vegetation type. Common trees include the western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and Douglas fir (*Pseudotsuga menziesii*). Coniferous forest is less dense in interior valleys than along the coast. Interior valley forests often contain deciduous trees, such as big-leaf maple (*Acer macrophyllum*), Oregon ash (*Fraxinus latifolia*), and black cottonwood (*Populus trichocarpa*). Prairie-type vegetative communities support open stands of Oregon white oak (*Quercus garryana*) or scattered groves of Douglas fir and other trees such as Pacific madrone (*Arbutus menziesii*). Fescue and other grass species are also abundant in prairie-type communities. Poorly drained sites feature forested wetlands, freshwater marshes, and shrub bogs. Mule deer are the most common large herbivore in the ecoregion. Mountain lion and bobcat are also found in the region. Small mammals include the bushytail wood rat (*Neotoma cinerea*), brush rabbit (*Sylvilagus bachmani*), and gray fox (*Urocyon cinereoargenteus*). Ruffed grouse (*Bonasa umbellus*), mountain quail (*Oreortyx pictus*), and acorn woodpeckers (*Melanerpes formicivorus*) are attracted to oak forests. Waterfowl, as well as eagles and hawks, are regionally abundant. Reptiles are not abundant in the region. Salamanders, frogs, and toads thrive in moist lowland habitats. Salmon (*Oncorhynchus* spp.) and whitefish (*Prosopium* spp.) are known from streams and rivers.

- *Prairie Parkland, Temperate (Fort Riley).* Vegetation in this region consists of prairie intermixed with groves and strips of deciduous trees. Local soil conditions and slope exposure help determine whether forests or grasslands will be dominant. Trees are most likely to occur near streams or on north-facing slopes. Limestone hills having only thin soils support few trees; in the eastern portion, however, trees can be found on most of the highest hills. Tall grasses dominate prairie communities, and the most common species are big bluestem (*Andropogon gerardii*), little bluestem, switchgrass (*Panicum virgatum*),

and Indian grass (*Sorgastrum nutans*). Wildflowers and legumes are also abundant in grasslands. Before European settlement, fire and grazing maintained grasslands in areas that are also suitable for trees and shrubs. Where fire and grazing are controlled, deciduous trees can colonize grasslands. Upland forest areas are dominated by oak and hickory species. Floodplains and riparian areas support forested corridors of eastern cottonwood, black willow (*Salix nigra*), and American elm (*Elmus americana*). Much of this region has been converted to agriculture because of the favorable climate and soils. Many species of both prairie and forest animals are found in this ecoregion. White-tailed deer and elk use both forest and grassland habitats in the region. Small mammals include eastern mole (*Scalopus aquaticus*), deer mouse, prairie vole (*Microtus ochrogaster*), and raccoon. Thirteen-lined ground squirrel (*Citellus tridecemlineatus*) and blacktail prairie dog (*Cynomys ludovicianus*) are common on the prairies. Coyotes and badgers are common predators. Belted kingfisher (*Megaceryle alcyon*), bank swallow (*Riparia riparia*), spotted sandpiper (*Actitis macularia*), and green-backed heron (*Butorides virescens*) occur in the riverine forests. In open upland areas, the brown-headed cowbird (*Molothrus ater*), eastern meadowlark (*Sturnella magna*), mourning dove, and red-tailed hawk are common. Reptiles include the red-sided garter snake (*Thamnophis sirtalis*), gopher snake, ornate box turtle, and prairie lizard. Large rivers support many of the fish species typical of the Missouri River drainage. Fish habitat is limited in the western portion of the ecoregion because many smaller streams are intermittent.

- *Southeastern Mixed Forest (Fort Benning).* Temperate forests in this region are stocked with broadleaf deciduous and needleleaf evergreen trees. Southeastern mixed forest, also known as the Piedmont region, has undergone extensive land conversion to agriculture and pine plantation. Loblolly pine, shortleaf pine (*Pinus echinata*), Virginia pine (*Pinus virginiana*), and other southern yellow pines are important timber trees in young forests. Oaks, hickories, black gum (*Nyssa sylvatica*), and sweetgums are commonly associated with pines and eventually gain dominance as pines mature and die. Red maple (*Acer rubrum*) is very common in wet areas. Dominant grasses include panic grasses (*Panicum* spp.) and other native and introduced species. Common understory species are dogwoods, viburnums (*Viburnum* spp.), blueberries (*Vaccinium* spp.), and hollies (*Ilex* spp.), often occurring with woody vines, including poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and wild grape (*Vitis* spp.). White-tailed deer, cottontail rabbits, and fox squirrel are common in uplands where deciduous trees are present. Gray squirrels are found in lowland drainages. Raccoon, opossum, and red fox can be found throughout the region (Bailey 1995). The eastern wild turkey, bobwhite, and mourning dove are common year-round residents. In mature forests, resident and neotropical migrant songbirds such as the pine warbler (*Dendroica pinus*), cardinal (*Cardinalis cardinalis*), summer tanager, Carolina wren (*Thryothorus ludovicianus*), ruby-throated hummingbird (*Archilochus colubris*), blue jays, and tufted titmouse (*Baeolophus bicolor*) are present. Snakes, turtles, and lizards are common in this warm, temperate climate. Amphibians are also well represented. Catfish (*Ictalurus* spp., *Ameiurus* spp.), madtoms (*Noturus* spp.), shiners (*Lythrurus* spp.), sunfish (*Lepomis* spp.), and black bass (*Micropterus* spp.) are present in the many rivers and reservoirs in the region. A diverse complement of freshwater mussels is known from Gulf Coast drainages.

- *Southwest Plateau and Plains Dry Steppe and Shrub (Fort Hood).* Arid grasslands are the dominant vegetation type. Grasslands are often mixed with shrubs or low trees. Xerophytic grasses, such as blue grama and buffalo grass, are often the most prevalent. On steep, rocky slopes, evergreen live oaks (*Quercus* spp.) and ash juniper (*Juniperus*

ashei) are frequently mixed with mesquite shrubs and grasses. Bald cypress (*Taxodium distichum*), eastern cottonwood, and willows are found near perennial streams. Prickly pear cactus, yucca, and other xerophytic plants often invade overgrazed or poor sites. The Mexican ground squirrel (*Citellus mexicanus*) and coyote occur here, as well as the white-tailed deer and nine-banded armadillo. Limestone caves in central Texas are home to large populations of Mexican freetail bats *(Tadarida brasiliensis*). Common ground-nesting birds include wild turkey and bobwhite. Hawks and falcons are frequently observed in open fields. Regionally abundant songbirds include the scissor-tailed flycatcher (*Tyrannus forficatus*), great-tailed grackle (*Quiscalus mexicanus*), and mockingbird (*Mimus polyglottos*). Snakes and lizards are common. Guadalupe bass (*Micropterus treculi*) is a notable sportfish endemic to the region.

- *Laurentian Mixed Forest Province (Camp Grayling)*. This province lies between the boreal forest and the broadleaf deciduous forest zones and is therefore transitional. Part of it consists of mixed stands of a few coniferous species (mainly pine) and a few deciduous species (mainly yellow birch, sugar maple, and American beech); the rest is a macromosaic of pure deciduous forest in favorable habitats with good soils and pure coniferous forest in less favorable habitats with poor soils. Mixed stands have several species of conifer, mainly northern white pine in the Great Lakes region, with an admixture of eastern hemlock. Eastern red cedar is found in the southeast. Pine trees are often the pioneer woody species that flourish in burned-over areas or on abandoned arable land. Because they grow more rapidly than deciduous species where soils are poor, they quickly form a forest canopy; but where deciduous undergrowth is dense, they have trouble regenerating, and remain successful only where fire recurs. Fires started by lightning are common in this province, particularly where soils are sandy and there is a layer of dry litter in summer. In winter, the shorttail weasel (ermine) and snowshoe hare turn white, as they do in polar provinces. The black bear, striped skunk, marmot, chipmunk, and two genera of jumping mice all pass the winter in hibernation. So do badger and the striped ground squirrel that live in the western parts of the province. Beaver and muskrat remain active all winter, working beneath the ice that covers the lakes and streams. Ptarmigan also turn white in winter. Many other birds, especially insectivorous species, migrate south. Common summer resident birds include the white-throated sparrow, northern junco, and yellow-bellied sapsucker.

- *Eastern Broadleaf Forest (Continental) Province (Camp Ripley)*. This province is dominated by broadleaf deciduous forest, but the smaller amounts of precipitation found here favor the drought-resistant oak-hickory association. Although other forests have oak and hickory, only this particular forest association has both species in abundance. The oak-hickory forest is medium-tall to tall, becoming savannalike in its northern reaches from eastern Oklahoma to Minnesota, where it gradually turns into prairie. From eastern Kansas to Indiana, it forms a mosaic pattern with prairie. Widespread dominants are white oak, red oak, black oak, bitternut hickory, and shagbark hickory. The understory is usually well developed, often with flowering dogwood. Other understory species include sassafras and hophornbeam. The shrub layer is distinct, with some evergreens. Many wildflower species occur. Wetter sites typically feature an abundance of American elm, tuliptree, and sweet gum. Northern reaches of the oak-hickory forest contain increasing numbers of maple, beech, and basswood. The maple-basswood forest, dominated by sugar maple and American basswood, occurs from central Minnesota south through Wisconsin and northeastern Iowa. Glaciated areas of Ohio and Indiana feature a beech-maple forest defined by American beech and sugar maple. In these latter associations, oak and hickory occur on poor sites. In the oak-hickory forest, acorns and hickory nuts

provide abundant food for the ubiquitous gray squirrel. Fox squirrels are often found, as are eastern chipmunks. Roving flocks of blue jays also feed on forest nuts. In summer, scarlet and/or summer tanagers, rose-breasted grosbeaks, and ovenbirds are common. The wild turkey is also found here. The cerulean warbler is common in the beech-maple forest, and occurs elsewhere as well.

Threatened and Endangered Species. Congress passed the ESA in 1973 to address concerns about the decline in populations of many unique wildlife species. Supporters of the ESA argued that America's natural heritage was of aesthetic, ecological, educational, recreational, and scientific value to the nation and therefore worthy of protection. The purpose of the ESA is to rebuild populations of protected species and conserve the ecosystems on which endangered and threatened species depend. The law offers two classes of protection for rare species in decline: endangered or threatened. Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened status indicates a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. More than 1,200 species are listed as either threatened or endangered. All federal agencies are required to protect threatened and endangered species while carrying out projects and to preserve threatened and endangered species habitats on federal land. Ideally, with sufficient protection under the ESA, the threatened and endangered species populations will recover to the point at which they no longer need protection under the act.

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

The ESA contains provisions for designation of *critical habitat* for listed species when deemed essential for the conservation and recovery of a species. Critical habitat includes geographic areas on which the physical or biological features essential to the conservation of the species are found and that might require special management considerations or protection. Areas not occupied by the species at the time of listing but considered essential to the conservation of the species may be designated as critical habitat. Critical habitat designations are limited to federal agency actions or federally funded or permitted activities.

Appendix D of the Army Transformation PEIS lists 112 protected species found on 23 representative Army and ARNG installations. The species include 57 plants, 7 mammals, 25 birds, 5 reptiles, 1 amphibian, 4 fish, and 13 invertebrates. Two representative installations, Orchard Training Area and Fort Drum, have no reported threatened and endangered species populations. Just over half (61 species) of these species occur on two installations in Hawaii. Critical habitat has been designated on two installations for two birds—at Fort Lewis for the northern spotted owl (*Strix occidentalis caurina*) and at Pohakuloa Training Area for the paula honeycreeper (*Loxioides bailleui*). Table C-10 of Appendix C of this PEA identifies the status of threatened and endangered species on or near ARNG installation.

Wetlands. *Wetlands* are the transitional area between dry land and aquatic habitat. As defined by the USACE, wetlands are 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. Wetlands generally include swamps, marshes, bogs and similar areas. Three diagnostic characteristics are usually employed to recognize wetlands: hydrology, soils, and vegetation.

- *Hydrology*. Wetlands are inundated with less than 6.6 feet of water on average; otherwise, they are considered deepwater habitat. However, unless wetlands are saturated to the soil surface at least some time during the growing season (evidence of ongoing wetland conditions), they are considered upland or nonwetland habitat.

- *Soils.* Long-term inundation leads to oxygen depletion in soils. The lack of oxygen in wetland soils during part or all of the year causes wetland soils to develop differently than upland soils and to exhibit characteristics that develop under permanent or periodic soil saturation.

- *Vegetation*. Wetlands feature plant species that are adapted to thrive in wet soils with little or no oxygen. Wetland plants have specialized structural or reproductive features that allow them to compete with other plants and persist in inundated soils. Therefore, wetlands are dominated by species that are tolerant of prolonged inundation or soil saturation.

Wetlands are protected in the United States by the CWA. Wetland protection involves a *no net loss* policy through compliance with CWA section 404. The CWA protects all navigable waters of the United States. The general definition of *navigable waters* is those waters that are subject to the ebb and flow of the tide or are currently used, have been used in the past, or could be susceptible for use to transport interstate or foreign commerce. In addition, the term applies to the jurisdictional limits of waters of the United States for all other waters such as lakes, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce. To meet stewardship and compliance objectives, Army land managers avoid effects on wetlands whenever possible. Wetlands are present on most representative installations. Installations in coastal areas with abundant rainfall are likely to have proportionately more wetland acreage than installations in mountain or desert settings. However, the overall scarcity of water resources in dry climates increases the importance of existing wetlands to desert wildlife. Wetlands are generally more abundant in association with land occupying major watersheds of streams, rivers, and lakes. In addition, installations might have isolated wetlands associated with soils, hydrology, topography, geography, and unique habitat communities. Examples of isolated wetlands are the prairie pothole region of the Dakotas, the Carolina Bay complexes in the Carolinas, and vernal pools in the West and Midwest. Isolated wetland hydrology is driven by surface runoff or groundwater recharge.

Army natural resources managers are faced with the challenge of protecting wetlands while at the same time providing realistic conditions for military training. Wetlands are susceptible to many different kinds of impacts because they are the active interface between the terrestrial and aquatic components of a drainage basin (Schneider and Sprecher 2000). Water, sediment, nutrients, toxic substances, and organic matter from upstream or upslope move into wetlands. In the wetland, these inputs can be changed in energy or biochemical status before they are eventually removed farther downstream. Animals also move in and out of wetlands, using them as sources of food, water, and habitat and transferring energy and chemical components between the terrestrial and aquatic ecosystems. Because of these interrelationships, activities upstream or upslope have

profound effects on wetlands and on aquatic sites downstream. Consequently, management activities in wetlands can have substantial effects on communities downstream or in the radius of movement of organisms that use the wetlands. To predict effects on wetlands, it is necessary to understand the functions that occur in these aquatic sites. Numerous authors have compiled lists of wetland functions, but no list is recognized as official or exhaustive. The National Wetlands Policy Forum has identified eight natural functions that wetlands can perform in the landscape: (1) nutrient removal and transformation, (2) sediment and toxicant retention, (3) shoreline and bank stabilization, (4) floodflow alteration, (5) groundwater recharge, (6) production export, (7) aquatic diversity and abundance, and (8) wildlife diversity and abundance (Conservation Foundation 1988).

Integrated Natural Resources Management Plans. The purpose of INRMPs is to guide natural resources management programs, while ensuring the sustainability of desired military training area conditions and maintaining ecosystem viability. In addition, INRMPs ensure that natural resources conservation measures and Army activities are consistent with federal stewardship requirements.

Under the Natural Resource Management on Military Lands Act of 1960 (16 U.S.C. section 670 and following), commonly known as the Sikes Act, as amended according to the Sikes Act Improvement Act of 1997, The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an INRMP for each military installation in the United States under the Secretary's jurisdiction.

Under 16 U.S.C. section 670a(b) of the Sikes Act Improvement Act of 1997, to the extent appropriate and applicable, an INRMP must be consistent with the use of military installations to ensure the preparedness of the Armed Forces. Each INRMP prepared under subsection (a) of this section must provide for the following:

- Fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation
- Fish and wildlife habitat enhancement or modification
- Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants
- Integration of and consistency among the various activities conducted under the plan
- Establishment of specific natural resource management goals and objectives and time frames for Proposed Action
- Sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources
- Public access to the military installation that is necessary or appropriate for the use described above, subject to requirements necessary to ensure safety and military security
- Enforcement of applicable natural resource laws (including regulations)

- No net loss in the capability of military installation lands to support the military mission of the installation

- Such other activities as the Secretary of the military department determines appropriate

The general conservation management policy of the DoD as described in DoD Instruction (DoDI) 4715.3 (May 3, 1996), *Environmental Conservation Program*, stipulates that all DoD conservation programs must work to guarantee continued access to the nation's land, air, and water resources for realistic military training and testing while ensuring that the natural and cultural resources entrusted to DoD's care are sustained in a healthy condition for scientific research, education, and other compatible uses by future generations.

Guidance for completing INRMPs is contained in the HQDA INRMP Policy Memorandum (March 21, 1997) titled, *Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys (PLS) and Integrated Natural Resources Management Plan (INRMP)*. The memorandum states that the purpose for completing PLSs and the INRMP is "to ensure that natural resource conservation measures and Army activities on mission land are integrated and are consistent with federal stewardship requirements." Installation INRMPs are to be reviewed annually for operation and effect and revised as necessary. Major revisions are to be completed at least every 5 years. In accordance with the Sikes Act Improvement Act of 1997, INRMPs are prepared in cooperation with federal and state fish and wildlife management agencies, and the public is invited to comment on plans before they are finalized. The ARNG has INRMPs being implemented in 45 states and Puerto Rico. In addition to 5-year revisions, annual coordination with the U.S. Fish and Wildlife Service and appropriate state fish and wildlife agency is required.

Regulatory environment. Several laws and regulations, and Executive Orders provide requirements and guidance for conservation and management of biological resources. The following are principal sources of such requirements and guidance that apply to all State and Territory ARNGs.

- *Endangered Species Act of 1973* (16 U.S.C. sections 1531–1544). The ESA is the key law at the national level for the listing and protecting of endangered and threatened species and their critical habitat.

- *Bald Eagle Protection Act* (16 U.S.C. sections 668–668d). The Bald Eagle Protection Act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions.

- *Migratory Bird Treaty Act* (16 U.S.C. sections 703–712). The Migratory Bird Treaty Act implements various treaties and conventions between the United States and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the act, taking, killing or possessing migratory birds is unlawful.

- *Federal Water Pollution Control Act (*CWA*)* (33 U.S.C. sections 1251–1387). The Federal Water Pollution Control Act (CWA) is a comprehensive statute aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters. It authorizes water quality programs, requires federal effluent limitations and state water quality standards, and requires permits for the discharge of pollutants into navigable waters. Provisions have also been added to address water quality problems in specific regions and specific waterways. Section 404 of the CWA establishes a program to regulate the discharge of dredged and fill material into waters of the United States,

including wetlands. Responsibility for administering and enforcing section 404 is shared by the USACE and EPA. USACE administers the day-to-day program, including individual permit decisions and jurisdictional determinations; develops policy and guidance; and enforces section 404 provisions.

- *Coastal Zone Management Act of 1972* (16 U.S.C. sections 1451–1464). The Coastal Zone Management Act established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Subsequent to federal approval of state plans, grants are awarded for implementation. The law includes a system of criteria and standards for requiring that federal actions be conducted in a manner consistent with the federally approved plan (federal consistency).

- *Farmland Protection Policy Act* (7 U.S.C. sections 4201–4209). The Farmland Protection Policy Act is intended to minimize the impact that federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that—to the extent possible—federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland.

- *Sikes Act* (16 U.S.C. sections 670a–670o). The Sikes Act provides for cooperation by the Departments of the Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources on military reservations. It requires the development of INRMPs for each military reservation and for the use of trained professionals to manage the wildlife and fishery resources. It also requires that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.

- *Executive Order 11988—Floodplain Management.* Executive Order 11988 prevents federal agencies from contributing to the adverse effects associated with the occupancy and modification of floodplains and the direct or indirect support of floodplain development. In the course of fulfilling their respective authorities, federal agencies are to take action to reduce the risk of flood loss, to minimize the effect of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

- *Executive Order 11990—Protection of Wetlands.* Executive Order 11990 ensures that federal agencies avoid to the extent possible the long- and short-term adverse effects associated with the destruction or modification of wetlands and avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

- *Executive Order 13112—Invasive Species.* Executive Order 13112 was signed to prevent the introduction of invasive species and provide for their control, as well as to minimize the economic, ecological, and human health effects that invasive species cause.

- *Executive Order 13186—Responsibilities of Federal Agencies to Protect Migratory Birds.* Executive Order 13186 directs each federal agency taking actions that are likely to have a measureable effect on migratory bird populations to develop and implement a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service that will promote the conservation of migratory bird populations.

- *Army Regulation (AR) 200-1* (December 13, 2007). This Army regulation covers environmental protection and enhancement and provides the framework for the Army Environmental Management System. It implements federal, state, and local environmental laws and DoD policies for preserving, protecting, conserving, and restoring the quality of the environment.

3.8.2 Environmental Consequences

Proposed action in general. No effects on biological resources would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects would be expected. The Fox would introduce a new system but one that the use of which would not be expected to pose any new types of effects on biological resources beyond what similar equipment, already in use, already produces.

Proposed Action – HIMARS. No effects would be expected. The HIMARS would replace existing equipment with upgraded equipment, the use of which would not be expected to introduce any effects on biological resources beyond what the equipment to be retired already produces. Each piece of new equipment is very similar to its predecessor and in some cases (e.g., the wheeled HIMARS versus the tracked M270) an improvement over its predecessor in terms of potentially lessening the impact of the equipment on biological resources.

Proposed Action – Lakota. No effects would be expected. The Lakota would replace existing aircraft (Huey and Kiowa helicopters) generally on a one-for-one basis. Use of the new aircraft would not be expected to introduce any effects on biological resources beyond what the aircraft to be retired already produces. Spills of petroleum or other liquids used during routine aircraft maintenance would be cleaned up in accordance with the standard operating procedures of the Clean Water Act program and, thus, not affect biological resources.

Proposed Action – Shadow. No effects would be expected. The Shadow system is a new equipment fielding and would introduce equipment not currently in use by the ARNG. No part of the Shadow system—the Tactical Unmanned Aerial Vehicles (TUAVs), the ground control stations, and the supporting vehicles and equipment—would be expected to create an adverse effect on biological resources. The military trucks used to transport the ground control stations and the TUAV launchers are wheeled military equipment similar to other standard military vehicles used at all military installations. Operation of the TUAVs themselves would not be expected to affect the biological environment.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment.

Proposed Action – Spartan. No effects would be expected. The Spartan would replace existing Sherpa and Huron aircraft generally on a one-for-one basis. Use of the new aircraft would not be expected to introduce any effects on biological resources beyond what the aircraft to be retired already produces. Spills of petroleum or other liquids used during routine aircraft maintenance would be cleaned up in accordance with the standard operating procedures of the Clean Water Act program and, thus, not affect biological resources.

No Action Alternative. No effects would be expected.

3.9 CULTURAL RESOURCES

3.9.1 Existing Conditions

Definition of resource. Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural properties. Paleontological resources are also considered under NEPA.

- *Prehistoric and historic archaeological resources*. These resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., arrowheads or pottery). Prehistoric resources range from scatters of a few artifacts to village sites and rock art that predate written records in a region. Historic archaeological resources include remains of structures, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features.

- *Historic buildings and structures*. These resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. In general, architectural resources must be more than 50 years old to be considered for protection under laws protecting cultural resources. Structures such as military buildings from the Cold War era may be considered significant if they meet certain criteria.

- *Traditional cultural properties*. These resources can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other ethnic groups consider essential for the preservation of their traditional culture.

- *Paleontological resources.* Paleontological resources are scientifically significant fossilized remains, specimens, deposits, and other such data from prehistoric nonhuman life, including remains of plants and animals.

The Secretary of the Interior developed a set of criteria used to identify whether a cultural resource is significant and should be listed on the National Register of Historic Places (NRHP). The criteria for evaluation are expressed at 36 CFR Part 60 as follows:

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

Incorporation. This PEA incorporates by reference the discussion of cultural resources contained in the Army Transformation PEIS. Specific information is provided below.

Management authorities and requirements. AR 200-1 (*Environmental Protection and Enhancement*) specifies Army policy for cultural resources management. The following discussion provides an overview of federal statutes and regulations that are applicable to the management of cultural resources at Army facilities and any and all real property of other federal, state, and local agencies and private parties used by the Army under license, permit, lease, or other land or facility use agreement.

Cultural resources are defined as historic properties in the National Historic Preservation Act (NHPA), as cultural items in the Native American Graves Protection and Repatriation Act (NAGPRA), as archaeological resources in the Archaeological Protection Act (ARPA), as sacred sites (to which access is provided under the American Indian Religious Freedom Act [AIRFA]) in Executive Order 13007, and as collections and associated records in 36 CFR Part 79, *Curation of Federally Owned and Administered Collections.* Requirements set forth in NEPA, NHPA, ARPA, NAGPRA, AIRFA, 36 CFR Part 79, Executive Order 13007, and their implementing regulations define the Army's compliance responsibilities, to which the ARNG fully adheres, for management of cultural resources. Regulations applicable to the Army's management of cultural resources include those promulgated by the Advisory Council on Historic Preservation (ACHP) and the National Park Service (NPS). The key to the successful balance of mission requirements and cultural resources compliance and management responsibilities is early planning and coordination to prevent conflicts between the mission and the resources.

The following statutory and regulatory authorities are pertinent.

- *National Historic Preservation Act of 1966 as amended.* The NHPA establishes the federal government's policy to provide leadership in the preservation of historic properties and to administer federally owned or controlled historic properties in a spirit of stewardship. The Army must administer, manage, and treat historic properties in accordance with the NHPA. The Army must also identify, evaluate, and nominate historic properties for listing in the NRHP consistent with the policies and guidelines of AR 200-1.

- Under section 106 of the NHPA, the Army is responsible for identifying, evaluating, and taking into account the effects of all undertakings on historic properties in accordance with the procedures set forth in 36 CFR Part 800. The ACHP is responsible for providing comments on undertakings that affect historic properties. The state historic preservation officer (SHPO) in each state or territory plays a significant role in the section 106 compliance process by providing comments on efforts to identify, evaluate, and treat any effects on historic properties. If an undertaking on Army lands might affect properties having historic value to a federally recognized Indian tribe, the tribe must be afforded the opportunity to participate as consulting parties during the consultation process defined in 36 CFR Part 800. Traditional cultural leaders and other Native Americans, Alaska Natives, and Native Hawaiians are considered consulting parties with respect to undertakings that could affect historic properties of significance to these persons. If an undertaking might involve excavation of NAGPRA cultural items, the requirements of NAGPRA and 43 CFR Part 10 must also be met before implementing the undertaking.

- *Antiquities Act of 1906, Archaeological Resources Protection Act of 1979, Archaeological and Historic Preservation Act of 1974.* The Antiquities Act of 1906 and ARPA prohibit the excavation, collection, removal, and disturbance of archaeological resources (as defined by ARPA) and objects of antiquity (as referenced in the Antiquities Act) on federally owned Army property without a permit issued by the USACE District

Real Estate Office on the approval of the installation commander. Violation of ARPA can result in the assessment of civil or criminal penalties and forfeiture of vehicles and equipment that were used in connection with the violation. The ARPA specifically provides for the survey and recovery of scientifically significant data that might be irreparably lost as a result of any alteration of the terrain by any federal construction project, or federally licensed project, activity, or program. Thus, known paleontological resources must also be addressed in any NEPA documentation prepared for actions that might affect or cause irreparable loss or destruction of such resources. Archaeological resources, objects of antiquity, and significant scientific data from federal installations belong to the installation, except where NAGPRA requires repatriation to a lineal descendant, Indian tribe, or Native Hawaiian organization. Archaeological resources, objects of antiquity, and significant scientific data from nonfederal land belong to the state, territory, or landowner. Such resources from lands used by the Army but for which fee title is held by another agency are the property of the agency designated as the land manager in the land use instrument (e.g., Public Land Order, Special Use Permit). ARNG land managers ensure that land use instruments allowing for military use are reviewed to determine proper roles and responsibilities. ARPA applies only to federal lands.

- *Native American Graves Protection and Repatriation Act of 1990.* The intent of NAGPRA is to identify proper ownership and to ensure the rightful disposition of cultural items in federal possession or control. NAGPRA mandates that the Army summarize, inventory, and repatriate cultural items in its possession or control to lineal descendants or to culturally affiliated federally recognized Indian tribes, Alaska Natives, or Native Hawaiian organizations. NAGPRA also requires that certain procedures be followed when there is an intentional excavation of or inadvertent discovery of cultural items. Installation commanders must ensure that intentional excavation and response to any inadvertent discovery of NAGPRA cultural items are carried out in compliance with all applicable statutory and regulatory requirements of NAGPRA, ARPA, and NHPA. Each statute mandates compliance with independent requirements. Compliance with one statutory requirement, therefore, might not satisfy other applicable requirements. NAGPRA applies only on federal lands.

- *American Indian Religious Freedom Act of 1978 and Executive Order 13007, Indian Sacred Sites.* Under AIRFA and Executive Order 13007, the Army must develop and implement procedures to protect and preserve the American Indian, Eskimo, Aleut, and Native Hawaiian right of freedom to believe, express, and exercise these peoples' traditional religions, including access to sacred sites, use and possession of sacred objects, and freedom to worship through ceremonials and traditional rites. Installation commanders are also required to establish procedures to facilitate consultation with federally recognized Indian tribes and Native Hawaiian organizations, as appropriate. Installation commanders must consult with Indian tribes and Native Hawaiians to identify sacred sites that are necessary to the exercise of traditional religions and must provide access to Army installations for Indian tribe, Alaska Native, and Native Hawaiian practice of traditional religions, rites, and ceremonies. The Army may impose reasonable terms, conditions, and restrictions on access to such sites when the commander deems it necessary to protect personal health and safety, to avoid interference with the military mission, or for other reasons of national security. The installation commander must maintain the confidentiality of sacred site locations.

- *Curation of Federally Owned and Administered Archaeological Collections.* The ARNG must ensure that all archaeological collections are processed, maintained, and curated in accordance with the requirements of 36 CFR Part 79 (for items removed from federal lands). However, NAGPRA cultural items and human remains in the ARNG's possession and control must be disposed of in a manner consistent with the requirements of NAGPRA and 43 CFR Part 10. ARNG archaeological collections may be processed, maintained, and curated on and by the ARNG or another federal agency, state agency, or other outside institution or nongovernmental organization, in cooperative repositories maintained by or on behalf of multiple agencies, or in other facilities, under contract, cooperative agreement, or other formal funding and administrative arrangement provided the standards of 36 CFR Part 79 are met.

Period resources. Prehistoric occupation in the United States is divided generally into major periods depending on region. The time frames of the most recent periods vary significantly, with each region defining different periods and dates. Table C-11, *Regional locations of representative installations*, in Appendix C identifies the regional locations of representative installations at which ARNG forces are located or conduct training. Archaeological remains or sites from the various periods can be found on the installations, depending on topography (e.g., degree of slope, distance from fresh water) and amount of soil disturbance due to natural actions such as erosion or man-made events like construction, agriculture, or military activities. Native American resources include traditional cultural properties; human remains and sacred objects that might be subject to NAGPRA regulations; sacred sites, including geographical locations such as hills, rivers, or unidentified natural landscapes that might exist within the Army installations; archaeological sites; buried cemeteries or other discrete human burials; plants or animals that are collected for religious or traditional ceremonies or activities; and any currently held archaeological holdings or collections that might include sacred objects or human remains.

Management activities. ARNG land and resources managers routinely undertake surveys to identify NRHP-eligible archaeological sites and standing structures, traditional cultural properties, or paleontological resources. They also consult with the ACHP and the SHPOs to negotiate programmatic agreements and memoranda of agreement concerning procedure for surveys, actions to be taken in the event of inadvertent discoveries, maintenance of cultural resources, and mitigation measures for adverse effects. ARNG personnel also consult with Native American, Alaska Native, or Hawaiian groups and tribes when their interests might be affected by ARNG activities. Specific policies, procedures, and responsibilities of the ARNG in meeting cultural resources compliance and management requirements are contained in AR 200-1 (*Environmental Protection and Enhancement*). The following pertains to dealing with issues related to Native Americans interests:

- *Presidential Memorandum for Heads of Executive Departments and Agencies on Government-to-Government Relations with Native American Tribal Governments (April 29, 1994).* This memorandum requires that consultation between the ARNG and federally recognized Indian tribes occur on a government-to-government basis. ARNG personnel treat designated representatives of federally recognized Indian tribal governments as representatives of a sovereign government. Consultation with federally recognized Indian tribes on a government-to-government basis occurs formally and directly between installation commanders and heads of federally recognized tribal governments. Installation and tribal staff-to-staff communications do not constitute formal government-to-government consultation but are normally necessary prerequisites to formal consultation.

- Executive Order 13175 (*Consultation and Coordination with Indian Tribal Governments)* was issued November 6, 2002, and became effective January 5, 2001, replacing Executive Order 13084. Guidance on implementing the Executive Order is provided in the *Department of Defense Annotated American Indian and Alaska Native Policy*, issued October 27, 1999, which establishes principles for DoD's interacting and working with federally recognized American Indian and Alaska Native governments. The Executive Order establishes a policy that federal agencies will respect Indian tribal self-government and sovereignty, honor tribal treaty and other rights, and strive to meet the responsibilities that arise from the unique legal relationship between the federal government and Indian tribal governments. To this end, federal agencies are to consult with tribal officials as to the need for federal standards and any alternatives that would limit the scope of federal standards or otherwise preserve the prerogatives and authority of Indian tribes. The Executive Order specifically cites the Presidential Memorandum of April 29, 1994, which further obligates federal agencies to "assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities."

Other relevant authorities bearing on ARNG activities with respect to cultural resources include the following:

- DoDI 4715.3 (*Environmental Conservation Program*). This instruction implements policy, assigns responsibility, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control.

- Executive Order 13287 (*Preserve America*). This Executive Order directs the federal government to provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the federal government; promoting intergovernmental cooperation and partnerships for the preservation and use of historic properties; inventorying resources; and promoting eco-tourism.

- Executive Order 13007 (*Indian Sacred Sites*). This Executive Order guides each executive branch agency on accommodating access to and ceremonial use of American Indian sacred sites by American Indian religious practitioners, and avoiding adversely affecting the physical integrity of such sacred sites.

An Integrated Cultural Resources Management Plan (ICRMP) is a 5-year plan for implementing an installation's cultural resources activities. The ICRMP supports all ARNG missions, including training, while ensuring good stewardship of sensitive cultural resources such as historic structures, archaeological sites, and properties of concern to Native Americans, Alaska Natives, and Native Hawaiians. For purposes of managing cultural resources, all resources within a state are considered to be part of a single installation; thus, one ICRMP is prepared for each state and territory. ICRMPs are reviewed every 5 years and revised as appropriate. The ARNG has ICRMPs in place in all states and territories except Colorado, District of Columbia, Guam, and Nevada, which are exempt.

Cultural Resources Managers identify for proper state employee(s) if there is any limitation on when one of the air systems can fly due to federally-recognized Native American ceremonies.

3.9.2 Environmental Consequences

Proposed Action in general. No effects on cultural resources would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects on cultural resources would be expected. Fox vehicles would be added to existing BCTs. The ICRMP is the tool the Cultural Resources Managers use to properly manage the Cultural Resources Program. Sensitive areas would continue to be marked for avoidance or placed off-limits, thereby ensuring the protection of cultural resources from damages by vehicles. Procedures in place as a result of ICRMPs address appropriate response actions to be taken in the event of inadvertent discovery of cultural resources.

Proposed Action – HIMARS. No effects on cultural resources would be expected. The HIMARS would use established ranges. The ICRMP is the tool the Cultural Resources Managers use to properly manage the Cultural Resources Program. Sensitive areas would continue to be marked for avoidance or placed off-limits, thereby ensuring the protection of cultural resources from damages by vehicles. Procedures in place as a result of ICRMPs address appropriate response actions to be taken in the event of inadvertent discovery of cultural resources.

Proposed Action – Lakota. No effects on cultural resources would be expected. The Lakota would replace the existing Huey and Kiowa aircraft currently in use. The ICRMP is the tool the Cultural Resources Managers use to properly manage the Cultural Resources Program. In some instances, construction of additional (larger) hangar or maintenance space might be required. In such an event, receiving organizations would prepare appropriate NHPA and NEPA analysis for the construction activities.

Proposed Action – Shadow. No effects on cultural resources would be expected. The Shadow systems would use existing training ranges, maneuver areas, or airfields. The ICRMP is the tool the Cultural Resources Managers use to properly manage the Cultural Resources Program.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment.

Proposed Action – Spartan. No effects on cultural resources would be expected. The Spartan would replace the existing Sherpa and Huron aircraft currently in use. The ICRMP is the tool the Cultural Resources Managers use to properly manage the Cultural Resources Program. In some instances, construction of additional (larger) hangar or maintenance space might be required. In such an event, receiving organizations would prepare appropriate NHPA and NEPA analysis for the construction activities.

No Action Alternative. No effects on cultural resources would be expected to occur. Implementing the No Action Alternative would result in continuation of activities being undertaken by current Soldier authorization levels. State and Territory ARNGs would continue to use their present weapons systems and equipment, conduct the same types of training, and engage in similar institutional matters. In these circumstances, there would be neither any increase nor any decrease in effects on cultural resources.

3.10 HAZARDOUS MATERIALS AND HAZARDOUS WASTES

3.10.1 Existing Conditions

Definition of resource. *Hazardous material* is defined as any substance with the physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, serious irreversible illness, and incapacitating reversible illness or that might pose a substantial threat to human health or the environment. *Hazardous waste* is defined as any solid, liquid, contained gaseous, or semisolid waste or any combination of wastes that poses a substantial present or potential hazard to human health or the environment.

Evaluation of environmental risks from hazardous materials and wastes focuses on underground storage tanks (USTs) and aboveground storage tanks and the storage, transport, and use of pesticides and herbicides; fuels; petroleum, oils, and lubricants (POLs), and a variety of chemicals. Risks can also extend to generation, storage, transportation, and disposal of hazardous wastes when such activities occur at or near the project site of a Proposed Action. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well-being of wildlife species, botanical habitats, soil systems, and water resources. In the event of release of hazardous materials or wastes, the extent of contamination varies on the basis of the type of soil, topography, and water resources.

Special hazards are substances that might pose a risk to human health but are not regulated as contaminants under the hazardous waste statutes. Included in this category are asbestos, radon, lead-based paint (LBP), polychlorinated biphenyls (PCBs), and unexploded ordnance (UXO). The presence of special hazards or controls over them might affect or be affected by implementing a Proposed Action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of the effects of the Proposed Action.

Incorporation. This PEA incorporates by reference the discussion of hazardous materials and hazardous wastes contained in the Army Transformation PEIS. Specific information is provided below.

Hazardous materials management. The goals of the Army's hazardous materials program are to reduce risk to public health and the environment, prevent pollution, and comply with applicable regulations for hazardous and toxic materials and wastes. Army policy provides that the use of hazardous materials and the generation of hazardous wastes must be avoided, reduced, or eliminated.

Three federal laws primarily influence the Army's hazardous materials and hazardous waste management and have led to numerous regulatory compliance requirements. These are RCRA, which pertains to solid and hazardous waste; CERCLA, which pertains to spills and abandoned waste sites; and TSCA, which pertains to use, storage, and disposal of hazardous chemicals.

The Pollution Prevention Act of 1990 (PPA) established a hierarchy of actions or preferences for addressing wastes. Under the act's precepts, pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be the last resort and should be conducted in an environmentally safe manner. The PPA represents a major departure from most other

environmental legislation. It recognizes the fundamental difference between source reduction (avoiding the creation of wastes that are difficult or costly to manage) and waste management and pollution control (having to deal with a regulatory system designed to handle problem waste). The Army's proactive adherence to the precepts of the PPA gives rise to several benefits. These include reduced risk of exposure to potentially harmful contaminants, pollutants, and hazardous substances; reduced disposal costs; reduced liability for noncompliance with regulatory provisions; and reduced risk to health and safety.

ARNG resource managers focus their attention on several discrete hazardous material and hazardous waste areas.

- *Underground storage tanks.* Army policy provides for the removal, repair, or replacement of damaged, leaking, or improperly functioning USTs or associated pollution prevention devices. USTs must include monitoring devices for leak detection and be fitted with cathodic protection, catch basins, and overfill warning devices.

- *Pesticides.* The Federal Insecticide, Fungicide, and Rodenticide Act requires the registration of pesticides to ensure that, when used according to label directions, they will not present unreasonable risks to human health or the environment. Other federal regulations governing pesticide use and management include 29 CFR Part 1910, *OSHA Safety and Health Standards*; 40 CFR Chapter 1, Subchapter E, *Pesticide Programs*; 40 CFR Part 165, *Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticide Containers*; and 40 CFR Part 171, *Certification of Pesticide Applicators*. Each state has its own regulations governing pesticide use, which are adhered to on Army installations. DoD sets forth pesticide management policy in DoD Directive 4150.7, *Pest Management Program*, and DoD 4160.21-M, *Defense Utilization and Disposal Manual*, Chapter 9, Hazardous Property Management. Army policy is provided in Chapter 5 of AR 200-1, *Environmental Protection and Enhancement*. Preventive actions are key to pest management at Army installations. Under Army directives, Preventive Medicine officials conduct a proactive program that includes surveying pest populations and reporting the results to the facilities engineer, conducting an installation pesticide monitoring program, obtaining timely identification of pests and information on the susceptibility of pests to pesticides, establishing health and personnel safety criteria for pesticide operations, and providing pest management certification training. The ARNG currently has Integrated Pest Management Plans in all 54 states and territories.

- *Lead-based paint.* Federal, state, and local regulations govern both the procedural and substantive aspects of management of LBP, LBP additives, and LBP hazards. Army policy is to manage LBP in place unless it presents an imminent health threat as determined by the installation medical officer or unless operational, economic, or regulatory requirements dictate its removal. Army policy also imposes requirements to reduce the release of lead, lead dust, or LBP into the environment from deteriorating paint surfaces, building maintenance, or other sources on Army installations or on Army-controlled property. Army wastes contaminated with LBP are disposed of properly. Wastes are characterized to determine whether they are classifiable under applicable regulations as hazardous, special, or solid.

- *Asbestos.* During demolition, maintenance, repair, remediation, or renewal of buildings, asbestos can be released into the air. Asbestos is a friable material; that is, crumbling or breaking of asbestos-containing material (ACM) can release asbestos fibers into the air.

Asbestos fibers can be released from various building materials, such as pipe and boiler wrap and other insulating materials and acoustic ceiling tiles. NESHAP, issued under the authority of the CAA, regulate the demolition and renewal of buildings with ACM. EPA and states have policies that address leaving asbestos in place and thus not disturbing it if its removal would pose a health threat.

- *Polychlorinated biphenyls.* The disposal of PCB compounds is regulated under TSCA, which bans the manufacture and distribution of PCBs with the exception of PCBs used in enclosed systems. By definition, *PCB equipment* is that which contains 500 parts per million (ppm) PCBs or more, *PCB-contaminated equipment* is that which contains PCB concentrations greater than 50 ppm but less than 500 ppm, and *PCB items* are those which contain PCB concentrations of 5 to 49 ppm. EPA regulates the removal and disposal of all sources of PCBs containing 50 ppm or more; the regulations are more stringent for PCB equipment than for PCB-contaminated equipment.

- *Radon.* The effects of exposure to radon are uncertain, primarily because it is difficult to isolate the effects on human beings of exposures to particular sources of radiation. It is now widely accepted that effects of radiation can occur at any dose, no matter how small—a theory called the linear, no-threshold hypothesis. According to this theory, there is no level of exposure below which no effect occurs. If the theory is correct, all exposure to radiation presents some health risk. The risk of lung cancer caused by exposure to radon through its inhalation is a topic of concern. The Army has implemented a Radon Reduction program to determine and control the levels of radon exposure of military personnel and their dependents, resulting in testing of most facilities as part of this program. Army policy provides for ongoing radon management efforts. In accordance with Chapter 9 of DA PAM 200-1, the Army maintains and updates records of completed radon assessments and includes radon testing results with real property and housing data to notify tenants and transferees of elevated radon levels. Army policy provides that indoor radon levels are to be measured on newly constructed units and units converted to housing or continuously occupied structures (such as hospitals) in high-radon-level areas. Where elevated levels of radon are encountered, Army facilities managers adhere to generally accepted abatement measures.

- *Installation pollution prevention.* To conserve and reduce the consumption of resources, ARNG environmental program managers seek to adopt and implement integrated management approaches, procedures, and operations concerning pollution prevention in all mission areas. Army policy is to conserve water and other natural resources and to minimize or eliminate sources of pollutants to the air, land, and surface water or groundwater due to water usage and solid waste generation and to demonstrate leadership to attain national goals set for controlling water pollutants. State and Territory ARNGs seek to conserve and recover resources and to reuse or recycle materials that otherwise would normally enter the solid or liquid waste stream. State and Territory ARNGs cooperate with federal, state, regional, and local authorities in forming management plans for water resources, solid wastes, and wastewater management.

- *Hazardous waste.* The ARNG manages hazardous waste to promote the protection of public health and the environment. Army policy is to substitute nontoxic or nonhazardous materials for toxic or hazardous ones; ensure compliance with local, state, and federal hazardous waste requirements; and ensure the use of waste management practices that comply with all applicable requirements pertaining to generation, treatment, storage, disposal, and transportation of hazardous wastes. The hazardous waste

management program reduces the need for corrective action through controlled management of solid and hazardous waste.

- *Solid waste.* State and Territory ARNGs manage the generation, collection, storage, processing, treatment, and disposal of solid wastes in compliance with federal, state, and local environmental laws and regulations through use of an integrated management approach to arrive at the most cost-effective and environmentally safe procedures. ARNG installations minimize the generation and disposal of solid wastes by actively encouraging and participating in source reduction, reuse, recycling, and composting programs. Installations develop and maintain affirmative procurement programs for acquiring recyclable and recycled-content products.

- *Installation restoration.* The Installation Restoration program seeks to clean up previously contaminated lands on ARNG installations as quickly as funds permit to protect human health and the environment. Army policy provides for protection of the health and safety of installation personnel and the public; protection of the quality of the environment by identifying and addressing the threats posed by uncontrolled hazardous materials; and compliance with federal, state, regional, and local requirements applicable to the cleanup of hazardous materials. The program also includes a comprehensive public affairs program that solicits public comments on proposed cleanup actions and considers public comments in decision making.

3.10.2 Environmental Consequences

Proposed Action in general. No significant effects involving hazardous or toxic materials and waste would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No significant effects involving hazardous or toxic materials and waste would be expected to result from the Proposed Action. The Fox would be fielded at multiple locations making additional quantities of hazardous or toxic materials and waste negligible. No new hazardous or toxic materials would be expected to be used and no new wastes would be expected to be generated as a result of the Proposed Action. Additionally, maintenance tasks performed on the Fox chassis would not exceed those associated with similar vehicles currently fielded. With the implementation of the Proposed Action, hazardous and toxic material use and disposal would be in accordance with local, state, and federal hazardous materials/waste regulations; therefore, the potential effects would be negligible.

Proposed Action – HIMARS. No significant effects involving hazardous or toxic materials and waste would be expected to result from the Proposed Action. Additional requirements for fuel and maintenance related materials and wastes associated with introducing new vehicles and the continued use of similar type vehicles and equipment would be negligible. No new hazardous or toxic materials would be expected to be used, and no new wastes would be expected to be generated as a result of the Proposed Action. With the implementation of the Proposed Action, hazardous and toxic material use and disposal would be in accordance with local, state, and federal hazardous materials/waste regulations; therefore, the potential effects would be negligible.

Proposed Action – Lakota. No significant effects involving hazardous or toxic materials and waste would be expected to result from the Proposed Action. While the quantities of these materials and waste can vary from current levels, the Lakota would be replacing the existing UH-1H and OH-58A/C aircraft on a one-for-one basis and would be fielded at multiple locations

making the quantities of these materials and waste negligible. No new hazardous or toxic materials would be expected to be used, and no new wastes would be expected to be generated as a result of the Proposed Action. With the implementation of the Proposed Action, hazardous and toxic material use and disposal would be in accordance with local, state, and federal hazardous materials/waste regulations; therefore, the potential effects would be negligible.

Proposed Action – Shadow. No significant effects involving hazardous or toxic materials and waste would be expected to result from the Proposed Action. With the implementation of the Proposed Action the Shadow and supporting equipment would be fielded at multiple states making the use and disposal of hazardous and toxic substances negligible. Additionally, hazardous and toxic material use and disposal would be managed in accordance with local, state, and federal hazardous materials/waste regulations.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, each aircraft would impose only a very small footprint on the environment. Batteries used to provide power for each Raven would be disposed of in accordance with applicable requirements for handling of hazardous materials and wastes.

Proposed Action – Spartan. No significant effects involving hazardous or toxic materials and waste would be expected to result from the Proposed Action. While the quantities of these materials and waste can vary from current levels, the Spartan would be replacing the Sherpa and Huron aircraft currently being used and would be fielded at multiple locations making the quantities of these materials and waste negligible. No new hazardous or toxic materials would be expected to be used, and no new wastes would be expected to be generated as a result of the Proposed Action. With the implementation of the Proposed Action, hazardous and toxic material use and disposal would be in accordance with local, state, and federal hazardous materials/waste regulations; therefore, the potential effects would be negligible.

No Action Alternative. Under the No Action Alternative, the NGB would not field ground and air systems as proposed. Existing equipment use would continue and hazardous material use, and waste disposal would continue to be managed in accordance with local, state, and federal regulations. No effects would be expected from implementing the No Action Alternative.

3.11 SOCIOECONOMIC RESOURCES

3.11.1 Existing Conditions

Definition of resource. *Socioeconomics* is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Population levels are affected by regional birth and death rates and immigration and emigration. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators can be accompanied by changes in other components such as housing availability and the provision of public services. The following are often viewed as major aspects of socioeconomics with respect to military proposals:

- *Demographics*. Demographics identifies the population levels and changes to population levels of a region. Demographic data can also be obtained to identify, as appropriate to evaluation of a Proposed Action, the nearby population's characteristics in terms of race, ethnicity, poverty status, educational attainment level, and other broad indicators.

- *Quality of life*. Quality of life data identify both necessities and amenities a population might have at its disposal. Quality of life typically pertains to availability of housing, type of housing (owned or rented), and costs of housing.

- *Environmental justice*. On February 11, 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This Executive Order provides that, to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each federal agency must make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. The essential purpose of the Executive Order is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, tribal, and local programs and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations near the site of a Proposed Action. Such information aids in evaluating whether a Proposed Action would render vulnerable any of the groups targeted for protection in the Executive Order.

- *Economic development (construction)*. Construction activity on Army installations can generate economic development in a region. Construction involves all types of construction activities, including the creation of buildings (e.g., office buildings, single-family homes, or apartment buildings), training facilities (e.g., multipurpose ranges), and infrastructure (i.e., roads, waste treatment facilities). The effect of construction activity on the local economy is felt through changes in civilian employment, local business sales volumes, personal income, and population. New construction could be expected to create new jobs, potentially increasing population and local income and spending.

- *Public services*. Public services include law enforcement, fire protection, medical services, and primary and secondary public schooling. A change in the distribution of forces across Army installations (stationing) or construction of new housing could create changes in population that would affect the demand for public services.

- *Protection of children*. On April 17, 1997, President Clinton issued Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This Executive Order seeks to protect children from disproportionately incurring environmental health or safety risks that might arise as a result of Army policies, programs, activities, and standards. The Executive Order recognizes a growing body of scientific knowledge that demonstrates that children might suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed; children eat, drink, and breathe more in proportion to their body weight; their size and weight can diminish protection from standard safety features; and their behavior patterns might make them more susceptible to accidents. On the basis of these factors, the President directed each federal agency to make it a high

priority to identify and assess environmental health risks and safety risks that could disproportionately affect children. The President also directed each federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. When needed, the Army takes precautions for the safety of children, for example, by using fencing, limiting access to certain areas, and providing adult supervision.

Incorporation. This PEA incorporates by reference the discussion of socioeconomics contained in the Army Transformation PEIS. Specific information is provided below.

Management of socioeconomics. The assessment of socioeconomic impacts resulting from Army actions can be one of the more controversial issues related to an Army action. The economic and social well-being of a local community can be dependent on the activities of an Army installation. Disruptions to the status quo can become politically charged and emotion-laden. Socioeconomic impacts are most often mitigated through time-phasing of an action. Spreading the action over a few years is often a good mechanism to lessen the suddenness or severity of economic impacts.

Environmental justice and protection of children. The ARNG carefully considers matters related to environmental justice and the protection of children. Minority groups, low-income groups, and children are integrated into the NEPA process through public involvement. Public involvement meets two requirements of Executive Orders 12898 and 13045. First, it aids in identifying minority and low-income groups and actions that might put children at risk. Second, it provides the means for these groups to participate in decision making. Persons or organizations known or thought to have a potential interest in the Proposed Action are identified, informed, and given the opportunity to participate in the decision-making process through invitation to attend a public scoping meeting and through a coordination letter that invites them to submit written comments to the Army. Guidance in addressing environmental justice issues is provided in the CEQ's *Environmental Justice Under the National Environmental Policy Act* (1997) and DoD's *Strategy on Environmental Justice* (1995).

3.11.2 Environmental Consequences

Proposed Action in general. No effects on socioeconomic resources would be expected to occur upon implementation of the Proposed Action, as shown in the following analysis of each of the systems proposed for fielding.

Proposed Action – Fox. No effects would be expected. Fielding and operational use of the Fox would not affect regional economic activity. Staffing of full-time personnel would not be expected to change, and Soldiers would continue to travel to their assigned ARNG location where they would train in the operation and use of the Fox system. The Proposed Action would not stimulate changes to regional demographics or quality of life (such as housing, public services). Fielding of the Fox system would not result in disproportionate adverse environmental or health effects on low-income or minority populations or children. The Proposed Action is not an action with the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination.

Proposed Action – HIMARS. No effects would be expected. Fielding and operational use of the HIMARS would not affect regional economic activity. Staffing of full-time personnel would not be expected to change, and Soldiers would continue to travel to their assigned ARNG location where they would be trained to operate the HIMARS. The Proposed Action would not stimulate

changes to regional demographics or quality of life (such as housing, public services). Operation of the HIMARS would occur at ranges certified for the system, and would not have disproportionate adverse environmental or health effects on low-income or minority populations or children. The Proposed Action is not an action with the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination.

Proposed Action – Lakota. No effects would be expected. Fielding and operational use of the Lakotas would not affect regional economic activity. Staffing of full-time personnel would not be expected to change, and Soldiers would continue to travel to their assigned ARNG location where they would train and fly the Lakota. In some instances, construction of an additional (larger) hangar or maintenance space to accommodate the Lakota might be required. In such an event, receiving organizations would prepare appropriate NEPA analysis for the construction activities.

The Proposed Action would not stimulate changes to regional demographics or quality of life (such as housing, public services). The Proposed Action is not an action with the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination, and would not result in disproportionate adverse environmental or health effects on low-income or minority populations or children.

Proposed Action – Shadow. No effects would be expected. Fielding and operational use of the Shadow would not affect regional economic activity. Staffing of full-time personnel would not be expected to change, and Soldiers would continue to travel to their assigned ARNG location where they would train to operate the Shadow system. Because the Proposed Action would not affect regional economic activity or demographics, there would be no subsequent effects on quality of life components such as housing or public services. No disproportionate adverse environmental or health effects would occur on low-income or minority populations or children. Under FAA and Army regulations, Shadow flight operations are limited to positively controlled airspace. The Proposed Action is not an action with the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination.

Proposed Action – Raven. No effects would be expected. Despite the large number of units proposed to be fielded, the aircraft would not affect the sociological environment. The Proposed Action is not an action with the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination.

Proposed Action – Spartan. No effects would be expected. Fielding and operational use of the Spartan would not affect regional economic activity. Staffing of full-time personnel would not be expected to change, and Soldiers would continue to travel to their assigned ARNG location where they would train and fly the Spartan. The Proposed Action would not stimulate changes to regional demographics or quality of life (such as housing, public services). No disproportionate adverse environmental or health effects would occur on low-income or minority populations or children. The Proposed Action is not an action with the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination.

No Action Alternative. No effects would be expected. The No Action Alternative would have no affect on existing socioeconomic conditions and would not result in disproportionate adverse environmental or health effects on low-income or minority populations or children

3.12 CUMULATIVE EFFECTS

The CEQ defines *cumulative effects* as the "impacts on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7).

Implementing the Proposed Action would occur on a national scope over a multiple-year period. Using weapons systems and equipment in training activities would change in only minor ways, thus being generally unlikely to produce cumulative effects on most environmental resources. Air quality and the noise environment warrant specific discussion.

- *Air quality.* No cumulative effects would be expected. Impacts on air quality would be primarily due to operating the systems and the possible construction or modification of facilities to house or maintain them. A wide range of other activities that produce some amounts of air pollutants would, of course, occur within each region. The states and the District of Columbia take into account the effects of all past, present, and reasonably foreseeable projects, activities, and associated emissions while they develop their SIP of the CAA. Estimated emissions generated by the Proposed Action would conform to the applicable SIP. Therefore, implementing the Proposed Action would not contribute to cumulative adverse effects on air quality.

- *Noise.* Long-term minor adverse cumulative effects would be expected. Because no effects, or minor beneficial effects, would be expected with the fielding of the Fox, HIMARS, Lakota, Shadow, and Raven systems, their fielding would not lead to any adverse cumulative effects. However, replacing the C-12 and the C-23 with the C-27J would increase noise levels near the ARNG installations of interest. These incremental increases would have minor cumulative effects on the overall noise environment at these locations.

3.13 MITIGATION

Mitigation actions are designed and implemented to reduce, avoid, or compensate for adverse effects. Implementation of the Proposed Action would be expected to result in minor adverse effects only with respect to a limited number of environmental resources. To guard against development of circumstances that could in limited cases result in site-specific adverse effects, the NGB and State and Territory ARNGs should maintain their stewardship posture by ensuring those necessary measures unique to their particular cases.

Mitigation does not include legal, regulatory, or policy-driven environmental protections and BMPs required to comply with federal and state laws or Army and NGB policies. These are already part of the Proposed Action.

No specific mitigation measures are identified with respect to implementing the Proposed Action. In the absence of specific mitigation measures, it is expected that the following general BMPs would be observed.

- *Real property.* Observe land use plans during training and administrative activities, and maintain compatibility with adjacent land uses.

- *Air quality.* Manage training land rehabilitation activities to minimize conditions that lead to fugitive dust.

- *Noise.* To the extent practicable, conduct training during daylight hours to minimize potential for disturbances to adjacent properties.

- *Water resources.* Adhere to all provisions of NPDES permits, INRMPs, storm water pollution prevention plans, and state sediment and erosion control guidelines in activities that might affect surface waters or groundwater. Reseed and revegetate training areas consistent with land rehabilitation and management program.

- *Geology and soils.* Continue land rehabilitation and management program to minimize potential for erosion of soils.

- *Biological resources.* Maintain up-to-date INRMPs for all appropriate training areas and sites. Adhere to state and local BMPs to minimize runoff and sedimentation to surface waters and wetlands during training activities.

- *Cultural resources.* Adhere to all provisions of ICRMPs to ensure continued protection of resources. Keep Soldiers informed of requirements to avoid culturally sensitive areas during training; ensure avoidance and protection by establishing buffer areas. Cultural Resources Managers should maintain continuous communications with the Training Officer and range personnel

- *Hazardous materials and hazardous wastes.* Optimize the use of environmentally friendly solvents, greases, and materials during all maintenance and training activities. Comply with all provisions of local pollution prevention plans. Encourage recycling of materials so that landfill usage can be minimized.

- *Socioeconomics, environmental justice, and protection of children.* Maintain barriers and post "Keep Out" signs around training areas to discourage children's entry.

Follow-on analyses for site-specific proposals, however, could find instances where specific mitigation measures should be committed to and implemented along with such proposals. For instance, in limited cases large-scale unit training exercises might have to be scheduled to avoid potential effects on sensitive species in certain location or at certain times of the year. There do not appear to be any instances in which the Proposed Action would interfere with ongoing mitigation actions already committed to by State and Territory ARNGs with respect to implementing other proposals, and implementing the Proposed Action would not be inconsistent with standard operating procedures for current ARNG actions.

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SECTION 4.0
CONCLUSIONS

This PEA has been prepared to evaluate the potential effects on the natural and human environment from the proposal of the NGB to field six ground and air systems. The PEA has examined the Proposed Action and a No Action Alternative. The No Action Alternative is prescribed by CEQ regulations to serve as the baseline against which the Proposed Action and alternatives are analyzed.

The PEA has considered potential effects on a wide range of environmental resources and conditions, including real property, airspace, air quality, noise, water resources, geology and soils, biological resources, cultural resources, hazardous materials and hazardous wastes, and socioeconomics (including environmental justice and protection of children).

Implementation of the Proposed Action would be expected to result in a mixture of long-term minor adverse and long-term minor beneficial effects on air quality and the noise environment. Other environmental resources or conditions evaluated in the PEA would not be affected. Long-term minor adverse cumulative effects would be expected with respect to noise. No specific mitigation measures are identified. Table 4-1 identifies which of the systems proposed for fielding would affect air quality and noise and the nature of those effects.

Table 4-1
Systems' effects on air quality and noise

System	Air quality	Noise
Fox	Long-term minor adverse	None
HIMARS	Long-term minor beneficial	Long-term minor beneficial
Lakota	Long-term minor adverse	Long-term minor beneficial
Shadow	Long-term minor adverse	None
Raven	None	None
Spartan	Long-term minor adverse	Long-term minor adverse Long-term minor cumulative

Implementing the Proposed Action would not result in significant environmental or socioeconomic effects. Issuance of a FNSI would be appropriate, and an EIS need not be prepared before implementing the Proposed Action.

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Appendix A
Key Terms

Capabilities Ratings. *See* Global Status of Resources and Training System.

Components. Major elements of the Army based on individuals' service obligations. The Army consists of two principal components: the Active Component and the Reserve Component. Members of the Active Component perform their duties full-time. Members of the Reserve Component, consisting of the U.S. Army Reserve and the Army National Guard, usually perform their duties on a part-time basis (with a commitment for 2 weeks of full-time training annually). The Army consists of approximately 510,000 Soldiers in the Active Component, 350,000 Soldiers in the Army National Guard, 205,000 Soldiers in the Army Reserve, and a civilian workforce of approximately 220,000 people.

Echelons of Army Operational Forces. Different sized elements or organizations within the Army that carry out missions. The basic building block of all Army organizations is the individual *Soldier*. A small group of Soldiers organized to conduct infantry maneuver and fires is called a *squad*. The next larger unit is known as a *platoon*. In ascending order, the next larger echelons are the Army's *companies* (or batteries or troops), *battalions* (or squadrons), *brigades* (or regiments or groups), *divisions*, *corps*, and *Armies*. Brigades consist of battalions, and smaller units and usually have 3,000 or more personnel. Brigades vary in size depending on the nature of their primary mission and their equipment. *Heavy* brigades of armored and mechanized forces generally have more personnel than *light* brigades, which consist mainly of dismounted infantry. Divisions have the necessary integral arms and services required for sustained combat. Capable of performing any tactical mission and designed to be largely self-sustaining, divisions are the basic units of maneuver at the tactical level. Divisions, which consist of brigades, battalions, and smaller units, vary in size. A corps is the deployable level of command required to synchronize and sustain combat operations.

General structure of Army forces

Element	Size (Number of Soldiers)	Leader
Squad, Section	9–10	Non-commissioned officer
Platoon	14–16	Lieutenant
Company/Battery/Troop	62–190	Captain
Battalion/Squadron	300–1,000	Lieutenant Colonel
Brigade/Regiment/Group	3,000–5,000	Colonel
Division	10,000–15,000	Major General
Corps	20,000–45,000	Lieutenant General
Army	50,000 +	General

Global Status of Resources and Training System. Pursuant to Chairman of the Joint Chiefs of Staff Instruction 3401.02 (*Global Status of Resources and Training System*), each Combat, Combat Support, and Service-designated Combat Service Support unit, including those of the National Guard and Reserve, reports an overall unit resource and training category level (C-level). The C-level reflects the status of the selected unit resources measured against the resources required to undertake the wartime mission(s) for which the unit is organized or designed. The C-level also reflects the condition of available equipment and unit training status. The five unit C-levels are as follows:

- *C-1*. The unit possesses the required resources and is trained to undertake the full wartime mission(s) for which it is organized or designed. The unit does not require any compensation for deficiencies.

- *C-2.* The unit possesses the required resources and is trained to undertake most of the wartime mission(s) for which it is organized or designed. The unit requires little, if any, compensation for deficiencies.

- *C-3.* The unit possesses the required resources and is trained to undertake many, but not all, portions of the wartime mission(s) for which it is organized or designed. The unit requires significant compensation for deficiencies.

- *C-4.* The unit requires additional resources or training to undertake its wartime mission(s), but it may be directed to undertake portions of its wartime mission(s) with resources on hand.

- *C-5.* The unit is undergoing a Service-directed resource action and is not prepared, at this time, to undertake the wartime mission(s) for which it is organized or designed.

The unit's overall C-level is based only on the resources and training organic (assigned or allocated) to the measured unit or its parent unit. Units measure and report status in four areas: personnel (P-level), equipment and supplies on hand (S-level), equipment condition (R-level), and training (T-level). The unit's overall C-level is identical to the lowest level recorded in any of the unit's individually measured resource areas (personnel, equipment and supplies on hand, equipment condition, or training). If prudent, the unit commander may subjectively raise or lower the unit's overall C-level.

Institutional Army. That portion of the Army that generates and sustains the capabilities of the deployable operating forces. Functions of Army Headquarters and other elements of the production and sustaining base include recruiting, training, equipping and maintaining, organizing, mobilizing and demobilizing, and administering forces to be provided to the warfighting Commanders-in-Chief of the unified commands.

Mission Essential Task List. A mission is the primary task assigned to an individual, unit, or force. It usually contains the elements of who, what, when, where, and the reasons therefore, but it seldom specifies how. A task is a clearly defined and measurable activity accomplished by Soldiers and units. Tasks are specific activities that contribute to the accomplishment of encompassing missions or other requirements. The METL is a compilation of mission-essential tasks that must be successfully performed if an organization is to accomplish its wartime mission. Commanders must selectively identify and train on those tasks that accomplish the unit's critical wartime mission. The METL serves as the focal point on which commanders plan, execute, and assess training.

Modernization. The development or procurement of new systems with improved warfighting capabilities.

National Military Strategy. The Chairman of the Joint Chiefs of Staff, in consultation with the Joint Chiefs of Staff and the Combatant Commanders, is responsible for articulating and issuing the National Military Strategy. The National Military Strategy conveys the advice of the Chairman and the Joint Chiefs of Staff on the strategic direction of the Armed Forces in implementing the guidance in the President's National Security Strategy. The current strategy calls for shaping, responding to, and preparing now to address the challenges and opportunities confronting the nation. The strategic national military objectives are to defend and protect U.S. interests through promoting peace and stability and, when necessary, defeating adversaries. The four strategic concepts governing the use of forces are strategic agility, overseas presence, power projection, and decisive force.

National Security Strategy. The National Security Strategy, formulated by the President, sets forth national security goals. The current strategy advances the nation's fundamental and enduring security

needs: protecting the lives and safety of Americans; maintaining the sovereignty of the United States, with its values, institutions, and territories intact; and providing for the prosperity of the nation and its people. It further establishes as a core objective "to enhance our security with effective diplomacy and with military forces that are ready to fight and win."

Power Projection Platform. Power projection is the ability of a nation to apply all or some of its elements of national power—political, economic, informational, or military—to rapidly and effectively deploy and sustain forces in and from multiple dispersed locations to respond to crises, to contribute to deterrence, and to enhance regional stability. An Army power projection platform is an installation that strategically deploys one or more high-priority Active Component brigades or larger units, mobilizes and deploys high-priority Army Reserve Component units, or both. The 15 installations identified by the Army as power projection platforms are Fort Benning, Georgia; Fort Bliss, Texas; Fort Bragg, North Carolina; Fort Campbell, Kentucky; Fort Carson, Colorado; Fort Dix, New Jersey; Fort Drum, New York; Fort Eustis, Virginia; Fort Hood, Texas; Fort McCoy, Wisconsin; Fort Lewis, Washington; Fort Polk, Louisiana; Fort Riley, Kansas; Fort Sill, Oklahoma; and Fort Stewart, Georgia.

Power Support Platform. An Active Army or federally activated state-operated installation that strategically deploys individuals from all services, the civilian force, and mobilized reserve components. Power support platforms house training facilities and heavy equipment for Reserve Component combat units. The 12 power support platforms identified by the Army are Aberdeen Proving Ground, Maryland; Camp Atterbury, Indiana; Camp Shelby, Mississippi; Camp Roberts, California; Fort Buchanan, Puerto Rico; Fort Huachuca, Arizona; Fort Jackson, South Carolina; Fort Knox, Kentucky; Fort Lee, Virginia; Fort Leonard Wood, Missouri; Fort Rucker, Alabama; and Gowen Field, Idaho.

Recapitalization. The rebuilding and selected upgrading of currently fielded systems to ensure operational readiness and zero time/zero mile systems.

Special Use Airspace. Special use airspace permits activities that either must be confined because of their nature or require limitations on aircraft that are not a part of those activities. Prohibited Areas and Restricted Areas are regulatory special use airspace. Warning Areas, Military Operations Areas, Alert Areas, and Controlled Firing Areas are nonregulatory special use airspace. Establishment of special use airspace is under the cognizance of the FAA.

Spectrum of Operations. The range of actions the Army might be called on to take to support the objectives of the National Security Strategy and the National Military Strategy. The spectrum of operations is often expressed by its order of ascending intensity. At the lower end of the spectrum are domestic disaster relief, environmental operations, domestic civil support, military-to-military contacts, arms control, humanitarian assistance, security assistance, counterdrug operations, show of force, and peace operations. Progressing toward higher intensities, the spectrum includes noncombatant evacuations, counterterrorism, peace enforcement, raids, strikes, insurgencies, limited conventional conflict, regional conventional war, tactical nuclear war, global conventional war, and strategic nuclear war.

Training Exercises. Army and ARNG elements perform many types of training exercises. The following describes these different kinds of events.

- *Combined Arms Live-Fire Exercises (CALFEX).* Collective training that is jointly conducted by associated Combat, Combat Support, and Combat Service Support units.

- *Command Field Exercise (CFX).* A field training exercise with reduced troop and vehicle density, but with full command and control and Combat Service Support units.

- *Command Post Exercise (CPX).* A medium-cost, medium-overhead exercise in which the forces are simulated; may be conducted from garrison locations or in between participating headquarters.

- *Deployment Exercise (DEPLEX).* An exercise that provides training for individual Soldiers, units, and support agencies in the tasks and procedures for deploying from home stations or installations to potential areas of hostilities.

- *Field Training Exercise (FTX).* A high-cost, high-overhead exercise conducted under simulated combat conditions in the field. It exercises command and control of all echelons in battle functions against actual or simulated opposing forces.

- *Fire Coordination Exercise (FCX).* A medium-cost, reduced-scale exercise that can be conducted at the platoon, company/team, or battalion/task force level. It exercises command and control skills through the integration of all organic weapon systems, as well as indirect and supporting fires. Weapon densities may be reduced for participating units and subcaliber devices substituted for service or training ammunition.

- *Map Exercise (MAPEX).* A low-cost, low-overhead training exercise that portrays military situations on maps and overlays that may be supplemented with terrain models and sand tables. It enables commanders to train their staffs in performing essential integrating and control functions under simulated wartime conditions.

- *Tactical Exercise Without Troops (TEWT).* A low-cost, low-overhead exercise conducted in the field on actual terrain suitable for training units for specific missions. It is used to train subordinate leaders and battle staffs on terrain analysis, unit and weapons emplacement, and planning of the execution of the mission.

Unit of Action. Streamlined units that are more capable of independent action because of their improved organization and enhanced equipment. UAs are permanently task organized to the way they will fight. The new brigade-based structure on which UAs are based replaces current arrangements designed for the Cold War when the Army was prepared to fight giant set-piece battles on European soil and when most support roles were organized at the division level. Compared to existing brigade combat teams, UAs have greater capacity for rapid packaging and responsive and sustained employment to support combatant commanders.

Unit of Employment. Highly tailorable, high-level echelons that integrate and synchronize Army forces for full-spectrum operations at the higher tactical and operational levels of war or conflict. Typically division- and corps-like elements, UEs focus on battles, major operations, and decisive land campaigns in support of joint operational and strategic objectives. UEs have the inherent capacity to interact effectively with multinational forces, as well as with interagency, nongovernmental organizations, and private organizations. A UE at the corps level is referred to as a "UEy" and at the division level, as a UEx. UEs represent standardization of the seven types of division headquarters now existing throughout the Army.

Warfighting Forces. Army doctrine recognizes three principal types of warfighting forces. *Combat arms* refers to units and Soldiers that close with and destroy enemy forces or provide firepower and destructive capabilities on the battlefield. The branches and functions included are Air Defense Artillery, Armor/Cavalry, Aviation, Field Artillery, Infantry, Special Forces, and Corps of Engineers. *Combat support* refers to units and Soldiers that provide critical combat functions in conjunction with combat arms units and Soldiers. The branches and functions included are Chemical Corps, civil affairs, psychological operations, Military Intelligence, Military Police Corps, and Signal Corps. *Combat Service*

Support refers to the essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Combat Service Support ensures the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. The branches and functions included are Adjutant General Corps, Acquisition Corps, Chaplain Corps, Finance Corps, Judge Advocate General Corps, Medical Corps, Ordnance Corps, Transportation Corps, and Quartermaster Corps.

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Appendix B
Selected Major Weapons and Equipment Systems

System	Principal environmental effects
AH-64 Apache. Attack helicopter. Entered Army service in 1984. Variants in service: AH-64A/D. Specifications (AH-64A): Length overall: 49 ft 5 in. Weight: 17,650 lb. Speed: 232 mph. Range: 380 mi. Crew: 2.	Air emissions, soil disturbance, noise
CH-47 Chinook. Heavy-lift cargo helicopter. Entered Army service: 1962. Variants in service: CH-47C/D, MH-47D/E. Specifications (CH-47D): Length overall: 51 ft. Weight: 53,500 lb. Range: 245 mi. Crew: 3.	Air emissions, soil disturbance, noise
UH-60 Blackhawk. Utility helicopter. Entered Army service: 1979. Variants in service: UH-60 A/L, EH-60C, MH-60K. Specifications (UH-60A): Length overall: 50 ft. Weight: 20,250 lb. Range: 375 mi. Crew: 3.	Air emissions, soil disturbance, noise
BGM-71 TOW. Wire-guided antitank missile. Entered Army service: 1970. Variants in service: TOW 2/2A/2B. Specifications: Length overall: 3 ft 10 in. Weight: 173 lb. Range: 2.5 mi. Crew: 2.	Metals deposition, destruction of vegetation, soil disturbance, potential vegetation ignition, noise
FIM-92A Stinger. Short-range air defense missile. Entered Army service: 1981. Specifications: Length overall: 60 in. Weight: 34.5 lb. Range: 3 mi.	Metals deposition, noise, air emissions
Family of Medium Tactical Vehicles (FMTV). Entered Army service: 1996. Variants in service: M-1078/1079/1081 Light Medium Tactical Vehicle (LMTV), M-1082-1095 Medium Tactical Vehicle (MTV) Specifications (M1078 Cargo Truck): Length: 21 ft. Weight: 16,499 lb. Movement: Wheeled. Range: 400 mi. Crew: 1.	Air emissions, soil disturbance (off-road), vegetation disturbance (off-road)
Javelin. Antitank missile. Entered Army service: 1996. Specifications: Length: overall: 3 ft 6 in. Weight: 26.1 lb. Range: 1.4 mi. Crew: 2.	Metals deposition, destruction of vegetation, soil disturbance, potential vegetation ignition, air emissions, noise
M-2 Machine Gun. Heavy machine gun. Entered Army service: 1938. Specifications: Caliber: 50-caliber. Length overall: 61.4 in. Weight: 84 lb. Range: 4.2 mi. Rate of fire: 550 rounds per minute.	Lead deposition to soils, minor air emissions, noise
M-1 Abrams. Main battle tank. Entered Army service: 1980. Variants in service: M1, M1A1, M1A2. Specifications: Length overall: 32 ft 0.5 in. Weight: 120,000 lb. Movement: Tracked. Speed: 45 mph. Main gun: 120 mm. Crew: 4.	Soil compaction, metals deposition, vegetation destruction, air emissions, noise
M2/M3 Bradley. Infantry/cavalry fighting vehicle. Entered Army service: 1981. Variants in service: M2A1/A2 (infantry fighting vehicle), M3A1/A2 (cavalry fighting vehicle). Specifications (M2): Length overall: 21 ft 2 in. Weight: 50,600 lb. Movement: Tracked. Main gun: 25 mm chain gun. Crew: 3.	Soil compaction, metals deposition, vegetation destruction, air emissions, noise
M-4 Carbine. Compact assault rifle. Entered Army service: 1997. Specifications: Caliber: 5.56 mm. Weight: 5.65 lb. Range: 500 m. Rate of fire: variable depending on rate selected.	Lead deposition, minor air emissions, noise
M9 Armored Combat Earthmover (ACE). Armored earthmover. Entered Army service: 1986. Specifications: Length overall: 20 ft 6 in. Weight: 54,000 lb. Movement: Tracked. Range: 200 mi. Crew: 1.	Soil compaction, air emissions, noise
M-9 Pistol. Semiautomatic pistol. Entered Army service: 1990. Specifications: Caliber: 9 mm. Length overall: 217 mm. Barrel: 125 mm. Weight: 850 g. Range: 50 m.	Lead deposition to soil, minor air emissions, noise

System	Principal environmental effects
M-16 Rifle. Assault rifle. Entered Army Service: 1964. Variants: M-16A1/A2/A3. Specifications: Caliber: 5.56 mm. Weight: 7.5 lb. Range: 800 m. Rate of fire: variable depending on rate selected.	Lead deposition to soils, minor air emissions, noise
M-56 Coyote. Smoke generation system. Entered Army service: 1998. Specifications: Modular system. Production: 90 minutes obscurant generation. Movement: Wheeled. Carrier: M998 (High Mobility Multipurpose Wheeled Vehicle)	Air emissions, vegetation disturbance (off-road), noise
M-58 Wolf. Smoke generation system. Entered Army service: 1998. Specifications: Modular system. Production: 90 minutes obscurant generation. Movement: Tracked. Carrier: M113 FOV.	Air emissions, vegetation disturbance (off-road), noise
M-88 Hercules (Heavy Equipment Recovery Combat Utility Lift and Evacuation System). Armored recovery vehicle. Entered Army service: 1961. Variants in service: M88A1, M88A2 Hercules. Specifications (M88A2): Length overall: 28 ft 4 in. Weight: 140,000 lb. Movement: Tracked. Range: 280 mi. Crew: 3.	Soil compaction, vegetation destruction, air emissions, noise
M-278 Combat Engineer Vehicle. Armed vehicle for breaching and obstacle removal operations. Entered Army service: 1965. Full-tracked armored vehicle (basic M60A1 tank) with a hydraulically operated debris blade. Crew: 4.	Soil compaction, vegetation destruction, air emissions, noise
M-93 Fox. Armored NBC reconnaissance vehicle. Entered Army service: 1998. Variants in service: XM-93, M-93A1. Specifications (M-93A): Length overall: 18 ft 8 in. Weight: 40,400 lb. Movement: Wheeled. Range: 500 mi. Crew: 3.	Soil disturbance (off-road), air emissions, noise
M-109. Self-propelled Howitzer. Entered Army service: 1963 (M109). Variants in service: M109A2/3/5/6. Specifications (M109A6): Length overall: 32 ft 2 in. Weight: 63,300 lb. Movement: Tracked. Main gun: M-284 155 mm Howitzer. Crew: 6.	Soil compaction, metals deposition, vegetation destruction, air emissions, noise
M-992 Field Artillery Ammunition Support Vehicle (FAASV). Ammunition carrier for M-109 Howitzers. Entered Army service: 1984. M-109 chassis with enclosed superstructure. Movement: Tracked. Weight: 57,100 lb. Crew: 2.	Soil compaction, vegetation destruction, air emissions, noise
M-113 Family of Vehicles. Armored personnel carrier; mortar carrier; command post. Entered Army service: 1960. Variants in service: M113A2, M113A3, M106, M577, M1064A3. Specifications (M113A3): Length overall: 17 ft 5 in. Weight: 27,000 lb. Movement: Tracked. Range: 300 mi. Crew: 2.	Soil compaction, vegetation destruction, air emissions, noise
M-119. Lightweight towed Howitzer. Entered Army service: 1989. Specifications: Caliber: 105 mm. Length overall: 16 ft. Weight: 4,100 lb. Carriage: Wheeled. Range: 13 mi.	Metals deposition, soil disturbance, minor air emissions, vegetation destruction, noise
M-249 Squad Automatic Weapon (SAW). Squad automatic weapon. Entered Army service: 1987. Specifications: Caliber: 5.56 mm. Length overall: 100 cm. Weight: 16.3 lb. Range: 800 m. Rate of fire: 750 rounds per minute.	Lead deposition, minor air emissions, noise
M-240 Machine Gun. Medium machine gun. Entered Army service: 1997. Specifications: Caliber: 7.65 mm. Weight: 27.6 lb. Range: 1,100 m. Rate of fire: 200-600 rounds per minutes.	Lead deposition, minor air emissions, noise
M-252 Mortar. Mortar. Entered Army service: 1987. Specifications: Caliber: 81 mm. Barrel length: 4 ft 6 in. Weight: 91 lb. Range: 5,600 m. Rate of fire: 15 rounds per minute (sustained).	Metals deposition, destruction of vegetation, soil disturbance, minor air emissions, noise
M-270 Multiple Launch Rocket System (MLRS). Entered Army service: 1983. Specifications (launcher): Length overall: 22 ft 10 in. Weight: 55,536 lb. Movement: Tracked. Average speed: 30 mph. Max speed: 40 mph. Range: 300 mi. Crew: 3.	Metals deposition to soil, destruction of vegetation, soil compaction, air emissions, noise

System	Principal environmental effects
M977 Heavy Expanded Mobility Tactical Truck (HEMTT). Type: Heavy Expanded Mobility Tactical Truck. Entered Army service: 1983. Variants in service: M977/978/983/984/985. Specifications (basic model): Length overall: 33 ft 4.5 in. Weight: 62,000 lb. Movement: Wheeled. Range: 300 mi. Crew: 2.	Air emissions, noise, soil compaction (off-road), vegetation destruction (off-road)
M-998 High Mobility Multipurpose Wheeled Vehicle (HMMWV, "Humvee"). Entered Army service: 1985. Specifications (basic model): Length overall: 15 ft. Weight: 5,200 lb. Maximum speed: 65 mph. Range: 300 mi.	Soils disturbance (off-road), vegetation disturbance (off-road), air emissions, noise
M-1097 Avenger. Self-propelled anti-aircraft system. Entered Army service: 1989. Specifications: Weapons: 8 Stinger missiles, 1 50-caliber machine gun. Vehicle: M998 HMMWV. Length overall: 16 ft 3 in. Weight: 8,600 lb. Movement: Wheeled. Crew: 2.	Metals deposition, minor air emissions, noise
MIM-104 Patriot. Medium/high altitude air-defense missile. Entered Army service: 1985. Specifications: Length overall: 17 ft 5 in. Weight: 1,534 lb. Vehicles: Multiple (wheeled). Range: 50 mi.	Metals deposition, air emissions, noise
Mk-19-3 Grenade Machine Gun. Belt-fed automatic grenade launcher. Entered Army service: 1983. Specifications: Caliber: 40 mm. Weight: 72.5 lb. Range: 2,300 m. Rate of fire: 60 rounds per minute.	Metals deposition, destruction of vegetation, soil disturbances, minor air emissions, noise
RQ-7B Shadow 200. Tactical unmanned aerial vehicle (TUAV) ground maneuver brigade commander's reconnaissance, surveillance, target acquisition, and battle damage assessment. Entered Army service: 2003. Specifications: Wingspan: 11.2 feet. Length: 14 feet. Payload: 45 - 60 lb. Weight: 375 lb.	Air emissions, noise
Source: U.S. Army. *Army Fact Files*. <http://www.army.mil/operations>. Accessed October 29, 2007.	

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Appendix C
ARNG Data Tables

Table C-1
Terrain settings at select Army and ARNG installations

Fort A.P. Hill, Virginia	Forest, swamp/wetland
Fort Benning, Georgia	Swamp/wetland, forest, open woodland/savanna
Camp Blanding, Florida	Forest, open woodland/savanna
Fort Bliss, Texas	Desert, mountain, semiarid steppe
Fort Bragg, North Carolina	Forest, open woodland/savanna
Fort Campbell, Kentucky	Forest, open woodland/savanna
Fort Carson, Colorado	Open woodland/savanna, grassland/prairie, semiarid steppe
Fort Chaffee, Arizona	Forest, swamp/wetland
Fort Dix, New Jersey	Forest, swamp/wetland
Fort Drum, New York	Swamp/wetland, forest, open woodland, grassland/prairie
Fort Hood, Texas	Open woodland/savanna, grassland/prairie, semiarid/steppe
Fort Indiantown Gap, Pennsylvania	Forest
Fort Irwin, California	Mountain, desert
Fort Knox, Kentucky	Forest
Fort Lewis and Yakima Training Center, Washington	Swamp/wetland, forest, desert, open woodland/savanna, mountain, grassland/prairie
Fort McClellan, Alabama	Forest
Orchard Training Area, Idaho	Semiarid steppe
Fort Pickett, Virginia	Forest
Fort Polk, Louisiana	Forest
Fort Riley, Kansas	Forest, grassland/prairie
Camp Shelby, Mississippi	Forest, open woodland/savanna
Fort Sill, Oklahoma	Open woodland/savanna, grassland/prairie
Fort Stewart, Georgia	Swamp/wetland, forest, open woodland/savanna
Puhakuloa Training Center, Hawaii	Mountain, jungle, open woodland/savanna, semiarid steppe
Fort Wainwright, Alaska	Mountain, swamp/wetland, arctic, forest, open woodland

Table C-2
Maneuver land requirements

Unit	Task	Box size (km)	Required land (km^2)	Days per event	Annual events
Mechanized	Movement to Contact	8x31	248	1	4
Infantry or	Offensive Ops	4x17	68	1	4
Armored	Defensive Ops	6x23	138	1	4
Battalion	Retrograde	6x23	138	1	4
			592 km^2 (146,283 acres)		
Mechanized	Movement to Contact	6x14	84	1	3
Infantry	Attack	5x10	50	1	3
Company	Raid	5x10	50	2	3
	Ambush	5x10	50	2	3
	Defend	3x8	24	2	3
	Retrograde	6x17	102	2	3
	Recon & Security	13x6	78	2	3
			438 km^2 (108,230 acres)		
Light Infantry	Attack	13x16 km	208	1	4
Battalion	Defend	8x8 km	64	1	4
	Movement to Contact	19x14 km	266	1	4
	Recon & Security	20x20 km	400	1	4
			938 km^2 (231,780 acres)		

Table C-2
Maneuver land requirements (continued)

Unit	Task	Box size (km)	Required land (km^2)	Days per event	Annual events
Light Infantry	Movement to Contact	7x10 km	70	2	4
Rifle Company	Attack	6x8 km	48	2	4
	Defend	4x4 km	16	2	4
	Recon & Security	6x8 km	48	2	4
	Raid	6x8 km	48	2	4
	Ambush	6x8 km	48	2	4
			278 km^2 (68,694 acres)		

Table C-3
Largest Army and ARNG installations

Installation	Major Command	Acreage
Aberdeen Proving Ground, MD	AMC	72,406
Camp Atterbury, IN	ARNG	33,139
Fort Benning, GA	TRADOC	171,873
Camp Blanding, FL	ARNG	72,000
Fort Bliss, TX	TRADOC	131,043
Fort Bragg, NC	FORSCOM	152,922
Fort Campbell, KY	FORSCOM	36,596
Fort Carson, CO	FORSCOM	137,404
Fort Chaffee, AR *	ARNG	64,272
Fort Dix, NJ	USAR	30,943
Fort Drum, NY	FORSCOM	107,648
Dugway Proving Ground, UT	AMC	798,855
Fort Gordon, GA	TRADOC	55,597
Gowen Field, ID	ARNG	570
Camp Grayling, MI	ARNG	146,750
Fort Greely, AK	USARPAC	16,905
Camp Gruber, OK	ARNG	33,027
Hawthorne Army Depot, NV	AMC	147,236
Fort A.P. Hill, VA	MDW	75,905
Fort Hood, TX	FORSCOM	214,621
Fort Huachuca, AZ	TRADOC	73,323
Fort Hunter Liggett, CA	USAR	164,272
Fort Irwin, CA	FORSCOM	636,250
Fort Jackson, SC	TRADOC	52,301
Fort Lewis, WA	FORSCOM	85,985
Fort McClellan, AL *	ARNG	36,310
Fort McCoy, WI	USAR	127,730
Orchard Training Area, ID	ARNG	138,050
Fort Pickett, VA *	ARNG	42,276
Pinon Canyon Maneuver Site, CO	FORSCOM	235,896
Fort Polk, LA	FORSCOM	198,721
Pohakuloa Training Center, HI	USARPAC	108,792
Fort Richardson, AK	USARPAC	71,441
Fort Riley, KS	FORSCOM	100,656
Camp Ripley, MN	ARNG	53,000
Camp Roberts, CA	ARNG	42,362
Camp Robinson, AR	ARNG	32,814
Fort Rucker, AL	TRADOC	59,460
Schofield Barracks, HI	USARPAC	16,676

Table C-3
Largest Army and ARNG installations (continued)

Installation	Major Command	Acreage
Camp Shelby, MS	ARNG	133,042
Fort Sill, OK	TRADOC	93,831
Fort Stewart, GA	FORSCOM	279,271
Fort Wainwright, AK	USARPAC	656,241
White Sands Missile Range, NM	AMC	3,640,413
Fort Leonard Wood, MO	TRADOC	53,225
Yakima Training Center, WA	FORSCOM	316,786
Yuma Proving Ground, AZ	AMC	1,008,898
Total Acreage		**10,957,734**

Source: *DoD Base Structure Report for Fiscal Year 2003*, Office of the Deputy Under Secretary of Defense (Installations & Environment).

Table C-4
Army principal installations and other sites, by state

	Principal installations				Other sites[1]
State/territory	Number	Buildings owned	Bldg sq ft	Total acres	Number
Alabama	27	6,238	34,958,533	208,472	170
Alaska	14	1,664	17,677,118	3,004,770	108
Arizona	7	2,553	10,936,568	1,169,358	37
Arkansas	6	1,974	9,259,044	118,077	85
California	31	8,740	52,293,453	971,991	167
Colorado	10	52	688,400	447	39
Connecticut	8	294	3,844,534	2,594	31
Delaware	4	155	872,339	575	15
District of Columbia	2	133	6,435,853	227	4
Florida	10	899	3,952,366	73,486	92
Georgia	16	7,177	53,079,283	520,995	92
Hawaii	21	3,974	28, 51,835	175,894	24
Idaho [a]	4	158	977,713	216,972	44
Illinois	23	1,968	18,197,748	26,234	75
Indiana	7	4,182	17,950,973	110,024	100
Iowa	8	1,489	6,934,720	50,080	70
Kansas	13	4,126	30,725,577	134,596	94
Kentucky	7	5,403	33,354,991	162,433	83
Louisiana	8	3,817	20,789,764	231,633	79
Maine	4	201	1,383,159	729,051	35
Maryland	18	3,555	29,486,853	85,537	53
Massachusetts	11	566	5,865,957	23,529	76
Michigan	11	1,299	8,041,411	156,637	74
Minnesota [a]	5	1,696	8,234,675	4,925	92
Mississippi	7	1,362	7,221,840	151,076	112
Missouri	14	3,035	19,485,825	86,625	98
Montana	6	225	1,596,478	32,604	39
Nebraska	7	899	3,572,185	14,220	43
Nevada	7	2,869	11,119,393	159,667	12
New Hampshire	4	100	945,470	497	25
New Jersey	20	2,943	24,321,486	48,494	39
New Mexico	5	3,098	9,774,147	4,670,855	44
New York	32	4,325	36,281,085	138,975	95
North Carolina	8	4,796	32,244,510	1,504,485	149

Table C-4
Army principal installations and other sites, by state (continued)

	Principal installations				Other sites[a]
State/territory	Number	Buildings owned	Bldg sq ft	Total acres	Number
North Dakota	8	636	2,641,159	14,781	45
Ohio	17	2,119	15,286,705	46,501	97
Oklahoma	11	4,791	26,602,201	173,600	121
Oregon	7	1,618	6,065,290	56,510	57
Pennsylvania	18	2,833	26,841,644	42,640	177
Rhode Island	2	140	901,377	602	23
South Carolina	8	1,582	12,627,466	69,408	109
South Dakota	5	252	1,312,372	4,302	52
Tennessee	15	4,402	25,019,868	117,278	110
Texas	30	9,946	66,664,276	465,291	153
Utah	12	2,536	15,562,877	868,084	38
Vermont	4	166	992,002	12,081	29
Virginia	17	6,500	47,454,469	156,366	71
Washington	13	2,117	17,993,169	613,346	50
West Virginia	4	218	2,664,274	3,036	63
Wisconsin	8	2,767	12,658,896	138,929	108
Wyoming	3	161	807,221	42,861	20
Totals	**567**	**119,464**	**755,660,104**	**15,104,882**	**3718**

[a] *Other Sites* are locations of less than 10 acres in size and less than $10 million in plant replacement value.
Information included: Building data reflect all types of facilities (administrative, classroom, medical, residential, storage, warehousing, maintenance, and so on). Acreage data identify the total number of acres that are occupied by the Army, including public land, state land, and land controlled by other federal agencies.
Source: *DoD Base Structure Report for Fiscal Year 2003*, Office of the Deputy Under Secretary of Defense (Installations & Environment).

Table C-5
Selected principal ARNG training areas

State	Site	City	Acreage
Alabama	Fort McClellan	Anniston	22,531
Alabama	Fort Rucker Training Site	Ozark	14,751
Alaska	Camp Carroll Major Training Area	Anchorage	61,552
Arizona	Camp Navajo	Bellemont	28,345
Arizona	Papago Park Military Reservation	Phoenix	451
Arkansas	Fort Chaffee	Fort Smith	64,272
Arkansas	Camp Robinson Major Training Area	North Little Rock	32,814
California	Camp Roberts Major Training Area	San Miguel	42,362
California	Camp San Luis Obispo Major Training Area	San Luis Obispo	4,100
California	Los Alamitos Training Site	Los Alamitos	2,676
Colorado	Fort Carson Major Training Area	Colorado Springs	195
Connecticut	Camp Hartell Training Site	Windsor Locks	59
Connecticut	Camp Rowland Major Training Area	Niantic	82
Connecticut	Stones Ranch Military Reservation	East Lyme	1,862
Delaware	Bethany Beach Training Site	Bethany Beach	194
Delaware	New Castle Training Site	New Castle	227
Florida	Camp Blanding Major Training Center	Starke	72,000
Georgia	Catoosa Training Site	Tunnel Hill	1,627
Hawaii	Fort Ruger	Honolulu	73
Hawaii	Kalaeloa	Kapolei	153
Hawaii	Keaukaha Military Reservation	Hilo	509
Idaho	Orchard Training Area	Boise	138,050

Table C-5
Selected principal ARNG training areas (continued)

State	Site	City	Acreage
Idaho	Orchard Training Site	Boise	138,551
Illinois	Camp Lincoln	Springfield	160
Illinois	Marseilles Major Training Area	Marseilles	2,815
Indiana	Camp Atterbury Major Training Area	Edinburgh	33,139
Iowa	Camp Dodge Training Site	Johnson	30,440
Kansas	Camp Funston	Junction City	156
Kentucky	Artemus Training Site	Barbourville	1,000
Kentucky	Eastern Training Site	Winchester	650
Kentucky	Fort Knox Armory	Fort Knox	120
Kentucky	Western Kentucky Training Site	Greenville	5,200
Louisiana	Camp Minden	Minden	13,665
Louisiana	Jackson Barracks	New Orleans	113
Louisiana	Camp Villere Major Training Area	Slidell	3,414
Louisiana	Camp Beauregard Major Training Area	Pineville	728
Maine	Deepwoods Major Training Area	Old Town	711,000
Maine	Riley-Bog Brook Major Training Area	Bethel	10,000
Maine	Caswell Training Site	Caribou	860
Maine	Hollis Plains Training Site	Buxton	425
Maryland	Edgewood Area	Aberdeen	140
Maryland	Camp Fretterd	Reisterstown	592
Maryland	Gunpowder Military Major Training Area	Glen Arm	240
Massachusetts	Camp Curtis Guild Major Training Area	Reading	680
Massachusetts	Camp Edwards Major Training Area	Bourne	14,712
Michigan	Camp Grayling Major Training Area	Grayling	146,750
Michigan	Fort Custer Training Center	Battle Creek	7,570
Minnesota	Arden Hill Army Training Site	Arden Hills	1,245
Minnesota	Camp Ripley	Little Falls	53,000
Mississippi	Camp Shelby Major Training Area	Hattiesburg	133,042
Mississippi	Camp McCain	Elliott	13,020
Missouri	Camp Clark Major Training Area	Nevada	2,574
Missouri	Camp Crowder Major Training Area	Neosho	4,362
Missouri	Ike Skelton Training Site	Jefferson City	770
Montana	Fort Harrison Major Training Area	Helena	6,150
Montana	Limestone Hills Major Training Area	Townsend	21,360
Nebraska	Camp Ashland Major Training Area	Ashland	980
Nebraska	Hastings Major Training Area	Hastings	3,211
Nebraska	Mead Major Training Area	Mead	1,197
Nevada	Clark County Complex	North Las Vegas	3,984
Nevada	Stead Major Training Area	Reno-Stead	395
New Hampshire	New Hampshire Training Site	Center Strafford	105
New Jersey	Sea Girt Major Training Area	Sea Girt	7,195
New Jersey	Fort Dix Training Site	Wrightstown	94
New Mexico	Onate Complex Training Site	Santa Fe	313
New Mexico	Roswell Local Training Area	Roswell	5,500
New York	Camp Smith Major Training Area	Cortlandt	1,614
New York	Youngstown Weekend Training Site	Youngstown	860
North Carolina	Camp Butner Training Site	Butner	4,734
North Carolina	Fort Fisher Major Training Area	Kure Beach	18
North Dakota	Camp Grafton Major Training Area	Devils Lake	10,677
Ohio	Camp Perry Major Training Site	Port Clinton	640
Ohio	Hawk McConnelsville Training Site	McConnelsville	444
Ohio	Newton Falls Training Site	Newton Falls	41,358

Table C-5
Selected principal ARNG training areas (continued)

State	Site	City	Acreage
Ohio	Rickenbacker Major Training Area	Columbus	126
Oregon	Biak Training Center	Redmond	31,427
Oregon	Camp Rilea Major Training Area	Warrenton	1,876
Oregon	Camp Withycombe	Clackamas	234
Pennsylvania	Fort Indiantown Gap Training Site	Annville	17,797
Puerto Rico	Fort Allen	Juana Diaz	776
Puerto Rico	Camp Santiago Major Training Area	Salinas	11,300
Rhode Island	Camp Fogerty Training Site	East Greenwich	374
South Carolina	Clarks Hill Major Training Area	McCormick	896
South Carolina	McCrady Major Training Area	Eastover	15,115
South Dakota	Fort Meade	Fort Meade	785
South Dakota	Camp Rapid Major Training Area	Rapid City	1,031
South Dakota	Mitchell Training Site	Mitchell	174
Tennessee	Catoosa Training Center	Tunnel Hill	1,600
Tennessee	Milan Major Training Area	Milan	2,557
Tennessee	Tullahoma Major Training Area	Tullahoma	6,700
Texas	Camp Bowie Major Training Area	Brownwood	4,895
Texas	Camp Mabry Training Site	Austin	376
Texas	Camp Maxey Major Training Area	Powderly	6,424
Texas	Camp Swift Major Training Area	Bastrop	11,662
Texas	Fort Wolters	Mineral Wells	3,989
Utah	Camp Williams Major Training Area	Riverton	20,904
Vermont	Camp Johnston Training Site	Burlington	64
Vermont	Ethan Allen Major Training Area	Colchester	667
Vermont	Ethan Allen Range	Jericho	11,219
Virginia	Byrd Field Training Site	Sandston	185
Virginia	Camp Pendleton Major Training Area	Virginia Beach	348
Virginia	Fort Pickett Major Training Center	Blackstone	42,276
West Virginia	Camp Dawson Major Training Area	Kingwood	2,225
Wisconsin	Camp Williams Major Training Area	Tomah	50
Wisconsin	Fort McCoy Training Site	Sparta	97
Wyoming	Camp Guernsey Major Training Area	Guernsey	33,752
		Total	**2,163,118**

Table C-6
Currently designated nonattainment areas for criteria pollutants

Installation	State	County/counties	Nonattainment area pollutants
Fort Benning	GA	Muscogee and Chatahoochee in GA; Russell in AL	Attainment
Camp Blanding	FL	Clay	Attainment
Fort Bliss	TX	El Paso and Hudspeth in TX; Otero and Dina Ana in NM	El Paso Co. – carbon monoxide, ozone, PM-10; Dona Ana Co. – ozone, PM-10
Fort Bragg	NC	Cumberland	Attainment
Fort Campbell	KY	Christian and Trigg in KY; Montgomery and Stewart in TN	Attainment
Fort Carson/Pinon Canyon Maneuver Site (PCMS)	CO	El Paso, Pueblo, Fremont/Las Animas	Attainment

Table C-6
Currently designated nonattainment areas for criteria pollutants (continued)

Installation	State	County/counties	Nonattainment area pollutants
Fort Drum	NY	Jefferson	Ozone
Fort Hood	TX	Coryell, Bell	Attainment
Fort Irwin	CA	San Bernardino	carbon monoxide, ozone, PM-10
Fort Knox	KY	Meade, Bullitt, Hardin	Bullitt Co. – ozone
Fort Lewis/Yakima	WA	Pierce, Thurston	Pierce Co. – PM-10
Orchard Training Area	ID	Elmore, Ada	Ada Co. – carbon monoxide
Fort Polk	LA	Vernon, Rapides, and Beauregard Parishes	Attainment
Fort Riley	KS	Riley, Geary, Clay	Attainment
Camp Shelby	MS	Forrest	Attainment
Fort Sill	OK	Comanche	Attainment
Fort Stewart	GA	Liberty	Attainment
Schofield Barracks	HI	Honolulu	Attainment
Fort Wainwright/ Richardson	AK	North Star Borough (Fairbanks)	Fairbanks – carbon monoxide
Fort Dix	NJ	Burlington	ozone
Fort McClellan	AL	Calhoun	Attainment
Fort Pickett	VA	Nottoway	Attainment
Fort Chaffee	AR	Sebastian, Logan, Franklin, Crawford	Attainment
Fort A.P. Hill	VA	Caroline	Attainment

Table C-7
Noise level zones and annoyance

Noise zone	Population highly annoyed	Transportation noise (ADNL)	Small arms noise (ADNL)	Impulsive noise (CDNL)
Zone I	< 15%	< 65 dBA	< 65 dBA	< 62 dBA
Zone II	15%–39%	65–75 dBA	65–75 dBA	62–70 dBA
Zone III	> 39%	> 75 dBA	> 75 dBA	> 70 dBA

Table C-8
Army and ARNG installations and corresponding ecoregion provinces

Installation	State	Ecoregion province
Fort A.P. Hill	VA	Outer Coastal Plain Mixed Forest
Fort Benning	GA	Southeastern Mixed Forest
Camp Blanding	FL	Outer Coastal Plain Mixed Forest
Fort Bliss	TX	Chihuahuan Desert Province
Fort Bragg	NC	Outer Coastal Plain Mixed Forest
Fort Campbell	KY	Eastern Broadleaf Forest (Continental)
Fort Carson	CO	Great Plains-Palouse Dry Steppe
Fort Carson/Pinon Canyon	CO	Great Plains-Palouse Dry Steppe
Fort Chaffee	AR	Eastern Broadleaf Forest (Continental)
FIG/Dix	NJ	Eastern Broadleaf Forest (Continental)
Fort Drum	NY	Eastern Broadleaf Forest (Continental)
Fort Hood	TX	Southwest Plateau and Plains Dry Steppe and Shrub
Fort Irwin	CA	American Semi-Desert and Desert

Table C-8
Army and ARNG installations and corresponding ecoregion provinces (continued)

Installation	State	Ecoregion province
Fort Knox	KY	Eastern Broadleaf Forest (Continental)
Fort Lewis	WA	Pacific Lowland Mixed Forest
Fort Lewis/Yakima	WA	Intermountain Semi-Desert
Fort McClellan	AL	Southeastern Mixed Forest
Orchard Training Area	ID	Intermountain Semi-Desert
Fort Pickett	VA	Southeastern Mixed Forest
Fort Polk	LA	Outer Coastal Plain Mixed Forest
Fort Riley	KS	Prairie Parkland (Temperate)/Great Plains Steppe
Camp Shelby	MS	Outer Coastal Plain Mixed Forest
Fort Sill	OK	Great Plains Steppe and Shrub
Fort Stewart	GA	Outer Coastal Plain Mixed Forest
Schofield Barracks	HI	Hawaiian Islands
Schofield Barracks/Pohakuloa	HI	Hawaiian Islands
Fort Wainwright	AK	Yukon Intermontane Plateaus Tayga
Fort Wainwright/Fort Richardson	AK	Coastal Trough Humid Tayga

Table C-9
Soil types

Entisols	Soils with little or no evidence of soil formation. Either young soils or their parent material has not yet reacted to soil forming factors. They can be formed on fresh lava flows or recent alluvium for which there has been too little time for soil formations to take place. They are found in extremely dry areas where too little water and vegetation prevents soil formation, or on steep slopes where the rates of erosion can be greater than the rate of soil formations, thereby preventing horizon development. Management needs vary depending on climate and topography, but in most cases they are subject to erodibility and should be maintained with natural vegetation.
Aridisols	Dry soils. Aridisols are characterized by a subsurface accumulation of salts (calcium carbonate, gypsum, other soluble salts, or sodium). Overgrazed aridisols are often left bare and are subject to wind erosion. Found in the western United States.
Alfisols	Developed under forests in cool to warm humid areas and are characterized by a subsurface horizon in which a silicate clay has accumulated. They are often found on sloping to steep land and are susceptible to soil erosion.
Mollisols	Dark soils of grasslands. High organic matter. Productive agricultural soils. Management issues deal with use of fertilizers and maintaining a crop cover to prevent erosion.
Ultisols	Developed primarily in forested, humid tropical, and subtropical areas, found in the southeastern United States. In some ultisols the topsoil has been eroded. Soil conservation practices are needed to prevent further soil deterioration. In areas with significant slope, land must be revegetated.
Oxisols	Highly weathered soils, found mostly in tropical areas. An easily recognized subsurface layer of iron and aluminum could be evident.
Inceptisols	Early stages of soil profile development, after entisols. Management varies depending on climate and topography.
Spodosols	Acid, sandy, forest soils. Characteristic of cold, moist to wet climates. Because they drain well, they are not as susceptible to erosion as more finely textured soils. The presence of a forest cover can help to moderate peak stream flows.
Vertisols	High content of sticky or swelling and shrinking type clays to a depth of 1 meter or more. In dry seasons, these soils develop deep wide cracks that are diagnostic for this soil order. Also typical is an uneven surface with micro-basins and knolls. Found most frequently in sub-humid to semiarid environments. High erodibility.

Table C-10
Threatened and endangered species on or near ARNG installation

CMD	Installation	State	Category	Common Name	Scientific Name	Onsite/ Contiguous	Status	Critical Habitat On/ Contiguous to Installation
ARNG	(CLINTON) TRUMAN RESERVOIR T.S.	MO	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	AUBURN TS/OMS 2	ME	Plant	Pogonia, small whorled	*Isotria medeoloides*	Onsite	E	N
ARNG	CAMP ASHLAND	NE	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	CAMP ATTERBURY	IN	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	CAMP ATTERBURY	IN	Mammal	Bat, Indiana	*Myotis sodalis*	Onsite	E	N
ARNG	CAMP BOWIE (State)	TX	Bird	Vireo, Black-capped	*Vireo atricapilla*	Onsite	E	N
ARNG	CAMP CROWDER	MO	Fish	Cavefish, Ozark	*Amblyopsis rosae*	Contiguous	T	N
ARNG	CAMP CROWDER	MO	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Contiguous	T	N
ARNG	CAMP GRAFTON	ND	Bird	Plover, Piping	*Charadrius melodus*	Contiguous	T	N
ARNG	CAMP GRUBER	OK	Insect	Beetle, American burying (=giant carrion)	*Nicrophorus americanus*	Onsite	E	N
ARNG	CAMP JOSEPH T ROBINSON	AR	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Contiguous	T	N
ARNG	CAMP MABRY	TX	Bird	Warbler (wood), Golden-cheeked	*Dendroica chrysoparia*	Onsite	E	N
ARNG	CAMP MAXEY	TX	Insect	Beetle, American burying (=giant carrion)	*Nicrophorus americanus*	Onsite	E	N
ARNG	CAMP MURRAY	WA	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	CAMP NAVAJO	AZ	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	CAMP NAVAJO	AZ	Bird	Owl, Mexican Spotted	*Strix occidentalis lucida*	Onsite	T	Y - O
ARNG	CAMP PERRY	OH	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	CAMP RIPLEY	MN	Mammal	Wolf, gray (MN only)	*Canis lupus*	Onsite	T	N
ARNG	CAMP RIPLEY	MN	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	CAMP SMITH CSMS A	NY	Fish	Sturgeon, shortnose	*Acipenser brevirostrum*	Contiguous	E	N
ARNG	CAMP SMITH CSMS A	NY	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Contiguous	T	N
ARNG	CATOOSA RANGE/TS	TN	Plant	Skullcap, Large-flowered	*Scutellaria montana*	Onsite	T	N
ARNG	CLARK COUNTY COMPLEX	NV	Reptile	Tortoise, desert	*Gopherus agassizii*	Onsite	T	N

Table C-10
Threatened and endangered species on or near ARNG installation (continued)

CMD	Installation	State	Category	Common Name	Scientific Name	Onsite/ Contiguous	Status	Critical Habitat On/ Contiguous to Installation
ARNG	CORVALLIS/CA MP ADAIR	OR	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Contiguous	T	N
ARNG	CORVALLIS/CA MP ADAIR	OR	Insect	Butterfly, Fender's blue	*Icaricia icarioides fenderi*	Contiguous	T	N
ARNG	CORVALLIS/CA MP ADAIR	OR	Plant	Lupine, Kincaid's	*Lupinus sulphureus kincaidii*	Onsite	E	N
ARNG	CORVALLIS/CA MP ADAIR	OR	Plant	Checker-mallow, Nelson's	*Sidalcea nelsoniana*	Onsite	T	N
ARNG	CORVALLIS/CA MP ADAIR	OR	Bird	Owl, Northern Spotted	*Strix occidentalis caurina*	Contiguous	T	N
ARNG	CTC CAMP SAN LUIS OB	CA	Plant	Thistle, Chorro Creek bog	*Cirsium fontinale var.obispoense*	Onsite	E	N
ARNG	CTC CAMP SAN LUIS OB	CA	Bird	Condor, California	*Gymnogyps californianus*	Onsite	E	N
ARNG	CTC CAMP SAN LUIS OB	CA	Snail	Snail, Morro shoulderband (=Banded dune)	*Helminthoglypta walkeriana*	Contiguous	E	N
ARNG	CTC CAMP SAN LUIS OB	CA	Fish	Steelhead (Southern California)	*Oncorhynchus mykiss*	Onsite	T	N
ARNG	CTC CAMP SAN LUIS OB	CA	Amphibian	Frog , California red-legged	*Rana aurora draytonii*	Onsite	T	N
ARNG	CTC CAMP SAN LUIS OB	CA	Bird	Vireo, Least Bell's	*Vireo bellii pusillus*	Onsite	E	N
ARNG	DOUGLAS ARMORY, WY	WY	Mammal	Prebles's jumping mouse	*Zapus hudsonius preblei*	Contiguous	E	N
ARNG	FLORENCE MIL RSRVTN	AZ	Reptile	Tortoise, desert	*Gopherus agassizii*	Onsite	T	N
ARNG	FORT CHAFFEE MANEUVER TRAINING CTR	AR	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	FORT CHAFFEE MANEUVER TRAINING CTR	AR	Insect	Beetle, American burying (=giant carrion)	*Nicrophorus americanus*	Onsite	E	N
ARNG	FORT MCCLELLAN ARNG	AL	Plant	Button, Mohr's Barbara	*Marshallia mohrii*	Onsite	E	N
ARNG	FORT MCCLELLAN ARNG	AL	Mammal	Bat, gray	*Myotis grisescens*	Onsite	E	N
ARNG	FORT MCCLELLAN ARNG	AL	Plant	Grass, Tennessee yellow-eyed	*Xyris tennesseensis*	Onsite	E	N
ARNG	FORT PICKETT ARNG MTC	VA	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	FORT PICKETT ARNG MTC	VA	Fish	Logperch, Roanoke	*Percina rex*	Onsite	E	N

Table C-10
Threatened and endangered species on or near ARNG installation (continued)

CMD	Installation	State	Category	Common Name	Scientific Name	Onsite/ Contiguous	Status	Critical Habitat On/ Contiguous to Installation
ARNG	FORT PICKETT ARNG MTC	VA	Plant	Sumac, Michaux's	*Rhus michauxii*	Onsite	E	N
ARNG	FORT RUGER	HI	Bird	Duck, Hawaiian (=koloa)	*Anas wyvilliana*	Onsite	E	N
ARNG	FORT RUGER	HI	Plant	Pu`uka`a	*Cyperus trachysanthos*	Onsite	E	Y - O
ARNG	FORT RUGER	HI	Bird	Coot, Hawaiian (=`alae-ke`oke`o)	*Fulica americana alai*	Onsite	E	N
ARNG	FORT RUGER	HI	Bird	Moorhen (=gallinule), Hawaiian Common	*Gallinula chloropus sandvicensis*	Onsite	E	N
ARNG	FORT RUGER	HI	Plant	Schiedea, diamond head	*Schiedea adamantis*	Onsite	E	N
ARNG	FORT RUGER	HI	Plant	None	*Spermolepis hawaiiensis*	Onsite	E	Y - O
ARNG	HILO (KEAUKAHA MILITARY RESERV	HI	Bird	Hawk, Hawaiian (=io)	*Buteo solitarius*	Onsite	E	N
ARNG	HILO (KEAUKAHA MILITARY RESERV	HI	Mammal	Bat, Hawaiian hoary	*Lasiurus cinereus semotus*	Onsite	E	N
ARNG	HOLLIS PLAINS TS	ME	Mammal	Rabbit, New England cottontail	*Sylvilagus transitionalis*	Onsite	C	N
ARNG	HQ STARC - MO	MO	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	HQ STARC - MO	MO	Bird	Tern, Least	*Sterna antillarum*	Contiguous	E	N
ARNG	KANAIO WETS	HI	Insect	Moth, Blackburn's sphinx	*Manduca blackburni*	Onsite	E	Y - O
ARNG	KANAIO WETS	HI	Plant	Ohai	*Sesbania tomentosa*	Onsite	E	N
ARNG	KEKAHA WETS	HI	Bird	Stilt, Hawaiian (=ae`o)	*Himantopus mexicanus (=himantopus) knudseni*	Onsite	E	N
ARNG	KEKAHA WETS	HI	Plant	Lau `ehu	*Panicum niihauense*	Onsite	E	Y - O
ARNG	KINGWOOD	WV	Plant	Clover, running buffalo	*Trifolium stoloniferum*	Onsite	E	N
ARNG	KWIGILLINGOK SCOUT ARMORY	AK	Bird	Eider, Stellar's	*Polysticta stellari*	Contiguous	T	N
ARNG	LEESBURG TS	SC	Plant	Coneflower, smooth	*Echinacea laevigata*	Onsite	E	N
ARNG	LEESBURG TS	SC	Plant	Loosestrife, rough-leaved	*Lysimachia asperulaefolia*	Onsite	E	N
ARNG	LEESBURG TS	SC	Bird	Woodpecker, Red-cockaded	*Picoides borealis*	Onsite	E	N
ARNG	LIL AARON STRAUSS	MD	Plant	Harperella	*Ptilimnium nodosum*	Onsite	E	N

Table C-10
Threatened and endangered species on or near ARNG installation (continued)

CMD	Installation	State	Category	Common Name	Scientific Name	Onsite/ Contiguous	Status	Critical Habitat On/ Contiguous to Installation
ARNG	MACON TS	MO	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	MACON TS	MO	Mammal	Bat, Indiana	*Myotis sodalis*	Onsite	E	N
ARNG	MTA CAMP RILEA	OR	Bird	Murrelet, Marbled	*Brachyramphus marmoratus marmoratus*	Contiguous	T	N
ARNG	MTA CAMP RILEA	OR	Bird	Plover, Western Snowy	*Charadrius alexandrinus nivosus*	Contiguous	T	N
ARNG	MTA CAMP RILEA	OR	Mammal	Sea-lion, Steller (=northern)	*Eumetopias jubatus*	Contiguous	T	N
ARNG	MTA CAMP RILEA	OR	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	MTA CAMP RILEA	OR	Bird	Pelican, Brown (Entire pop, except U.S. Atlantic Coast, FL, AL	*Pelecanus occidentalis*	Contiguous	E	N
ARNG	MTA CAMP RILEA	OR	Insect	Butterfly, Oregon silverspot	*Speyeria zerene hippolyta*	Onsite	T	Y - O
ARNG	MTA CAMP RILEA	OR	Bird	Owl, Northern Spotted	*Strix occidentalis caurina*	Contiguous	T	N
ARNG	MTA CAMP SHELBY	MS	Reptile	Alligator, American (Similarity of Appearance)	*Alligator mississippiensis*	Onsite	T	N
ARNG	MTA CAMP SHELBY	MS	Reptile	Tortoise, gopher	*Gopherus polyphemus*	Onsite	T	N
ARNG	MTA CAMP SHELBY	MS	Plant	Quillwort, Louisiana	*Isoetes louisianensis*	Onsite	T	N
ARNG	MTA CAMP SHELBY	MS	Bird	Woodpecker, Red-cockaded	*Picoides borealis*	Contiguous	E	N
ARNG	MTA CAMP SHELBY	MS	Reptile	Snake, black pine	*Pituophis melanoleucus lodingi*	Onsite	C	N
ARNG	MTC CAMP BLANDING	FL	Reptile	Alligator, American (Similarity of Appearance)	*Alligator mississippiensis*	Onsite	T	N
ARNG	MTC CAMP BLANDING	FL	Bird	Jay, Florida Scrub	*Aphelocoma coerulescens*	Onsite	T	N
ARNG	MTC CAMP BLANDING	FL	Reptile	Snake, eastern indigo	*Drymarchon corais couperi*	Onsite	T	N
ARNG	MTC CAMP BLANDING	FL	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	MTC CAMP BLANDING	FL	Bird	Stork, Wood	*Mycteria americana*	Onsite	E	N
ARNG	MTC CAMP BLANDING	FL	Bird	Woodpecker, Red-cockaded	*Picoides borealis*	Onsite	E	N
ARNG	MTC CAMP BLANDING	FL	Mammal	Panther, Florida	*Puma concolor coryi*	Onsite	E	N
ARNG	MTC CAMP BLANDING	FL	Plant	Rhododendron, Chapman	*Rhododendron chapmanii*	Onsite	E	N
ARNG	MTC-H CAMP GRAYLING	MI	Bird	Warbler (wood), Kirtland's	*Dendroica kirtlandii*	Onsite	E	N

Table C-10
Threatened and endangered species on or near ARNG installation (continued)

CMD	Installation	State	Category	Common Name	Scientific Name	Onsite/ Contiguous	Status	Critical Habitat On/ Contiguous to Installation
ARNG	MTC-H CAMP GRAYLING	MI	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	MTC-H CAMP GRAYLING	MI	Reptile	Massasauga (=rattlesnake), eastern	*Sistrurus catenatus catenatus*	Onsite	C	N
ARNG	MTC-H CAMP GRAYLING	MI	Plant	Goldenrod, Houghton's	*Solidago houghtonii*	Onsite	T	N
ARNG	MTCH CAMP GUERNSEY	WY	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	MTC-H CAMP ROBERTS	CA	Crustacean	Fairy shrimp, vernal pool	*Branchinecta lynchi*	Onsite	T	N
ARNG	MTC-H CAMP ROBERTS	CA	Plant	Amole, purple	*Chlorogalum purpureum*	Onsite	T	N
ARNG	MTC-H CAMP ROBERTS	CA	Bird	Condor, California	*Gymnogyps californianus*	Contiguous	E	N
ARNG	MTC-H CAMP ROBERTS	CA	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	MTC-H CAMP ROBERTS	CA	Fish	Steelhead (Southern California)	*Oncorhynchus mykiss*	Onsite	T	N
ARNG	MTC-H CAMP ROBERTS	CA	Bird	Vireo, Least Bell's	*Vireo bellii pusillus*	Contiguous	E	N
ARNG	MTC-H CAMP ROBERTS	CA	Mammal	Fox, San Joaquin kit	*Vulpes macrotis mutica*	Onsite	E	N
ARNG	NG CHEVAK ARMORY	AK	Bird	Eider, Stellar's	*Polysticta stellari*	Contiguous	T	N
ARNG	NG ELIM ARMORY	AK	Bird	Eider, Spectacled	*Somateria fischeri*	Contiguous	T	N
ARNG	NG ST MICHAEL ARMORY	AK	Bird	Eider, Spectacled	*Somateria fischeri*	Contiguous	T	N
ARNG	NHNG TRAINING CENTER	NH	Plant	Pogonia, small whorled	*Isotria medeoloides*	Onsite	E	N
ARNG	OMS 10B/ST GEORGE	UT	Plant	Bear-poppy, Dwarf	*Arctomecon humilis*	Onsite	E	N
ARNG	ORCHARD TRNG AREA BOISE	ID	Bird	Eagle, Bald	*Haliaeetus leucocephalus*	Onsite	T	N
ARNG	ORCHARD RANGE TS BOISE	ID	Plant	Slickspot Peppergrass	*Lepidium Papilliferum*	Onsite	PE	N
ARNG	SANTA CRUZ ARMORY	CA	Plant	Tarplant, Santa Cruz	*Holocarpha macradenia*	Onsite	E	Y - O
ARNG	SEA GIRT	NJ	Plant	Amaranth, Seabeach	*Amaranthus pumilus*	Onsite	T	N
ARNG	SEA GIRT	NJ	Bird	Plover, Piping	*Charadrius melodus*	Onsite	T	N
ARNG	SMR CAMP BEAUREGARD	LA	Bird	Woodpecker, Red-cockaded	*Picoides borealis*	Contiguous	E	N
ARNG	SPRINGFIELD AVCRAD/AASF	MO	Fish	Cavefish, Ozark	*Amblyopsis rosae*	Contiguous	T	N
ARNG	STATE MILITARY RESERVATION	NH	Insect	Butterfly, Karner blue	*Lycaeides melissa samuelis*	Onsite	E	N
ARNG	STEWART RIVER TS	AK	Bird	Eider, Spectacled	*Somateria fischeri*	Contiguous	T	N

Table C-10
Threatened and endangered species on or near ARNG installation (continued)

CMD	Installation	State	Category	Common Name	Scientific Name	Onsite/ Contiguous	Status	Critical Habitat On/ Contiguous to Installation
ARNG	TS GARRISON	ND	Bird	Plover, Piping	*Charadrius melodus*	Contiguous	T	N
ARNG	TS WILLISTON	ND	Bird	Plover, Piping	*Charadrius melodus*	Contiguous	T	N
ARNG	UKUMEHAME WETS	HI	Bird	Duck, Hawaiian (=koloa)	*Anas wyvilliana*	Onsite	E	N
ARNG	UKUMEHAME WETS	HI	Bird	Goose, Hawaiian (=nene)	*Branta sandvicensis*	Onsite	E	N
ARNG	UKUMEHAME WETS	HI	Bird	Coot, Hawaiian (=`alae-ke`oke`o)	*Fulica americana alai*	Onsite	E	N
ARNG	UKUMEHAME WETS	HI	Bird	Moorhen, Hawaiian Common	*Gallinula chloropus sandvicensis*	Onsite	E	N
ARNG	UKUMEHAME WETS	HI	Bird	Stilt, Hawaiian (=ae`o)	*Himantopus mexicanus knudseni*	Onsite	E	N

Table C-11
Regional locations of representative installations

Installation	State	Archaeological region
Fort Benning	GA	Southeast
Camp Blanding	FL	Southeast
Fort Bliss	TX	Southwest
Fort Bragg	NC	Southeast
Fort Campbell	KY	Southeast
Fort Carson	CO	West
Fort Chaffee	AR	Southeast
Fort Dix	NJ	Mid-Atlantic
Fort Drum	NY	Mid-Atlantic/Northeast
Fort A.P. Hill	VA	Mid-Atlantic/Southeast
Fort Hood	TX	Southwest
Fort Indiantown Gap	PA	Mid-Atlantic
Fort Irwin	CA	West
Fort Knox	KY	South
Fort Lewis	WA	Northwest
Fort McClellan	AL	Southeast
Orchard Training Area	ID	Northwest
Fort Pickett	VA	Mid-Atlantic/Southeast
Fort Polk	LA	Southeast
Fort Riley	KS	Midwest/West
Camp Shelby	MS	Southeast
Fort Sill	OK	West
Fort Stewart	GA	Southeast
Schofield Barracks	HI	Pacific
Fort Wainwright	AK	Far Northwest

Appendix D
RECORD OF NON-APPLICABILITY
In Accordance with the Clean Air Act - General Conformity Rule For The Proposed Army National Guard Transformation Equipment Fielding

15 April 2008

Consistent with current modernization plans, the NGB proposes to field six ground and air systems to State and Territory ARNGs throughout the United States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. As explained in detail in this PEA, these systems are known generally as the Fox, HIMARS, Lakota, Shadow, Raven, and Spartan. The total annual direct and indirect emissions of all criteria pollutants were estimated for the operation of the systems, as were allowances for a small facility construction or modification project to facilitate the systems' fielding. The estimated emissions are outlined below and compared to the most restrictive applicability threshold under the General Conformity Rule.

Table 1. System Operational and Minor Construction Emissions Compared to Applicability Thresholds

	Estimated Emissions [tpy]					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Construction Emissions	4.78	5.32	0.88	0.01	3.53	3.52
Fox Operations	0.64	0.36	0.08	0.00	0.02	0.02
Lakota Operations	2.88	8.57	0.38	0.98	0.09	0.09
Shadow Operations	1.33	1.25	0.14	0.09	0.17	0.17
Spartan Operations	3.51	6.14	1.13	1.27	2.51	2.50
De minimis Thresholds [tpy]	100	25	100	100	100	25
Would Emissions Exceed *de minimis* Thresholds?	No	No	No	No	No	No

Notes: There are no areas in the U.S. designated extreme nonattainment for the 8-hour ozone.
There are no ARNG installations in nonattainment areas for lead.
HIMARS and Raven operations would result in no change or a net reduction in emissions.
tpy = tons per year

General Conformity under the Clean Air Act, Section 176 has been evaluated according to the requirements of 40 CFR Part 93, Subpart B. The requirements of this rule are not applicable to the Proposed Action because either

(1) The receiving installation is in an attainment area, or

(2) The projected emissions would be below the applicability thresholds.

This is true regardless of the system, location of the installation, pollutant(s) of interest, or the severity of nonattainment. Any major construction or modification of facilities, additional support activities, or unusual increases in training intensity by State and Territory ARNGs would require site-specific analysis under NEPA and the General Conformity Rule. This may require additional emission estimations to ensure the total direct and indirect emissions from the action would not exceed the applicability thresholds, and that the General Conformity Rules still would not apply. Supported documentation and emission estimates appear in the NEPA Documentation.

Eric N Anderson
Signature

Dep Chief NGB-ARE
Title

28 Apr 08
Date

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Appendix E
Emissions Calculations

Table E-1 Roll-up of construction and operational emissions

	Estimated emissions (tpy)					
	CO	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Construction Emissions	4.78	5.32	0.88	0.01	3.53	3.52
Fox Operations	0.64	0.36	0.08	0.00	0.02	0.02
Lakota Operations	2.88	8.57	0.38	0.98	0.09	0.09
Shadow Operations	1.33	1.25	0.14	0.09	0.17	0.17
Spartan Operations	3.51	6.14	1.13	1.27	2.51	2.50
***De minimis* Thresholds [tpy]**	100	25	100	100	100	25
Would Emissions Exceed *de minimis* Thresholds?	No	No	No	No	No	No

Sources: AP-42 sections 13.2.2 and 13.2.3; CARB 2007; FAA 2007; USAF 2002; and USAF 2006.
Note: There are no areas in the United States designated extreme nonattainment for the 8-hour ozone, and there are no ARNG installations in nonattainment areas for lead. HIMARS and Raven operations would result in no change or a net reduction in emissions.
tpy = tons per year

Table E-2 Construction or modification parameters

Days of Construction	180	Days
Construction Site Area	2	Acres
Number of Construction Workers	40	Personnel
Volume of Concrete	200	Cubic Yards
Volume of Cut and Fill Material	1,000	Cubic Yards

Table E-3 Construction equipment use

Equipment type	Number of units	Days on site	Hours per day	Operating hours
Air Compressors	1	180	4	720
Cement & Mortar Mixers	1	180	7	1,260
Cranes	1	180	7	1,260
Roller	1	180	7	1,260
Dozer	1	180	7	1,260
Generator Sets	1	180	7	1,260
Tractors/Loaders/Backhoes	1	180	7	1,260

Table E-4 Construction equipment emission factors (lbs/hour)

Equipment	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Air Compressors	0.3782	0.7980	0.1232	0.0007	0.0563	0.0563
Cement and Mortar Mixers	0.0447	0.0658	0.0113	0.0001	0.0044	0.0044
Cranes	0.6011	1.6100	0.1778	0.0014	0.0715	0.0715
Roller	0.4341	0.8607	0.1328	0.0008	0.0601	0.0601
Dozer	1.5961	3.2672	0.3644	0.0025	0.1409	0.1409
Generator Sets	0.3461	0.6980	0.1075	0.0007	0.0430	0.0430
Tractors/Loaders/Backhoes	0.4063	0.7746	0.1204	0.0008	0.0599	0.0599

Source: CARB 2007

Table E-5 Construction equipment emissions (tons)

Equipment	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Air Compressors	0.1361	0.2873	0.0444	0.0003	0.0203	0.0203
Cranes	0.3787	1.0143	0.1120	0.0009	0.0451	0.0451
Roller	0.2735	0.5422	0.0837	0.0005	0.0379	0.0379
Dozer	1.0055	2.0583	0.2296	0.0015	0.0888	0.0888
Generator Sets	0.2180	0.4397	0.0677	0.0004	0.0271	0.0271
Tractors/Loaders/Backhoes	0.2560	0.4880	0.0759	0.0005	0.0377	0.0377
Total Equipment Emissions	**2.27**	**4.83**	**0.61**	**0.00**	**0.26**	**0.26**

Table E-6 Delivery of equipment and supplies

Number of Deliveries	2
Number of Trips	2
Miles Per Trip	30
Days of Construction	180
Total Miles	21,600

Pollutant	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Emission Factor (lbs/mile)	0.0219	0.0237	0.0030	0.0000	0.0009	0.0007
Total Emissions (lbs)	474.10	512.19	64.64	0.55	18.49	15.97
Total Emissions (tons)	**0.24**	**0.26**	**0.03**	**0.00**	**0.01**	**0.01**

Source: CARB 2007

Table E-7Transportation of cut and fill material

Volume (Cubic Yards)	1,000
Truck Capacity (Cubic Yards)	15
Number of Deliveries	67
Number of Trips	2
Miles Per Trip	30
Total Miles	4,000

Pollutant (pounds/mile)	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Emission Factor (lbs/mile) HHDDT	0.0136	0.0446	0.0035	0.0000	0.0022	0.0019
Total Emissions (lbs)	294.06	962.93	75.94	0.89	46.58	41.04
Total Emissions (tons)	**0.15**	**0.48**	**0.04**	**0.00**	**0.02**	**0.02**

Source: CARB 2007

Table E-8 Fugitive particles

Area (acres)	2
Emission Factor (lbs TSP/acre/day)	80
Construction Duration (days)	90
Percent PM10/TSP	0.45
PM10 Emissions (tons)	**3.24**

Source: AP-42 sections 13.2.2 and 13.2.3

Table E-9 Transportation of concrete

Volume of Concrete (Cubic Yards)	200.0
Truck Capacity (Cubic Yards)	10
Number of Deliveries	20
Number of Trips	2
Miles Per Trip	30
Total Miles	1,200.0

Pollutant	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Emission Factor (lbs/mile)	0.0136	0.0446	0.0035	0.0000	0.0022	0.0019
Total Emissions (lbs)	16.34	53.50	4.22	0.05	2.59	2.28
Total Emissions (tons)	**0.01**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**

Source: CARB 2007

Table E-10 Worker commutes

Number of Workers	40					
Number of Trips	2					
Miles Per Trip	30					
Days of Construction	180					
Total Miles	432,000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	4,556.92	476.45	466.21	4.64	36.74	22.87
Total Emissions (tons)	**2.28**	**0.24**	**0.23**	**0.00**	**0.02**	**0.01**

Source: CARB 2007

Table E-11 Total construction emissions (tons)

Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Construction Equipment	2.2679	4.8299	0.6132	0.0041	0.2568	0.2568
Delivery of Equipment and Supplies	0.2371	0.2561	0.0323	0.0003	0.0092	0.0080
Transportation of Shale	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Fugitive Particles	0.0000	0.0000	0.0000	0.0000	3.2400	3.2400
Transportation of Concrete	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
Worker Commutes	2.2785	0.2382	0.2331	0.0023	0.0184	0.0114
Total Construction Emissions	**4.78**	**5.32**	**0.88**	**0.01**	**3.53**	**3.52**

Table E-12 Operation emissions M93A1 (Fox)

Number of Operations	230					
Number of Trips	2					
Miles Per Trip	30					
Total Miles	13,800					
Pollutant (pounds/mile)	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0136	0.0446	0.0035	0.0000	0.0022	0.0019
Total Emissions (lbs)	187.87	615.21	48.52	0.57	29.76	26.22
Total Emissions (tons)	**0.09**	**0.31**	**0.02**	**0.00**	**0.01**	**0.01**

Source: CARB 2007
Note: Emission factors for Heavy Heavy-Duty Diesel Truck (HHDDT) were used.

Table E-13 Fox worker commutes

Number of Workers	5					
Number of Trips	3					
Miles Per Trip	30					
Days Per Year	230					
Total Miles	103,500					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	1,091.8	114.1	111.7	1.1	8.8	5.5
Total Emissions (tons)	**0.55**	**0.06**	**0.06**	**0.00**	**0.00**	**0.00**

Source: CARB 2007

Table E-14 Total Fox operational emissions (tons)

Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Fox Operations	0.09	0.31	0.02	0.00	0.01	0.01
Worker Commutes	0.55	0.06	0.06	0.00	0.00	0.00
Total Operational Emissions	**0.64**	**0.36**	**0.08**	**0.00**	**0.02**	**0.02**

Table E-15 Operation emissions UH-72A Lakota

Number of Aircraft	6					
Maximum Daily Operations	4					
Number of Training Days Per Year	230					
Number of Flights	5,520					
	CO	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
LTO Emission Factors (kg/operation)	0.508	3.334	0.11	0.78	0.066	0.066
LTO Emission (tons)	0.64	4.18	0.14	0.98	0.08	0.08
Flight Emission Factors (kg/operation)	1.35	3.45	0.15	0.00	0.000	0.000
Flight Emissions (tons)	1.69	4.33	0.19	0.00	0.00	0.00
Total	**2.33**	**8.51**	**0.33**	**0.98**	**0.08**	**0.08**

Source: FAA 2007
Note: Emission factors for the UH-1 Iroquois used as surrogate

Table E-16 Lakota worker commutes

Number of Workers	5					
Number of Trips	3					
Miles Per Trip	30					
Days Per Year	230					
Total Miles	103,500					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	1,091.8	114.1	111.7	1.1	8.8	5.5
Total Emissions (tons)	**0.55**	**0.06**	**0.06**	**0.00**	**0.00**	**0.00**

Source: CARB 2007

Table E-17 Total Lakota operational emissions (tons)

Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Lakota Operations	2.33	8.51	0.33	0.98	0.08	0.08
Worker Commutes	0.55	0.06	0.06	0.00	0.00	0.00
Total Operational Emissions	**2.88**	**8.57**	**0.38**	**0.98**	**0.09**	**0.09**

Table E-18 Operation emissions RQ-7B Shadow

Number of Aircraft	1					
Maximum Daily Operations	4					
Number of Training Days Per Year	230					
Number of Flights	920					
	CO	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
LTO Emission Factors (kg/hour)	2.50	0.56	1.59	0.05	0.09	0.09
Time in Mode/Operation (Minutes)	5	5	5	5	5	5
LTO Emission (tons)	0.04	0.01	0.03	0.00	0.00	0.00
Flight Emission Factors (kg/hour)	0.48	2.80	0	0.22	0.40	0.40
Time in Mode/Operation (Minutes)	115	115	115	115	115	115
Flight Emissions (tons)	0.19	1.12	0.00	0.09	0.16	0.16
Total	**0.24**	**1.13**	**0.03**	**0.09**	**0.16**	**0.16**

Source: USAF 2006

Table E-19 Shadow worker commutes

Number of Workers	10					
Number of Trips	3					
Miles Per Trip	30					
Days Per Year	230					
Total Miles	207.000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	2.183.5	228.3	223.4	2.2	17.6	11.0
Total Emissions (tons)	**1.09**	**0.11**	**0.11**	**0.00**	**0.01**	**0.01**

Source: CARB 2007

Table E-20 Total Shadow operational emissions (tons)

Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Shadow Operations	0.24	1.13	0.03	0.09	0.16	0.16
Worker Commutes	1.09	0.11	0.11	0.00	0.01	0.01
Total Operational Emissions	**1.33**	**1.25**	**0.14**	**0.09**	**0.17**	**0.17**

Table E-21 Emission factors C-27J Spartan

Mode	**Thrust mode**	**Fuel flow (lb/hr)**	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Ground Idle	Idle	900	3.84	7.49	1.97	1.7	3.64	3.64
Flight Idle	Approach	1,240	2.82	8.31	0.58	1.7	3.85	3.85
Normal RTD	Climbout	2,180	1.65	9.69	0.42	1.7	1.46	1.46
Int. Mil.	Takeoff	2,456	1.77	11.42	0.28	1.7	1.22	1.22
Time-In-Mode Data	**Idle Out**	**Takeoff**	**Idle In**	**Climbout**	**Approach**			
	9.2	0.4	6.7	1.2	5.1			
Emission in lbs Pollutant per LTO	--	--	5.26	13.09	2.22	2.75	5.43	5.43

Source USAF 2002

Note: $PM_{2.5}$ emission factors are not available, so $PM_{2.5}$ is conservatively assumed equivalent to PM_{10} emissions. Emission factors for C-130 were used as a conservative surrogate.

Table E-22 Operation emissions C-27J Spartan

Number of Aircraft	4					
Maximum Daily Operations	1					
Number of Training Days Per Year	230					
Number of Flights	920					
	CO	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factors (lb/operation)	5.26	13.09	2.22	2.75	5.43	5.43
Total Emission (tons)	**2.42**	**6.02**	**1.02**	**1.27**	**2.50**	**2.50**

Source USAF 2002

Table E-23 Spartan worker commutes

Number of Workers	10					
Number of Trips	3					
Miles Per Trip	30					
Days Per Year	230					
Total Miles	207,000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.01	0.00	0.00	0.00	0.00	0.00
Total Emissions (lbs)	2,183.53	228.30	223.39	2.22	17.61	10.96
Total Emissions (tons)	**1.09**	**0.11**	**0.11**	**0.00**	**0.01**	**0.01**

Source: CARB 2007

Table E-24Total operational emissions (tons)

Activity/Source	CO	NO_x	VOC	SO_x	PM_{10}
Spartan Operations	2.42	6.02	1.02	1.27	2.50
Worker Commutes	1.09	0.11	0.11	0.00	0.01
Total Operational Emissions	**3.51**	**6.14**	**1.13**	**1.27**	**2.51**

Appendix F
Public Comments

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FEB 6, 2008

AURELIO DUARTE #1945262
Ruda Unit-B-5-T
2004 LAMESA Highway
BROWNFIELD, TX. 79316

MAJOR STEVE STADELMAN
National Guard Bureau
ARMY National Guard Readiness Center
111 South George MASON
Arlington, Virginia 22204-1383

RE: Draft Programatic Environmental Assessment

MAJOR STADELMAN, I'm very interested in taking a look at the assessment in question please forward any information you might have. Your time and effort is greatly appreciated. Again thank you!

Best Regards

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ACRONYMS AND ABBREVIATIONS

AAF	Army Aviation Facility
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ADNL	A-weighted Day-night Average Sound Level
AFB	Air Force Base
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
$AlCl_3$	Aluminum Chloride
AlOCl	Aluminum Oxyhalide
Al_2O_3	Aluminum Oxide
ANG	Air National Guard
AR	Army Regulation
ARB	Air Reserve Base
ARNG	Army National Guard
ARPA	Archaeological Protection Act
ARTP	Army Readiness and Training Evaluation Program
ATC	Air Traffic Control
ATTACC	Army Training and Testing Area Carrying Capacity
BCT	brigade combat team
BMP	best management practice
Bn	battalion
CAA	Clean Air Act
CAB	Combat Aviation Brigades
CDNL	C-weighted Day-night Average Sound Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CL	Chlorine
CM	Chemical
CO	carbon monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
DA	Department of the Army
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
dBP	Peak Level decibel
DNL	Day-night Average Sound Level
DoD	Department of Defense
DoDI	DoD Instruction
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPNL	Effective Perceived Noise Level
ESA	Endangered Species Act
EU	European Union
FAA	Federal Aviation Administration

FAR	Federal Aviation Regulation
FARP	forward arming and refueling points
Fe	Iron
FeCl	Ferrous Chloride
$Fe(OH)_2$	Ferrous Hydroxide
FNSI	Finding of No Significant Impact
GIS	geographic information system
GSA	General Services Administration
H	Hydrogen
HAPs	hazardous air pollutants
HCl	Hydrogen chloride
HIMARS	High Mobility Artillery Rocket System
H_2O	water
HQDA	Headquarters, Department of the Army
ICAO	International Civil Aviation Organization
ICRMP	Integrated Cultural Resources Management Plan
IFR	instrument flight rules
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
JCA	Joint Cargo Aircraft
km	kilometer
LBP	lead-based paint
lbs	pounds
LCTA	Land Condition-Trend Analysis
LRAM	Land Rehabilitation and Maintenance
LUH	Light Utility Helicopter
m	meter
MACT	Maximum Available Control Technology
MATES	Maneuver and Training Equipment Sites
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
met	metric
METL	mission essential task list
mi	miles
MIM	maneuver impact mile
MLRS	multiple launch rocket system
mm	millimeter
MOA	Military Operation Area
MOU	Memorandum of Understanding
mph	miles per hour
MSL	mean sea level
N	Nitrogen
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NATO	North Atlantic Treaty Organization
NBCRS	Nuclear, Biological, and Chemical Reconnaissance System
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NO	nitric oxide

NO_x	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	new source performance standards
OH	Hydroxide
ONMP	Operational Noise Management Program
OSHA	Occupational Health and Safety Administration
PAM	Pamphlet
PCB	polychlorinated biphenyl
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PK	peak sound pressure level
PLS	planning level survey
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POL	petroleum, oil, and lubricant
POTW	publicly owned treatment work
PPA	Pollution Prevention Act
ppm	part per million
RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
RONA	Record of Non-Applicability
RPV	remotely piloted vehicle
RRPR	Reduced Range Practice Rocket
RTLA	Range and Training Land Assessment
S&S	Security & Support Battalion
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
shp	shaft horsepower
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_x	sulphurous oxides
SUA	support unit of action
SUAS	Small Unmanned Aircraft System
TDA	Table of Distribution and Allowances
$TiCl_4$	titanium tetrachloride
TOE	Table of Organization and Equipment
tpy	tons per year
TRI	Training Requirements Integration
TSCA	Toxic Substances Control Act
TUAS	Tactical Unmanned Aircraft System
TUAV	Tactical Unmanned Aerial Vehicle
UA	unit of action
UAS	Unmanned Aircraft Systems
UAV	unmanned aerial vehicle
UH	utility helicopter
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USFWS	U.S. Fish and Wildlife Service

UST	underground storage tank
UTES	Unit Training Equipment Sites
UXO	unexploded ordnance
VFR	visual flight rules
VOC	volatile organic compound