

Final Environmental Impact Statement

**Implementation of Base Realignment and Closure
(BRAC) Recommendations and Other Army Actions at
Fort Lee, Virginia, and Fort A.P. Hill, Virginia**



prepared for

**Fort Lee, Virginia
and
Fort A.P. Hill, Virginia**

by

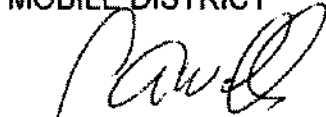
U.S. Army Corps of Engineers, Mobile District

February 2007

FINAL ENVIRONMENTAL IMPACT STATEMENT
IMPLEMENTATION OF BASE REALIGNMENT AND CLOSURE
(BRAC) RECOMMENDATIONS AND OTHER ARMY ACTIONS AT
FORT LEE, VIRGINIA, AND FORT A.P. HILL, VIRGINIA

Prepared by:

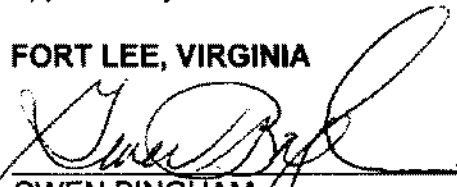
U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT



CRAIG A. WELLS
Lieutenant Colonel, Engineer
Deputy Commander

Approved by:

FORT LEE, VIRGINIA



GWEN BINGHAM
Colonel, U.S. Army
Garrison Commander
Fort Lee, Virginia

FORT A.P. HILL, VIRGINIA



MICHAEL S. GRAESE
Lieutenant Colonel, U.S. Army
Installation Commander
Fort A.P. Hill, Virginia

FINAL ENVIRONMENTAL IMPACT STATEMENT

TITLE OF PROPOSED ACTION: Implementation of Base Realignment and Closure (BRAC) Recommendations and Other Army Actions at Fort Lee, Virginia, and Fort A.P. Hill, Virginia

LEAD AGENCIES: Department of the Army

COOPERATING AGENCY: Crater Planning District Commission

AFFECTED JURISDICTIONS: Prince George County, Virginia; Petersburg, Virginia; Hopewell, Virginia; Caroline County, Virginia; Essex County, Virginia

PREPARED BY: Peter F. Taylor Jr., Colonel, U.S. Army Corps of Engineers, Mobile District, Commanding

APPROVED BY: Gwen Bingham, Colonel, U.S. Army, Garrison Commander, Fort Lee, Virginia; Michael S. Graese, LTC, U.S. Army, Installation Commander, Fort A.P. Hill, Virginia

ABSTRACT: This Final Environmental Impact Statement (EIS) considers the proposed implementation of the BRAC recommendations at Fort Lee, Virginia, and Fort A.P. Hill, Virginia. The Final EIS identifies, evaluates, and documents the effects of facility construction, maintenance, management, and renovation on the environment and economic and social conditions at Fort Lee and Fort A.P. Hill that would result from the implementation of the realignment actions mandated by the BRAC Commission. A no action alternative is also evaluated.

FEIS PUBLICATION: The U.S. Environmental Protection Agency announced the publication of the Final EIS in its Notice of Weekly Receipts (NWR) of EISs, published in the *Federal Register*. Not less than 30 days after publication of the NWR, the Army will sign a Record of Decision (ROD) that will include an overview of the range of alternatives considered for Fort Lee and Fort A.P. Hill, state which of the alternatives considered in the Final EIS will be implemented, and include mitigation measures associated with the chosen alternative. During the period between publication of the NWR and the ROD, copies of the Final EIS can be obtained by contacting Ms. Carol Anderson, Fort Lee Environmental Management Office, IMNE-LEE-PWE, 1816 Shop Road, Fort Lee, Virginia, 23801 (or CRMLee@lee.army.mil); or by contacting Terry Banks, 19952 North Range Rd., Fort A. P. Hill, VA, 22427 (or Terry.Banks1@us.army.mil). Copies have also been provided to the libraries listed in section 6 of the Final EIS.

FINAL ENVIRONMENTAL IMPACT STATEMENT ORGANIZATION

This Final Environmental Impact Statement addresses the proposed action to implement the BRAC recommendations and other Army Actions at Fort Lee, Virginia, and Fort A.P. Hill, Virginia. It has been developed in accordance with the National Environmental Policy Act and implementing regulations issued by the Council on Environmental Quality (Title 40 *Code of Federal Regulations* [CFR] 1500–1508) and the Army (32 CFR 651). Its purpose is to inform decision-makers and the public of the likely environmental and socioeconomic consequences of the proposed action and alternatives.

An **EXECUTIVE SUMMARY** briefly describes the proposed action, environmental and socioeconomic consequences, and mitigation measures.

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- SECTION 1.0:** **PURPOSE, NEED, AND SCOPE** summarizes the purpose of and need for the proposed action and describes the scope of the environmental impact analysis process.
- SECTION 2.0:** **PROPOSED ACTION** describes the proposed action to implement the BRAC Commission's recommendations at Fort Lee and Fort A.P. Hill.
- SECTION 3.0:** **ALTERNATIVES** examines alternatives to implementing the proposed action.
- SECTION 4.0:** **AFFECTED ENVIRONMENT AND CONSEQUENCES** describes the existing environmental and socioeconomic settings at Fort Lee and Fort A.P. Hill and identifies potential effects of implementing the proposed action.
- SECTION 5.0:** **LIST OF PREPARERS** identifies the preparers of the document.
- SECTION 6.0:** **DISTRIBUTION LIST** indicates recipients of this Final Environmental Impact Statement.
- SECTION 7.0:** **REFERENCES** provides bibliographical information for cited sources.
- SECTION 8.0:** **PERSONS CONSULTED** lists persons and agencies consulted during preparation of this Final Environmental Impact Statement.
- SECTION 9.0:** **ACRONYMS AND ABBREVIATIONS** lists acronyms and abbreviations used in the document.
- APPENDICES**
- A** Agency Coordination and Scoping Comments
 - B** Air Quality Supporting Documentation
 - C** Weapon Expenditures and Range Operations Used in Noise Contour Calculations
 - D** Virginia Coastal Resources Management Program Consistency Determination
 - E** Economic Impact Forecast System Methodology
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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

On September 8, 2005, the Defense Base Closure and Realignment Commission (BRAC Commission) recommended that certain realignment actions occur at Fort Lee, Virginia. These recommendations were approved by the President on September 15, 2005, and forwarded to Congress. Upon expiration of the statutory period for Congress to enact a joint resolution of disapproval on November 9, 2005, the BRAC Commission's recommendations became law. The BRAC Commission recommendations must now be implemented as provided for in the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510), as amended.

The BRAC Commission's recommendations realign Fort Lee by relocating specified organizations and activities to the post. The BRAC Commission made six recommendations concerning Fort Lee (see section ES.3). To enable implementation of the recommendations, the Army proposes to provide necessary facilities at Fort Lee to support the relocations. The BRAC Commission found the capacity of Fort Lee sufficient to meet the new training requirements, except for insufficient land and space available to conduct major field training exercises (FTX), to include the Warrior Training FTX. The Army proposes to use Fort A.P. Hill to conduct FTX and Explosive Ordnance Disposal (EOD) training, on the basis of its proximity to Fort Lee, its suitable lands, and its schedule availability. The final environmental impact statement (EIS) analyzes and documents environmental effects associated with the Army's proposals at Fort Lee and Fort A.P. Hill.

ES.2 INSTALLATION SETTING AND MISSION

Fort Lee lies between Petersburg, Virginia, and Hopewell, Virginia, approximately 25 miles south of Richmond, Virginia. Fort Lee is home of the U.S. Army Combined Arms Support Command (CASCOM), an organization having the mission to develop logistics leaders, doctrine, organizations, training, and materiel solutions to sustain a campaign-quality Army with joint and expeditionary capabilities in war and peace. Fort A.P. Hill, in Caroline and Essex counties approximately 70 miles north of Fort Lee, provides realistic joint and combined arms training, logistics, and support to numerous Active Component and Reserve Component visiting units.

ES.3 PROPOSED ACTION

The proposed action is to implement the BRAC Commission's recommendations to realign Fort Lee. Implementing the BRAC Commission's recommendations would consist of three major components: (1) The BRAC Commission's recommendations would result in the relocation of approximately 7,700 additional personnel to Fort Lee, (2) additional facilities at both Fort Lee and Fort A.P. Hill would be constructed to accommodate relocated personnel and functions, and (3) the Army would conduct training and other operations at both Fort Lee and Fort A.P. Hill. Details of these components are provided below.

The BRAC Commission made six recommendations concerning Fort Lee, which would be implemented under the proposed action as follows.¹

¹ Complete text of the BRAC Commission's recommendations is available on the Army's Web site at <http://www.hqda.army.mil/acsimweb/brac/braco.htm>.

- Establish a Sustainment Center of Excellence (SCOE) at Fort Lee. Activities that would relocate to Fort Lee and be incorporated into the SCOE are portions of the Transportation Center and School from Fort Eustis, Virginia; the Ordnance Maintenance Mechanical School of the Ordnance Center and School from Aberdeen Proving Ground, Maryland; and the Ordnance Munitions and Electronics Maintenance School (OMEMS) of the Missile and Munitions Center from Redstone Arsenal, Alabama. The Transportation Center and School and the Ordnance Center and School would be consolidated with the Quartermaster Center & School, the Army Logistic Management College, and the Combined Arms Support Command to form the SCOE.
- Establish a Joint Center for Consolidated Transportation Management Training. Transportation Management Training from Lackland Air Force Base, Texas, would relocate to Fort Lee, Virginia, to accomplish this.
- Establish a Joint Center of Excellence for Culinary Training. Culinary Training from Lackland Air Force Base, Texas, would relocate to Fort Lee.
- Co-locate Miscellaneous Department of Defense, Defense Agency, and Field Activity Leased Locations. Close Metro Park III and IV (6350 and 6359 Walker Lane), a leased installation in Alexandria, Virginia, by relocating the Defense Contract Management Agency (DCMA) Headquarters to Fort Lee, Virginia.
- Relocate all components of the Defense Commissary Agency (DeCA) to Fort Lee. Defense Commissary Agency Eastern, Midwestern Regional, and Hopewell, Virginia, Offices would be consolidated at Fort Lee. Leased facilities at 300 AFCOMS Way in San Antonio, Texas; 5258 Oaklawn Boulevard in Hopewell, Virginia; and 5151 Bonney Road in Virginia Beach, Virginia, would be closed.

In addition to the five actions above, through which Fort Lee would gain functions, facilities, and personnel, the BRAC Commission recommended the creation of Joint Mobilization Sites that would result in a loss at Fort Lee. Under this recommendation, all mobilization processing functions at Fort Lee, Virginia; Fort Eustis, Virginia; and Fort Jackson, South Carolina would be relocated to Fort Bragg, North Carolina, and Fort Bragg would be designated Joint Pre-Deployment/Mobilization Site Bragg/Pope.

Fort Lee's military and civilian population consists of two major categories of personnel: student Soldiers attending professional schools and permanent party personnel. Following implementation of the proposed action, Fort Lee's average daily population would nearly double, rising from 12,953 personnel to 20,703 personnel (Table ES-1).

ES.3.1 Facilities

Implementation of the proposed action would require renovation of existing facilities and construction of new facilities to accommodate the influx of personnel and activities to Fort Lee and Fort A.P. Hill. These facilities would support the new SCOE, U.S. Air Force (USAF) consolidated transportation management training, culinary training for Air Force and Navy personnel, the DeCA, the DCMA, and FTX and logistics and leader development training at Fort A.P. Hill.

ES.3.2 Sustainment Center of Excellence

Facilities for the SCOE would require new construction amounting to approximately 3.57 million square feet and renovations amounting to approximately 67,100 square feet, resulting in a total built space of approximately 3.64 million square feet. In addition, there would be approximately

**Table ES-1
Fort Lee personnel populations**

Source	Student Soldiers (Annual)	Student Soldiers (ADL)^a	Permanent Party^b
Redstone Arsenal	3,617	1,102	492
Aberdeen Proving Ground	13,565	2,349	1,053
Fort Eustis	5,910	473	397
Lackland Air Force Base	3,817	750	142
Defense Commissary Agency	0	0	338
Defense Contract Mgmt Agency	0	0	654
Subtotal	26,909	4,674	3,076
Fort Lee (pre-BRAC)	33,976	5,065	7,888
Fort Lee (post-BRAC): Total	60,885	9,739	10,964
Total Average Daily Population (ADL+Permanent Party), post-BRAC implementation: 20,703			

Notes:

^a Average daily load

^b Includes military personnel, civilians, and on-site contractor support

8.2 million square feet (approximately 166 acres) of new surfaced roads, gates, and parking areas, as well as wash platforms, a 325-acre training ammunition supply point (ASP), athletic fields, and a pedestrian bridge.

ES.3.3 Joint Culinary Center of Excellence

USAF culinary training would relocate from Lackland Air Force Base (AFB) and U.S. Navy culinary training would relocate from U.S. Naval Station Great Lakes to Fort Lee to establish a Joint Center for Culinary Training. Facilities for these proposed relocations would include approximately 45,000 square feet of built space for an academic building and a food laboratory, and 19,800 square feet of tent pads for field training at Fort Lee.

ES.3.4 Consolidated Transportation Management Training

Transportation Management Training would relocate from Lackland AFB to Fort Lee. Facilities for the proposed relocation would include academic buildings and high bays, and dining and dormitory facilities that would be shared with culinary students. Facilities for Transportation Management Training and those shared with culinary students would total approximately 232,500 square feet. Additionally, approximately 3 acres of parking area would be constructed for the Joint Culinary Center and Transportation Management Training

ES.3.5 Defense Commissary Agency

Leases at three facilities now used by DeCA would be terminated and its 338 personnel would relocate to Fort Lee. To accommodate those personnel, Fort Lee proposes to construct a 71,000-square-foot addition to the existing DeCA Headquarters Building (Building 11200) and provide an additional 280,000 square feet (approximately 6.5 acres) of parking.

ES.3.6 Defense Contract Management Agency

DCMA Headquarters would relocate from two leased facilities in Alexandria, Virginia, to Fort Lee, and the 654 personnel of DCMA would occupy a renovated Building 10500, a 159,000-square-foot facility.

ES.3.7 Field Training Exercises and Warrior Training FTX, Fort A.P. Hill

The BRAC Commission found that Fort Lee had insufficient land and space to conduct Warrior Training. The Commission determined that the shortfall could be mitigated by using nearby training sites at Fort Pickett, an installation operated by the Virginia Army National Guard. The BRAC Commission, however, did not require the use of Fort Pickett as a training facility to support the incoming BRAC activities; it cited the installation as an example only. Further evaluation by the Army determined that Fort Pickett does not have suitable training areas or facilities and lacks schedule availability to support Warrior Training for SCOE students. Accordingly, the Army proposes to use Fort A.P. Hill to conduct FTX, on the basis of its proximity to Fort Lee, its suitable lands, and its schedule availability.

Operations at Fort A.P. Hill would primarily involve field skills and technical training (force protection, patrolling, convoy, small arms, and military operations on urban terrain [MOUT]). Soldiers participating in FTX (including Warrior Training FTX) at Fort A.P. Hill would operate under the austere conditions of a logistics support area (LSA) and forward operating bases (FOBs), which would be established in the Pender Camp area in the northern portion of the post. Facilities installed to support the training at Fort A.P. Hill would include shelters, tent pads, a MOUT facility, security towers, a security wall, bleachers, concrete pads, roads, entry gates, demolition ranges, classrooms and instructor facilities, exterior lights, and an ASP. In addition, other supporting facilities (such as a dining facility, a barracks, a motor pool, and a medical clinic) could be constructed.

ES.3.8 Explosive Ordnance Disposal Training, Fort A.P. Hill

Explosive Ordnance Disposal (EOD) training would be conducted on ranges constructed in the eastern portion of the installation in Training Areas 26 and 27, east of the impact area. Facilities proposed to support EOD training could include classrooms, offices, laboratory facilities, a motor park, exterior lights, perimeter fencing, an ASP, demolition ranges, and a mobile MOUT. These requirements for EOD training facilities represent a maximum-build scenario for what would be installed at Fort A.P. Hill, and they are still under review.

ES.3.9 Training

CASCOM would provide students undergoing advanced individual training at Fort Lee with realistic field training in combat skills. The concept of operations for training at Fort A.P. Hill would involve transporting approximately 800 students and 80 noncommissioned officers of the Noncommissioned Officers Academy from Fort Lee to Fort A.P. Hill on Monday morning and their return to Fort Lee Thursday evening. During their 4-day stay at Fort A.P. Hill, all trainees would engage in intensive training for approximately 10 hours each day. Training would involve MOUT exercises, weapon and convoy live-fire exercises, patrolling, force protection, convoying, and technical training. Skills training in the field at Fort A.P. Hill would extend to select “warrior tasks” and “battle drills,” and logistics and leader development training for students of the Logistics University/Army Logistics Management College.

Training at Fort Lee would be predominantly indoors in classrooms, laboratories, simulators, and maintenance shops. Additional training would occur outdoors at Fort Lee's designated training areas. Some transportation training would remain at Fort Eustis, Virginia. This training, by personnel attending the Transportation Center and School, would involve using existing rail and maritime equipment at Fort Eustis. Mock-ups of rail cars and aircraft would also be used for transportation training at Fort Lee.

ES.4 REALIGNMENT PROCESS

Under the BRAC law, the Army must initiate all realignments not later than September 14, 2007, and complete all realignments not later than September 14, 2011. Implementation of the proposed action would occur over a span of approximately 5 years. Facilities renovations and new construction would be synchronized to meet the needs, on a priority basis, of units and activities proposed for relocation to Fort Lee.

ES.5 ALTERNATIVES

The Army examined alternatives to the proposed action according to three variables: means to physically accommodate relocating personnel and missions, siting of new construction, and schedule. This section presents the Army's development of alternatives and addresses alternatives available for the proposed action. The section also describes the no action alternative.

Implementation of BRAC would result in a net increase of approximately 7,750 personnel at Fort Lee, and Fort A.P. Hill would have an additional 4-day per week daily personnel load of 880 student Soldiers and instructors, as well as a limited number of permanent personnel.

Evaluation of all facilities at Fort Lee shows a substantial shortfall in built space to accommodate the additional personnel and their equipment. In limited instances, some units and functions could be assigned to existing facilities. Of these, some would require renovation to adequately support new occupants. Overall, however, the post requires almost 4.1 million square feet of additional built and renovated space to support the proposed action.

Using off-post leased space to meet Fort Lee's requirements would involve several major drawbacks. Force protection policies specify certain facilities characteristics, such as physical security features, set-back from roadways, and "hardened" construction. Partially to comply with force protection policies, the 2005 BRAC changes deliberately remove personnel from leased space. Furthermore, leasing space in the private sector—having personnel and equipment both on-post and off-post—would adversely affect command and control functions, result in higher operational costs, and impair efficient use of resources. For these reasons, use of leased space is not feasible and is not further evaluated in this final EIS.

Construction of new facilities is driven by the need to ensure that adequate space is available for mission requirements. Officials at Fort Lee have examined the post's existing inventory of approximately 7.5 million square feet of space and found that it is fully used for current mission requirements. Accordingly, new construction is required, and the potential environmental effects associated with new construction are evaluated in detail in this final EIS.

In 2005 Fort Lee conducted a planning meeting to determine and evaluate siting plan options for new construction at the post. The Army developed the following four siting plan courses of action (COA):

- COA 1—Emphasizes use of buildable land (that is, land without environmental constraints such as cultural resources or wetlands) within the existing cantonment area.
- COA 2—Emphasizes use of undeveloped, unconstrained land north of Route 36.
- COA 3—Emphasizes consolidation with the existing Quartermaster School while minimizing displacing of existing facilities.
- COA 4—Emphasizes maximum consolidation.

Fort Lee used a scoring system to evaluate the four COAs under six criteria. The siting plan in COA 2 was found to be superior to the other COAs by a considerable margin. Advantages of COA 2 included less than a 10-minute walk for Soldiers; available land; a minimum relocation of functions for its implementation; and space available for future development on Fort Lee proper. Therefore, COA 2 was deemed the most desirable option for further evaluation, and only COA 2 is evaluated in detail in the final EIS.

The proposed facility locations adhere to the general and specific siting criteria used by Fort Lee, and while numerous variations of the proposal for siting of facilities could be developed, the locations chosen reflect a sound, compatible set of solutions. Alternative siting schemes would produce different, but not better, layouts. Accordingly, the siting locations selected are evaluated in detail in the final EIS, and alternative siting schemes are eliminated from further consideration.

Fort A.P. Hill evaluated options of using existing training areas and facilities to accommodate the technical, combat, and leadership training to be conducted at the installation as a result of BRAC. The installation found that conflicts in schedules and training missions would have arisen from any attempt to use training facilities that are now used regularly, and that outfitting currently unused training areas and creating unique facility for the FTX, EOD, and leadership training missions would be the only viable option that would honor existing training commitments and also accommodate the intensive, weekly FTX and leadership training. Further investigation of available areas at Fort A.P. Hill determined that Training Areas 15, 16, 26, and 27 would best meet the needs of existing and future missions, and their use is fully considered in the final EIS.

A No Action Alternative, required to be evaluated under CEQ regulations, is also evaluated in this Final EIS. Inclusion of the No Action Alternative is prescribed by CEQ regulations and serves as the benchmark against which federal actions can be evaluated. No action assumes that the Army would continue its mission at Fort Lee as it existed in the fall of 2005, with no units relocating from other locations, no new units established, and no new facilities constructed. Because the BRAC Commission's recommendations now have the force of law, continuation of the fall 2005 Fort Lee mission is not possible without further Congressional action; it serves as a baseline alternative against which other alternatives can be evaluated.

ES.6 ENVIRONMENTAL CONSEQUENCES

The environmental consequences of implementation of the Preferred Alternative on each of the resource areas analyzed are summarized below and in Table ES-2. Consequences at Fort Lee are discussed first in section ES.6.1 and consequences at Fort A.P. Hill are discussed in section ES.6.2.

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative
Fort Lee					
Land Use	Long-term minor adverse	None	None	None	No effects
Aesthetics and Visual Resources	Long-term minor adverse	(1) Revegetate areas maintained as lawns. (2) Protect riparian buffers.	None	None	No effects
Air Quality	Short- and long-term minor adverse	(1) Control fugitive dust. (2) Comply with open burning ordinances.	None	(1) Permit for fuel-burning equipment used during construction. (2) Permit for fuel-burning equipment used for heating and cooling the new buildings. (3) Open burning permit.. (4) Permit for new generators. (5) Revised Title V permit.	No effects
Noise	Short- and long-term minor adverse	None	None	None	No effects
Geology and Soils	Short- and long-term minor adverse	(1) Limit land disturbance on each parcel. (2) Follow state-mandated BMPs for erosion and sediment control as well as for storm water control. (3) Use temporary crossing bridges or mats to minimize soil compaction.	None	None	No effects

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences *(continued)*

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative
Water Resources					
<i>Surface Water Quality</i>	Short- and long-term minor adverse	(1) Implement erosion controls for construction sites IAW an Erosion and Sediment Control Plan prepared IAW VA's Erosion and Sediment Control Law. (2) Maintain 100-foot buffers along all streams. (3) Implement storm water controls IAW a VPDES Stormwater General Permit for Construction Activities. (4) Maintain stream water quality IAW a Stormwater Management Plan prepared IAW VA's Stormwater Management Law.	(1) Meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters. (2) Reduce the hydrologic impacts of increased storm water runoff and sediment and any loss of wetland water quality functions with created wetlands or some other means, as determined by the Commonwealth of Virginia.	(1) VPDES Stormwater Management General Permit. (2) Section 401 Water Quality Certification. (3) Permit for encroach upon state-owned subaqueous lands (if applicable).	No effects
<i>Groundwater Quality</i>	Long-term minor adverse				No effects
<i>Sediment</i>	Short- and long-term minor adverse				No effects
<i>Other Pollutants</i>	Short- and long-term minor adverse				No effects
<i>Riparian Areas</i>	Short- and long-term minor adverse				No effects
<i>Floodplains</i>	Long-term minor adverse				No effects
<i>Chesapeake Bay Preservation Act</i>	Short- and long-term minor adverse				No effects
<i>Virginia CRMP</i>	Short- and long-term minor adverse				No effects
Biological Resources					
<i>Vegetation, Wildlife, Natural Habitats</i>	Short- and long-term minor adverse	(1) Limit land disturbance on each land parcel to no more than what is necessary for the desired use or development. (2) Revegetate disturbed areas with native, indigenous vegetation. (3) Place contractor staging and mobilization areas inside construction footprints to avoid wetland and natural areas wherever practicable. (4) Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats. (5) Place protective fencing or signage, as appropriate, around environmentally sensitive areas. (6) Promote environmental awareness and conservation through installation communication (e.g., newsletters, newspaper articles, bulletins).	(1) Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats, particularly between the Range Area and Petersburg National Battlefield. (2) Place protective fencing or signage, as appropriate, around environmentally sensitive areas. (3) Meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters. (4) Replace any wetlands lost at an appropriate ratio, as determined by the U.S. Army Corps of Engineers and the Commonwealth of Virginia.	(1) VA Water Protection Permit. (2) Clean Water Act Section 404 permit.	No effects
<i>Aquatic Biota</i>	Short- and long-term minor adverse				No effects
<i>Sensitive Species</i>	No effects				No effects
<i>Wetlands</i>	Short-term minor adverse				No effects
<i>Ecosystem</i>	Long-term minor adverse				No effects

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences *(continued)*

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative
Cultural Resources	Long-term minor adverse	None	(1) Fence cultural sites during nearby construction activities. (2) Conduct periodic monitoring of the five sites to ensure that avoidance and protection measures are effective. (3) Continue consultation with the Petersburg National Battlefield to identify measures to minimize visual impacts to the battlefield (for example, the retention or creation of a visual vegetative buffer). (4) Locate and orient the heavy vehicle maintenance facilities (highways) at Fort Lee to minimize noise exposure to Petersburg National Battlefield and the Jackson Circle family housing area. (5) Install noise control devices on outdoor equipment. (6) If necessary, develop a Programmatic Agreement to determine measures to be implemented to mitigate adverse effects.	None	No effects
Socioeconomics					
<i>Economic Development</i>	Long-term minor and significant beneficial, and long-term minor adverse	(1) Provide information to local school districts about available funding through Federal Impact Aid Program and the National Defense Authorization Act Fiscal Year 2006.	None	None	No effects
<i>Schools; Family Support and Social Services</i>	Short- and long-term significant adverse	(2) Secure construction vehicles and equipment when not in use. (3) Place barriers and "no trespassing" signs around construction sites where practicable. (4) Place fence or other barrier between Jackson Circle family housing area and the proposed new training area, limiting access to authorized personnel only.			No effects
<i>Housing; Police, Fire, Medical Services</i>	Short-term significant adverse, and long-term minor adverse				No effects
<i>Environmental Justice</i>	No effects				No effects
<i>Shops, Services, Recreation; Protection of Children</i>	Short- and long-term minor adverse				No effects

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences *(continued)*

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative			
Traffic and Transportation	Short- and long-term significant adverse, and short-term minor adverse	None	(1) Continue to coordinate with VDOT and the MPO to address traffic impacts and capacity deficiencies associated with the BRAC action. (2) Prioritize transportation projects identified as needed to mitigate the traffic impacts due to BRAC Implementation. (3) Seek funding for priority projects from sources such as the DAR Program, the Tri-Cities Area MPO, and VDOT.	None	No effects			
Utilities	Long-term minor beneficial and adverse	(1) Install water-efficient control devices, such as low-flow showerheads, faucets, and toilets, in all new facilities. (2) Install energy-efficient interior and exterior lighting fixtures and controls in all new and renovated facilities. (3) Achieve the goal of recycling 50 percent of the construction and demolition debris.	None	Permit for water supply facilities.	No effects			
Hazardous and Toxic Substances <i>ACM, LBP</i> <i>Hazardous Materials Use</i> <i>Spills</i> <i>Hazardous Waste Disposal</i> <i>Hazardous Materials Storage</i> <i>Pesticide Use</i> <i>MEC</i>	Long-term minor beneficial Long-term minor adverse Long-term negligible adverse No effects Long-term minor adverse No effects No effects	(1) Comply with all regulatory requirements for ACM, LBP, hazardous materials and wastes, and spill prevention and control , and with all applicable Fort Lee SOPs. (2) Test and dispose of any contaminated soil in accordance with applicable laws and regulations. (3) implement pollution prevention principles in all construction activities. (4) Honor all CERCLA obligations at active and closed ERP sites at the installation. (5) Report any incident of petroleum contamination to VDEQ as required.	None	None	No effects No effects No effects No effects No effects No effects No effects			
Fort A.P. Hill								
Land Use	Long-term minor adverse				None	None	None	No effects
Aesthetics and Visual Resources	Long-term minor adverse				(1) Revegetate areas maintained as lawns. (2) Protect riparian buffers	None	None	No effects

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences *(continued)*

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative
Air Quality	Short- and long-term minor adverse	(1) Control fugitive dust. (2) Comply with open burning ordinances.	None	(1) Permit for fuel-burning equipment used during construction. (2) Permit for fuel-burning equipment used for heating and cooling the new buildings. (3) Permit for new generators. (4) Open burning permit.	No effects
Noise	Short- and long-term minor adverse	None	If necessary, Fort A.P. Hill would expand the perimeter noise monitoring system to add a noise monitor in the area of concern. Mission permitting, locations or scheduling of training activities could be adjusted to lower off-post noise levels.	None	No effects
Geology and Soils	Short-term minor adverse	(1) Limit land disturbance on each parcel. (2) Follow state-mandated BMPs for erosion and sediment control and storm water control. (3) Use temporary crossing bridges or mats to minimize soil compaction.	None	None	No effects
Water Resources					
Surface Water Quality	Short- and long-term minor adverse	(1) Implement erosion controls for construction sites IAW an Erosion and Sediment Control Plan prepared IAW VA's Erosion and Sediment Control Law. (2) Maintain 100-foot buffers along all streams. (3) Implement storm water controls IAW a VPDES Stormwater General Permit for Construction Activities. (4) Maintain stream water quality IAW a Stormwater Management Plan prepared IAW VA's Stormwater Management Law.	None	(1) VPDES Stormwater Management General Permit. (2) Section 401 Water Quality Certification.	No effects
Groundwater Quality	Long-term minor adverse				No effects
Sediment	Short- and long-term minor adverse				No effects
Other Pollutants	Short- and long-term minor adverse				No effects
Riparian Areas	Long-term minor adverse				No effects
Floodplains	Long-term minor adverse				No effects
Chesapeake Bay Preservation Act	Short- and long-term minor adverse				No effects
Virginia CRMP	Short- and long-term minor adverse				No effects

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences *(continued)*

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative
Biological Resources <i>Vegetation, Wildlife, Natural Habitats</i> <i>Aquatic Biota</i> <i>Sensitive Species</i> <i>Wetlands</i> <i>Ecosystem</i>	Long-term minor adverse No effects Long-term minor adverse No effects Long-term negligible adverse effects	(1) Limit land disturbance on each land parcel to no more than what is necessary for the desired use or development. (2) Revegetate disturbed areas with native, indigenous vegetation. (3) Place contractor staging and mobilization areas inside construction footprints to avoid wetland and natural areas wherever practicable. (4) Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats. (5) Place protective fencing or signage, as appropriate, around environmentally sensitive areas. (6) Promote environmental awareness and conservation through installation communication (e.g., newsletters, newspaper articles, bulletins).	(1) Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats. (2) Place protective fencing or signage, as appropriate, around environmentally sensitive areas.	(1) VA Water Protection Permit. (2) Clean Water Act Section 404 permit.	No effects No effects No effects No effects No effects
Cultural Resources	Long-term minor adverse	None	(1) Fence all historic properties during nearby construction activities. (2) Monitor historic properties periodically to ensure that avoidance and protection measures are effective. (3) Develop a Programmatic Agreement between Fort A.P. Hill and the Virginia SHPO to determine measures to be implemented to mitigate the adverse effect.	None	No effects
Socioeconomics <i>Economic Development</i> <i>Medical Services</i> <i>Police, Fire, Schools, Housing, Family Support and Social Services, Shops, Recreation</i> <i>Environmental Justice</i>	Long-term minor beneficial Long-term minor adverse No effects No effects	None	None	None	No effects No effects No effects No effects

Table ES-2
Summary of Potential Environmental and Socioeconomic Consequences *(continued)*

Resource Area	Potential Effect of the Proposed Action	Applicable BMPs for the Resource Area	Mitigation Measures	Applicable Permits	Potential Effect of the No Action Alternative
<i>Protection of Children</i>	No effects				No effects
Traffic and Transportation	Short- and long-term minor adverse	None	None	None	No effects
Utilities	Short- and long-term minor beneficial and adverse	(1) Install water-efficient control devices, such as low-flow showerheads, faucets, and toilets, in all new facilities. (2) Install energy-efficient interior and exterior lighting fixtures and controls in all new and renovated facilities. (3) Achieve the goal of recycling 50 percent of the construction and demolition debris.	None	None	No effects
Hazardous and Toxic Substances					
<i>ACM, LBP</i>	Long-term minor beneficial	(1) Comply with all regulatory requirements for ACM, LBP, hazardous materials and wastes, and spill prevention and control. (2) Test and dispose of any contaminated soil in accordance with applicable laws and regulations. (3) implement pollution prevention principles in all construction activities. (4) Honor all CERCLA obligations at active and closed ERP sites at the installation. (5) Report any incident of petroleum contamination to VDEQ as required.	None	None	No effects
<i>Hazardous Materials Use</i>	Long-term minor adverse				No effects
<i>Spills</i>	Short-term negligible adverse				No effects
<i>Hazardous Waste Disposal</i>	No effects				No effects
<i>Hazardous Materials Storage</i>	Long-term minor adverse				No effects
<i>Pesticide Use</i>	No effects				No effects
<i>MEC</i>	No effects				No effects

ES.6.1 Fort Lee**ES.6.1.1 Preferred Alternative****ES.6.1.1.1 Land Use**

Long-term minor adverse effects on land use would be expected. The facilities that would be constructed in Training Area 5 and the existing ASP area between Route 144 and Route 36 would be less compatible with the Petersburg National Battlefield than the present use of the Army's land because of the potential for noise and visual impacts on the battlefield setting and visitor experience. The proposed Vehicle Recovery Area (VRA) could also result in a land use incompatibility with nearby residential areas and correctional facilities.

ES.6.1.1.2 Aesthetics and Visual Resources

A long-term minor adverse effect on visual resources at the Petersburg National Battlefield would be expected from the replacement of a natural setting in Training Area 5 and the existing ASP area with buildings and maintenance structures that could be visible from the battlefield's visitor center and interpretive trails. Development near the battlefield and not on Fort Lee has already encroached somewhat on the visual setting of the battlefield, and development in Training Area 5 and the existing ASP area would further adversely affect the battlefield's visual character. The increase in exterior lights on buildings, parking lots, and training areas could add to light pollution levels in the community.

ES.6.1.1.3 Air Quality

Short-term and long-term minor adverse effects on air quality would be expected, primarily due to nonroad vehicle and fugitive dust emissions during the construction phases, and ongoing operational emission due to emergency backup generators, heating boilers and other internal combustion sources. The short-term construction emissions would exceed de minimis thresholds for calendar years 2008 through 2012, but would not cause or contribute to a violation of any federal, state, or local air regulation, or contribute to a violation of Fort Lee's air operating permit.

ES.6.1.1.4 Noise

Short- and long-term minor adverse effects on the noise environment would be expected, primarily due to heavy equipment noise during construction, the addition of the vehicle recovery facilities in the northern training area, and the addition of heavy vehicle maintenance facilities (or highways) in Training Area 5. Training Area 5 is adjacent to the Petersburg National Battlefield and the Jackson Circle family housing area.

ES.6.1.1.5 Geology and Soils

Short- and long-term minor adverse effects would be expected from soil erosion that would result from construction activities and potentially from increased storm water runoff. Erosion control measures implemented as part of the Storm Water Pollution Prevention Plan would minimize soil erosion both during and after construction. As recommended by the Fort Lee Integrated Natural Resources Management Plan, areas with slopes of 5 percent or greater would be avoided for development. No effects on geology, topography, or prime farmland would occur.

ES.6.1.1.6 Water Resources

Long-term minor adverse effects on surface water quality, groundwater quality, and riparian areas would be expected. Construction of facilities and infrastructure as a result of the proposed action could increase runoff due to an increase in impervious surface area, increased soil erosion, and increases in sediment and pollutant loads. Proposed facilities will be sited to avoid sensitive environmental areas, including resource protection areas, to the maximum extent practicable.

Long-term indirect minor adverse effects on groundwater quality would be expected from infiltration of storm water laden with increased loads of nitrogen and other contaminants such as soluble metals into the groundwater. Absorption loss and infiltration of pollutants could partially be alleviated by installing best management practices that facilitate infiltration to groundwater. The reduction in pervious surfaces could reduce groundwater infiltration, which could reduce baseflow conditions during dry periods. Long-term minor adverse effects on floodplains in riparian areas would be expected if encroachment into these areas were required for facility construction.

ES.6.1.1.7 Biological Resources

Long-term minor adverse effects on vegetation, wildlife, and natural habitats—and therefore on the local ecosystem—would be expected from the loss of forested areas in Training Area 5 and the ASP area adjacent to it. Training Area 5 and the ASP area support a mature forest that connects natural areas on the Range Area to those of the Petersburg National Battlefield, and the contiguous natural area is important for animal population dispersal. Deer population management (through an active hunting program) on Fort Lee could be hindered from a loss of hunting areas. No impacts on federally listed or state-listed endangered or threatened species at Fort Lee would be expected under the Preferred Alternative.

Short- and long-term minor adverse effects on aquatic biota in streams on the installation would be expected from temporary sedimentation in streams during the construction of facilities. Long-term impacts on aquatic biota could result from hydrologic changes due to increased storm water runoff generated by the additional area of impervious surface on the installation.

Short-term minor adverse effects on wetlands would be expected from implementation of the Preferred Alternative, primarily from temporary storm water runoff and sedimentation due to construction activities. Wetlands lost because of development in the Training Area 5 and ASP area would be replaced at an appropriate ratio.

ES.6.1.1.8 Cultural Resources

Long-term minor adverse impacts on important cultural resources would occur as a result of new construction activities in the Fort Lee cantonment and the proposed VRA. When conducting ground-disturbing activities, there is always the possibility that buried archaeological resources will be discovered or unanticipated adverse effects will occur on historic properties. All areas proposed for construction activities or new operations (such as the VRA) at Fort Lee, however, either have been inventoried for archaeological resources or are in areas that have been heavily disturbed through previous construction activities, and the likelihood of disturbing cultural resources is low. Only one construction area, Training Area 5 between Routes 36 and 144, contains National Register of Historic Places-eligible archaeological sites. In accordance with the installation's Integrated Cultural Resources Management Plan (ICRMP) and Section 106 of the National Historic Preservation Act (NHPA), all sites would be fenced during construction activities to ensure avoidance and protection, and best management practices would be implemented to protect the sites from changes in erosion patterns during and after construction.

Construction and operation of new facilities in Training Area 5 would have long-term minor adverse impacts on Petersburg National Battlefield. Operations at the heavy vehicle maintenance facilities (or highbays) would introduce loud noise levels. The construction of buildings visible from the park would result in modern intrusions into the viewshed and setting of the park. These impacts would adversely affect the historic setting of the battlefield, adversely affect people's appreciation and understanding of the property and its historic context, and adversely affect the visitor's experience of the park and its attractions. Fort Lee and the Virginia State Historic Preservation Officer (SHPO) are developing a Programmatic Agreement specifically to address the proposed BRAC activities, and the installation is working with Petersburg National Battlefield and the Virginia SHPO to identify measures to avoid, reduce, and mitigate these impacts on the park to the maximum extent possible.

ES.6.1.1.9 Socioeconomics

Short-term significant and long-term minor and significant beneficial effects and long-term minor adverse effects would be expected. The realignment of Fort Lee would create beneficial impacts on long-term job creation, income generation, and spending. An estimated 9,800 direct jobs could be created as a result of direct expenditures associated with realignment activities, generating increases in local income and spending. Income in the socioeconomic region of influence could increase by as much as \$317 million as a result of direct jobs generated by realignment activity, and sales volume could total more than \$411 million. Secondary job creation, income generation, and spending would also result. Direct plus indirect effects could amount to 15,000 jobs, an income generation of more than \$558 million, and sales of more than \$1.5 billion. These increases in employment, income, and business sales volume would not exceed historical fluctuations, however, and would be considered minor.

Short- and long-term significant adverse effects on schools would be expected from a potential increase of an estimated 4,500 school children in the region of influence. School districts would receive Federal Impact Aid for existing and new federally connected students, in accordance with the Federal Impact Aid Program, and could receive additional aid under the National Defense Authorization Act for Fiscal Year 2006, Subtitle G, Section 572, to compensate for potential impacts. Short-term significant and long-term minor adverse effects on housing; law enforcement, fire protection, and medical services; and family support and social services could occur. Adverse effects on family support and social services would be expected from an increased demand for these services on- and off-post. Short- and long-term minor adverse effects on the protection of children (because of the safety risk posed to children by construction activity) could occur. Short- and long-term minor adverse effects on shops and recreation would be expected from an increased demand. No adverse effects on environmental justice would be expected.

ES.6.1.1.10 Transportation

Short- and long-term significant adverse effects to vehicle-based transportation resources would be expected from adding personnel at Fort Lee. Short-term minor adverse effects would be expected due to the use of on-road construction vehicles during the periods of construction. The increased travel demand resulting from the Preferred Alternative would have significant adverse effects on traffic in the Fort Lee area in both the short term (2015) and long term (2026). In gauging the level of these effects, it is important to note that although the implementation of the Preferred Alternative would increase traffic and decrease LOS on all roadways, intersections in the area would eventually degrade to unacceptable levels simply due to existing traffic growth in the areas. The effects to railway, air, or public transportation at Fort Lee would be negligible.

ES.6.1.1.11 Utilities

Long-term minor adverse and beneficial impacts on utility systems would be expected. Beneficial effects would be expected from utility system upgrades made to accommodate the additional personnel and functions moving to the post. Adverse effects would result from the additional demand placed on all utility systems.

ES.6.1.1.12 Hazardous and Toxic Substances

Long-term minor beneficial effects would be expected from the removal of asbestos-containing materials (ACM) and lead-based paint (LBP) present in existing buildings that would be demolished or renovated. Long-term minor adverse effects could result from an increase in the use of hazardous materials (such as pesticides, solvents, paints, asphalt, lubricants, fuel and motor oils) and the generation of hazardous wastes. Long-term negligible adverse effects could result from incidental spills associated with the use of hazardous materials, and long-term minor adverse effects could result from an increase in storage capacity requirements for petroleum, oil, and lubricants (POL). No effects from pesticide use or related to unexploded ordnance (UXO) would be expected.

ES.6.1.1.13 Cumulative Effects

Implementation of the Preferred Alternative would produce a mixture of beneficial and adverse cumulative impacts with respect to land use, aesthetics and visual resources, water resources, biological resources, cultural resources, socioeconomics, and utilities. None of the cumulative impacts would be significantly adverse.

ES.6.1.2 No Action Alternative

No impacts to any of the resource areas would be expected from implementation of the No Action Alternative at Fort Lee.

ES.6.2 Fort A.P. Hill**ES.6.2.1 Preferred Alternative****ES.6.2.1.1 Land Use**

A long-term minor adverse effect on surrounding land use would be expected from noise generated at the proposed EOD site, which is close to the installation border and residential areas of the Port Royal settlement.

ES.6.2.1.2 Aesthetics and Visual Resources

Long-term minor adverse effects on the visual environment could be caused by light pollution from lights installed to support nighttime activities at both the LSA and EOD training sites.

ES.6.2.1.3 Air Quality

Short- and long-term minor adverse effects on air quality would be expected, primarily due to nonroad vehicle and fugitive dust emissions during construction and ongoing operational emission due to emergency backup generators, heating boilers, and other internal combustion sources at Fort A.P. Hill. The Preferred Alternative would not cause or contribute to a violation of

any federal, state, or local air regulation, or contribute to a violation of Fort A.P. Hill's air operating permit.

ES.6.2.1.4 Noise

Short- and long-term minor adverse effects on the noise environment at Fort A.P. Hill would be expected with the implementation of the Preferred Alternative. The effects would be primarily due to heavy equipment noise during construction and the operation of the proposed EOD range. The noise contours for the implementation of the Preferred Alternative would extend existing noise contours approximately 300 meters (328 yards) beyond the southern boundary and approximately 600 meters (656 yards) beyond both the northern and eastern boundaries. Individuals within these areas will be exposed to a louder acoustical environment and more frequent noise, when compared to existing conditions. These newly exposed areas are low-density residential, undeveloped, or agricultural. There would be no new small-arms ranges or changes in small-arms weapons used, and therefore there would be no off-installation effects on the noise environment surrounding the Pender Camp area.

ES.6.2.1.5 Geology and Soils

Short-term minor adverse effects on soils would occur during preparation of the LSA, FOBs, and EOD sites for their military training purposes. No effects on geology, topography, or prime farmland soils would occur.

ES.6.2.1.6 Water Resources

Long-term minor adverse effects on surface water quality, groundwater quality, and riparian areas would be expected. Construction of facilities and infrastructure could increase runoff due to an increase in impervious surface area, increased soil erosion, and increases in sediment and pollutant loads.

ES.6.2.1.7 Biological Resources

Long-term minor adverse effects on vegetation and wildlife would be expected from the creation and use of an LSA and an EOD site. Military training activities at the proposed LSA will result in continual disturbances to existing vegetation and resident wildlife. Ecosystem-level impacts would be expected to be negligible. Long-term minor adverse impacts on sensitive species at the proposed LSA would be expected from the potential disturbance of American ginseng (*Panax quinquefolius*, state listed as threatened) populations by the military training activities.

ES.6.2.1.8 Cultural Resources

The proposed BRAC activities would likely have no impacts to historic properties at Fort A.P. Hill. While unanticipated adverse effects to historic properties from the BRAC activities are a possibility, compliance with applicable federal legislation and the installation's ICRMP would mitigate those effects, thereby limiting the severity of any impacts.

Long-term minor adverse impacts could occur to important cultural resources as a result of the Preferred Alternative at Fort A.P. Hill. The Preferred Alternative would include use of new ranges and construction of facilities at Fort A.P. Hill where construction activities could disturb known or unknown cultural resources. Compliance with Section 106 of the NHPA, the installation's ICRMP, and the BRAC Programmatic Agreement would mitigate any unanticipated effects.

ES.6.2.1.9 Socioeconomics

Long-term minor beneficial effects on economic development would be expected. Based on a total cost range of construction of \$8 to \$35 million, 60 to 80 direct jobs could be created and approximately \$1.8 million to \$2.5 million in direct income and approximately \$2.9 million to \$7.4 million in direct sales volume could be generated. The direct effects would also result in secondary job creation, income generation, and spending. These increases in business volume, income, and employment would not exceed historical fluctuations and would therefore be considered minor. No increase in population is projected.

No adverse effects on housing would be expected. Long-term minor adverse effects on medical services would be expected from the additional student Soldier load at the installation that could increase demand for medical services. No adverse effects on police or fire services would be expected. No effect on schools, family support, services, and recreation; environmental justice; or protection of children would be expected.

ES.6.2.1.10 Transportation

Both short- and long-term minor adverse effects on vehicle-based transportation resources at Fort A.P. Hill would be expected with the implementation of the Preferred Alternative. These effects would be directly related to using on-road construction vehicles during the periods of construction, and bussing of Army personnel to and from Fort A.P. Hill for training activities. The effects to railway, air, or public transportation at Fort A.P. Hill would be negligible.

ES.6.2.1.11 Utilities

Long-term minor adverse and beneficial effects on utilities would be expected. Beneficial effects would be from renovations and upgrades necessary to support the additional activities and personnel loads in the LSA and EOD areas. Adverse effects would result from the additional demand on all utility systems of the increased personnel load at the installation.

ES.6.2.1.12 Hazardous and Toxic Substances

Long-term minor beneficial effects would be expected related to ACM and LBP present in existing buildings if such buildings were demolished or renovated and the ACM and LBP was removed. Long-term minor adverse effects could result from an increase in the use of hazardous materials. Short-term negligible adverse effects could result from an increase in spills associated with the use of hazardous materials. No effects would be expected from hazardous waste disposal. The installation is a large-quantity generator of hazardous wastes and has established procedures for managing and disposing of hazardous wastes. Long-term minor adverse effects could result from an increase in storage capacity requirements for POL. No adverse health effects or environmental impacts would be expected from UXO or pesticides.

ES.6.2.1.13 Cumulative Effects

Implementation of the Preferred Alternative would produce a mixture of beneficial and adverse cumulative impacts with respect to land use, noise, socioeconomics, and utilities. None of the cumulative impacts would be significantly adverse.

ES.6.2.2 No Action Alternative

No impacts to any of the resource areas would be expected from implementation of the No Action Alternative at Fort A.P. Hill.

ES.7 MITIGATION RESPONSIBILITY AND PERMIT REQUIREMENTS

ES.7.1 Mitigation Responsibility

Table ES-3 summarizes mitigation measures that the Army is considering to minimize, avoid, or compensate adverse environmental effects of implementing the Preferred Alternative at Fort Lee, and Table ES-4 summarizes proposed mitigation measures for implementation of the Preferred Alternative at Fort A.P. Hill. Mitigation generally does not include legal, regulatory, or policy-driven environmental protections required to comply with Federal and state laws or Army and Fort A.P. Hill policies. Only those resource areas for which mitigation has been determined to be necessary are listed in Tables ES-3 and ES-4.

ES.7.2 Permit Requirements

Table ES-5 lists the compliance status of Fort Lee and Fort A.P. Hill for the authorities applicable to the proposed action.

Permit Requirements

Air Quality Regulation.

- (a) Permit for fuel-burning equipment used during construction. (Regional office of DEQ)
- (b) Permit for fuel-burning equipment used for heating and cooling the new buildings. (Regional office of DEQ)
- (c) Open burning permit (Regulations for the Control and Abatement of Air Pollution [9 VAC 5-40-5600 et seq.])

Storm Water Management.

- (a) Stormwater Management Plan, Stormwater Management Law (for projects involving land disturbance of 1 acre or more) (Virginia Code section 10.1-603)
- (b) Virginia Water Protection Permit (Virginia DEQ)
- (c) Clean Water Act Section 401 water quality certification (Virginia DEQ)
- (d) VPDES Stormwater General Permit for Construction Activities (Department of Conservation and Recreation's Division of Soil and Water Conservation)

Erosion and Sediment Control. Erosion and Sediment Control Plan, Erosion and Sediment Control Law (for projects involving land disturbance of 2,500 square feet or more in Chesapeake Bay Preservation Areas) (Virginia Code sections 10.1-560 et seq.)

Wetlands. Clean Water Act Section 404, permit for dredge or fill material in wetlands. (U.S. Army Corps of Engineers)

Subaqueous Lands Encroachment. Permit for encroach upon state-owned subaqueous lands. (Marine Resources Commission: Army must submit a Joint Federal-State Permit Application [JPA])

Table ES-3
Fort Lee Recommended Mitigation Measures for BRAC Actions

Aesthetics and Visual Resources
Continue consultation with the Petersburg National Battlefield to identify measures to minimize visual impacts to the battlefield (for example, the retention or creation of a visual vegetative buffer).
Noise
Locate and orient the heavy vehicle maintenance facilities (highbays) at Fort Lee to minimize noise exposure to Petersburg National Battlefield and the Jackson Circle family housing area.
Install noise control devices on outdoor equipment.
Place the highbay facilities as far away from sensitive noise receptors as feasible.
Water Resources
Meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters.
Reduce the hydrologic impacts of increased storm water runoff and sediment and any loss of wetland water quality functions with created wetlands or some other means, as determined by the Commonwealth of Virginia.
Biological Resources
Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats. In particular, design and construction planning for Training Area 5 should support the creation of a wildlife corridor to link the North Range Area with the Petersburg National Battlefield and the Blackwater Swamp. Areas with existing environmental constraints (such as for cultural resources and riparian buffers) together with non-obtrusive training areas could be used to create a viable wildlife corridor and mitigate population dispersal problems that could be created by habitat fragmentation.
Place protective fencing or signage, as appropriate, around environmentally sensitive areas.
Fort Lee would meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters.
Replace any wetlands lost at an appropriate ratio, as determined by the U.S. Army Corps of Engineers and the Commonwealth of Virginia.
Cultural Resources
Fence sites 44PG160, 44PG195, 44PG196, 44PG197, and 44PG299 during nearby construction activities.
Conduct periodic monitoring of the five sites to ensure that avoidance and protection measures are effective.
If avoidance and protection of the five sites are not feasible, a Programmatic Agreement would be developed between Fort Lee and the Virginia SHPO to determine measures to be implemented to mitigate the adverse effect. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region.
Consult with Petersburg National Battlefield and the Virginia SHPO to identify measures to avoid, reduce, and mitigate visual and noise impacts on the park from BRAC facilities and activities in Training Area 5. A Programmatic Agreement would be developed between Fort Lee, the National Park Service, and the Virginia SHPO to define the measures to be implemented. Mitigation measures for noise impacts could include locating noise-producing buildings or activities away from the battlefield, orienting buildings and activities to reduce noise effects, and locating buildings between the battlefield and the noise-source to block noise. Mitigation measures for visual impacts could include locating taller buildings away from the battlefield and planting vegetation to reduce visual impacts.
Transportation
Continue to coordinate with VDOT and the MPO to address traffic impacts and capacity deficiencies associated with the BRAC action. Prioritize transportation projects identified as needed to mitigate the traffic impacts due to BRAC Implementation. Seek funding for priority projects from sources such as the DAR Program, the Tri-Cities Area MPO, and VDOT.

Table ES-4
Fort A.P. Hill Recommended Mitigation Measures for BRAC Actions

Noise
If necessary, Fort A.P. Hill would expand the perimeter noise monitoring system to add a noise monitor in the area of concern. The monitors would allow the installation to evaluate operations under varied weather conditions and assess how noise levels can impact neighbors off-post. Mission permitting, locations or scheduling of training activities could be adjusted to lower off-post noise levels.
Cultural Resources
Fence all historic properties during nearby construction activities.
Monitor historic properties periodically to ensure that avoidance and protection measures are effective.
If avoidance and protection of historic properties are not feasible, then a Programmatic Agreement would be developed between Fort A.P. Hill and the Virginia SHPO to determine measures to be implemented to mitigate the adverse effect. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region.

Table ES-5
Summary of Compliance Status with Relevant Authorities

LAWS, REGULATIONS, AND POLICIES	INSTALLATION COMPLIANCE STATUS	
	Fort Lee	Fort A.P. Hill
Archaeological Resources Protection Act	Yes	Yes
Chesapeake Bay Agreement	Yes	Yes
Clean Air Act, 42 U.S.C. 7401	Yes	Yes
Clean Water Act, 33 U.S.C. 1344 et seq.	Yes	Yes
National Historic Preservation Act	Yes	Yes
Code of Virginia, Title 62.1-44, Waters of the State, Ports and Harbors	Yes	Yes
Code of Virginia, Title 29.1-564 Taking, transportation, sale, etc., of endangered species prohibited (VA listed species protection)	Yes	Yes
Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601-9675	Yes	Yes
Endangered Plant and Insect Species Act, Chapter 39 Sections 3.1-1020 through 1030 of the Code of Virginia	Yes	Yes
Endangered Species Act, 16 U.S.C. 1531	Yes	Yes
Federal Facility Compliance Act, 42 U.S.C. 6901	Yes	Yes
Fish and Wildlife Conservation Act, 16 U.S.C. 2901	Yes	Yes
Fish and Wildlife Coordination Act, 16 USC 661-667e	Yes	Yes
Migratory Bird Treaty Act, 16 U.S.C. 701-719c	Yes	Yes
The National Historic Preservation Act, 16 U.S.C. 470 et seq.	Yes	Yes
The National Environmental Policy Act, Public Law 91-190	Yes	Yes
Noise Control Act of 1972 (Public Law 92-574)	Yes	Yes
Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901-6992k	Yes	Yes
Toxic Substances Control Act	Yes	Yes
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001	Yes	Yes
Executive Orders		
EO 11988 (<i>Floodplain Management</i>)	Yes	Yes
EO 11990 (<i>Protection of Wetlands</i>)	Yes	Yes

Table ES-5
Summary of Compliance Status with Relevant Authorities *(continued)*

LAWS, REGULATIONS, AND POLICIES	INSTALLATION COMPLIANCE STATUS	
	Fort Lee	Fort A.P. Hill
EO 12088 (<i>Federal Compliance with Pollution Control Standards</i>)	Yes	Yes
EO 12580 (<i>Superfund Implementation</i>)	Yes	Yes
EO 12898 (<i>Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations</i>)	Yes	Yes
EO 13045 (<i>Protection of Children from Environmental Health Risks and Safety Risks</i>)	Yes	Yes
EO 13101 (<i>Greening the Government through Waste Prevention, Recycling, and Federal Acquisition</i>)	Yes	Yes
EO 13123 (<i>Greening the Government through Efficient Energy Management</i>)	Yes	Yes
EO 13148 (<i>Greening the Government through Leadership in Environmental Management</i>)	Yes	Yes
EO 13175 (<i>Consultation and Coordination with Indian Tribal Governments</i>)	Yes	Yes
EO 13186 (<i>Responsibilities of Federal Agencies to Protect Migratory Birds</i>)	Yes	Yes
Army Regulations and Policies		
Sustainable Project Rating Tool (SPiRiT)	Yes	Yes
Leadership in Energy and Environmental Design (LEED)	Compliance requirement begins FY 08	Compliance requirement begins FY 08
Department of Defense Instruction (DODI) 4715.3, Environmental Conservation Program	Yes	Yes
Army Regulation (AR) 200-1, Environmental Protection and Enhancement	Yes	Yes
AR 200-3, Natural Resources—Land, Forest and Wildlife Management	Yes	Yes
AR 200-4, Cultural Resources Management	Yes	Yes
32 Code of Federal Regulations (CFR) Part 651, Environmental Analysis of Army Actions	Yes	Yes

Water Supply Facilities. Waterworks capacity and permitting requirements (Field Office of the Department of Health's Office of Drinking Water)

Groundwater Supply. The area including Fort A. P. Hill is under consideration as a groundwater management area. If designated such, permits would be needed for development of new wells.

SECTION 1.0

PURPOSE, NEED, AND SCOPE

1.1 INTRODUCTION

On September 8, 2005, the Defense Base Closure and Realignment (BRAC) Commission recommended that certain realignment actions occur at Fort Lee, Virginia. These recommendations were approved by the President on September 15, 2005, and forwarded to Congress. Upon expiration of the statutory period for Congress to enact a joint resolution of disapproval on November 9, 2005, the BRAC Commission's recommendations became law. The BRAC Commission's recommendations realign Fort Lee by relocating specified organizations and activities to the post. The BRAC Commission made six recommendations concerning Fort Lee (see section 2.1). The BRAC Commission recommendations must now be implemented as provided for in the Defense Base Closure and Realignment Act of 1990 (Public Law (PL) 101-510), as amended.

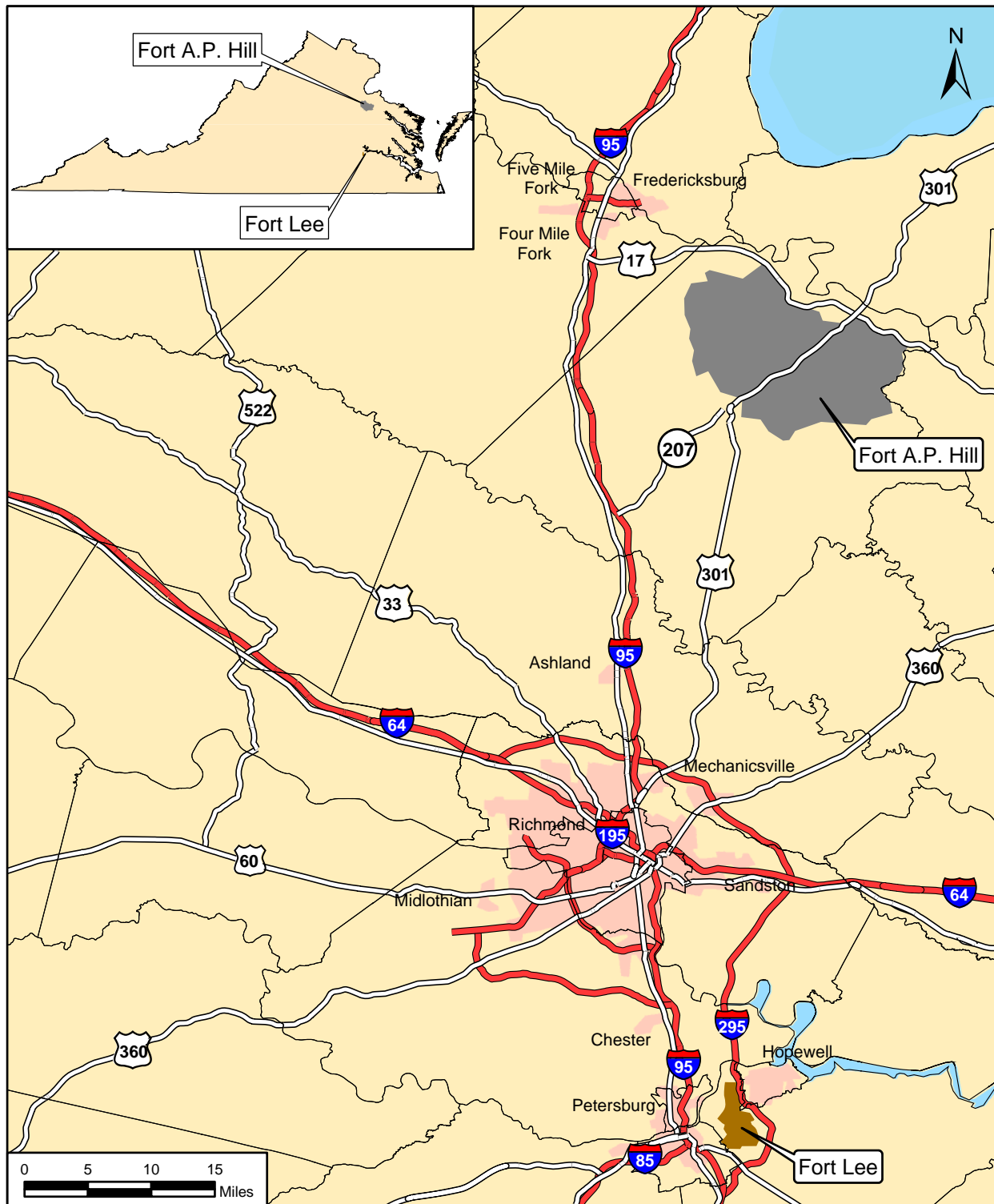
To enable implementation of the recommendations, the Army proposes to provide necessary facilities at Fort Lee to support the relocations. The BRAC Commission found the capacity of Fort Lee sufficient to meet the new training requirements created by consolidating four schools onto the installation, except for insufficient land and space available to conduct combat or field training exercises (FTX). The Commission determined that the shortfall could be successfully mitigated by using nearby training sites at Fort Pickett, an installation operated by the Virginia Army National Guard. The BRAC Commission, however, did not require the use of Fort Pickett as a training facility to support the incoming BRAC activities; it cited the installation as an example only. Further evaluation by the Army determined that Fort Pickett does not have suitable training areas or facilities and lacks schedule availability to support FTX for Sustainment Center of Excellence (SCOE) students. Accordingly, the Army proposes use of Fort A.P. Hill to conduct combat or field and technical training, on the basis of its proximity to Fort Lee, its suitable lands, and its schedule availability. This final environmental impact statement (EIS) analyzes and documents environmental effects associated with the Army's proposals at Fort Lee and Fort A.P. Hill, details of which are set forth in section 2.0.

Fort Lee lies between Petersburg, Virginia, and Hopewell, Virginia (Figure 1.1-1). It is home of the U.S. Army Combined Arms Support Command (CASCOM), an organization that has the mission to develop logistics leaders, doctrine, organizations, training, and materiel solutions to sustain a campaign-quality Army with joint and expeditionary capabilities in war and peace. Fort A.P. Hill, in Caroline and Essex counties approximately 70 miles north of Fort Lee (Figure 1.1-1), provides realistic joint and combined arms training, logistics, and support to numerous Active Component and Reserve Component visiting units.

1.2 PURPOSE AND NEED

The purpose of the proposed action is to implement the BRAC Commission's recommendations pertaining to Fort Lee.

The need for the proposed action is to improve the ability of the Nation to respond rapidly to the challenges of the 21st century. The Army is 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 Army



LEGEND

- | | |
|---|---|
| Fort Lee | County Boundary |
| Fort A.P. Hill | Interstate |
| Urban Area | Highway |

Installation Location

Figure 1.1-1

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. The following paragraphs discuss major initiatives that contribute to the Army's need for the proposed action.

Base Realignment and Closure. In previous rounds of BRAC, the explicit goal was to save money and downsize the military to reap a "peace dividend." In the 2005 BRAC round, Department of Defense (DoD) has sought to reorganize its installation infrastructure to most efficiently support its forces, increase operational readiness, and facilitate new ways of doing business. Thus, BRAC represents more than cost savings. It supports advancing the goals of transformation, improving military capabilities, and enhancing military value. The Army must carry out the BRAC recommendations at Fort Lee to achieve the objectives for which Congress established the BRAC process and to comply with the law.

Army Transformation. On October 12, 1999, the Secretary of the Army and the Chief of Staff 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 their providing options to shape the global environment to the benefit of the United States and its allies. Transformation responds to 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 its *Programmatic Environmental Impact Statement for Army Transformation* 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. On April 11, 2002, the Army issued a Record of Decision (ROD) reflecting its intent to transform the Army. This final EIS evaluates a proposed action that comports with the transformation process, which is designed to provide the Nation with combat forces that are more responsive, deployable, agile, versatile, lethal, survivable, and sustainable.

Installation Sustainability. On October 1, 2004, the Secretary of the Army and the Chief of Staff issued *The Army Strategy for the Environment*. The strategy focuses on the interrelationships of mission, environment, and community. A sustainable installation simultaneously meets current and future mission requirements, safeguards human health, improves quality of life, and enhances the natural environment. A sustained natural environment is necessary to allow the Army to train and maintain military readiness.

1.3 SCOPE

The Defense Base Closure and Realignment Act of 1990 specifies that the National Environmental Policy Act (NEPA) does not apply to actions of the President, the Commission, or the DoD, except "(i) during the process of property disposal, and (ii) during the process of relocating functions from a military installation being closed or realigned to another military installation after the receiving installation has been selected but before the functions are relocated" (Sec. 2905(c)(2)(A), PL 101-510, as amended). The law further specifies that in applying the provisions of NEPA to the process, the Secretary of Defense and the secretaries of the military departments concerned do not have to consider "(i) the need for closing or realigning the military installation that has been recommended for closure or realignment by the Commission, (ii) the need for transferring functions to any military installation that has been selected as the receiving installation, or (iii) military installations alternative to those

recommended or selected” (Sec. 2905(c)(2)(B)). The Commission’s deliberation and decision, and the need for closing or realigning a military installation, are exempt from NEPA. Accordingly, this final EIS does not address the need for realignment for actions specified by the BRAC Commission or alternative military installations for activities directed by the Commission to be realigned to Fort Lee.

1.4 PUBLIC INVOLVEMENT

1.4.1 NEPA Public Involvement Process

Under regulations issued by the Council on Environmental Quality (CEQ),¹ the evaluation of potential environmental effects of federal actions is open to the public. Public participation in the NEPA process promotes both open communications between the public and the Army and better decisionmaking. All persons and organizations that have a potential interest in the proposed action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the NEPA environmental analysis process.

Public participation opportunities with respect to the proposed action are guided by CEQ regulations and Army regulation.² These regulations provide for four major aspects of public participation available in conjunction with preparation of an EIS: (1) Notice of Intent, (2) scoping, (3) 45-day public review of the draft EIS, and (4) public meeting on the draft EIS. Each of these steps in the process provides for public involvement and is briefly discussed below.

Throughout this process, the public can obtain information on the status and progress of the proposed action and the EIS through the Fort Lee Public Affairs Office at 804-734-6963.

1.4.2 Notice of Intent

The Notice of Intent (NOI), informing the public that an EIS will be prepared, is the first formal step in the NEPA public involvement process. The agency proposing the action publishes the notice in the *Federal Register* before the start of the scoping process. The NOI includes a description of the proposed action and gives the name and address of an agency contact person. The NOI declaring the Army’s intent to prepare an EIS for realignment of Fort Lee was published in the *Federal Register* on November 23, 2005.

1.4.3 Scoping Process

The purpose of scoping is to solicit public comment on issues or concerns that should be addressed in the EIS. It is designed to involve the public early in the EIS process. Public comments are solicited through mailings, media advertisements, and both agency and public scoping meetings. Though informal comments are welcome at any time throughout the process, the scoping period and the scoping meeting(s) provide formal opportunities for public participation in and comment on the environmental impact analysis process.

The Army held a public scoping meeting on April 20, 2006, at Union Station in Petersburg, Virginia, and published display advertisements for the meeting in the *Richmond-Times Dispatch*

¹ Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, Title 40 *Code of Federal Regulations* (CFR) Parts 1500–1508.

² *Environmental Analysis of Army Actions*, 32 CFR Part 651.

on Monday, April 10, 2006; in the *Petersburg Progress Index* on Wednesday, April 12, 2006; and in the *Caroline Progress* on Wednesday, April 19, 2006. Notices concerning the public meeting were also sent to a mailing list comprising public officials, agencies, organizations, and individuals. Fort Lee provided the mailing list. The notices identified a contact person at the installation for obtaining further information and another contact person to whom comments could be sent by May 22, 2006.

In addition to the public scoping meeting, the Army reserved a time for meeting with state and federal agency officials to discuss the scope of the EIS, also on April 20, 2006. No agencies attended the meeting, though representatives from the Governor's office and the Hopewell Regional Wastewater Treatment Facility attended the public scoping meeting.

More than 50 members of the public attended the public scoping meeting. Comments provided by the public are categorized by topic and summarized below.

- Construction. Comments included requests to:
 - Use sustainable and low-impact development principles (e.g., green roofs, permeable pavement)
 - Consider green buildings that recycle gray water and use solar power
- Traffic and Transportation. Comments included requests to:
 - Provide electric bus or light rail systems for Fort Lee employees and visitors
 - Provide commuter stations along the two interstates north and south of Fort Lee
 - Include bicycle lanes on every corridor into and out of Fort Lee
 - Provide bike racks on-post at all buildings
 - Evaluate potential impacts of traffic on secondary roads leading to Fort Lee
 - Provide parking decks instead of parking lots
- Socioeconomics. Comments included requests to:
 - Build high-density housing on-post to maximize the number of residents there because Soldiers cannot afford high-cost housing or high gasoline bills for commuting to cheaper residential areas
 - Evaluate cost and other impacts on local governments' social services, including mental health and elderly care
 - Evaluate cost and other impacts on local school systems, including an increase in the number of students and students requiring disabled/mentally challenged services
 - Reevaluate Fort Lee estimates for the number of schoolchildren that would come to the region
 - Enhance and improve Army community services, including increased recreational opportunities for teens and others (including more swimming pools on-post), family improvement services, counseling for troops returning from deployment and their families, and increased number of mental health and support personnel
 - Provide a library on-post

- Prepare for increased criminal activity
 - Reopen Kenner Army Hospital or enlarge Kenner Army Health Clinic
- Wetlands, Wildlife, and Endangered Species. Comments included requests to preserve wetlands, endangered and threatened species, and wildlife corridors
- Water Quality. Comments included requests to:
 - Minimize runoff and the amount of impermeable surfaces
 - Work with local wastewater treatment authorities to ensure that treatment plants will have the necessary capacity to accommodate Fort Lee's growth
- Other. Comments and issues raised included:
 - Improve Fort Lee's self-sufficiency in energy production and use and water use
 - Provide informational handouts to people attending the scoping meeting
 - Concern about noise increases at Fort Lee
 - Concern about noise and viewshed impacts at the Petersburg National Battlefield

1.4.4 Public Review of the Draft EIS

The Army made the draft EIS available for public review and comment and sent copies of the draft EIS to people who requested copies. Notices of availability (NOA) of the draft EIS were published in the *Federal Register* on October 6, 2006 by the U.S. Environmental Protection Agency and on October 3, 2006 by the Army. In addition, the Army provided copies of the draft EIS to local libraries in the vicinity of Fort Lee and Fort A.P. Hill. Agencies, organizations, and individuals were invited to review and comment on the document. The draft EIS was available for a period of 45 days to allow reviewers the opportunity to comment on the proposed action, the alternatives, and the adequacy of the analysis.

1.4.5 Public Meeting

The Army held two public meetings to receive public input on the draft EIS. One meeting was held the evening of October 25, 2006 at Union Station in Petersburg, Virginia, and one meeting was held the evening of October 26, 2006, in Port Royal, Virginia. Oral and written comments were received at the public meetings (see Appendix I). The Army placed advertisements informing the public of the times and places of the meetings in the *Richmond-Times Dispatch*, the *Petersburg Progress Index*, the *Freelance Star*, and the *Caroline Progress*.

1.4.6 Final EIS

As provided for in CEQ regulations, the Army considered all comments provided by the public and agencies on the draft EIS. The final EIS incorporates changes suggested by the comments on the draft EIS, as appropriate, and contains responses to all comments received during the review period (see Appendix I). The Army mailed copies of the final EIS to various federal, state, and local agencies and placed copies in local libraries. No sooner than 30 days after publication of the final EIS, the Army will prepare a ROD that will provide an overview of the range of alternatives considered for Fort Lee and Fort A.P. Hill and include any required mitigation measures associated with the proposed action.

1.5 IMPACT ANALYSIS PERFORMED

This final EIS has been developed in accordance with NEPA and implementing regulations issued by CEQ and the Army. Its purpose is to inform decisionmakers and the public of the likely environmental consequences of the proposed action and alternatives.

This final EIS identifies, documents, and evaluates the environmental effects of the BRAC realignment actions at Fort Lee, Virginia, and of the training activities to take place at Fort A.P. Hill, Virginia. 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 is described in section 2.0, and alternatives, including the no action alternative, are described in section 3.0. Conditions existing as of November 2005, considered the “baseline” conditions, are described in section 4.0, Affected Environment and Environmental Consequences. The expected effects of the proposed action, also described in section 4.0, are presented immediately following the description of baseline conditions for each environmental resource addressed in the EIS. Section 4.0 also addresses the potential for cumulative effects and identifies mitigation measures where appropriate.

The Crater Planning District Commission has joined the Army as a cooperating agency in the preparation of this EIS, as described in the CEQ regulations. The Crater Planning District Commission is composed of 10 local governments in south-central Virginia: the cities of Colonial Heights, Emporia, Hopewell, and Petersburg and the counties of Chesterfield, Dinwiddie, Greensville, Prince George, Surry, and Sussex. The major focus of the Commission’s work program is economic, industrial, and small business development, reflecting the priorities that have been established by the member localities. Another important work area involves environmental issues, in response to local needs. The Crater Planning District Commission’s aid in preparation of the EIS includes providing applicable agency policies and plans and participating in reviews of the document for factual accuracy and completeness.

1.6 REGULATORY FRAMEWORK

1.6.1 BRAC Procedural Requirements

As noted in section 1.3, the Defense Base Closure and Realignment Act of 1990 specifically addresses the applicability of NEPA to BRAC actions, the Congressional waiver of the procedural elements of NEPA to the actions of DoD and the BRAC Commission in recommending bases for closure and realignment, and the actions of the President in approving or disapproving the BRAC Commission’s recommendations. The BRAC Commission procedures for identifying affected installations and bases are specified by this law and include the DoD Force Structure Plan, selection criteria (published in the *Federal Register* for public comment), DoD recommendations, review and recommendations by the BRAC Commission, and review by the President. The BRAC Commission assessed the DoD’s closure and realignment recommendations for consistency with the eight statutory selection criteria (Table 1.6-1) and the DoD Force Structure Plan.

In addition, the Defense Base Closure and Realignment Act of 1990 requires that all closures and realignments be initiated no later than 2 years after the date on which the President transmits a report to Congress including the recommendations for closures and realignments (Sec. 2904 (a)(3) PL 101-510, as amended) and that all such closures and realignments be completed by no

Table 1.6-1
BRAC statutory selection criteria

Military Value (given priority consideration)
1. The current and future mission capabilities and the impact on operational readiness of the total force of the DoD, including the impact on joint warfighting, training, and readiness.
2. The availability and condition of land, facilities, and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas and staging areas for the use of the Armed Forces in homeland defense missions) at both existing and potential receiving locations.
3. The ability to accommodate contingency, mobilization, surge, and future total force requirements at both existing and potential receiving locations to support operations and training.
4. The cost of operations and the manpower implications.
Other considerations
5. The extent and timing of potential costs and savings, including the number of years, beginning with the date of completion of the closure or realignment, for the savings to exceed the costs (pay-back period).
6. The economic impact on existing communities in the vicinity of military installations.
7. The ability of the infrastructure of both the existing and potential receiving communities to support forces, missions, and personnel.
8. The environmental impact, including the impact of costs related to potential environmental restoration, waste management, and environmental compliance.

Source: BRAC Commission 2005.

later than the end of the 6-year period beginning on the same date (Sec. 2904(a)(4), PL 101-510, as amended). President Bush concurred with the 2005 BRAC Commission's report and sent it to Congress on September 15, 2005. Therefore, the BRAC actions at Fort Lee must be initiated by no later than September 14, 2007, and completed by no later than September 14, 2011.

1.6.2 Relevant Statutes and Executive Orders

A decision on how best to implement the BRAC realignment action at Fort Lee rests on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, the Army is guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) 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, and Toxic Substances Control Act. Executive Orders bearing on the proposed action include EO 11593 (*Protection and Enhancement of the Cultural Environment*), EO 11988 (*Floodplain Management*), EO 11990 (*Protection of Wetlands*), EO 12088 (*Federal Compliance with Pollution Control Standards*), EO 12580 (*Superfund Implementation*), EO 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*), EO 13101 (*Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*), EO 13123 (*Greening the Government through Efficient Energy Management*), EO 13148 (*Greening the Government through Leadership in Environmental Management*), EO 13175 (*Consultation and Coordination with Indian Tribal Governments*), and EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*). These authorities are addressed in various sections throughout this EIS when relevant to particular environmental resources and conditions. The full text of the laws,

regulations, and EOs is available on the Defense Environmental Network & Information Exchange Web site at <http://www.denix.osd.mil>.

Environmental stewardship authorities include The Chesapeake Bay Agreement (<http://www.chesapeakebay.net/agreement.htm>) and Army policy for sustainable design and development (<http://www.hqda.army.mil/acsimweb/fd/linkssdd.htm>). DoD and Department of the Army initiatives and regulations that influence master planning and environmental stewardship include Department of Defense Instruction (DODI) 4715.3, *Environmental Conservation Program*; Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*; 32 CFR Part 651, *Environmental Analysis of Army Actions*; AR 200-3, *Natural Resources—Land, Forest and Wildlife Management*; and AR 200-4, *Cultural Resources Management*.

SECTION 2.0 PROPOSED ACTION

2.1 INTRODUCTION

The BRAC Commission made six recommendations concerning Fort Lee, which would be implemented under the proposed action as follows.³

- Establish a Sustainment Center of Excellence at Fort Lee. Activities that would relocate to Fort Lee and be incorporated into the SCOE are portions of the Transportation Center and School from Fort Eustis, Virginia; the Ordnance Maintenance Mechanical School (OMMS) of the Ordnance Center and School from Aberdeen Proving Ground, Maryland; and the Ordnance Munitions and Electronics Maintenance School (OMEMS) of the Missile and Munitions Center from Redstone Arsenal, Alabama. The Transportation Center and School and the Ordnance Center and School would be consolidated with the Quartermaster Center & School, the Army Logistic Management College, and the Combined Arms Support Command to form the SCOE.
- Establish a Joint Center for Consolidated Transportation Management Training. Transportation Management Training from Lackland Air Force Base, Texas, would relocate to Fort Lee, Virginia, to accomplish this.
- Establish a Joint Center of Excellence for Culinary Training. Culinary Training from Lackland Air Force Base, Texas, would relocate to Fort Lee.
- Co-locate Miscellaneous DoD, Defense Agency, and Field Activity Leased Locations. Close Metro Park III and IV (6350 and 6359 Walker Lane), a leased installation in Alexandria, Virginia, by relocating the Defense Contract Management Agency Headquarters to Fort Lee, Virginia.
- Relocate all components of the Defense Commissary Agency (DeCA) to Fort Lee. Defense Commissary Agency Eastern, Midwestern Regional, and Hopewell, Virginia, Offices would be consolidated at Fort Lee. Leased facilities at 300 AFCOMS Way in San Antonio, Texas; 5258 Oaklawn Boulevard in Hopewell, Virginia; and 5151 Bonney Road in Virginia Beach, Virginia, would be closed.
- In addition to the five actions above, through which Fort Lee would gain functions, facilities, and personnel, the BRAC Commission recommended the creation of Joint Mobilization Sites that would result in a loss at Fort Lee. Under this recommendation, all mobilization processing functions at Fort Lee, Virginia; Fort Eustis, Virginia; and Fort Jackson, South Carolina would be relocated to Fort Bragg, North Carolina, and Fort Bragg would be designated Joint Pre-Deployment/Mobilization Site Bragg/Pope.

Consistent with procedures Congress established in the Defense Base Closure and Realignment Act of 1990, the BRAC Commission's recommendations became law on November 9, 2005, and now must be implemented. This section describes proposed military and civilian force structure changes at Fort Lee. It also identifies requirements for garrison facilities and training facilities

³ Complete text of the BRAC Commission's recommendations is available on the Army's Web site at <http://www.hqda.army.mil/acsimweb/brac/braco.htm>.

requirements for SCOE training operations. The proposed action described in this section is the Army's preferred alternative.

Implementing the BRAC Commission's recommendations would consist of three major components. First, the BRAC Commission's recommendations would result in the relocation of approximately 7,700 additional personnel to Fort Lee. Second, additional facilities at Fort Lee and Fort A.P. Hill would be constructed to accommodate relocated personnel and functions. Finally, the Army would conduct training and other operations at Fort Lee and Fort A.P. Hill. Details of these components are provided in the following sections.

2.2 PROPOSED ACTION DETAILS

2.2.1 Personnel Changes

Fort Lee's military and civilian population consists of two major categories of personnel: students attending professional schools (on a temporary duty or permanent change of station basis) and permanent party personnel. Table 2.2-1 shows the proposed increases in personnel (by source location), Fort Lee's pre-BRAC implementation population, and its post-BRAC implementation population. Following implementation of the proposed action, Fort Lee's average daily population would nearly double, rising from 12,593 personnel to 20,703 personnel.

**Table 2.2-1
Fort Lee personnel populations**

Source	Student Soldiers (Annual)	Student Soldiers (ADL) ^a	Permanent Party ^b
Redstone Arsenal	3,617	1,102	492
Aberdeen Proving Ground	13,565	2,349	1,053
Fort Eustis	5,910	473	397
Lackland Air Force Base	3,817	750	142
Defense Commissary Agency	0	0	338
Defense Contract Mgmt Agency	0	0	654
Subtotal	26,909	4,674	3,076
Fort Lee (pre-BRAC)	33,976	5,065	7,888
Fort Lee (post-BRAC): Total	60,885	9,739	10,964
Total Average Daily Population (ADL+Permanent Party), post-BRAC implementation: 20,703			

^a Average daily load.

^b Includes military personnel, civilians, and on-site contractor support.

Fort A.P. Hill's population consists of a small permanent party of military and civilian personnel and student Soldiers from numerous military organizations (including the Army, Navy, Air Force, Marine Corps, National Guard, Coast Guard, and others) that use the installation's ranges and training areas for a limited time on a rotating basis. The installation had an average daily training utilization load of 145 personnel from October through July of 2006 (Fort A.P. Hill 2006a). The BRAC action at Fort A.P. Hill would add a training load of 880 student Soldiers and instructors to that daily population for the 4 days of FTX at the proposed LSA and EOD sites, and could increase the permanent party stationed on the installation. The magnitude of the potential increase in permanent personnel at Fort A.P. Hill has not yet been determined.

2.2.2 Facilities

Implementation of the proposed action would require renovation of 226,100 square feet of existing facilities, construction of approximately 3.86 million square feet of new facilities, approximately 6.9 million square feet of roads and guest control (gate) facilities, and approximately 40 acres of parking area to accommodate the influx of personnel and activities to Fort Lee. The facilities required to support each of the new missions at the installations are shown in Figures 2.2-1 and 2.2-2.

2.2.2.1 Sustainment Center of Excellence

A variety of facilities will be required for the SCOE (Table 2.2-2) and a number of additional Garrison facilities will be required to support the SCOE and other incoming functions and activities (Table 2.2-3). New construction will amount to approximately 3.57 million square feet and renovated facilities will amount to approximately 67,100 square feet, resulting in a total built space of approximately 3.64 million square feet. In addition to the proposed new and renovated facilities, there would be approximately 8.2 million square feet (approximately 166 acres) of new surfaced roads, gates, and parking area for organizational and privately owned vehicles, as well as wash platforms; a 32.5-acre training ammunition supply point (ASP) in the southwest corner of the Range Area near the Fort Lee property boundary, north of the existing ASP site; a Vehicle Recovery Area (VRA) at the north end of the Fort Lee Range Area on newly annexed land; seven athletic fields; and a pedestrian bridge.

2.2.2.2 Joint Culinary Center of Excellence

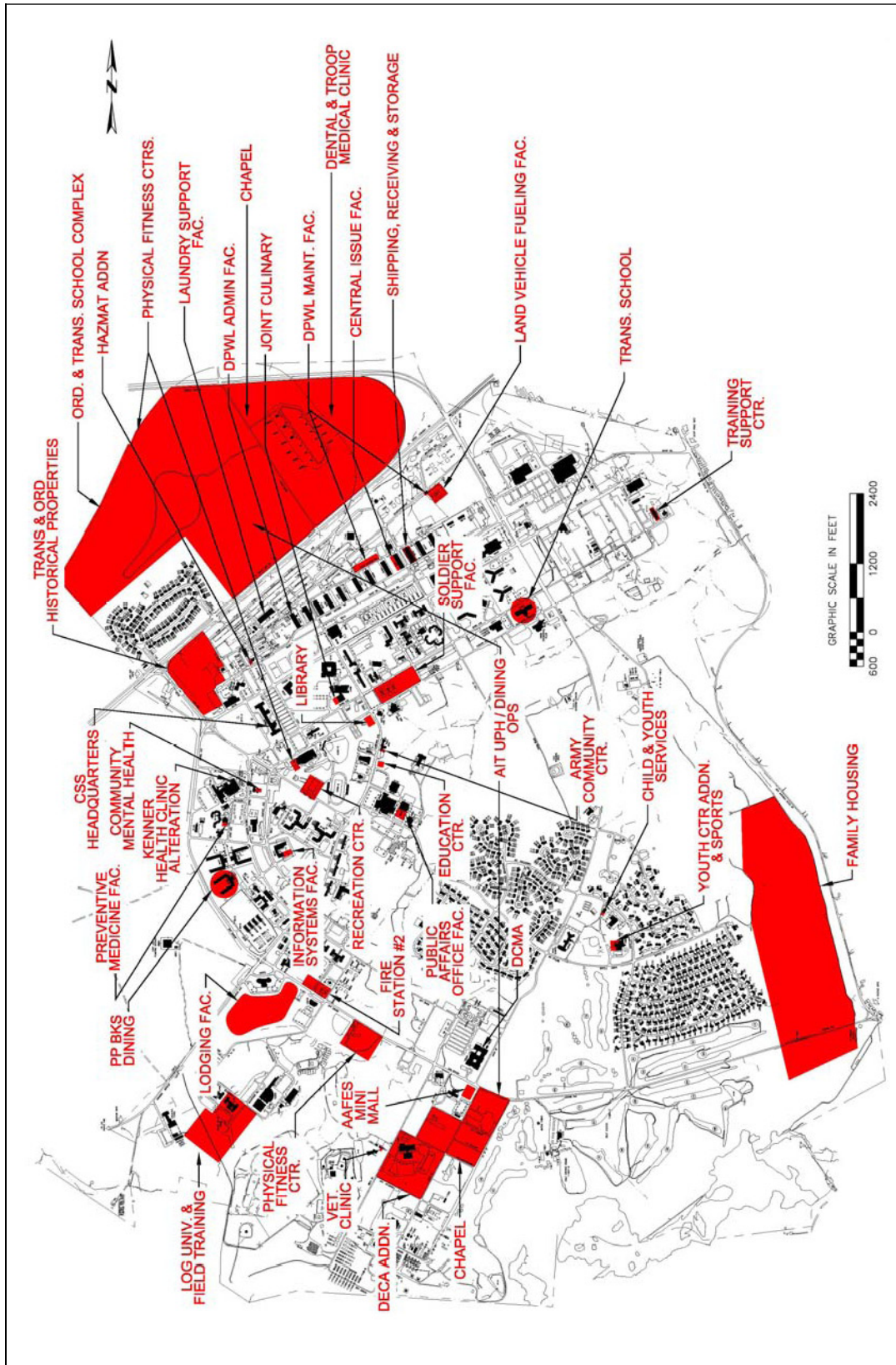
Under the proposed action, U.S. Air Force (USAF) culinary training would relocate from Lackland Air Force Base (AFB) and U.S. Navy (USN) culinary training would relocate from U.S. Naval Station Great Lakes to Fort Lee to establish a Joint Center for Culinary Training. Facilities for these proposed relocations are listed in Table 2.2-3. In addition to the facilities listed in Table 2.2-3, there would be 19,800 square feet of tent pads for field culinary operations training at Fort Lee.

2.2.2.3 Consolidated Transportation Management Training

Transportation Management Training would relocate from Lackland AFB to Fort Lee. Facilities for the proposed relocation are listed in Table 2.2-3. Student Soldiers at the Joint Culinary Center of Excellence and at Fort Lee for Transportation Management Training would share a dining facility and dormitory. Approximately 3 acres of parking area would be constructed for the Joint Culinary Center and Transportation Management Training.

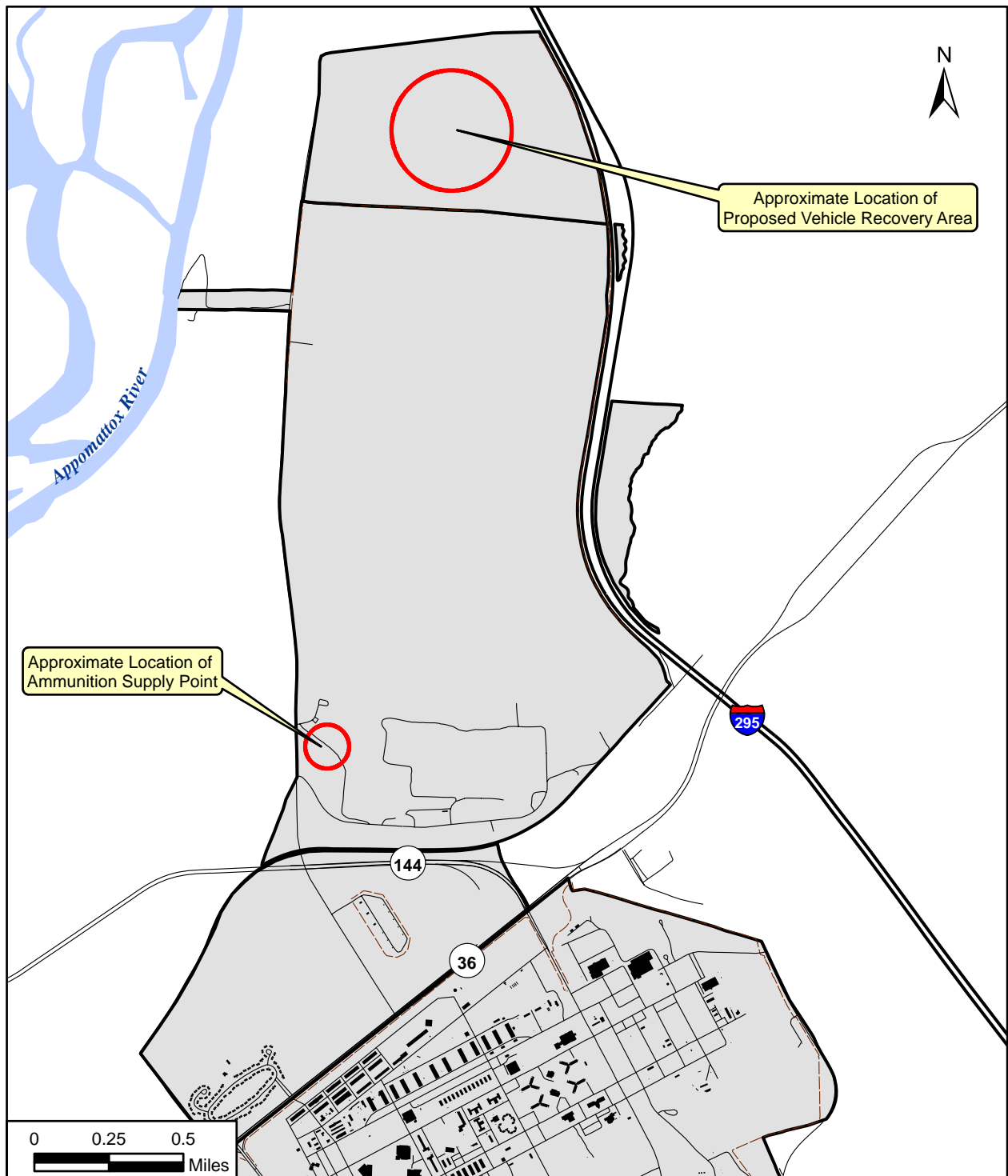
2.2.2.4 Defense Commissary Agency

Under the BRAC Commission's recommendations, leases at three facilities now used by DeCA would be terminated and its 338 personnel would relocate to Fort Lee. To accommodate those personnel, Fort Lee proposes to construct a 71,000-square-foot addition to the existing DeCA Headquarters Building (Building 11200) and provide an additional 280,000 square feet (approximately 6.5 acres) of parking.



Proposed Facilities Projects at Fort Lee

Figure 2.2-1



LEGEND

- Installation Property
- Road
- Building
- Surface Water

Proposed Facilities Projects at Fort Lee - Range Area

Fort Lee, Virginia

Source: Fort Lee GIS, 2006.

Figure 2.2-2

Table 2.2-2
Facilities for the Sustainment Center of Excellence

Facility type	Size (square feet)
AAFES MiniMall	16,047
ACS Addition	8,000
Administration Facility	27,225
Auditorium	5,181
Auto-Aided Instructional Facility	22,288
Central Issue Facility	41,289
Chapels	29,120
Child and Youth Services	22,020
Combatives Training	5,000
Dining Facilities (2)	98,723
Dispatch Facility	180
DOIM Facility	60,000
DPWL Maintenance Facility	20,000
Education Center	17,500
Fire Station # 2	18,230
Flammable Materials Storage	1,058
General Instructional Facility	413,784
General Item Repair Instructional Facility	116,811
HAZMAT Storage	720
Headquarters Facilities (5)	244,110
Kenner Health Clinic Alteration	12,600
Lab Instructional Facility	90,489
Laundry Support Facility	13,200
Log University Library	12,000
Material Handling Instructional Facility	2,235
Oil Storage	520
Organizational Classroom	4,499
Organizational Storage	65,054
Physical Fitness Centers	114,681
Ready Magazine	8,736
Recreation Center	56,086
Renovate Building 2300	54,500
Shipping, Receiving & Storage (CRP & ASL)	23,100
Simulation Facilities	68,880
Soldier Support Center	68,877
Unaccompanied Personnel Housing	575,358
Vehicle Maintenance Shop	41,678
Vehicle Maintenance Instructional Facilities (4)	1,111,181
Youth Center Addition & Sports	15,753
TOTAL BUILT AND RENOVATED SPACE:	3,641,062
Parking and Roads	
Organizational Parking	444,150
Personal Vehicle Parking	1,288,755
Roads/ACP	6,454,448
TOTAL ROADS AND PARKING:	8,187,353
Other Facilities	
Training Ammunition Supply Point	325 acres
Wash Platform	5 each
Athletic Fields	7 each
Pedestrian Bridge	1 each

Notes: DOIM = Directorate of Information Management; DPWL = Directorate of Public Works and Logistics

Table 2.2-3
Facilities to support the Joint Culinary Center of Excellence and Consolidated
Transportation Management Training

Facility	Size (square feet)
Academic facility (Joint Culinary Center)	23,932
Food laboratory (Joint Culinary Center)	21,100
Academic facility (Transportation Management Training)	24,830
High bay facility (Transportation Management Training)	36,223
Dining facility	14,010
Student dormitory (600 personnel)	157,400
Total built space	277,495
Parking	126,000

2.2.2.5 Defense Contract Management Agency

Under the BRAC Commission's recommendations, the headquarters of the Defense Contract Management Agency (DCMA) would relocate from two leased facilities in Alexandria, Virginia, to Fort Lee. At Fort Lee, the 654 personnel of DCMA would occupy a renovated Building 10500, a 159,000-square-foot facility that now houses the CASCOT headquarters (Figure 2.2-1). CASCOT would relocate to Mifflin Hall (Building 5000), which would be renovated and expanded or demolished and reconstructed to provide a new SCOE Headquarters building.

2.2.2.6 Field Training Exercises and Warrior Training FTX, Fort A.P. Hill

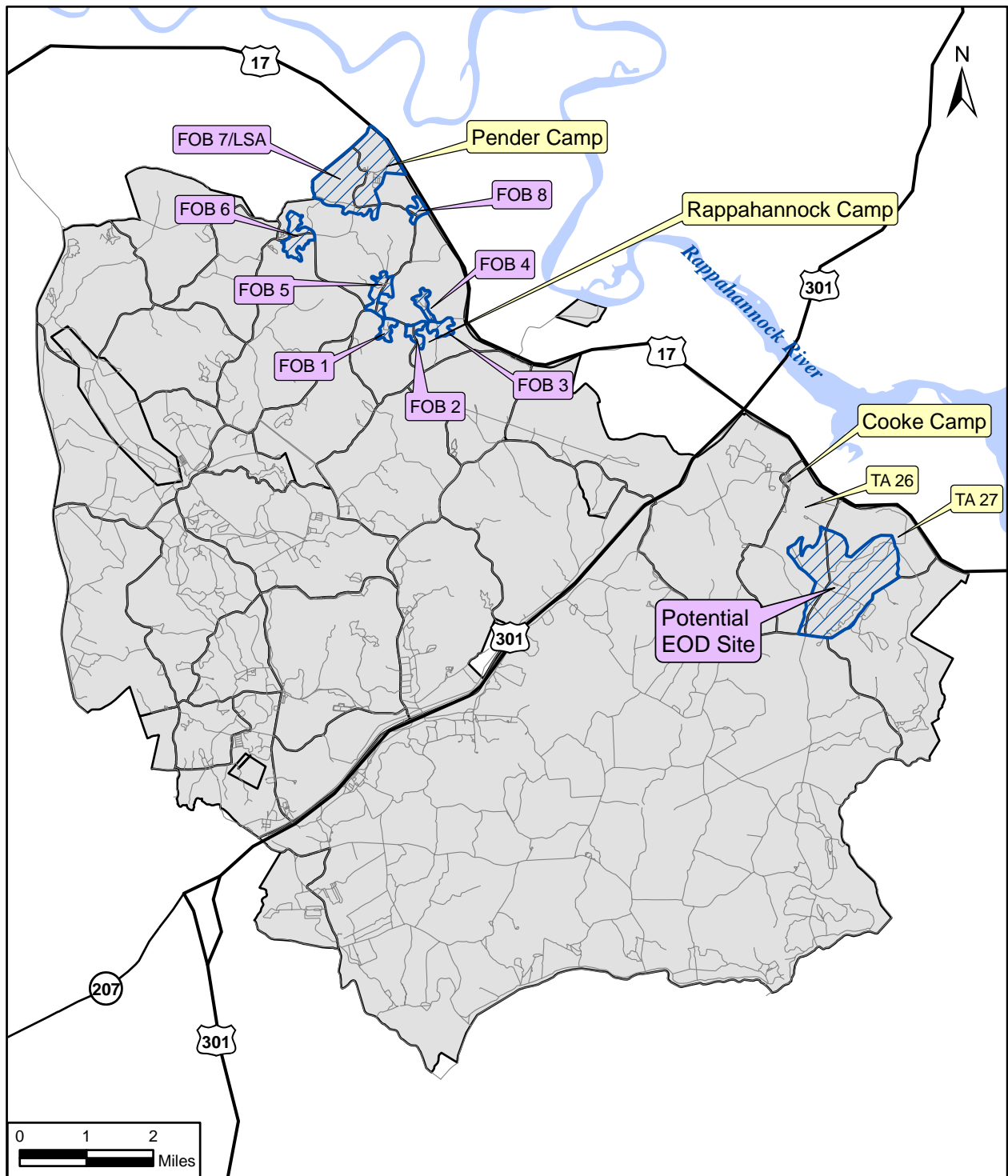
Operations at Fort A.P. Hill would primarily involve field skills and technical training (force protection, patrolling, convoy, small arms, and military operations on urban terrain [MOUT]). Soldiers participating in FTX (including Warrior Training FTX) at Fort A.P. Hill would operate under the austere conditions of a logistics support area (LSA) and forward operating bases (FOBs), which would be established generally in the Pender Camp area (in the northern portion of the post) (Figure 2.2-3). Under the proposed action, the structures and facilities proposed to support training at Fort A.P. Hill are listed in Table 2.2-4. Facilities to support the training could be semi-permanent or permanent, and would be established in the Pender Camp area and potentially in other previously disturbed areas, such as Rappahannock Camp.

2.2.2.7 Explosive Ordnance Disposal Training, Fort A.P. Hill

Explosive Ordnance Disposal (EOD) training would be conducted on ranges constructed in the eastern portion of the installation in Training Areas 26 and 27, east of the impact area (Figure 2.2-3). The structures and facilities proposed to support EOD training at Fort A.P. Hill are listed in Table 2.2-4 represent a maximum-build scenario for what would be installed at Fort A.P. Hill. Barracks to support the EOD training mission would be established in the vicinity of Wilcox Camp near Route 301 and classroom facilities would be established within TA 26 or TA 27.

2.2.3 Training

Training is the instruction of personnel to increase their capacity to perform specific military functions and tasks individually and collectively. Training is the Army's top priority because it is the cornerstone of combat readiness. Training prepares Soldiers, leaders, and units to fight and



LEGEND

- Installation Property
- Road
- Proposed Project Area

Proposed Sites at Fort A.P. Hill

Fort A.P. Hill, Virginia

Figure 2.2-3

Source: Fort A.P. Hill GIS, 2006.

**Table 2.2-4
Structures and facilities, Fort A.P. Hill**

FACILITIES PROPOSED FOR THE LSA and FOBs		
Facility	Quantity	Size/Capacity (each)
Multipurpose shelter	1	5,000 sf
Warehouse shelter	4	3,000 sf
Billet ^{a, b}	58	2,944 sf
MOUT facility	1	To be determined
Security tower	10	To be determined
Security wall (HESCO barrier) ^c	1	0.5 mile
Bleachers (covered)	3	300 personnel
C-17 mock-up	1	To be determined
Concrete pad (gray water disposal, with 500-gallon container)	4	100 sf
Concrete pad (storage, with fence)	2	100 sf
Concrete pad (with fence)	7	500 sf
Concrete pad (with drain and curb)	2	600 sf
Concrete pad	1 ea.	900 sf, 2,000 sf
Concrete pad (with overhead cover and lights)	1	1,000 sf
Staging area (ammo transfer holding point)	1	Approximately 4 acres
Staging area (parking lot, paved or rock)	1	4,000 sf
Staging area (parking lot, unimproved or rock)	2	0.5 acre
Staging area (rock)	1	14,400 sf
Road (unimproved)	1	Approximately 1 mile
Entry gate with barriers	7	To be determined
Lights, exterior/night operations	29	N/A
Administration building	1	To be determined
Barracks	1	To be determined
Dining facility	1	To be determined
Other (motor pool, parking, basic medical facility, utilities)	N/A	To be determined
FACILITIES PROPOSED FOR THE EOD^d		
Classroom/lab	14	1,000 sf
Classroom	6	625 sf
Ordnance identification lab	2	1,000 sf
Motor park (paved or rock)	1	2 acres
Perimeter fence	1	Around building
Lights (exterior, night operations)	1	N/A
Ammunition supply points	1	To be determined
Demolition ranges	14	100-m to 2,500-m safety arcs
Mobile MOUT	1	To be determined
Instructor offices	78	To be determined

Notes: ^a The Army is investigating options for an austere bivouac capability which may include SEAhuts^e, tents, or other permanent or semi-permanent facilities.

^b In the event the Army elects to house Warrior Training students in tents instead of SEAhuts, there would be approximately 50,000 square feet of cement pads for general-purpose medium tents and general-purpose large tents. The quantity required will depend on size and cost, and there could be 9 (vice 58) large sleep huts and 8 ops huts.

^c A HESCO barrier is a collapsible wire mesh container with a heavy duty plastic liner. When the container is opened up, a front end loader is used to fill it with sand (dirt or gravel), resulting in a protective barrier to protect personnel and equipment from enemy fire or bombs.

^d Proposed EOD facilities presented in the table are a worse-case scenario and the requirements are under review.

^e SEAhuts (Southeast Asia huts) were first designed during the Vietnam years. The housing meets minimum standards for sheltering Soldiers from the elements. Constructed of plywood with metal roofing, each SEAhut is approximately 92 feet long by 32 feet wide. Each temporary shelter includes five sleeping rooms plus a combination shower/latrine. Rooms have wall-mounted heating/cooling systems, electricity, lighting, and a drywall finish.

win in combat. The goal of Army training is to produce a force trained to mobilize, deploy, fight, and win anywhere in the world across the full spectrum of military operations. The objective of all Army training is unit readiness. Training of Soldiers and leaders in schools or units enhances the ability of units to perform to standard. Training enables Soldiers and units to fight and win under challenging operational environments or conditions.

SCOE would provide students undergoing advanced individual training at Fort Lee with realistic field training in combat skills. The concept of operations for training at Fort A.P. Hill would involve transporting approximately 800 student Soldiers and 80 noncommissioned officers (NCOs) of the Noncommissioned Officers Academy from Fort Lee to Fort A.P. Hill on Monday morning and returning them to Fort Lee Thursday evening. During their 4-day stay at Fort A.P. Hill, all trainees would engage in intensive training for approximately 10 hours each day. Training would involve MOUT exercises, weapon and convoy exercises, patrolling, force protection training, improvised explosive device (IED) training, and technical training. Skills training in the field at Fort A.P. Hill would extend to select “warrior tasks” and “battle drills.” The following tasks and drills are typical of these types of training:

- *Warrior tasks.* Employ mines and grenades, use visual signaling techniques, engage targets during urban operations, enter a building during an urban operation, navigate from one point to another (dismounted), move under directed fire, maintain equipment, and react to unexploded ordnance hazard.
- *Battle drills.* React to contact, react to ambush, react to indirect fire, react to chemical attack, break contact, and evacuate injured personnel from vehicles.

In addition, Student Soldiers of the Logistics University/Army Logistics Management College would engage in logistics and leader development training activities. Student Soldiers at the EOD facility would train in classroom and laboratory settings and on range facilities.

Training at Fort Lee would be mainly indoors in classrooms, laboratories, simulators, and maintenance shops. Additional training would occur outdoors at Fort Lee’s designated training areas. Field training at Fort Lee would involve the use of an airplane fuselage mock-up and a rail car mock-up for transportation training, training on functional courses, and ASP training at a 325-acre facility to be constructed at the southwestern corner of the Range Area, northwest of the existing ASP. EOD training that would require the use of an AIT “dry” (no live charges) demolition range would also occur at Fort Lee. Such training would potentially involve digging and the use of pyrotechnics, simulators, and machinery. In addition to the off-post training that would occur at Fort A.P. Hill, there would be a limited amount of training at Fort Eustis, Virginia. This training, by personnel attending the Transportation Center and School, would involve using existing rail and maritime equipment at Fort Eustis.

2.3 SCHEDULE

Under the BRAC law, the Army must initiate all realignments by not later than September 14, 2007, and complete all realignments by not later than September 14, 2011.⁴ Implementation of the proposed action would occur over a span of approximately 5 years. Facility renovation and

⁴ Section 2904(a), of PL 101-510, as amended, provides that the Army must “... initiate all closures and realignments no later than 2 years after the date on which the President transmits a report [by the BRAC Commission] to the Congress ... containing the recommendations for such closures or realignments; and ... complete all such closures and realignments no later than the end of the 6- year period beginning on the date on which the President transmits the report ... ” The President took the specified action on September 15, 2005.

new construction would be synchronized to meet the needs of units and activities proposed for relocation to Fort Lee, on a priority basis and depending on availability of funds.

SECTION 3.0 ALTERNATIVES

3.1 INTRODUCTION

A bedrock principle of NEPA is that an agency should consider reasonable alternatives to a proposed action. Considering alternatives helps to avoid unnecessary impacts and allows analysis of reasonable ways to achieve the stated purpose. To warrant detailed evaluation, an alternative must be reasonable. To be considered reasonable, an alternative must be “ripe” for decisionmaking (any necessary preceding events having taken place), affordable, capable of implementation, and satisfactory with respect to meeting the purpose of and need for the action. The following discussion identifies alternatives the Army considered and notes whether they are feasible and, hence, subject to detailed evaluation in this EIS.

The Army examined alternatives to the proposed action according to three variables: means to physically accommodate relocating personnel and missions, siting of new construction, and schedule. This section presents the Army’s development of alternatives and addresses alternatives available for the proposed action. The section also describes the no action alternative.

3.2 DEVELOPMENT OF ALTERNATIVES

Means to Accommodate Realignments. Realignment of units involves ensuring that the installation has adequate physical accommodations for personnel and their operational requirements. The Army considers four means of meeting increased space requirements: use of existing facilities, modernization or renovation of existing facilities, leasing of off-post facilities, and construction of new facilities.

Army Regulation 210-20, *Master Planning for Army Installations*, establishes Army policy to maximize use of existing facilities. New construction is not authorized when support for a new mission can be achieved by using existing underused, adequate facilities, provided that the use of such facilities does not degrade operational efficiency. Selection and use of facilities to support mission requirements adheres to the foregoing four choices in the order in which they are listed. That is, if there are adequate existing facilities to accommodate requirements, and absent other overriding considerations, further examination of renovation, leasing, or construction alternatives is not required. Similarly, if a combination of using existing facilities and renovation satisfies the Army’s needs, leasing or new construction need not be addressed. New construction may proceed only when using existing facilities, renovation, leasing, or a combination of such measures are inadequate to meet mission requirements.

Siting of New Construction. The Army considers new construction of facilities when using existing facilities, renovation, or leasing would fail to provide adequate accommodations for realigned functions. The Army considers both general and specific siting criteria for construction of new facilities.

General siting criteria include consideration of compatibility between the functions to be performed and the installation’s land use designation for the site, adequacy of the site for the function, proximity to related activities, distance from incompatible activities, availability and capacity of roads, efficient use of property, development density, potential future mission requirements, and special site characteristics, including potential environmental incompatibilities.

Specific siting criteria include consideration of location of the workforce and efficient, streamlined management of functions. Colocating similar types of functions, as opposed to dispersing them, permits more efficient use of equipment, vehicles, and other assets.

Schedule. Alternatives for scheduling of proposed realignment actions are principally affected by three factors: the availability of facilities to house realigned personnel and functions, efforts to minimize potential disruption of mission activities on the basis of the number of personnel involved in the relocation or the amount of work to be performed, and early realization of benefits to be gained by completion of the realignments. In most cases, minor shifts in schedule would not produce different environmental results.

3.3 ALTERNATIVES TO THE PROPOSED ACTION

3.3.1 Means to Physically Accommodate Realignments and Other Actions

Implementation of BRAC at Fort Lee would result in a net increase of approximately 7,750 personnel.

Evaluation of all facilities at Fort Lee shows a substantial shortfall in built space to accommodate the additional personnel and their equipment. In limited instances, some units and functions could be assigned to existing facilities. Of these, some would require renovation to adequately support new occupants. Overall, however, the post requires almost 3.86 million square feet of additional space to support the proposed action.

Using off-post leased space to meet Fort Lee's requirements would involve several major drawbacks. Force protection policies specify certain facility characteristics, such as physical security features, set-back from roadways, and "hardened" construction. Partially to comply with force protection policies, the 2005 BRAC changes deliberately remove personnel from leased space. Leasing space in the private sector—having personnel and equipment both on-post and off-post—would adversely affect command and control functions, result in higher operational costs, and impair efficient use of resources. For these reasons, use of leased space is not feasible and is not further evaluated in this EIS.

Construction of new facilities is driven by the need to ensure that adequate space is available for mission requirements. Officials at Fort Lee have examined the post's existing inventory of approximately 7.5 million square feet of space and found that it is fully used for current mission requirements. Accordingly, new construction is required, and the potential environmental effects associated with new construction are evaluated in detail in this EIS.

FTX and EOD training at Fort A.P. Hill require specific facilities for developing Soldier and Warrior skills needed in the current battlefield situation. Such facilities are not available at the installation and their construction and installation are required to provide Soldiers with realistic training events. Because of this, using the existing facilities, beyond the basic infrastructure available at previously used training sites (Pender Camp, Rappahannock Camp, and Cooke Camp), would not accomplish the training mission and is not considered to be a viable option. No land for lease that could be suitable for the proposed training missions (such as National Forest Service land) is available in the area.

3.3.2 Siting of New Construction

In 2005 Fort Lee conducted planning meetings to determine and evaluate siting plan options for new construction at the post. The Army developed the following four siting plan courses of action (COA) (Figures 3.3-1 to 3.3-4):

- COA 1 (Figure 3.3-1)—Emphasizes use of buildable land (that is, land without environmental constraints such as cultural resources or wetlands) within the existing cantonment area.
- COA 2 (Figure 3.3-2)—Emphasizes use of undeveloped, unconstrained land north of Route 36.
- COA 3 (Figure 3.3-3)—Emphasizes consolidation with the existing Quartermaster School while minimizing displacing of existing facilities.
- COA 4 (Figure 3.3-4)—Emphasizes maximum consolidation.

Fort Lee used six criteria to evaluate the siting plan COAs:

- Payoff—The siting plan would provide for effective and efficient Soldier training.
- Consolidation—Soldiers would be able to walk to their quarters, dining facility, and training sites in less than 10 minutes.
- Completion—The siting plan could be accomplished within the BRAC timeline constraints.
- Risk—The siting plan would be free of or not burdened by development constraints.
- Cost—The siting plan would provide best funding probability.
- Environmental—The plan would preclude known or potential impacts on wetlands, archaeological resources, or other sensitive resources.

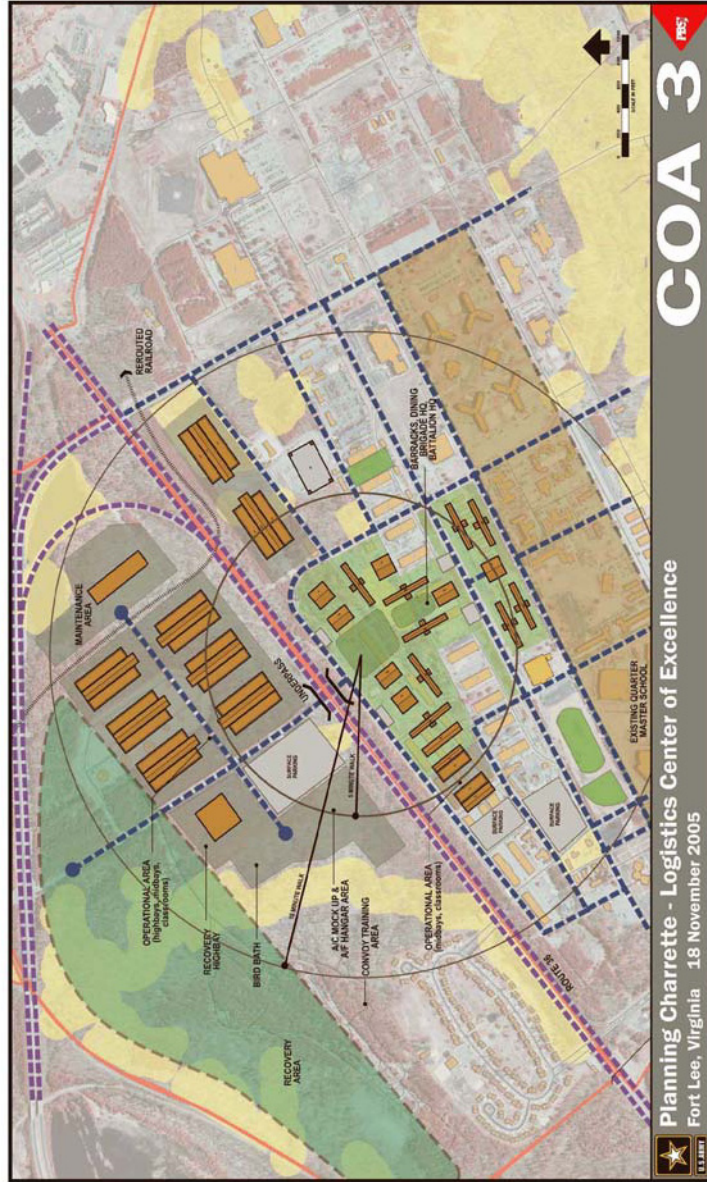
Evaluation of the COAs resulted in determining the following advantages and disadvantages for each:

- COA 1—Advantages: Less than a 10-minute walk within each campus; land is available; implementation allows earliest completion of any COA; and would require minimum relocation of functions. Disadvantages: The Ordnance School would have to be split into two areas; there would be reduced flexibility to deal with surges in student populations; there would be no room for expansion; and development would have to work around environmental constraints.
- COA 2—Advantages: Less than a 10-minute walk for Soldiers; land is available; implementation would require minimum relocation of functions; and space would be available for future development on Fort Lee proper. Disadvantages: Vehicle recovery training would not be colocated; there would be no expansion room within the proposed footprint; development would have to work around environmental constraints.
- COA 3—Advantages: Less than a 10-minute walk for Soldiers; the siting plan would consolidate schools; and there would be space available for future development on Fort Lee proper. Disadvantages: Not all required land is available; implementation might require use of swing space; implementation would require a long completion time because it would involve rerouting the railroad as well as demolition and reconstruction of buildings in the Cantonment Area that are currently in use, thereby precipitating temporal problems associated with



Course of Action 2 at Fort Lee

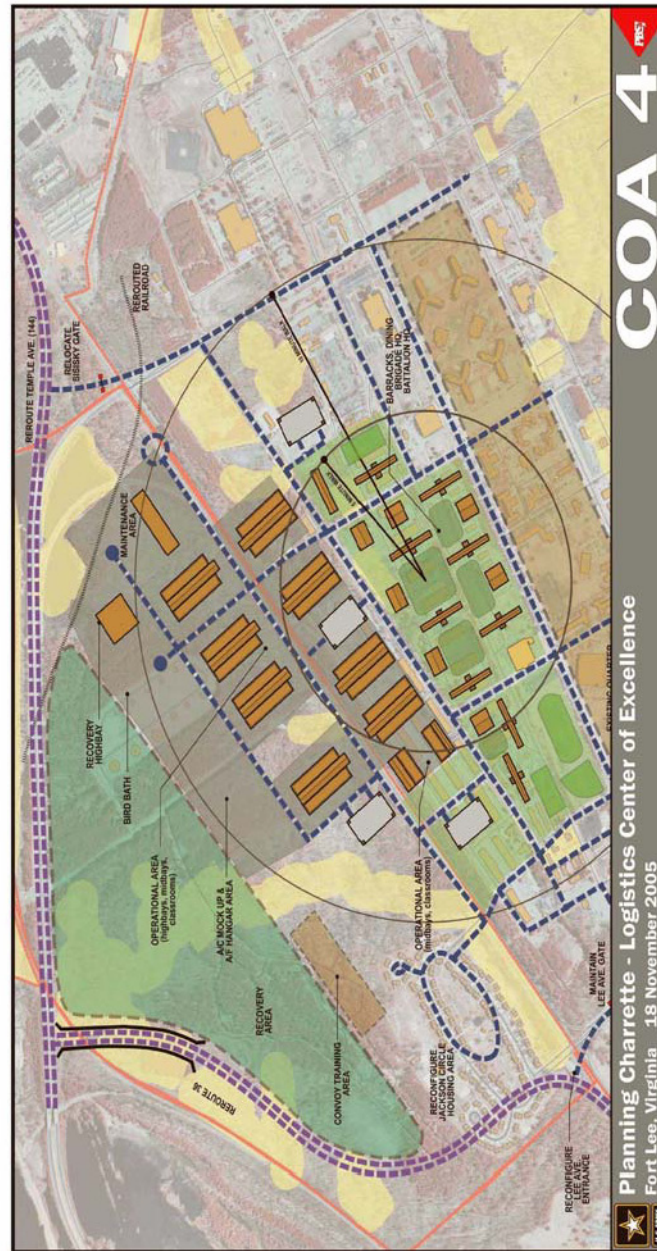
Figure 3.3-2



Course of Action 3 at Fort Lee

Figure 3.3-3

Figure 3.3-4



temporary relocations; these factors would give the COA a high cost (relative to other COAs); and there would be no room for expansion within the proposed footprint.

- COA 4—Advantages: Less than a 10-minute walk for Soldiers; the plan would provide for the best consolidation of schools; there would be space available for future expansion; and development would have a low impact. Disadvantages: Not all required land is available; implementation might require use of swing space; and implementation would be complex (relative to other COAs); it would require a long completion time because it would involve the same issues of relocation as COA 3, in addition to an even more time-intensive issue of rerouting Route 36; and because of the temporal factors it would have a high cost (relative to other COAs).

Fort Lee used a scoring system to evaluate the four COAs under the six criteria. Table 3.3-1 reports the results of that evaluation. The siting plan in COA 2 was found to be superior by a considerable margin. Given the distinct, scored advantages of the siting plan in COA 2, the other siting plans were deemed unreasonable and therefore were not subjected to further evaluation. Accordingly, only COA 2, as represented in Figure 2.2-1, is evaluated in detail in this EIS.

Table 3.3-1
Course of action evaluations

Criterion	COA 1	COA 2	COA 3	COA 4
Payoff	4	1.5	3	1.5
Consolidation	3	4	1.5	1.5
Completion	1.5	1.5	3	4
Risk	1.5	1.5	3	4
Cost	2	1	3	4
Environmental	4	1	2.5	2.5
Total (lower is better)	16	10.5	16	17.5

Siting of new facilities at Fort Lee, as shown in Figure 2.2-1, reflects the following:

- The proposed sites would generally colocate like uses and separate incompatible uses. Reference to the Army's 12 general land use categories has aided in this effort.⁵
- Functionally similar activities would be colocated. Activities within a command or organization would also be colocated. Such proximities would enhance command and control and contribute to efficiency and effectiveness. For example, barracks and dining facilities for personnel attending a specific school would be located near the classrooms intended for those students' use.
- To the maximum extent practicable, the sites for new facilities would not be located within any stream buffers, wetland buffers, floodplains, or archaeological sites.

The proposed locations adhere to the general and specific siting criteria set forth in section 3.2. While numerous variations of the present proposal for siting of facilities could be developed, the locations shown in Figure 2.2-1 reflect a sound, compatible set of solutions. Alternative siting

⁵ Management of Army lands recognizes the following 12 land use categories: Airfields, Maintenance, Industrial, Supply/Storage, Administration, Training/Ranges, Unaccompanied Personnel Housing, Family Housing, Community Facilities, Medical, Outdoor Recreation, and Open Space.

schemes would produce different, but not better, layouts. Accordingly, the siting locations shown in Figure 2.2-1 are evaluated in detail in this EIS, and alternative siting schemes are eliminated from further consideration.

Fort A.P. Hill is a training installation used by nearly every branch of the Armed Forces, including the Army, Air Force, Navy, Marines, Coast Guard, and National Guard, as well as civilians, non-DoD personnel, British Marines, and others. The total number of personnel trained at the installation from October 2005 through July 2006 was 35,108. Nearly every area of the installation is dedicated to training areas, training ranges, and impact areas, and many of the training facilities are dedicated to specific types of training. The specific nature of the FTX, Warrior, and leadership skill development training associated with the incoming BRAC missions could not have been accomplished using existing training facilities at Fort A.P. Hill. Selecting one or more underused training areas on the installation is deemed the most viable option to accommodate the training needs.

3.3.3 Schedule

The schedule for implementing the proposed action must balance facilities' construction time frames and the planned arrival dates of inbound units and activities, all within the 6-year limitation of the BRAC law (see section 2.6). Realignment earlier than that in the schedule in section 2.3 is not feasible because of the time required to renovate and build facilities. Rescheduling realignment to a later date would unnecessarily delay realization of benefits to be gained. Because earlier implementation is not possible, and because delay is avoidable and unnecessary, alternative schedules are not further evaluated in this EIS.

Training at Fort A.P. Hill would begin when the first BRAC elements move to Fort Lee, which would most likely be before construction of all facilities at Fort Lee is completed. Schedules to use the existing training areas and ranges are largely inflexible because of the limited time that individual forces have available to come to Fort A.P. Hill, be at the installation, and accomplish their training missions. The FTX, Warrior, and leadership training—which must be accomplished by the incoming BRAC missions—requires a regular, weekly use of a training area for 4 days. Accommodating the BRAC-related training on other, currently used training sites would not have been feasible because it would have required eliminating other training missions from those areas to accommodate such a regular, intensive training schedule for the FTX and leadership skills training. Using unused or underused areas on Fort A.P. Hill, therefore, is deemed the most feasible option to assimilate the new training need into the installation's schedule. Pender Camp, Rappahannock Camp and the other proposed FOB sites, and the EOD area were determined to best fit the terrain, area, and schedule needs of the BRAC training mandate.

3.4 NO ACTION ALTERNATIVE

Inclusion of the No Action Alternative is prescribed by CEQ regulations and serves as the benchmark against which federal actions can be evaluated. No action assumes that the Army would continue its mission at Fort Lee as it existed in the fall of 2005, with no units relocating from other locations, no new units established, and no new facilities constructed. Because the BRAC Commission's recommendations now have the force of law, continuation of the fall 2005 Fort Lee mission is not possible without further Congressional action; it serves as a baseline alternative against which other alternatives can be evaluated. The no action alternative is evaluated in detail in this EIS.

SECTION 4.0

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Section 4.1 describes the baseline (November 2005) affected environment on Fort Lee, and section 4.2 describes the affected environment on Fort A.P. Hill. The baseline of November 2005 is the level of operations and environmental conditions at the installations at the time of the BRAC Commission's recommendations became law. A NOI declaring the Army's intent to prepare an EIS for realignment of Fort Lee was published in the *Federal Register* on November 23, 2005. For each resource area within sections 4.1 and 4.2, the impact analysis findings for implementing the Preferred Alternative and no action alternative follow the baseline description. The effects of implementing the Preferred Alternative and no action alternative are described in terms of their being short-term or long-term, direct or indirect, adverse or beneficial, and minor or significant. "Short-term" in general refers to an effect that would not last longer than the period of construction, which would be through September 2011 in the case of implementation of the Preferred Alternative. "Long-term" implies effects that persist after construction is complete or that are associated with post-construction military operations. "Significant" is used in accordance with the CEQ definition of the term (see http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm, Section 1508.27). "Minor" implies an effect that is less than significant. "Direct" and "indirect" are used in accordance with the CEQ definitions of the terms (see http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm, Section 1508.8). Sections 4.1.13 and 4.2.13 present summaries of the cumulative effects associated with implementing the Preferred Alternative on Fort Lee and Fort A.P. Hill, respectively. Cumulative effects are assessed in accordance with the CEQ definition of the term "cumulative impact" (see http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm, Section 1508.7). Sections 4.1.14 and 4.2.14 provide summaries of mitigation measures identified to minimize adverse effects on the installation. Sections 4.1.15, 4.2.15, 4.3, and 4.4 contain information required by CEQ regulations for EISs: Unavoidable Adverse Environmental Impacts (sections 4.1.15 and 4.2.15), Irreversible or Irretrievable Commitments of Resources (section 4.3), and Short-Term Uses of Man's Environment and Maintenance and Enhancement of Long-Term Productivity (section 4.4).

4.1 FORT LEE

4.1.1 Land Use

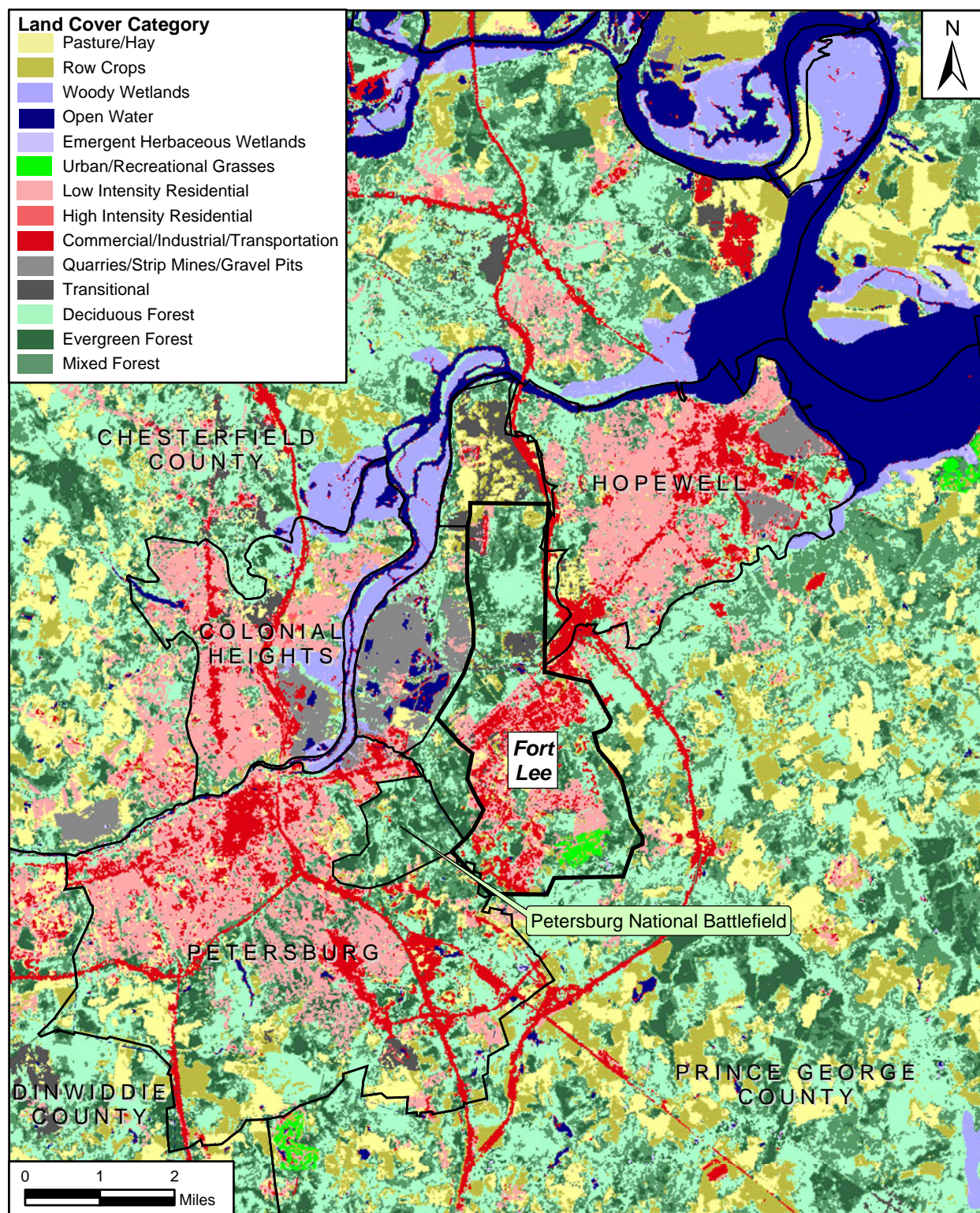
4.1.1.1 Affected Environment

4.1.1.1.1 Regional Geographic Setting and Location

Fort Lee is adjacent to the cities of Petersburg and Hopewell and Prince George County, which is in the Richmond-Petersburg Metropolitan Statistical Area (MSA). The political jurisdictions surrounding the installation are Chesterfield County, Dinwiddie County, Prince George County, and the cities of Colonial Heights, Hopewell, and Petersburg (Figure 4.1-1). The location of the installation is shown in Figure 1.1-1.

4.1.1.1.2 Installation Land Use

Land use in the cantonment area is composed of 14 land use types, including administration, community facilities, recreational, medical, training areas, supply/storage facilities, family housing, and troop housing (Figure 4.1-2). Family housing includes NCO family housing and



Surrounding Land Use

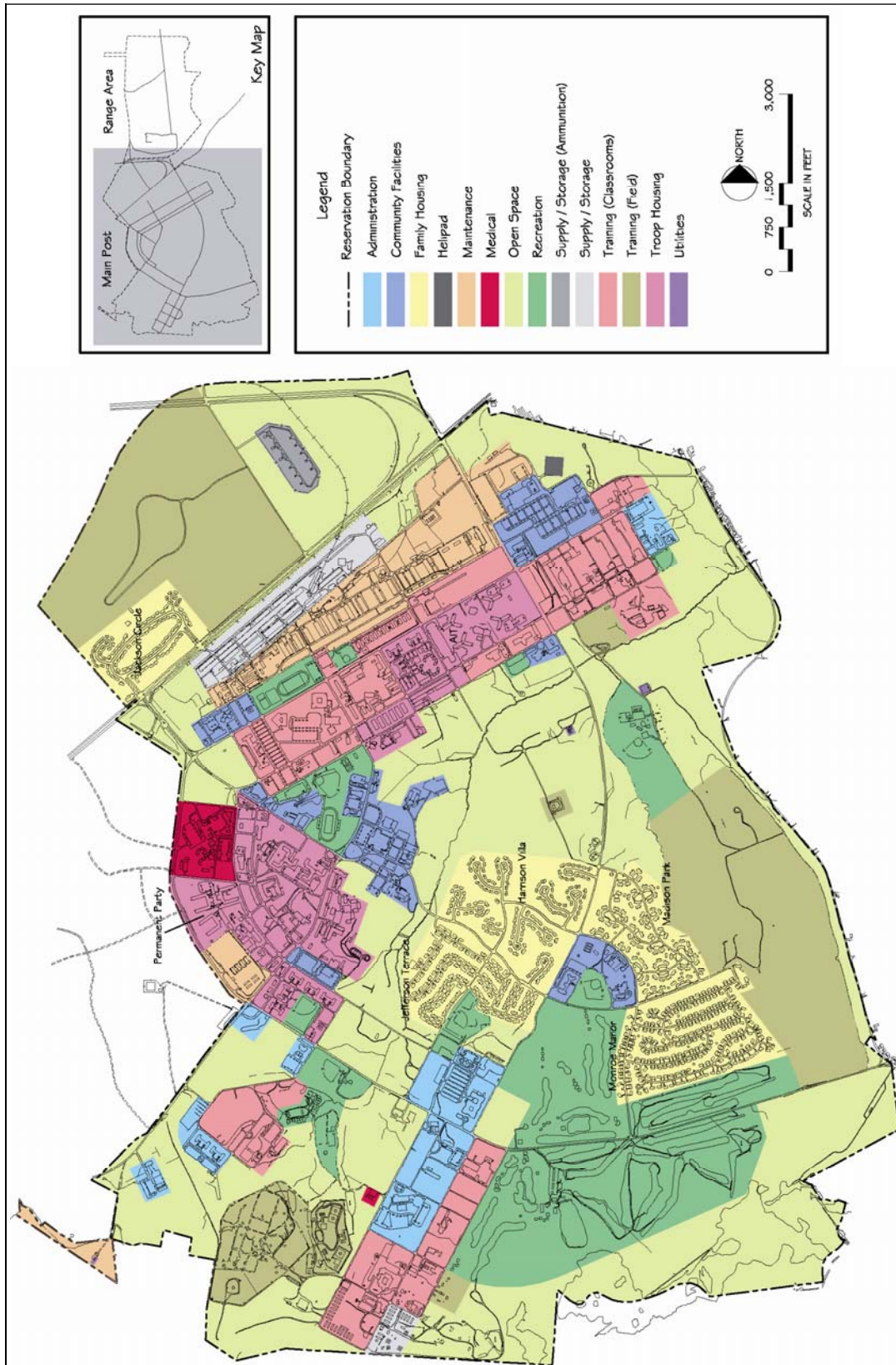
Fort Lee, Virginia

Figure 4.1-1

Source: USGS NLCD, 1999.

Fort Lee and Fort A.P. Hill, Virginia

February 2007



Existing Land Use at Fort Lee

Figure 4.1-2

Source: Fort Lee, 2006.

officer family housing. Troop housing includes NCO/enlisted barracks and unaccompanied officers' quarters. Community service areas include commissary, exchange, chapels, library, recreation center and child development center. Recreation areas include the golf course and driving range, physical fitness center, swimming pools, track and football stadium, and various playing courts and fields.

About half (about 55 percent) of the land at Fort Lee is used as operational areas, which contain the firing ranges, field training areas, aviation activity area, and ammunition storage. The training areas are north of Route 36 and extend to the northern extent of the installation. Between Route 36 and Route 144 is Training Area 5 and an existing ASP), and north of Route 144 are small-arms firing ranges, open areas, and agricultural lease areas in the northernmost section on property recently annexed to the installation. The training sites on Fort Lee include bivouac areas, maneuver trails, a combat training course, and outdoor class facilities.

Approximately 1,300 acres are used for field training. Fort Lee also owns a 14-acre parcel of land on the Appomattox River west of the northern training areas that is used for water purification training.

4.1.1.1.3 Surrounding Land Use

Within the six surrounding jurisdictions of Chesterfield, Dinwiddie, and Prince George counties, and the cities of Colonial Heights, Hopewell, and Petersburg, patterns of land use vary significantly (see Figure 4.1-1). Land areas immediately adjacent to Fort Lee are within the jurisdiction of the Crater Planning District Commission. While each of the six surrounding cities and counties maintains various zoning and subdivision ordinances, these rules have little direct effect on the installation. The most restrictive controls on surrounding development are physical features and protected areas, including the Appomattox River and associated wetlands, the Blackwater Swamp, the I-295 corridor, and the Petersburg National Battlefield. Residential development near the northern range area is discouraged to prevent noise and safety problems in the future.

Urbanization, however, has been increasing around Fort Lee. The completion of the I-295 bypass around Richmond in the early 1990s had a profound effect on the Fort Lee area. The I-295 bypass extends southward from I-64 north of Richmond to I-95 just south of Petersburg and has four interchanges in Prince George County. This provides travelers and commuters with an easy route around Richmond-Petersburg area. Excellent highway access combined with housing that is more affordable than that in nearby Chesterfield County resulted in the rate of population growth in Prince George County increasing threefold since the completion of I-295. This increased urbanization around Fort Lee has the potential to create conflicts between installation operations and adjacent land uses.

Land use immediately adjacent to Fort Lee in Prince George County is a mixture of agricultural, residential, and commercial uses. The portions of Prince George County that are near Fort Lee are commercial and medium-density residential (R-2 zoning, which allows for 12,000-square-foot lots if water and sewer are provided). The Prince George County 1999 Comprehensive Plan, which is being updated, shows those uses as well as public and semi-public uses, such as schools and government complexes along the Route 36 corridor (Griffin 2006a). Prince George County has large, forested tracts and a substantial amount of land in agricultural that is planned as single family residential on the outside of I-295. To the east, a small pocket is zoned for commercial

use, and further east along Route 156 (Prince George Drive) it is planned and zoned for industrial use and mixed residential (Griffin 2006b).

Land use in the City of Hopewell adjacent to Fort Lee is planned and zoned as B-3 commercial and highway/commercial with predominantly retail uses along Oaklawn Boulevard (Route 36) and I-295 (Innocent 2006). State and federal correction facilities are adjacent to the operational areas north of River Road.

Adjacent to the installation's southwestern boundary is the Petersburg National Battlefield, which was the location of one of the Civil War's most significant campaigns. This 1,427-acre facility is largely wooded, which provides an effective visual barrier for Fort Lee during the growing season. The visitor center and an interpretive trail are on the section of the battlefield property that is next to the training area between Route 36 and Route 144.

Residential use is important in all six localities, while commercial development is more prevalent in Petersburg, Colonial Heights, Hopewell, and Chesterfield County than in Prince George or Dinwiddie Counties. Petersburg is typical of older cities in that it has a centralized downtown commercial district that developed in the 1800s. In contrast, Chesterfield County's commercial development consists of the large shopping malls and strip development that is typical of newer, suburban areas. Most of the heavily industrialized land in the region is in Petersburg and Hopewell, with scattered industrial sites in Dinwiddie, Prince George, and Chesterfield Counties.

Large portions of southern and western Chesterfield County are undeveloped, although development is occurring at a rapid rate in the area. Land east of Swift Creek is predominantly proposed by Chesterfield County as infill development with a section below Pocahontas State Park and west of Route 301 for planned development. Southeastern Chesterfield County—to the east of Route 301 and I-95 corridors above Colonial Heights and bounded by the James River to the north with a southern boundary of Appomattox River—influences development and growth potential for Fort Lee. With continuing transportation improvements, this area is a prime location for revitalized and new industrial and commercial development. The two planning components closest to Fort Lee are southern Jefferson Davis Corridor and Eastern Area Consolidation. In the southern Jefferson Davis Corridor, encompassing Route 301 and I-95 corridors, continued development of commercial, industrial, and mixed-use centers is encouraged. The land immediately north of the Appomattox River in the Eastern Area Consolidation component is planned and zoned for general commercial, light industry, industry with small areas adjacent to Appomattox River for open public space, and residential (1.5 dwellings per acres or less). The Meadowville Technology Park to be developed to the north near James River as a major regional employment center will increase growth pressures in the area (Caroline County 2004).

The city of Petersburg is west of Fort Lee on Route 36, which has heavy commercial use with limited vacant land remaining for development. Although Petersburg has no specific plans for the Route 36 corridor, it has identified that road improvements and visual appeal enhancements are needed. Expected growth for Petersburg is projected to the south of town along Route 460 (County Drive), which has more vacant land than the Route 36 corridor. The west side of Petersburg was zoned in the 1970s as industrial. The expected growth did not occur, and the land has mixed zoning including, agriculture, residential, industrial, and commercial in response to development needs as they occurred. The city expects requests to rezone additional property as new land use needs are identified (Hatch 2006).

Further to the southwest, Dinwiddie County has large, forested tracts and a substantial amount of land in agricultural use. Along the I-85 corridor, Dinwiddie County is zoned and planed as industrial and residential. There is a direct connection between Fort Lee and Fort Pickett using Route 460 through Dinwiddie County and access to regional markets using I-95 and Route 1. The northwest quadrant of Dinwiddie County is the location of the main Enterprise Zone for industrial development and has several residential developments in progress. To accommodate new land uses the undeveloped forest and pasture land will need to be rezoned (Scheid 2006).

4.1.1.1.4 State Coastal Management Program

The Virginia Coastal Zone Management Program is discussed in section 4.1.6, Water Resources.

4.1.1.1.5 Current and Future Development in the Region

The three cities near Fort Lee are all heavily developed so that new construction either fills in isolated, vacant parcels or is redevelopment of previously developed parcels of land. Most new development in the area is occurring along major highway corridors (I-85 and I-95) in Chesterfield, Dinwiddie, and Prince George Counties.

4.1.1.2 Environmental Consequences

4.1.1.2.1 Preferred Alternative

A long-term minor adverse effect on land use at the adjacent Petersburg National Battlefield would be expected. Accommodating the additional personnel that the Preferred Alternative would bring to the installation would require that Fort Lee construct approximately 3.86 million square feet of facilities. Many facilities would be constructed in Training Area 5 and the existing ASP area between Route 144 and Route 36. Training Area 5 is adjacent to the part of the Petersburg National Battlefield where there is a visitor center and an important, frequently visited interpretive trail. With respect to the adjacent battlefield, a National Park Service historic site, the proposed use of the land for Transportation School training would be less compatible with the adjacent battlefield than the present field training use of the land. The effect would be minor, however, because Fort Lee would locate highbay facilities, which would generate substantial amounts of noise, as far from the battlefield as practicable and would limit the height of buildings near the battlefield. Furthermore, a forested buffer would be maintained between the battlefield and the Fort Lee developed area.

A Vehicle Recovery Area (VRA) is proposed to be established at the north end of the Fort Lee Range Area on newly annexed land. The annexed land is leased to the Commonwealth of Virginia for agricultural purposes. A VRA is used to train Soldiers to recover vehicles that have become immobilized because of mud, deep water, or mechanical breakdown. The recovery vehicles used in training tend to be large and, accordingly, noisy. Although the Army would attempt to minimize the potential for adverse effects on nearby land uses, the training that would be conducted in the area could result in a land use incompatibility with nearby residential areas and the correctional facilities. Further discussion of this potential effect is provided under Noise (section 4.1.4).

The proposed new ASP would be located north of the existing ASP site in the southwest corner of The Range Area near the Fort Lee property boundary. The site would contain six proposed magazines for storage of ammunition and explosive material, access roads and loading zones for

the magazines and a possible fence around reservation. Although the Army would attempt to minimize the potential for adverse effects on nearby land uses, the movement of large trucks in the area to transport munitions could result in a land use incompatibility between the industrial land use with nearby residential areas. Safety zones around the magazines would be such that an accidental detonation would not affect property off the installation.

Other BRAC-related facilities would be constructed as individual facilities or small clusters of facilities on separate parcels in the main cantonment area, or they would be renovations of existing facilities. As shown in Table 4.1.1-1, these facilities would be, in the case of facilities to be renovated, within areas of the cantonment area designated for the proposed uses and adjacent to areas of compatible land use.

No impacts on regional land use planning or zoning at Fort Lee would be expected.

Cumulative Effects

An adverse cumulative effect on land use would result from the combined loss of field training areas at Fort Lee. Both the BRAC action and the Army Residential Communities Initiative (RCI) action would result in the removal of Training Areas 5, 10, 13, and 14 from Fort Lee's field training land inventory.⁶ The total amount of land converted from field training land to other uses would be approximately 470 acres. No other cumulative effects on Fort Lee land use or surrounding land uses would be expected. Land bordering the installation where BRAC facilities would be constructed is in land uses (developed, agricultural, or transportation routes) that are compatible with the proposed development.

Mitigation

Mitigation recommended for visual (section 4.1.2.2.1) and noise impacts (section 4.1.4.2.1) on the Petersburg National Battlefield would adequately address land use impacts. The loss of field training areas would reduce future development of field training programs at Fort Lee. The 2005 BRAC plan recognizes the limitation for commands being moved to Fort Lee that require field training by designating Fort A.P. Hill as the support site for field training components.

4.1.1.2.2 No Action Alternative

No impacts would be expected to on-post or off-post land use under the No Action Alternative. Land use configurations and transitions would remain as described in section 4.1.1.1.2.

4.1.2 Aesthetic and Visual Resources

Aesthetics and visual resources are the natural and man-made features of a landscape. They include cultural and historic landmarks, landforms of particular beauty or significance, water surfaces, and vegetation. Together these features form the overall impression that a viewer receives of an area or its landscape.

⁶ The Army Residential Communities Initiative is a program to privatize family housing on Army installations. At Fort Lee, the RCI program could result in approximately 600 new family housing units constructed on the installation. An Environmental Assessment of the RCI action at Fort Lee is under development (September 2006).

Table 4.1.1-1
Land use areas for BRAC facilities, Fort Lee

BRAC facility	Future Land Use	Existing land use	Nearby land uses	Potential Consequences
Training area BRAC facilities				
Transportation school complex	Training			proximity to national park may be incompatible, loss of field training area
Physical fitness center	Recreation	Field training, open space, ammunition supply & storage	Field training, urban, national park, supply & storage	
Dining facility	Community			
Dental & troop medical clinic	Medical			
Chapel	Community			
Main cantonment area BRAC facilities				
HAZMAT addition	Maintenance	Maintenance	Community, recreation	
Laundry support facility	Maintenance	Supply/storage	Maintenance	
DPWL maintenance facility	Maintenance	Maintenance	Supply/storage	
Central issue facility	Maintenance, supply/storage	Maintenance, supply/storage	Training (classroom)	
Shipping, receiving, & storage	Maintenance, supply/storage	Maintenance	Training (classroom)	
Land vehicle fueling facility	Maintenance	Maintenance	Open space	
Ordnance museum	Community	Open space	Family housing, community, supply/storage, maintenance, National Park	loss of open space
SCOE HQ	Administration	Training (classroom)	Open space, community	
Library	Community	Recreation	Troop housing, training (classroom)	loss of recreation space
Soldier support facility	Community	Troop housing	Training (classroom)	loss of Troop housing
Transportation school	Training (classroom)	Training (classroom)	Recreation, community, troop housing	
Training support center	Training, administration	Administration	Recreation, open space	
Physical fitness center	Recreation	Recreation	Community, training (classroom)	
Recreation center	Recreation	Community	Recreation, troop housing	loss of Community space
Education center	Community	Community	Open space	
Army community center	Community	Community	Open space	

Table 4.1.1-1
Land Use Areas for BRAC facilities, Fort Lee (continued)

Main cantonment area BRAC facilities (continued)				
Public Affairs Office facility	Administration	Community	Community	loss of Community space
Child & youth services	Community	Community	Recreation, family housing	
Youth center addition & sports	Community	Community	Recreation, family housing	
Information systems facility	Training (classroom)	Troop housing	Troop housing	loss of Troop housing space
AIT Unaccompanied personnel housing	Housing	Training (classroom)	Community, open space, recreation	loss of Training (classroom) space
Chapel	Community	Training (classroom)	Community, recreation	loss of Training (classroom) space
DCMA	Administration	Community	Open space	loss of community space
AAFES mini mall	Community	Community	Open space	
DeCA addition	Administration	Community	Training (classroom), open space	loss of community space
Fire station #2	Maintenance	Troop housing, recreation	Community, open space	loss of Troop housing, recreation space
Veterinary clinic	Medical	Medical	Open space	
Physical fitness center	Recreation, community	Recreation	Open space	
Log University & field training	Training (field, classroom)	Open space, community	Open space, training (classroom)	loss of open space
Lodging facility	Community	Open space	National park, training (classroom), recreation, community, troop housing	loss of open space
Permanent party barracks & dining	Community	Troop housing	National park, maintenance	loss of Troop housing space
Preventative medicine facility	Medical	Medical	Medical	
Kenner health clinic alteration	Medical	Medical	Medical	
Community mental health	Medical	Troop housing	Medical	loss of Troop housing space

Visual environments are key contributors to people's daily experiences and life styles and can significantly affect moods and feelings of well-being. Major public improvement projects and facilities can have varying degrees and types of impacts on the visual environments. The impacts can range from very significant to hardly noticeable. Visual environments can be viewed as negative, or they can improve and contribute in a positive way to the appearance and image of communities.

Visual impacts on historic resources are protected under federal law through Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulations at 36 CFR Part 800.

4.1.2.1 Affected Environment

4.1.2.1.1 Installation

The area within Fort Lee is typical of U.S. Army installations established before World War II. In the cantonment area in the southern portion of the installation, the layout is functionally developed. It consists of an eclectic assortment of facilities ranging from World War II wooden structures to an assortment of more permanent structures constructed over decades and reflecting the current designs of the times. The cantonment area is usually viewed only by personnel and family members stationed at Fort Lee, students and other temporary personnel, federal employees, retirees, and visitors to the U.S. Army Women's Museum or U.S. Army Quartermaster's Museum. These are generally people accustomed to the aesthetics of a military installation. The northern portion of the installation is used for military training with the

exception of some military family housing that borders Route 36 and storage facilities bordered by Route 36 on the south by the Norfolk and Southern Railroad and Route 144 to the north.

The overall visual impression of the existing cantonment area is one of functional efficiency, order, and focused activity.

4.1.2.1.2 Outside the Installation

The view of Fort Lee seen by the public is the view from Routes 36 and 144. These roads proceed from the developed areas of Petersburg, Hopewell, and Colonial Heights. The city of Petersburg, along Route 36 proceeding to Fort Lee, prior to the Petersburg National Battlefield (Eastern Front), is described as a grayfield. Grayfields are under-performing or abandoned shopping centers or office parks. This area can be described as having low scenic quality. The Petersburg National Battlefield is further described under Cultural Resources, section 4.1.8.

Passing through the Petersburg National Battlefield, the view is a wooded area, providing a natural scenic view adjacent to Fort Lee. This area can be described as having ordinary or common scenic quality.

Passing through Fort Lee along Route 36 the view is of developed area on the south with a buffer area of mature trees (Figure 4.1-3). This area can be described as having ordinary or common scenic quality.

Proceeding from Hopewell on Route 36, the area is typical of development surrounding major interstate exits. There is a plethora of hotels, restaurants, and other commercial establishments. This area can be described as having low scenic quality.

From Colonial Heights to Fort Lee, Temple Avenue (Route 144) crosses the Appomattox River and then continues through a corridor containing a mixture of quarries, wetlands, and undeveloped parcels of land. This area can be described as having ordinary or common scenic quality.



Fort Lee Aerial Photo
Fort Lee, Virginia
Figure 4.1-3

4.1.2.2 Environmental Consequences

4.1.2.2.1 Preferred Alternative

A long-term minor adverse effect on visual resources at the Petersburg National Battlefield would be expected from implementation of the Preferred Alternative, which would involve substantial deforestation in Training Area 5 and the existing ASP area. An adverse visual impact would be expected from the replacement of a natural setting with buildings and maintenance structures that could be visible from the battlefield's visitor center and interpretive trails. Development near the battlefield and not on Fort Lee has already encroached somewhat on the visual setting of the battlefield, and development in Training Area 5 and the existing ASP area would further adversely affect the battlefield's visual character. The effect would be minor because a forested buffer would be maintained between the battlefield and the new development on Fort Lee.

The increase in exterior lights on buildings, parking lots, and training areas would add to light pollution levels in the community (IDA 2006). More counties are following Virginia Outdoor Lighting Task Force recommendations to form an outdoor lighting ordinance, which nearby Chesterfield County has enacted to address concerns regarding wasted energy, glare, urban sky glow and safety hazards to humans and wildlife (VOLT 2006). Recommendations to minimize or avoid light pollution include motion sensors, light shields, low-pressure sodium (LPS) or low-lumen (low-light-output) lights and judicious placement of fewer lights (IDA 2006).

Cumulative Effects

No cumulative effects on aesthetics or visual resources on Fort Lee would be expected. Other projects conducted at Fort Lee, including RCI and non-BRAC Master Plan construction and renovation projects planned through 2011 (those that would occur concurrently with BRAC construction, which by law must be completed by September 14, 2011), would alter other areas of the installation, but the viewshed and land use changes due to these projects would essentially maintain the same character of an active military installation. An adverse cumulative effect on the aesthetics of the area near Fort Lee's TA5 and the ASP area would be expected. BRAC development between Route 144 (Temple Ave.) and Route 36 (Oaklawn Blvd.) would alter the landscape along the stretches of those routes that pass by Fort Lee property, which are currently forested. After BRAC implementation those stretches of road could be nearly completely developed. Other development in the area (north of the Petersburg National Battlefield at the northernmost point where Fort Lee property adjoins it, for instance) is already intensifying the urban character of the region, and BRAC development would contribute to that change.

Mitigation

The Army is consulting with the Petersburg National Battlefield to identify measures to avoid visual impacts to the park from the presence of BRAC facilities and activities in Training Area 5. If avoidance is not feasible, a Memorandum of Agreement (MOA) would be developed between Fort Lee, Petersburg National Battlefield, and the Virginia State Historic Preservation Officer (SHPO) to determine measures to be implemented to mitigate the adverse effect.

No other mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on aesthetic and visual resources. Fort Lee, however, would implement best management practices required as part of DoD and Fort Lee policy and the Commonwealth of Virginia for the protection of natural areas, and such measures would adequately limit the adverse impact of the Preferred Alternative on aesthetic and visual resources. Examples of best

management practices that might be implemented to protect the aesthetic and visual resources of the installation are provided below.

Best Management Practices for Aesthetic and Visual Resources

- **Revegetation.** Areas currently maintained as lawns throughout Fort Lee would be evaluated for possible revegetation using native trees, shrubs, and herbaceous plants. Disturbed areas would be revegetated with native, indigenous vegetation.
- **Protection of Riparian Buffers.** To the fullest extent possible, undisturbed riparian buffer zones at least 100 feet wide would be preserved along streams to preserve the natural landscape.

4.1.2.2.2 No Action Alternative

No effects would be expected at Fort Lee under the No Action Alternative because there would be no changes to existing aesthetic and visual resources.

4.1.3 Air Quality

4.1.3.1 Affected Environment

4.1.3.1.1 National Ambient Air Quality Standards and Attainment Status

EPA Region 3 and the Virginia Department of Environmental Quality (VDEQ) regulate air quality in Virginia. The Clean Air Act (CAA) (42 United States Code [U.S.C.] 7401–7671q), as amended, gives EPA the responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that set acceptable concentration levels for seven criteria pollutants: fine particulate matter (PM₁₀), very fine particulate matter (PM_{2.5}), sulfur dioxide (SO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), ozone (O₃), and lead (Table 4.1.3-1). Short-term standards (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term standards (annual averages) have been established for pollutants contributing to chronic health effects. Each state has the authority to adopt standards stricter than those established under the federal program; however, the Commonwealth of Virginia accepts the federal standards. Appendix B describes the NAAQS in detail, including a summary of the criteria pollutants' effects on public health and welfare.

Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas. Federal regulations designate AQCRs in compliance with the NAAQS as *attainment* areas. *Maintenance* areas have previously been designated *nonattainment*, and the U.S. Environmental Protection Agency (EPA) has redesignated them *attainment* for a probationary period through implementation of maintenance plans. On the basis of the severity of the pollution problem, EPA categorizes nonattainment areas as marginal, moderate, serious, severe, or extreme. Implementation of the proposed action would generate additional emissions at Fort Lee, which is within the State Capital Intrastate AQCR (AQCR 225). EPA designates AQCR 225 as a marginal nonattainment area for the new 8-hour O₃ standard. EPA designates AQCR 225 as an attainment area for all other criteria pollutants. Previously, AQCR 225 was a maintenance area for the 1-hour O₃ standard. EPA revoked the 1-hour O₃ standard, and it is no longer in affect for this region.

**Table 4.1.3-1
The National Ambient Air-Quality Standards**

Pollutant	Primary NAAQS ^a	Secondary NAAQS ^a
CO		
8-Hour Maximum ^b (ppm)	9	None
1-Hour Maximum ^b (ppm)	35	None
NO_x		
Annual Arithmetic Mean (ppm)	0.053	0.053
O₃		
8-Hour Maximum ^c (ppm)	0.08	0.12
PM_{2.5}		
Annual Arithmetic Mean ^d (µg/m ³)	15	15
24-Hour Maximum ^e (µg/m ³)	65	65
PM₁₀		
Annual Arithmetic Mean ^f (µg/m ³)	50	50
24-Hour Maximum ^b (µg/m ³)	150	150
SO₂		
Annual Arithmetic Mean (ppm)	0.03	None
24-Hour Maximum ^b (ppm)	0.14	None
3-Hour Maximum ^b (ppm)		0.5

Notes:^aSource: 40 CFR Part 50.1-50.12^bNot to be exceeded more than once per year^cThe 3-year average of the fourth highest daily maximum 8-hour average O₃ concentrations over each year must not exceed 0.08 ppm.^dThe 3-year average of the weighted annual mean PM_{2.5} concentrations from must not exceed 15.0 µg/m³.^eThe 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 65 µg/m³.^fThe 3-year average of the weighted annual mean PM₁₀ concentration at each monitor within an area must not exceed 50 µg/m³.

ppm = parts per million

µg/m³ = micrograms per cubic meter

When NO_x and volatile organic compounds (VOC) are exposed to heat and sunlight, ground-level O₃ is formed. Ground-level O₃ is a major component of smog, can damage lung tissue, aggravate respiratory disease, and make people more susceptible to respiratory infections. Ozone is a regionwide problem involving interstate transport of pollutants. Therefore, projects within an EPA-designated O₃ transport region (OTR) must meet stricter regulatory requirements. All areas associated with the proposed action are outside the OTR.

4.1.3.1.2 State Implementation Plan and Clean Air Act Conformity

The CAA, as amended in 1990, mandates that state agencies adopt State Implementation Plans (SIPs) that target the elimination or reduction of the severity and number of violations of the NAAQS. SIPs set forth policies to expeditiously achieve and maintain the NAAQS. The 8-hour O₃ standard is in the initial implementation stages. Currently the AQCR 225 has no applicable SIP for the 8-hour O₃ standards. VDEQ has published the *Draft Maintenance Plan for the Richmond-Petersburg Nonattainment Area* (VDEQ 2006a) and is in the process of petitioning the EPA to redesignate the region as a *maintenance* area for the 8-hour O₃ standard (VDEQ 2006b).

This maintenance plan constitutes a SIP revision and will provide for maintenance of the 8-hour NAAQS in the area for at least 10 years after redesignation, including additional measures to ensure prompt correction of any violation of the NAAQS. The draft maintenance plan includes the following provisions to ensure maintenance of the NAAQS:

- VDEQ developed an attainment emissions inventory and identified the level of emissions sufficient to attain the NAAQS.
- VDEQ demonstrated maintenance by showing that future emissions will not exceed the level of the attainment inventory over the 10-year period following redesignation.
- VDEQ will continue to operate an air-quality monitoring network to verify the area's attainment status.
- VDEQ continues to have the legal authority to implement and enforce all measures necessary to attain and maintain the NAAQS.
- VDEQ outlines contingency measures that would promptly correct any NAAQS violation.

The maintenance plan for the 8-hour O₃ standard, once approved, would supersede the previous maintenance plan that was designed to maintain compliance in AQCR 225 with the revoked 1-hour O₃ standard. This maintenance plan is expected to be approved by the EPA in 2008.

In addition, EPA has published guidance to address compliance with the CAA with respect to the new standard in the interim period:

- Environmental Protection Agency 40 CFR Parts 50, 51, and 81—*Federal Register (FR)*, Vol. 69, No. 84, Friday, April 30, 2004, *Final Rule to Implement the 8-Hour O₃ National Ambient Air Quality Standard—Phase 1*
- Environmental Protection Agency 40 CFR Parts 51, 52, and 80—*Federal Register*, Vol. 70, No. 228, Tuesday, November 29, 2005, *Final Rule to Implement the 8-Hour O₃ National Ambient Air Quality Standard—Phase 2*

Federal agencies are required to ensure that their actions conform to the SIP. Conformity, as defined in the CAA, means reducing the severity and number of violations of the NAAQS to achieve attainment of the standards for nonattainment regions. EPA has developed two distinctive sets of conformity regulations: one for transportation projects and one for nontransportation projects. Nontransportation projects are governed by general conformity regulations (40 CFR Parts 6, 51, and 93), described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*, published in the *Federal Register* on November 30, 1993. The general conformity rule became effective January 31, 1994. In addition, under Section 176(c) of the CAA, the general conformity rule became applicable 1 year after the 8-hour O₃ nonattainment designation became effective. In addition, the Commonwealth of Virginia has adopted conformity regulations (9 Virginia Administrative Code [VAC] 5-160-10 through 9 VAC 5-160-200). The Virginia General Conformity regulations were approved as part of the SIP by EPA on January 7, 2003 (68 FR 723). This is after the new O₃ standards were approved, but before they went into effect, so it is likely that the approved rules were written with the new standards in mind.

The proposed action at Fort Lee is a nontransportation project within a nonattainment area. Therefore, a general conformity analysis is required with respect to the O₃ standard. Under the general conformity rule, a project *conforms* if such activities DO NOT do any of the following:

1. Cause or contribute to any new violations of a standards in an area
2. Increase the frequency or severity of any existing violation of any standard in an area
3. Delay timely attainment of any standard or any required interim emission reductions or other milestones in an area

The general conformity rule specifies threshold or *de minimis* emission levels by pollutant to determine the applicability of conformity requirements for a project. For an area outside the OTR designated as marginal nonattainment for the 8-hour O₃ standard, such as AQCR 225, the *de minimis* criterion is 100 tons per year (tpy) for both NO_x and VOCs (Table 4.1.3-2).

Table 4.1.3-2
De Minimis thresholds for nonattainment areas

Criteria pollutants	De Minimis threshold (tpy)
O₃ (VOCs or NO_x)	
Serious NAAs	50
Severe NAAs	25
Extreme NAAs	10
Other O ₃ NAAs outside an O ₃ transport region	100
Marginal and moderate NAAs inside an O₃ transport region	
VOC	50
NO _x	100
CO	
All NAAs	100
SO₂ or NO_x	
All NAAs	100
PM₁₀	
Moderate NAAs	100
Serious NAAs	70
Lead	
All NAAs	25

Source: 40 CFR 93.153

Notes:

tpy = tons per year; NAA = nonattainment area

4.1.3.1.3 Local Ambient Air Quality

Existing ambient air quality conditions near Fort Lee can be estimated from measurements conducted at air monitoring stations close to the installation. The most recently available data from nearby monitoring stations are tabulated in (Table 4.1.3-3). With the exception of the 8-hour O₃ standards, most recent air quality measurements are below the NAAQS (USEPA 2006a, VDEQ 2005a).

Table 4.1.3-3
Monitored concentrations of criteria pollutants near Fort Lee

Pollutant	Monitoring station	Monitored data
CO		
8-hour maximum (ppm)	Forest Hill Fire Station Richmond	3.2
1-hour maximum (ppm)	Museum of Science Richmond	2.4
NO_x		
Annual arithmetic mean (ppm)	Charles City County Route 608	0.016
O₃		
8-hour maximum (ppm)	Charles City County Route 608	0.083
PM_{2.5}		
Annual arithmetic mean (µg/m ³)	Math and Science Center	13.9
24-hour maximum (µg/m ³)	Henrico County	32
PM₁₀		
Annual arithmetic mean (µg/m ³)	NA	NA
24-hour maximum (µg/m ³)	NA	NA
SO₂		
Annual arithmetic mean (ppm)	Charles City County Route 608	0.005
24-hour maximum (ppm)		0.116
3-hour maximum (ppm)		0.065

Sources: USEPA 2006a, VDEQ 2005a

Note:
 NA = Not monitored in the region

4.1.3.1.4 Existing Installation Emissions

Based on the installation's potential to emit, Fort Lee is not designated a major source of any criteria pollutants. Stationary sources of air emissions at Fort Lee include boilers, generators, degreasers, gasoline dispensers, and other various sources. Fort Lee operates under a synthetic minor Stationary Source Permit to Operate (Permit # 50564). VDEQ issued this permit on February 1, 2005 (VDEQ 2005b). As part of its permit requirements, the installation must submit annual comprehensive emission statements. Table 4.1.3-4 summarizes 2005 on-post emissions from stationary sources.

Table 4.1.3-4
2005 stationary source total emissions (tpy)

Installation	SO ₂	CO	PM ₁₀	PM _{2.5}	NO _x	VOC	Total HAP
Fort Lee	1.0	15.2	2.1	1.8	23.9	13.1	1.8

Source: Fort Lee 2006a

4.1.3.2 Environmental Consequences

Air quality impacts would be considered minor unless the estimated emissions would not conform to the draft maintenance plan for the Richmond/Petersburg area; would contribute to a violation of any federal, state, or local air regulation; or would contribute to a violation of Fort Lee's air operating permit.

4.1.3.2.1 Preferred Alternative

Short-term and long-term minor adverse effects on air quality would be expected from implementation of Preferred Alternative. These effects would be primarily due to nonroad vehicle and fugitive dust emissions during the construction phases, and ongoing operational emission due to emergency backup generators, heating boilers and other internal combustion sources at Fort Lee. The short-term construction emissions would exceed de minimis thresholds for calendar years 2008 through 2012. Therefore, a formal conformity determination has been prepared (see Appendix B). The Preferred Alternative would not cause or contribute to a violation of any federal, state, or local air regulation, or contribute to a violation of Fort Lee's air operating permit.

The construction and operational emissions associated with the implementation of the Preferred Alternative at Fort Lee were estimated (Tables 4.1.3-5 and 4.1.3-6). Emission estimates were made for incoming activities and for on-post infrastructure expansion and development. The predominant emission sources from incoming activities would be internal combustion engines and vehicles (military and privately owned vehicles). The largest source of on-post emissions would be due to construction activities (site clearing and grading, and building and road construction). The BRAC construction schedule, in terms of annual overall construction, is outlined in Table 4.1.3-7. Assumptions for the building construction for the purposes of calculating air emissions include the following:

- Construction emissions on the basis of total square feet to be constructed
- Assumed construction period of 2.0 to 2.5 years
- Total square footage broken down to smaller projects of 50,000 square feet each
- Each 50,000-square-foot project lasts 6 months
- 50,000-square-foot projects occur concurrently

Emissions were estimated for each year from 2007 to 2012. The year 2007 is the year when construction activities are anticipated to start, and 2012 represents the year when construction and movement of new personnel to Fort Lee would be completed. BRAC details including the construction schedule and movement of incoming activities are still in the early-planning stages. Reasonable assumptions were derived from available information from Fort Lee and incoming activities or standard technical documentation. Emissions from all sources were categorized as follows:

1. Vehicular Emissions (Military, GSA, and privately owned vehicles)
2. Stand-alone Internal Combustion Engines and External Combustion Equipment Emissions
3. Construction Emissions

Table 4.1.3-5
Estimated air emissions (tpy) at Fort Lee due to the Preferred Alternative

	2007		2008		2009		2010		2011		2012	
Category	NO_x	VOC	NO_x	VOC	NO_x	VOC	NO_x	VOC	NO_x	VOC	NO_x	VOC
Site Grading	3.72	0.39	12.9	1.36	2.77	0.29	2.95	0.31	1.51	0.16	-	-
Construction Site Hauling	0.17	0.01	0.58	0.05	0.11	0.01	0.11	0.01	0.05	0.00	-	-
Building Construction	64.2	11.8	286.3	52.8	269.8	49.7	98.5	18.2	76.8	14.2	26.0	4.79
Asphalt Application	-	-	-	-	-	-	1.12	0.12	1.12	0.12	1.12	0.12
Architectural Coating	-	-	-	-	-	0.82	-	8.53	-	7.47	-	7.50
Construction Worker Trips	0.42	0.61	2.25	3.22	2.24	3.19	0.93	1.32	0.73	1.03	0.15	0.21
POVs, GOVs, & Engine Testing ^{a,b}	-	-	-	-	9.14	6.72	38.1	27.4	48.7	34.5	49.4	33.6
Boilers/Heaters—Natural Gas	-	-	-	-	3.21	0.18	17.0	0.94	18.3	1.01	25.1	1.40
Emergency Generators ^c	-	-	-	-	-	-	2.01	0.1	6.03	0.2	8.04	0.2
Area Sources ^d	-	-	-	-	-	-	0.46	3.51	0.46	3.51	0.46	3.51
Paint Spray Booth(s)	-	-	-	-	-	-	-	1.32	-	1.32	-	1.32
Stage I Filling Station	-	-	-	-	-	0.53	-	2.38	-	2.78	-	3.42
Total	69	13	302	57	287	61	161	64	154	66	110	56

Notes:

POV = Privately Owned Vehicle

GOV = Government Owned Vehicle

tpy = tons per year

^aRefueling emissions included.^bAccounts for miles driven on and employee commute to and from Fort Lee.^cAssumed (4) 500 kW generators phased-in (1) -2010, (2) -2011, (1)-2012, Assumed a 250 hr/yr limit for each engine.^dIncludes degreasing, pesticides, herbicides, painting, lawn mowers for residential area(s)/housing units

Table 4.1.3-6
Air emissions compared to applicability thresholds

Construction year	NO_x (tpy)	VOC (tpy)	De minimis threshold (tpy)	Would emissions equal/exceed de minimis levels? (Yes/No)
2007	69	13	100	No
2008	302	57	100	Yes
2009	287	61	100	Yes
2010	161	64	100	Yes
2011	154	66	100	Yes
2012	110	56	100	Yes
Operational Emissions	83	44	100	No

Note:

tpy = tons per year

Table 4.1.3-7
Estimated BRAC construction schedule at Fort Lee

	2007	2008	2009	2010	2011	2012
Construction started [square feet]	1,020,612	3,530,557	761,308	810,399	416,000	0
% of total construction area	0.16%	0.54%	0.12%	0.12%	0.06%	0.00%

4. Area Source Emissions (painting, lawn mowing, degreasing, pesticides/herbicides)
5. New Boilers/Heating Emissions
6. Emergency/Standby Generator Emissions
7. Stage-I Tank Filling Emissions
8. Ordnance Detonation/Firing Range Emissions
9. Paint Spray Booth Emission

Because NO_x and VOCs are the identified precursors for O₃, the applicable nonattainment pollutant of concern in AQCR 225, they were carried forward for detailed analysis. Detailed methodologies for estimating both construction and operational air emissions are in Appendix B.

The estimated emissions from the Preferred Alternative would exceed the de minimis threshold values during the calendar years 2008 through 2012 (Table 4.1.3-6). Therefore, a formal conformity determination has been prepared according to the Commonwealth of Virginia general conformity regulations 9 VAC 5-160 (see Appendix B). The estimated emissions associated with the Preferred Alternative have been included in VDEQ attainment emissions inventory for the draft maintenance plan for the Richmond/Petersburg Area. Because the total direct and indirect emissions from the action are specifically identified and accounted for in the applicable implementation plan's attainment or maintenance demonstration, the Preferred Alternative would by default conform to the revised SIP once approved. In addition to including the emissions in the upcoming SIP revision, there are several other ways to demonstrate the action conforms to SIP requirements and milestones. These include:

- The emissions are fully offset within the same non-attainment or maintenance area through a revision to the applicable SIP or a similarly enforceable measure that affects emissions reductions so that there is no net increase in emissions of that pollutant.
- The emissions are determined and documented by the State agency primarily responsible for the applicable SIP to result in a level of emissions that, together with all other emissions in the non-attainment or maintenance area, would not exceed the emissions budgets specified in the applicable SIP.
- The emissions are determined by the State agency responsible for the applicable SIP to result in a level of emissions that, together with all other emissions in the non-attainment or maintenance area, would exceed an emissions budget specified in the applicable SIP, and the state Governor or the Governor's designee for SIP actions makes a written commitment to the USEPA that includes the following:
 - A specific schedule for adoption and submittal of a revision to the SIP which would achieve the needed emission reductions prior to the time emissions from the Federal action would occur;
 - Identification of specific measures for incorporation into the SIP that would result in a level of emissions that, together with all other emissions in the non-attainment or maintenance area, would not exceed any emissions budget specified in the applicable SIP;
 - A demonstration that all existing applicable SIP requirements are being implemented in the area for the pollutants affected by the Federal action and that local authority to implement additional requirements has been fully pursued;
 - A determination that the responsible Federal agencies have required all reasonable mitigation measures associated with their action; and
 - Written documentation that includes all air quality analyses supporting the conformity determination.

Although not anticipated, one or a combination of these additional measures may be necessary to demonstrate conformity. The conformity determination is required by law and will, by definition, show that the action would not:

- Cause or contribute to any new violations of a NAAQS in any area
- Increase the frequency or severity of any existing violation of any NAAQS in any area
- Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area

Cumulative Effects

Impacts on air quality are primarily due to the use of heavy construction equipment for ground clearing and facility construction and renovation. Construction of BRAC facilities and of new family housing under the RCI program would occur simultaneously. Pollutant emissions attributable to the two actions would occur concurrently within the same AQCR. Other construction and development projects will, of course, occur within the Fort Lee region, and all of the projects would produce some measurable amounts of air pollutants. The Commonwealth of Virginia takes into account the effects of all past, present, and reasonably foreseeable projects in the region and associated emissions during the development of the SIP. Estimated emissions

generated by the Preferred Alternative would conform to the SIP. Therefore, this alternative would not contribute to significant adverse cumulative air quality impacts.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on air quality. Best management practices required as part of DoD and Fort Lee policy and by the Commonwealth of Virginia, examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on air quality.

Best Management Practices for Air Quality

Fugitive Dust Control. The grading and site-preparation phases of constructions would generate fugitive dust emissions. Fort Lee's air-operating permit does not outline specific installation-wide limitations on construction-phase emissions of criteria pollutants. Virginia's Administrative Code (9 VAC 5-40-90 and 9 VAC 5-50-90) does require reasonable precautions to prevent particulate matter from becoming airborne. Such precautions can include, but would not be limited to, the following:

- Using water or chemicals for dust control when demolishing existing buildings or structures, construction operations, grading roads, or clearing land.
- Applying water or suitable chemicals on dirt roads, materials stockpiles, and other surfaces that could create airborne dust.
- Paving roadways and maintaining them in a clean condition.
- Installing and using hoods, fans, and fabric filters to enclose and vent the handling of dusty material, including the implementation of adequate containment methods during sandblasting or other similar operations.
- Covering open equipment for conveying or transporting material likely to create objectionable air pollution when airborne.
- Promptly removing spilled or tracked dirt or other materials from paved streets.

Open Burning. Project activities would likely include the burning of construction or demolition material or land-clearing debris. Therefore, open burning might require a permit for this activity (9 VAC 5-40-5600 et seq). The Virginia Administrative Code provides for, but does not require, the local adoption of a model ordinance concerning open burning. The model ordinance includes, but is not limited to, the following:

- All reasonable effort must be made to minimize the amount of material burned with the number and size of the debris piles.
- The material to be burned must consist of brush, stumps, and similar debris waste and lean-burning demolition material.
- The burning must be at least 500 feet from any occupied building unless the occupants have given prior permission, other than a building on the property on which the burning is conducted.

- The burning must be conducted at the greatest distance practicable from highways and air fields.
- The burning must be attended at all times and conducted to ensure the best possible combustion with a minimum of smoke being produced.
- The burning must not be allowed to smolder beyond the minimum period of time necessary for the destruction of the materials.
- The burning must be conducted only when the prevailing winds are away from any city, town or built-up area.

Before construction, Fort Lee would contact the appropriate state and local agencies and acquire necessary open burning permits when required.

4.1.3.2.2 Regional Mobile Emissions

Mobile emission sources of concern include primarily changes in vehicular traffic. The primary air emissions from vehicular traffic are CO, NO_x, and VOCs. Lead emissions from vehicular traffic have declined in recent years through the increased use of unleaded gasoline and are extremely small. Air-quality impacts from traffic are generally evaluated on two scales: meso-scale and micro-scale

Meso-scale

Meso-scale analysis is performed at the regional level. NO_x and VOCs are of regional concern in nonattainment areas for O₃. Changes in traffic patterns in AQCR 225 resulting from the Preferred Alternative would introduce changes in regional O₃ levels. Ozone and its precursors are subject to air transport phenomena under different weather conditions. Therefore, the Metropolitan Planning Organization (MPO), using regional O₃ airshed models, generally evaluates regional effects on O₃. Meso-scale analysis is not generally conducted on a project-specific basis and is not necessary for this EIS.

The two MPOs, Richmond and Tri-Cities, along with the Virginia Department of Transportation (VDOT) are responsible for developing conformity demonstrations for transportation plans and programs within this area. The Transportation Improvement Plan (TIP) and Long-range Transportation Plan (LRTP) for the metropolitan Richmond area contain a list of proposed transportation projects to be built in the region between now and 2026. The Metropolitan Richmond Air Quality Committee (MRAQC) prepares an air quality plan for the Richmond area. This plan evaluates the ability of the transportation project inventory contained in the draft TIP and LRTP, emission controls, and subsequent mobile emissions budget ability to comply with the SIP being developed. Because the 2005 BRAC action at Fort Lee is not an approved transportation project, transportation conformity is not required. Vehicle emissions were included in the emission estimations and will be accounted for in the general conformity demonstration. Also, it would be necessary for MRAQC to include the changes in vehicle emission for all BRAC and non-BRAC actions in the region when developing the new TIP and LRTP. Fort Lee would conform to all air-pollution controls outlined in the SIP.

Micro-scale

CO and PM are site-specific pollutants with higher concentrations found adjacent to roadways and signalized intersections. Micro-scale analysis is performed to identify localized *hot spots* of criteria pollutants. Micro-scale analysis is often conducted on a project-specific basis in regions where CO and PM are of particular concern. None of the regions associated with the Preferred Alternative are nonattainment or maintenance areas for these pollutants; therefore, micro-scale analysis is not necessary for this EIS.

4.1.3.2.3 Regulatory Review and Air Permit Requirements

The new facilities would be equipped with several natural gas boilers, emergency generators, and other stationary sources of air emissions. These sources of air emissions would be subject to federal and state air permitting requirements. These requirements include, but would not be limited to, nonattainment new source review (NSR), prevention of significant deterioration (PSD), Title V, new source performance standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAP).

Nonattainment New Source Review

NSR requires operators of stationary sources of air pollution such as heating boilers and emergency generators to obtain permits before they start construction (40 CFR 52.21). VDEQ requires nonattainment NSR permits for new major sources or existing major sources making a major modification in a nonattainment area. NSR permits specify what construction would be allowed, what emission limits must be met, and, often, how the source must be operated. NSR includes requirements for best available control technology (BACT) and emission offsets. To assure that sources follow the permit requirements, permits also contain monitoring, record-keeping, and reporting requirements. It is not anticipated that Fort Lee would become a major source of air emissions. Therefore, NSR would not likely apply to the new facilities (Table 4.1.3-8).

Table 4.1.3-8
Air quality regulatory review for proposed stationary sources at Fort Lee

Regulation	Project status
New Source Review	Fort Lee is not anticipated to become a major source of air emissions. Therefore, NSR would not apply to the new facilities.
Prevention of Significant Deterioration (40 CFR Part 52)	Potential emissions would not exceed the 250-tpy PSD threshold. Therefore, the project would not be subject to PSD review.
Title V	Fort Lee is not a major source of air emissions under the Title V provisions. As such, it operates under a synthetic minor air-operating permit. With the implementation of the preferred alternative modifications to Fort Lee's existing operating permit would be required.
National Emission Standards for Hazardous Air Pollutants (40 CFR Parts 61 and 63)	Potential HAP emissions would not exceed NESHAP thresholds. Therefore, the use of MACT would not be required.
New Source Performance Standards (40 CFR Part 60)	Emergency generators are not included in NSPS. However, any boilers rated equal to or greater than ten million BTUs installed would have to comply with NSPS.

Prevention of Significant Deterioration

The federal PSD program preserves the air quality in attainment areas. PSD regulations impose limits on the amount of pollutants that major sources may emit. These limits are 250 tons per year for any criteria pollutant. PSD requirements include BACT, evaluation of emission impacts on vegetation and soils, and dispersion modeling. Under the PSD program, Class I areas are assigned to protect federal wilderness areas, such as national parks, where the least amount of air quality deterioration is allowed. Potential emissions associated with the Preferred Alternative would not exceed the 250-tpy PSD threshold for any criteria pollutant. Therefore, the project would not be subject to PSD review (Table 4.1.3-8).

Title V

Title V of the CAA Amendments of 1990 requires a federal operating permit for major sources of criteria pollutants (40 CFR Part 70). Title V permits would be required if the annual potential to emit exceeds thresholds for criteria and hazardous air pollutants. The attainment status in each AQCR determines the major source threshold criteria. Fort Lee is not a major source of air emissions under the Title V provisions. As such, the installation operates under a synthetic minor air-operating permit. Increases due to implementing the Preferred Alternative would not contribute to a violation of this permit. The new facilities would be equipped with several emergency generators and natural gas boilers that fall under Virginia's air permitting regulations. When the project reaches the final design phases, Fort Lee would obtain all required construction and operating permits for new emission sources. Fort Lee would review all new emission sources with respect to current facilitywide emissions limits to ensure compliance with the Title V provisions (Table 4.1.3-8).

National Emission Standards for Hazardous Air Pollutants

The CAA Amendments of 1990, under revisions to Section 112, require EPA to list and promulgate NESHAPs to reduce the emissions of hazardous air pollutants, such as formaldehyde, benzene, xylene, and toluene from categories of major and area sources (40 CFR Part 63). New stationary sources whose potential to emit HAPs exceeds either 10 tons per year of a single HAP or 25 tons per year of all regulated HAPs would be subject to maximum achievable control technology (MACT). Potential HAP emissions associated with the Preferred Alternative would not exceed NESHAP thresholds. Therefore, the use of MACT would not be required (Table 4.1.3-8).

New Source Performance Standards

The NSPS process requires EPA to list categories of stationary sources that cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare. The NSPS program sets uniform emission limitations for many industrial sources. Emergency generators are not included in NSPS. Boilers rated greater than one million British Thermal Units (BTUs) installed would have to comply with NSPS. No other industrial sources subject to NSPS would be anticipated with the implementation of the Preferred Alternative (Table 4.1.3-8).

4.1.3.2.4 No Action Alternative

No effects would be expected. The No Action Alternative would result in no changes in ambient air quality conditions. No BRAC-related construction activities would be undertaken, and no BRAC-related changes in operations or traffic would take place. Air quality conditions would remain as described in section 4.1.3.1.

4.1.4 Noise

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

Sound varies in intensity and frequency. Sound pressure levels (SPL), described in decibels (dB), are used to quantify sound intensity. The decibel is a logarithmic unit that expresses the ratio of a SPL to a standard reference level. The Hertz (Hz) is used to quantify sound frequency. The human ear responds differently to different frequencies. *A-weighting*, described in A-weighted decibels (dBA), approximates this frequency response to express better the perception of sound by humans. Generally, a change in noise level of 3 dBA is barely perceptible to most listeners. A scale relating sounds encountered in daily life to their approximate dBA values is provided in Table 4.1.4-1. *C-weighting*, described in C-weighted decibels (dBC), is similar to A-weighting, except it incorporates more low-frequency noise. C-weighting is predominately used to describe noise that has a component of rumble or the potential for noise-induced vibrations. It has been used traditionally to describe extreme impulse-type sounds, such as the sounds from large-caliber weaponry and demolitions (FICUN 1980).

**Table 4.1.4-1
Common sound levels**

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

Source: Harris 1998.

4.1.4.1 Affected Environment

4.1.4.1.1 The Military Noise Environment and Land Use Compatibility

The military noise environment consists primarily of three types of noise: transportation noise from aircraft and vehicles, noise from firing at small-arms ranges, and impulsive noise from large-caliber weapons firing and demolition operations. AR 200-1 defines land-use compatibility concerning environmental noise for Army activities. Three noise zones are defined in the regulation:

- 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 (normally incompatible): 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.

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 (Hede 1982). Other metrics used by the Army to quantify the noise environment at Army installations are 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-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. Table 4.1.4-2 outlines noise limits and zones for land use planning for small-arms, aircraft, and large-caliber weapons and demolitions.

Table 4.1.4-2
Noise limits and zones for land use planning

Noise zone	Small-arms	Aircraft (ADNL)	Large-Caliber Weapons (> 20 mm) and Demolition(CDNL)
I	< 87 dBP	< 65 dBA	< 62 dBC
II	87–104 dBP	65–75 dBA	62–70 dBC
III	> 104 dBP	> 75 dBA	> 70 dBC

Source: U.S. Army 1997.

4.1.4.1.2 Concern and Complaints Regarding Large-Caliber Weapons and Demolition

The use of explosives and large-caliber weapons are common causes of complaint 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, 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 4.1.4-3 outlines level of concern guidelines using peak noise levels for impulsive noise.

Table 4.1.4-3
Peak noise limits and level of concern for land use planning

Noise zone	Large-caliber weapons (> 20 mm) and demolition
Acceptable	< 115 dBP
Marginal	115–130 dBP
Unacceptable	> 130 dBP

Source: U.S. Army 1997.

4.1.4.1.3 Existing Ambient Noise Levels

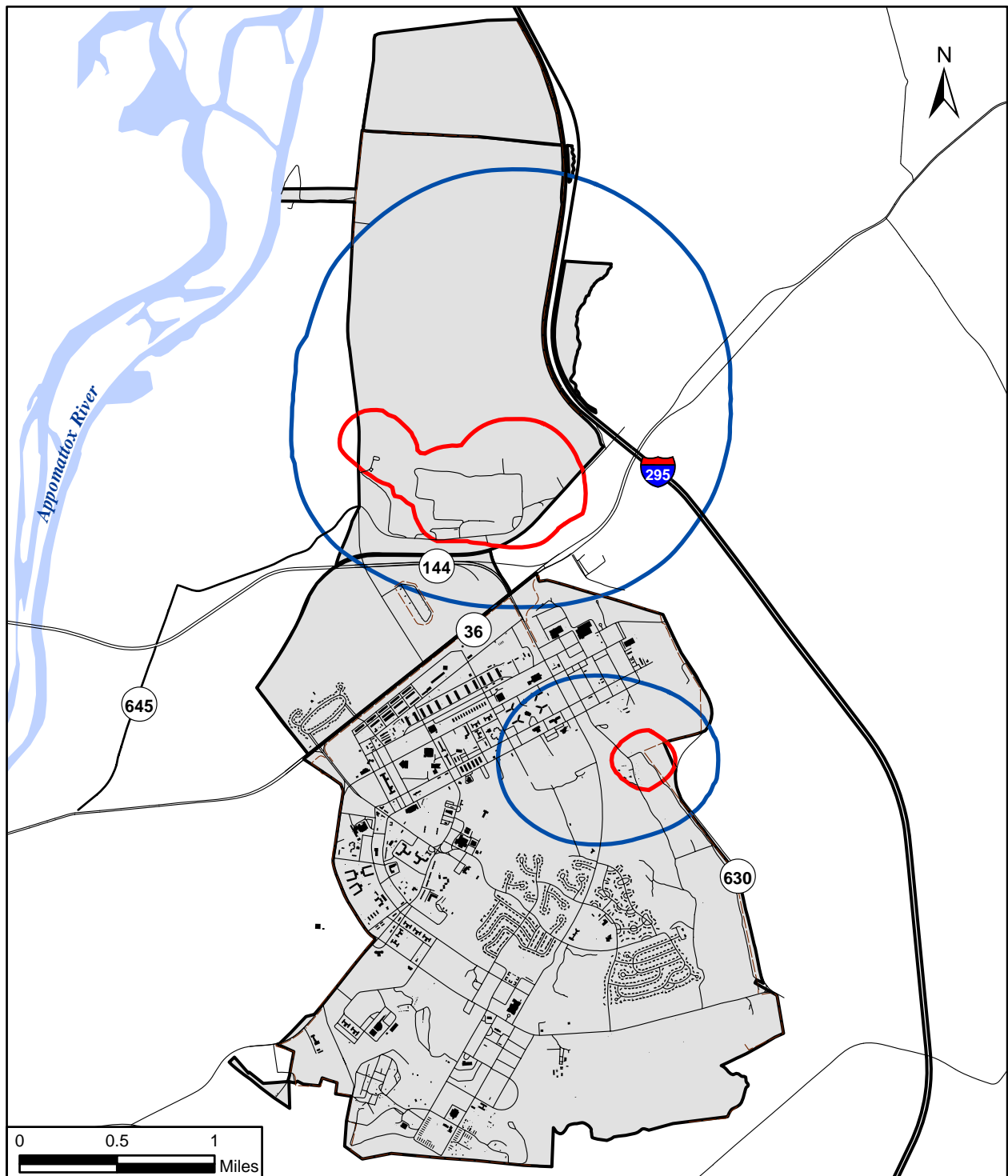
The following discussion of conditions that exist within the areas around Fort Lee deals primarily with noise levels, and compatible and incompatible land uses. The examination of existing conditions focuses on aircraft operations, small-arms ranges, large weapons firing, and demolition.

The noise generated by small-arms training activities at Fort Lee extends to areas outside the installation boundary. The noise from aircraft, industrial-type operations, operation of railroad equipment, and movement of heavy military vehicles does not have a considerable effect on the surrounding civilian communities or military housing areas at Fort Lee (USACHPPM 2002). Fort Lee, though not subject to local noise policies or ordinances, has no existing activities that conflict with the local standards and guidelines affecting human health and safety. There is no use of heavy artillery or demolitions on Fort Lee.

Fort Lee does not have an active airfield and has minimal aircraft noise. Fort Lee's mission for rotary-wing aircraft operations is accommodated at Felker Army Airfield, Fort Eustis, Virginia. The aviation mission is to provide support to Fort Lee and its tenant activities. Aviation missions include MEDEVAC, helicopter sling-load operations training, and aircraft crash site training. The noise and buffer zones associated with aircraft operations do not extend beyond the drop zone and the other training areas. Individual aircraft flyovers of off-post areas might cause residents under or near the flight track to be annoyed, and these existing operations lead to a small number of noise complaints.

Fort Lee operates several small-arms ranges on the post. These ranges are for both Army training and recreational uses such as skeet shooting. The noise contours for small-arms operations at Fort Lee were created using peak sound levels as prescribed in AR 200-1 (U.S. Army 1997). Noise zone II (Peak Level 87–104 dB) extends beyond the eastern boundary less than 1,000 meters (1,093 yards) and beyond the western boundary less than 500 meters (547 yards). Noise zone III (Peak Level > 104 dB) extends beyond the eastern boundary less than 200 meters (219 yards) and beyond the western boundary less than 150 meters (164 yards) (Figure 4.1-4).

The on-post land contained within noise zones II and III and the buffer zone is used for training. The off-post land contained in these zones along the western boundary is sparsely populated; there are a few homes along Route 645 and Route 630. The off-post land contained in these zones along the eastern boundary is developed and includes commercial and residential land uses. The land uses of the on-post land contained in noise zones II and III meet federal noise guidelines. The off-post commercial land uses are incompatible in noise zone III and compatible in the other zones. The off-post residential land uses in zones II and III are not considered compatible.



LEGEND

- | | |
|-----------------------|--------------------|
| Installation Property | Noise Zones |
| Road | Zone II |
| Building | Zone III |
| Surface Water | |

**Existing Small Caliber
Range Noise Contours**

Fort Lee, Virginia

Sources: Fort Lee GIS, 2006; USACHPPM, 2006.

Figure 4.1-4

4.1.4.2 Environmental Consequences

4.1.4.2.1 Preferred Alternative

Short- and long-term minor adverse effects on the noise environment at Fort Lee would be expected with the implementation of the Preferred Alternative. The effects would be primarily due to heavy equipment noise during construction, the addition of the vehicle recovery facilities in the northern training area, and the addition of heavy vehicle maintenance facilities (or highbays) in Training Area 5. Training Area 5 is adjacent to the Petersburg National Battlefield and the Jackson Circle family housing area.

Noise from Construction Activities

The Preferred Alternative would require construction activities at Fort Lee. Individual pieces of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high construction noise typically extends to distances of 400 to 800 feet from the site of major equipment operations. Locations more than 1,000 feet from construction sites seldom experience noteworthy levels of construction noise. Table 4.1.4-4 presents typical noise levels (dBA at 50 feet) that EPA has estimated for the main phases of outdoor construction. Given the temporary nature of proposed construction activities and the limited amount of noise that construction equipment would generate, this effect would be considered minor.

Table 4.1.4-4
Noise levels associated with outdoor construction

Construction phase	Sound level (dBA)
Ground clearing	84
Excavation, grading	89
Foundations	78
Structural	85
Finishing	89

Source: USEPA 1971.

Although construction-related noise effects would be minor, the following best management practices would be used to reduce these already-limited noise effects further:

- Construction would predominately occur during normal weekday business hours in areas adjacent to noise-sensitive land uses such as residential areas, recreational areas, and any off-post areas.
- Construction equipment mufflers would be properly maintained and in good working order.
- Residents adjacent to construction areas would be notified of the duration of construction activity before beginning work.

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

Noise from Aircraft, Small-arms Activities, and Vehicle Recovery

There would be no changes to aircraft operations, small-arms training, artillery training, or use of demolitions at Fort Lee with the implementation of the Preferred Alternative. Therefore, noise generated by these activities would remain as described in section 4.1.4.1. The proposed vehicle recovery training area and the addition of heavy vehicle maintenance facilities (or highbays) would have the potential to have minor adverse effects on the existing noise environment. The sizes and types of the equipment used at these facilities and their associated noise level would be comparable to those used during construction (Table 4.1.4-4). However, the activity would be an ongoing operational activity, not temporary in nature.

Vehicle recovery training would involve the use of heavy trucks, cranes, winches, and other heavy equipment. The general location of the proposed vehicle recovery training area is shown in Figure 2.2-2. As with the construction, locations more than 1,000 feet from the site would seldom experience noteworthy levels of noise. Because of the selected location of the proposed vehicle recovery training, there would be no on-post or off-post incompatible land uses.

Noise from Highbays

The heavy vehicle maintenance facilities would be constructed within Training Area 5, between Route 36 and Route 144. Sources of noise associated with the facilities would be heavy vehicles and maintenance equipment such as tanks, armored vehicles, and cranes. Adverse effects associated with the operation of heavy maintenance equipment noise would be confined within the buildings when the bay doors were closed. In addition, laundry units, reverse osmosis, and tactical water purification systems might be operated in conjunction with the facilities. Noise generated by the facilities would be considered primarily nuisance-type noise. When the bay doors were opened, the sound, frequency, and levels would ultimately depend on the final location, layout, orientation, construction, and operation of the highbays. Sensitive land uses adjacent to Training Area 5 include the Petersburg National Battlefield and the Jackson Circle family housing area.

Cumulative Effects

No cumulative effects on the noise environment would be expected.

Mitigation

Extra care would be taken during the planning and design stages such that the location and orientation of the heavy vehicle maintenance facilities (highbays) at Fort Lee would minimize noise exposure to Petersburg National Battlefield and the Jackson Circle family housing area. Mitigation measures that the Army is considering include installing noise control devices on outdoor equipment, placing the facilities as far away from sensitive land uses as feasibly possible, orienting the bays away from noise-sensitive areas, and configuring outdoor equipment such that it is not within the line of sight of the sensitive areas.

4.1.4.2.2 No Action Alternative

No effects would be expected. Selecting the No Action Alternative would result in no impact on the ambient noise environment. No BRAC-related construction, changes in traffic, or changes in military operations at Fort Lee would be expected. Ambient noise conditions would remain as described in section 4.1.4.1.

4.1.5 Geology and Soils

4.1.5.1 Affected Environment

4.1.5.1.1 Geologic and Topographic Conditions

Fort Lee is within the Atlantic Coastal Plain Physiographic Province. Sediments consist of lenses of sand, gravel, silt, and clay, which approach a thickness of 300 feet. The Coastal Plain deposits overlie igneous and metamorphic rock units, which dip to the east. The western edge of the Coastal Plain is characterized by a thin layer of sediments that overlies the igneous and metamorphic rock units of the Piedmont Physiographic Province. The boundary between these two provinces, referred to as the Fall Line, lies approximately 2 to 3 miles west of Fort Lee. Locally, Fort Lee lies within the Prince George Upland, which is bordered on the west by the Fall Line and on the east by Chippokes Creek (Fort Lee DPWL-EMO 2005).

The topography of Fort Lee is gently rolling, and the average elevation is 95 feet above mean sea level (msl). The areas on the installation with the highest elevations are mainly in the cantonment area near the intersection of Mahone Avenue and Adams Avenue, in the recreation area that serves the family housing east of Saratoga Drive, and at the installation's southern boundary. Elevations in these areas range from 140 to 160 feet above msl. Elevations along Bailey Creek drop to 50 feet above msl, and elevations in the firing range area along Cabin Creek are 50 to 60 feet above msl (Versar 2005a).

4.1.5.1.2 Soils

There are 34 unique soil series on Fort Lee (USDA 1985). They are listed on Table 4.1.5-1, along with their status as prime farmland, erodibility potential, hydric status, drainage, permeability, water capacity, shrink-well potential, and flooding and ponding frequency.

The most common soil series on Fort Lee are the following:

- *Slagle sandy loam*. This soil series is nearly level to gently sloping (0 to 2 percent slopes) and very deep. The surface layer is typically sandy loam about 10 inches thick, and it has a moderately low content of organic matter. The top of the seasonal high water table is at 18 inches.
- *Emporia fine sandy loam*. This series is gently sloping to moderately sloping (2 to 6 percent slopes) and very deep. The surface layer is typically fine sandy loam about 8 inches thick, and it has a moderately low content of organic matter. The top of the seasonal high water table is at 45 inches.
- *Slagle sandy loam*. This series is gently sloping to moderately sloping (2 to 6 percent slopes) and very deep. The surface layer is typically sandy loam about 10 inches thick. The surface layer has a moderately low content of organic matter. The top of the seasonal high water table is at 18 inches.
- *Urban land*. The urban land on Fort Lee consists of areas where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. The urban land and Udorthent soil series also include areas that have been excavated or filled for development.
- *Kinston complex*. This series is nearly level to gently sloping and very deep. Typically, the surface layer is loam about 7 inches thick with a moderate content of organic matter. The top of the seasonal high water table is at 6 inches.

- *Chickahominy silt loam*. This series is nearly level to gently sloping and very deep. Typically, the surface layer is silt loam about 7 inches thick with a moderately low content of organic matter. The top of the seasonal high water table is at 3 inches.
- *Hydric soils* are defined as soils characterized by or having an abundance of moisture, and are one criteria used to delineate wetlands. Soils considered hydric might impose limitations on agriculture, engineering, or the use of septic tanks due to excess moisture. Specific criteria related to wetness must be present for areas to be classified as jurisdictional wetlands. There are twelve soil series on Fort Lee that are considered hydric or contain hydric inclusions, as shown on Table 4.1.5-1. These soil series cover a total of 2,126 acres, or approximately 42 percent of the installation (USDA 1985).

Fort Lee has seven highly erodible soils and eleven potentially highly erodible soils, as shown on Table 4.1.5-1. A total of 481 acres of highly erodible soils cover 9 percent of Fort Lee, and 2,579 acres of potentially highly erodible soils cover 48 percent of the installation (USDA 1985).

4.1.5.1.3 Prime Farmland Soils

Prime farmland soils are protected under the Farmland Protection Policy Act (FPPA) of 1981 (7 CFR Part 658; Natural Resources Conservation Service [NRCS] Final Rule, Farmland Policy, July 5, 1984; proposed revisions published on January 8, 1987). The intent of the FPPA is to minimize the extent to which federal programs contribute to the unnecessary or irreversible conversion of farmland soils to nonagricultural uses. The act also ensures that federal programs are administered in a manner that, to the extent practicable, will be compatible with private, state, and local government programs and policies and the rules and regulations for implementing the act (see 7 CFR Part 658, July 5, 1984).

The implementing procedures of the FPPA and the NRCS require federal agencies to evaluate the direct and indirect adverse effects of their activities on prime and unique farmland. Federal agencies must also evaluate the effects of their activities on farmland of statewide and local importance and must consider alternative actions that could avoid adverse effects. Potential effects on prime and unique farmlands are determined by preparing the Farmland Conversion Impact Rating Form (Form AD 1006) and applying criteria established in Section 658.5 of the FPPA (7 CFR Part 658). Because of the use of the area for military purposes, however, the soils on the sites would not qualify as Prime Farmland soils, and no Form AD 1006 is required.

Prime farmland soils are defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. The soil qualities, growing season, and moisture supply are those needed for a well-managed soil to produce a sustained high yield of crops in an economic manner. Farmland soils of statewide importance include lands, in addition to prime farmland, that are important for the production of food, feed, fiber, forage, and oilseed crops.

Fort Lee has 24 soil series identified as prime farmland. Eight soil series covering 2,531 acres, or 45 percent of Fort Lee, are designated as Prime Farmland in All Areas. Thirteen soil series covering 832 acres, or 16 percent, are designated as Prime Farmland of Statewide Importance. Three soil series covering 228.4 acres, or 4.3 percent of Fort Lee, are designated as Prime Farmland If Drained. The soils designated as Prime Farmland in All Areas, Prime Farmland of Statewide Importance, and Prime Farmland If Drained that occur on Fort Lee are listed on Table 4.1.5-1 (USDA 1985).

**Table 4.1.5-1
Soil Series on Fort Lee**

Map Unit	Name	Acres	%	Prime Farm land	Erodibility	Hydric or Hydric Inclusions	Drainage	Permeability	Water Capacity	Shrink Swell	Flooding/Ponding
25B	Slagle sandy loam, 2 to 6 percent slopes	854.8	16.0	PF	PHE	Yes	MWD	VS	M	L	No/No
11B	Emporia fine sandy loam, 2 to 6 percent slopes	815.1	15.3	PF	PHE	No	WD	VS	M	L	No/No
30B	Wickham fine sandy loam, 2 to 6 percent slopes	33.5	0.6	PF	PHE	No	WD	M	M	L	No/No
4B	Aycock silt loam, 2 to 6 percent slopes	13.4	0.3	PF	PHE	No	WD	MS	H	L	No/No
1B	Ackwater silt loam, 2 to 6 percent slopes	65.2	1.2	SI	PHE	No	MWD	MS	M	M	No/No
23B	Peawick silt loam, 2 to 6 percent slopes	32.5	0.6	SI	PHE	No	MWD	VS	M	H	No/No
18B	Montross silt loam, 2 to 6 percent slopes	31.4	0.6	SI	PHE	No	MWD	M	L	L	No/No
29	Urban land-Udorthents complex	291.4	5.5	NPF	PHE	No	x	x	x	x	No/No
26	Udorthents, loamy	160.9	3.0	NPF	PHE	Yes	WD	x	x	x	x
27	Udorthents, clayey	149.5	2.8	NPF	PHE	No	WD	x	x	x	No/No
7B	Bonneau loamy sand, 0 to 6 percent slopes	131.1	2.5	NPF	PHE	No	WD	M	M	L	No/No
25A	Slagle sandy loam, 0 to 2 percent slopes	645.7	12.1	PF	NHE	No	MWD	VS	M	L	No/No
21	Norfolk fine sandy loam	93.6	1.8	PF	NHE	No	WD	M	H	L	No/No
4A	Aycock silt loam, 0 to 2 percent slopes	64.3	1.2	PF	NHE	No	WD	MS	H	L	No/No
30A	Wickham fine sandy loam, 0 to 2 percent slopes	10.9	0.2	PF	NHE	No	WD	M	M	L	No/No
18A	Montross silt loam, 0 to 2 percent slopes	182.7	3.4	SI	NHE	No	MWD	M	L	L	No/No
23A	Peawick silt loam, 0 to 2 percent slopes	83.1	1.6	SI	NHE	Yes	MWD	VS	M	H	No/No
17	Lynchburg-Slagle complex	29.0	0.5	SI	NHE	Yes	SPD	M	M	L	No/No
1A	Ackwater silt loam, 0 to 2 percent slopes	25.9	0.5	SI	NHE	No	MWD	MS	M	M	No/No
20	Newflat silt loam	19.2	0.4	SI	NHE	Yes	SPD	VS	M	H	No/No
24	Rains loam	164.3	3.1	PFID	NHE	Yes	PD	M	M	L	No/No
16	Lynchburg loam	64.0	1.2	PFID	NHE	No	SPD	M	M	L	No/No
3	Argent silt loam	<0.1	<0.1	PFID	NHE	Yes	PD	S	H	M	No/No
28	Urban land	319.2	6.0	NPF	NHE	No	x	x	x	x	No/No
14	Kinston complex	299.3	5.6	NPF	NHE	Yes	PD	M	H	L	FF/No
10	Chickahominy silt loam	269.0	5.0	NPF	NHE	Yes	PD	MS	h	M	No/No
9	Catpoint fine sand	4.9	0.1	NPF	NHE	Yes	SED	R	L	L	No/No
13D	Emporia and Slagle soils, 6 to 15 percent slopes	242.2	4.5	SI	HE	Yes	WD	VS	M	L	No/No

Table 4.1.5-1
Soil Series on Fort Lee (continued)

Map Unit	Name	Acres	%	Prime Farm land	Erodibility	Hydric or Hydric Inclusions	Drainage	Permeability	Water Capacity	Shrink Swell	Flooding/Ponding
25C	Slagle sandy loam, 6 to 10 percent slopes	99.1	1.9	SI	HE	No	MWD	S	M	L	No/No
11C	Emporia fine sandy loam, 6 to 10 percent slopes	15.3	0.3	SI	HE	No	WD	VS	M	L	No/No
1C	Ackwater silt loam, 6 to 10 percent slopes	3.9	0.1	SI	HE	No	MWD	MS	M	M	No/No
30C	Wickham fine sandy loam, 6 to 10 percent slopes	3.1	0.1	SI	HE	No	WD	M	M	L	No/No
12F	Emporia soils, 15 to 45 percent slopes	97.6	1.8	NPF	HE	Yes	WD	VS	M	L	No/No
7C	Bonneau loamy sand, 6 to 10 percent slopes	20.2	0.4	NPF	HE	No	WD	M	M	L	No/No

FF - Frequently Flooded

H - High

HE - Highly Erodible

L - Low

M - Moderate

MS - Moderately Slow

MWD - Moderately Well Drained

NHE - Not Highly Erodible

NPF - Not Prime Farmland

PD - Poorly Drained

PFID - Prime Farmland If Drained

PHE - Potentially Highly Erodible

R - Rapid

S - Slow

SED - Somewhat Excessively Drained

SI - Farmland of Statewide Importance

SPD - Somewhat Poorly Drained

VS - Very Slow

WD - Well Drained

x - Not Available

PF - All Areas Prime Farmland

4.1.5.2 Environmental Consequences

4.1.5.2.1 Preferred Alternative

Short- and long-term minor adverse effects would be expected from implementing the Preferred Alternative. Soil erosion is generally not a problem in the undeveloped areas of Fort Lee. Soil erosion would result from construction activities, however, and potentially from increased storm water runoff. Erosion control measures implemented as part of the Storm Water Pollution Prevention Plan (SWPPP) would minimize soil erosion both during and after construction. As recommended by the Fort Lee Integrated Natural Resources Management Plan (INRMP), areas with slopes of 5 percent or greater would be avoided for development. No effects on geology, topography, or prime farmland would occur.

Cumulative Effects

No cumulative effects on geology or soils would be expected.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on soils. Best management practices, including limiting land disturbance on each parcel to no more than what is necessary for the desired use, following erosion and sediment control measures for storm water control (see section 4.1.6.2.1), and using temporary crossing bridges or mats to minimize soil compaction where parking and stacking are unavoidable would adequately limit the adverse impact of the Preferred Alternative on soils.

4.1.5.2.2 No Action Alternative

No effects on geology, topography, soils, or Prime Farmland would occur under the No Action Alternative.

4.1.6 Water Resources

4.1.6.1 Affected Environment

4.1.6.1.1 Watershed Characterization

Watersheds and Subwatersheds

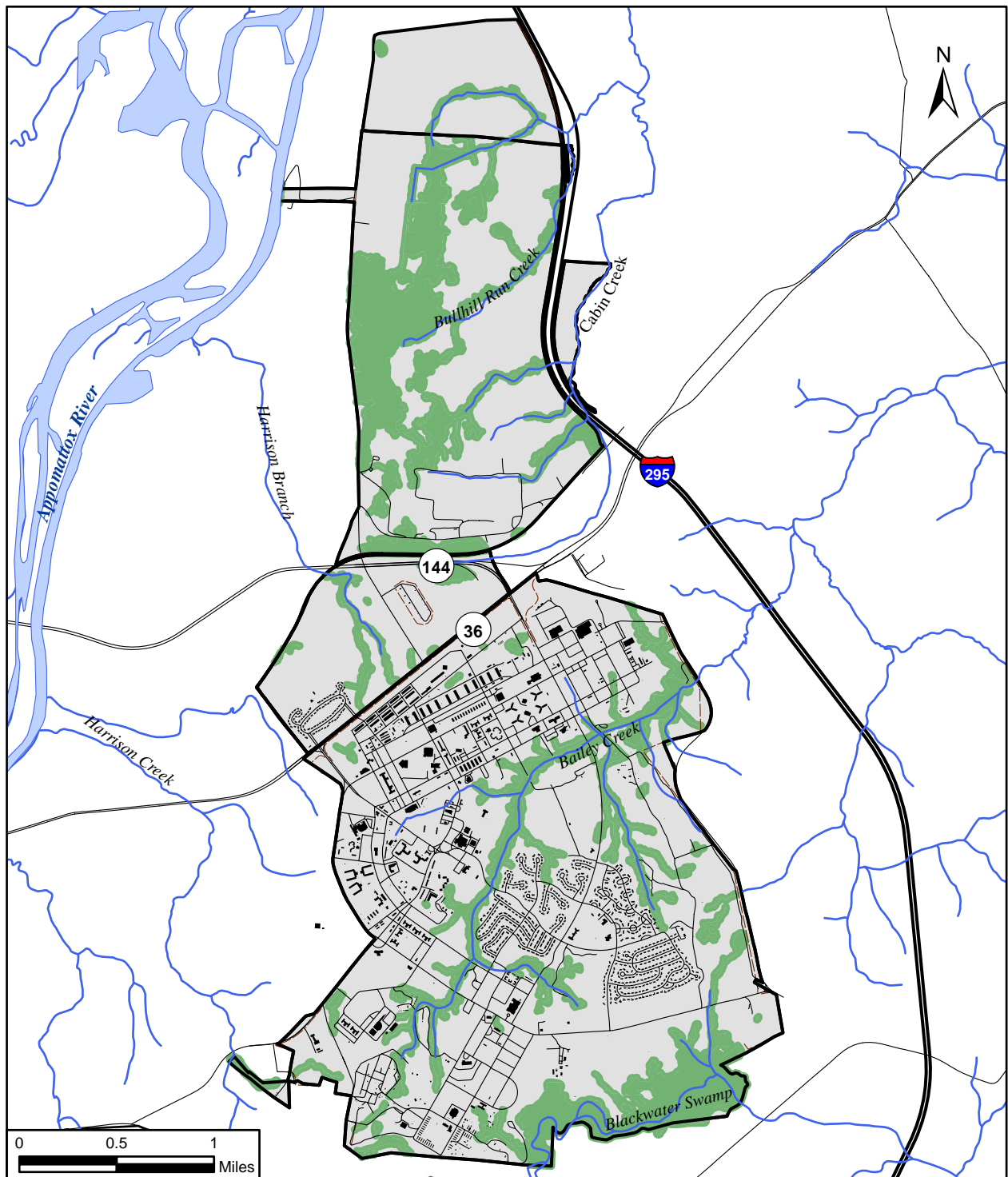
Three major river systems drain Fort Lee: the James (to which Bailey Creek flows), Appomattox, and Blackwater rivers (8-digit Hydrologic Unit Codes (HUCs) 02080207, 02080206, and 03010202) (Figure 4.1-5). The total area of each major watershed and its percentage of the total watershed area within Fort Lee are presented in Table 4.1.6-1.

Table 4.1.6-1
Watershed area information: Fort Lee

Watershed (from VA watersheds coverage—vawatbod.shp)	Total surface (Acres)	Area within installation (Acres)	Percentage of total watershed area within installation	Percentage of installation within watershed
James River	94,268	2,303	2%	43%
Lower Appomattox River	52,589	2,372	5%	44%
Blackwater Swamp	77,147	670	1%	13%

Fort Lee water bodies ultimately flow into the Chesapeake Bay, except for the southern portion of Fort Lee, which flows into the Blackwater Swamp. Most of Fort Lee lies within the Appomattox and James river basins. The Blackwater Swamp flows into the Blackwater River, which flows into the Chowan River and eventually empties into Albemarle Sound along the northern coastline of North Carolina. The Appomattox River flows approximately 0.5 mile along the northwestern portion of the installation, and the James River is approximately 3 miles northeast of Fort Lee.

The headwaters of Bailey Creek are in the southwestern section of Fort Lee. The creek originates on Fort Lee and drains most of the cantonment area (2,532 acres). Bailey Creek flows in a northeastern direction through the center of the installation for approximately 2.86 miles. After exiting the installation at Route 630, Bailey Creek flows another 5.7 miles before it empties into the James River. Land uses within the Bailey Creek watershed range from highly developed areas with extensive impervious surface to dense woodlands that produce relatively little runoff. The stream remains near its natural state within the central, undeveloped parts of the watershed; however, in the developed sections of the installation, the stream has been channelized in some sections and has undergone other modifications to accommodate development on the post and associated storm water inputs. There is an extensive network of storm water drains and culverts that rapidly convey water to Bailey Creek during wet-weather events (Versar 2001). As a result, the stream has been affected by erosion, sedimentation, and nonpoint source pollution associated with storm water runoff.



LEGEND

- | | |
|-----------------------|----------------------------|
| Installation Property | River/Stream |
| Road | Wetland (with 100' buffer) |
| Building | |
| Surface Water | |

Surface Water Features

Fort Lee, Virginia

Figure 4.1-5

Source: Fort Lee GIS, 2006.

The northern and western portions of Fort Lee are drained by several streams, including Harrison Creek, Harrison Branch, Bullhill Run, and Cabin Creek. These streams drain to the Appomattox River, which then flows into the James River. The Range Area is in this area, along with various facilities and other structures. Approximately 10 acres of the cantonment area drain into Harrison Creek and flow in a northwest direction through Petersburg National Battlefield Park. Harrison Branch drains approximately 250 acres surrounding the Jackson Circle housing units and a small southwestern portion of the Range Area. The remaining portion of the Range Area, approximately 95 percent of the 1,304-acre area, lies within the Bullhead Run/Cabin Creek watersheds. Both the cantonment and Jackson Circle areas are heavily built-up; the Range Area is primarily undeveloped.

The southern boundary of Fort Lee coincides with the location of the Blackwater Swamp. Portions of the golf course south of A Avenue, part of the petroleum training area, and other land east of 40th Street drain into the Blackwater Swamp. The swamp drains into the Blackwater River, which flows to the southeast and joins the Nottoway River near the Virginia/North Carolina border to form the Chowan River. The Chowan River flows into Albemarle Sound, along North Carolina's northern coastline.

Flows and Exchanges

The U.S. Geological Survey (USGS) collects stream flow data at gages throughout Virginia. There are no USGS flow gages within the immediate vicinity of Fort Lee. The closest gage is approximately 12 miles upstream on the Appomattox River (USGS 02041650 at Matoaca, Virginia). Flow data are available for this gage for the period from 1969 to 2004. USGS gage 0247500 is on the Blackwater River and has data from 1941 to 2004; however, this gage is approximately 40 miles southeast of the installation.

Storm water runoff on Fort Lee primarily flows into Bailey Creek through natural and man-made conveyances. To characterize flow in Bailey Creek, stream flow was monitored and modeled as part of the Bailey Creek Baseline Survey in 1998 (Fluor Daniel 1998). A 2-inch rainfall event was simulated using information contained in the document *Urban Hydrology for Small Watersheds* (USDA 1986) to demonstrate the typical flow increase in Bailey Creek following a storm event of this magnitude. The watershed includes various impervious areas where surface water drainage is collected and rapidly conveyed to Bailey Creek. Several areas within the watershed have high runoff coefficients, including highly developed housing and vehicle maintenance areas (Fort Lee Motor Pool). Normal base flow was estimated to be between 0.06 and 1.76 million gallons per day (mgd) at various locations along the stream. The greatest flow was at Route 630, where Bailey Creek exits the installation. The 2-inch rainfall simulation produced flows ranging from 8.49 to 45.97 mgd at various locations.

4.1.6.1.2 Surface Water Quality

Water Quality Standards

VDEQ defines surface water quality standards that protect designated uses of surface waters in Virginia. The water quality standards consist of three components: use designations, general and numeric water quality criteria necessary to protect those uses, and an antidegradation statement. Water quality standards have the dual purposes of establishing the water quality goals for a specific water body and serving as the regulatory basis for establishing water quality-based treatment controls and strategies beyond the technology-based levels of treatment required by Sections 301(b) and 306 of the Clean Water Act (CWA). State freshwater criteria apply to

streams within Fort Lee. All streams in Virginia, including those flowing through the installation, are minimally assigned the following designated uses: recreation (e.g., swimming, boating); propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish).

Virginia water quality standards contain general criteria statements and a wide range of numeric water quality criteria for pesticides and polychlorinated biphenyls (PCBs), VOCs, acid- and base-extractable organics, other organics, metals, pH, and inorganics, as well as conventional pollutants such as total dissolved solids. Table 4.1.6-2 lists numeric water quality criteria for which standards are in place and that are of particular interest for Fort Lee waterbodies, based on the 2004 303(d) list (see below). Note that VDEQ is also developing nutrient criteria for surface waters. Waterbodies on Fort Lee are Class III waters (Nontidal Waters, Coastal and Piedmont Zones), with the exception of the Blackwater Swamp, which is a Class VII water (Swamp Waters).

Table 4.1.6-2
Virginia surface water quality standards for Class III waters: Parameters of interest for Fort Lee impaired waters

Parameter	Units	Field parameters/ Pathogens	Aquatic life— freshwater acute	Aquatic life— freshwater chronic	Human health— public water supplies	Human health— all other surface waters
Water temperature (maximum) ^a	°C	32	—	—	—	—
Dissolved oxygen ^b	mg/L	4.0 (min.)/ 5.0 (daily avg)	—	—	—	—
pH	SU	6.0–9.0	—	—	—	—
Fecal coliform bacteria ^c	#/100 mL	200/400	—	—	—	—
<i>E. coli</i> ^d	#/100 mL	126/235	—	—	—	—
Total PCBs (water)	µg/L	—	—	—	0.0017	0.0017
Total PCBs (fish tissue screening criteria)	ppb	—	—	—	54	54
Aldrin (water)	µg/L	—	3.0	—	0.0013	0.0014
Aldrin (fish tissue screening criteria)	ppb	—	—	—	6.3	6.3

Notes:

^a Nontidal waters (Coastal and Piedmont Zones).

^b Estuarine waters (Tidal Water-Coastal Zone to Fall Line) and Non-tidal waters (Coastal and Piedmont Zones).

^c The Virginia fecal coliform bacteria standard for primary contact recreational waters is as follows: "Fecal coliform bacteria shall not exceed a geometric mean of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a calendar month nor shall more than 10 percent of the total samples taken during any calendar month exceed 400 fecal coliform bacteria per 100 ml of water."

^d The Virginia *Escherichia coli* standard for primary contact recreational waters (freshwaters) states that *E. coli* shall not exceed a geometric mean of 126 per 100 ml for two or more samples over any calendar month and shall not exceed a single sample maximum of 235 per 100 ml.

303(d) Listed Waters

Section 303(d) of the CWA requires states to identify and develop a list of waterbodies that are impaired and for which technology-based and other required controls have not resulted in attainment of water quality standards. Fort Lee has several streams that were listed on Virginia's 2004 Section 303(d) list of impaired waters (Table 4.1.6-3). The development of Total Maximum Daily Loads (TMDLs) is required for water bodies listed on the 303(d) list. TMDLs and load reductions are required for the pollutants of concern for each listed waterbody. VDEQ is developing TMDLs in accordance with a 10-year EPA consent decree schedule (for waterbodies originally listed on the 1998 303(d) list).

The 2004 VDEQ TMDL Fact Sheet lists 6.54 miles of Bailey Creek as impaired (VDEQ 2004). The segment begins at the headwaters of Bailey Creek and extends downstream to the fall line. The stream is listed as impaired for not supporting the fish consumption use due to PCBs and aldrin in fish tissue and not supporting the recreation use due to fecal coliform contamination. Bailey Creek was initially included on the 303(d) list in 1994 because of water quality monitoring performed at

Table 4.1.6-3
303(d) listed water bodies within Fort Lee

Installation	303(d) listed waterbody	Extent	Use impaired	Impairment cause
Fort Lee	Bailey Creek	Headwaters to the fall line	Fish consumption, recreation	PCBs, aldrin, fecal coliform
		Fall line to the mouth	Fish consumption, recreation, aquatic life	DO, pH, fecal coliform, <i>E. coli</i> , PCBs, aldrin
	Blackwater Swamp	Headwaters to Blackwater River	Aquatic life, recreation	DO, pH, fecal coliform
	Harrison Creek	Mainstem	Recreation	fecal coliform

the Route 10 bridge (2-BLY000.65) and historical water quality problems in Bailey Bay. The causes of impairment were excessive dissolved oxygen (DO) and fecal coliform standard violations recorded at 2-BLY000.65. In recent years, the upper portion of Bailey Creek was delisted for DO; however, the lower (tidal) portion remains impaired for DO. The TMDLs for aldrin and PCBs in fish tissue are due by 2014. Bacteria TMDLs are due by 2010 (VDEQ 2004).

The tidal portion of Bailey Creek (downstream of Fort Lee) begins at the fall line and extends downstream to its mouth at the confluence with the James River. This segment is listed as impaired for not supporting the Aquatic Life, Recreation, and Fish Consumption uses. Impairment causes include DO, pH, fecal coliform bacteria, *E. coli*, and PCBs in fish tissue. Bacteria and DO TMDLs are due by 2010, and pH and PCB TMDLs are due by 2016 (VDEQ 2004).

The 2004 fact sheet for the Blackwater Swamp indicates Aquatic Life and Recreational use impairments from the headwaters to the Blackwater River. The causes of impairment are DO, pH, and fecal coliform bacteria. The DO and pH TMDLs are on a 10-year consent decree schedule (due by 2010), and the fecal coliform TMDLs are due by 2014. The DO and pH violations are suspected to be caused by natural swampwater conditions throughout the watershed, whereas the source of the fecal coliform violations in the Blackwater Swamp is considered unknown.

Harrison Creek was also listed as impaired in the 2004 assessment. The creek drains a small northwestern portion of Fort Lee, which includes Training Area 5. This segment is listed as not supporting Recreation use due to fecal coliform contamination. The TMDL is due by 2016.

In-Stream Water Quality

Table 4.1.6-4 lists the VDEQ surface water monitoring stations on streams that drain Fort Lee. All the stations listed under Fort Lee are outside the installation. The nearest station is on Bailey Creek at the Route 630 crossing where the stream exits Fort Lee.

The Fort Lee Integrated Natural Resources Management Plan (INRMP) notes that in the past, surface water quality was affected by petroleum, oil, and lubricant spills; soil erosion; stream siltation; and pesticide runoff (Versar 2006). Improved control measures have significantly reduced the occurrence of such situations and have helped to improve the quality of the installation's surface water (Versar 2001).

Table 4.1.6-4
VDEQ water quality monitoring stations within or near Fort Lee

Station ID	Stream	Location
Fort Lee		
2-BAB000.31	Bailey Creek	At Dock Landing Road Bridge
2-BAY000.42	Bailey Creek	Bailey Creek, Rt. 5 Bridge
2-BAY002.42	Bailey Creek	Bailey Creek at Yahley Mill Road
2-BLY000.65	Bailey Creek	Rt. 10 Bridge
2-BLY002.28	Bailey Creek	Below Confluence with Hopewell STP Effluent
2-BLY002.49	Bailey Creek	Above Confluence with Hopewell STP Effluent
2-BLY003.42	Bailey Creek	Bailey Creek, Rt. 156 Bridge
2-BLY005.73	Bailey Creek	Rt. 630 Bridge Below Fort Lee
5ABKR001.92	Blackwater Swamp	Rt. 601 Bridge
5ABKR003.68	Blackwater Swamp	Rt. 625 Bridge 1 Mile NE Disputanta
5ABKR005.48	Blackwater Swamp	Rt. 618 Bridge
5ABKR007.28	Blackwater Swamp	Rt. 635 Bridge
5ABKR010.39	Blackwater Swamp	Rt. 156 Bridge
5ABKR014.01	Blackwater Swamp	Rt. 106 Bridge
5ABKR016.95	Blackwater Swamp	Rt. 460 Bridge
5ABNF000.65	North Fork Blackwater Swamp	Rt. 616 Bridge
5ABNF003.73	North Fork Blackwater Swamp	Rt. 710 Bridge
5ABNF005.77	North Fork Blackwater Swamp	N. F. Blackwater Swamp at Rt. 106
2-HRA000.85	Harrison Creek	Harrison Creek at Rt. 36
8-HSN002.12	Harrison Creek	Harrison Creek at Rt. 37

Fort Lee partnered with VDEQ in 1997 and 1998 to conduct a baseline survey of Bailey Creek. The Bailey Creek Baseline Environmental Survey (BES) was conducted to determine the physical, biological, and chemical conditions of the Bailey Creek system as it originates and exits Fort Lee (Fluor Daniel 1998). The installation measured various physical and chemical water quality parameters and performed habitat assessments for aquatic species at points along the stream. Monitoring included water sampling, sediment sampling, tissue sampling, and habitat and biological assessments. Surface water samples were analyzed for VOCs, base-neutral acid

compounds (BNA), PCBs, target analyte list (TAL) metals, chlorinated herbicides, total organic carbon (TOC), nitrate/nitrite, chlorides, ammonia, phosphorous, total Kjeldahl nitrogen (TKN), total hardness, and total suspended solids (TSS). Physical data included pH, DO, specific conductance, turbidity, salinity, and stream flow data. Sediment samples were analyzed for VOCs, BNAs, PCBs, TAL metals, chlorinated herbicides, and TOC. Clam tissue was analyzed for BNAs, pesticides/PCBs, chlorinated herbicides, TAL metals, and percent lipids. The biological assessment consisted of habitat evaluation, a macroinvertebrate survey, and a fish community survey. The results of the biological assessment indicated that Bailey Creek is being negatively affected by the constant pulsing of storm water in the watershed. These impacts were linked to poor substrate conditions and degraded biological communities. The water quality, sediment, and tissue data collected during the study did not indicate significant chemical stressors, although surface water criteria were exceeded on some occasions. According to this report, the primary stressors in the Bailey Creek watershed are believed to be storm water runoff and sediment transport.

Information obtained during the Bailey Creek BES led to the following conclusions:

- No threatened or endangered species were observed to be present during the field survey.
- The stream receives significant amounts of storm water and sediment from Fort Lee, which has resulted in decreased substrate and loss of biological habitat.
- The biological community, including macroinvertebrates and fish, was ranked as poor to moderate.
- There was no evidence of significant releases of contaminants from waste units in the Bailey Creek watershed at the time the survey was conducted.

Other studies have also noted that the largest source of impact on Fort Lee water resources is storm water runoff. Bailey Creek and other streams have received an increasingly high volume of storm water as a result of new construction over the past several years. In light of these problems, a storm water management plan was prepared to address current sedimentation issues and prevent future problems (Southerland et al. 1999).

A Water Resources Management Plan, which included a Watershed Management Plan, was developed for Fort Lee in 2001 (Versar 2001). The goal of the plan was to address installation-wide pollution and water quality degradation issues. In addition to providing an overview of current water resource conditions, the plan identifies opportunities to reduce or mitigate impacts and includes recommendations for the implementation of watershed protection measures at the installation. This report also identifies storm water runoff as the principal source of impact on water quality on Fort Lee. Regular water quality monitoring was proposed as part of the Watershed Management Plan, in addition to required monitoring under Fort Lee's National Pollutant Discharge Elimination System (NPDES) storm water permits. Fort Lee continues to conduct permit-related storm water monitoring; however, regular water quality monitoring has not been initiated to date.

Fort Lee conducts groundwater monitoring at various locations associated with the petroleum training facility, the fuel storage area, and the pesticide mixing area in accordance with the DoD's Installation Restoration Program (IRP) and the Resource Conservation and Recovery Act (RCRA). Samples are analyzed for VOCs, semivolatiles, pesticides, and petroleum constituents. Groundwater associated with closed or closing landfills is also monitored as outlined in the landfill closure plan.

Fort Lee's INRMP notes that the installation performed a Chesapeake Bay Site Assessment of Bailey Creek that involved assembling a group of water quality experts to examine the installation's storm water system and identify areas that could negatively affect water quality. This study focused on Bailey Creek because this stream drains most of the installation and is Fort Lee's largest Chesapeake Bay tributary. The INRMP also indicates that water quality has improved in recent years as a result of the way the installation manages and uses hazardous and toxic materials, especially petroleum products.

4.1.6.1.3 Pollutant Sources

Pollutant sources are typically characterized as point or nonpoint sources under the CWA. Point sources, according to 40 CFR 112.3, are defined as any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. The National Pollutant Discharge Elimination System (NPDES) Program, under CWA Sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources. Nonpoint sources are generally precipitation-driven and occur as overland flow carries pollutants, often attached to sediment, into streams. However, nonpoint sources may also include non-precipitation-driven events such as contributions from groundwater, septic systems, direct deposition of pollutants from wildlife, livestock, or atmospheric fallout, or various military training activities.

Point Sources

Fort Lee has three general storm water Virginia Pollutant Discharge Elimination System (VPDES) permits and one individual wastewater treatment permit (VA0059161) for discharges associated with mobile reverse osmosis water purification units (Table 4.1.6-5). General permits VAR100270 and VAR050595 regulate storm water discharges from construction sites and industrial activities, respectively. The third general permit (VAR040007) regulates discharges from Fort Lee's Municipal Separate Storm Sewer System (MS4). Fort Lee is implementing the *General Storm Water Pollution Prevention Plan for On-Site Construction Activities* and the *Fort Lee Oil and Hazardous Substance Spill Prevention and Response Plan* in accordance with the permits. These permits include typical monitoring and reporting requirements to identify potential storm water impacts and promote effective storm water management.

**Table 4.1.6-5
VPDES permits for Fort Lee**

VPDES number	Permit type	Description
VA0059161	Individual	Wastewater treatment permit for mobile reverse osmosis water purification units (3 outfalls) and storm water treatment for petroleum training site ponds (2 outfalls)
VAR040007	General	Small municipal separate storm sewer system (MS4); expires December 9, 2007
VAR100270	General	General permit for storm water discharges from construction sites; expires June 30, 2009
VAR050594	General	General permit for storm water discharges associated with industrial activity; expires June 30, 2009

Nonpoint Sources

Nonpoint sources represent contributions from diffuse, non-permitted sources. The only exception to this definition is cases where storm water collection systems have been constructed to manage storm water flows from larger areas. Storm water discharges from these systems (such as from MS4s) are regulated as point sources because storm water runoff is delivered to the receiving waterbody through a conduit.

The primary source of nonpoint pollution on Fort Lee is storm water runoff, due to the amount of developed land and impervious surface. Activities such as clearing vegetation or grading, removing, and compacting soils, as well as extensive use of impervious surfaces, can increase the amount of storm water runoff in a watershed and result in pollutant transport. In urbanized areas, increased storm water runoff can cause increased flooding, stream bank erosion, and degradation of in-stream habitat. Storm water runoff can become contaminated as it flows across the surface, picking up pollutants from roadways, yards, farms, golf courses, and parking lots. Watershed land cover distribution is an important factor in the delivery of nonpoint source pollutants, such as sediment, nutrients, heavy metals, and pathogens, through soil erosion. As the amount of impervious surface area increases, the amount of storm water runoff also typically increases.

The *Bailey Creek Watershed Delineation and Evaluation, Fort Lee, Virginia* (Versar 2005a) discusses nonpoint source pollution within the context of Bailey Creek. The same sources exist in other areas of Fort Lee; therefore, this information is relevant to watersheds across the installation. Land uses within Fort Lee range from highly developed areas with extensive impervious surface to dense woodlands that produce relatively little runoff (Versar 2005a). The land uses that affect Bailey Creek subwatersheds include developments that are typical of a large Army post, such as residential housing, various training areas, vehicle storage and maintenance, administration and other institutional buildings, commercial buildings, and golf courses.

The natural stream network remains relatively intact in the undeveloped parts of the watershed. However, the natural drainage pattern has been significantly changed in the developed sections of the installation, which primarily includes the middle and lower portion of the watershed within Fort Lee. Runoff is captured by an extensive network of storm water drains and culverts that rapidly convey water to Bailey Creek or to the upland areas bordering Bailey Creek.

Storm Water Management

Storm water runoff and other watershed problems at Fort Lee have been described in several management studies, including the installation's INRMP (Versar 1998), the *Bailey Creek Watershed Management Report* (Southerland et al. 1999), and the *Water Resources Management Plan* (Versar 2001). According to these past studies, the installation's greatest threat to stream water quality, physical stability, and stream habitat appears to be storm water runoff. A preliminary storm water analysis for TA5 was also conducted in November and December 2006 to provide additional detail regarding implementation of the preferred alternative in TA5 and its implications related to storm water management and associated wetlands (Appendix K).

Excess runoff from developed areas causes erosion and carries sediment and many other pollutants, including nutrients, oil and grease, heavy metals, and organic chemicals such as residues from pesticides. On developed lands, the types and severity of impacts from storm water runoff are usually directly related to the amount of impervious surface within the drainage area. For example, roads, rooftops, parking lots, driveways, and other impervious surfaces are major sources of nonpoint source pollution. Sediment and erosion control, storm water management

control, and other best management practices (BMPs) are often needed to mitigate the direct impacts of runoff in urban areas.

Both past and present studies indicate that aquatic resources, principally in the main cantonment area at Fort Lee, have been significantly affected by runoff from impervious surfaces that is collected and concentrated in an extensive storm drain network. The negative effect of storm water runoff is evident in the progressively severe bank erosion and sedimentation occurring in the middle and lower sections of the cantonment's primary drainage, Bailey Creek. Areas that drain into Bailey Creek range from highly developed areas (with extensive impervious surfaces that generate large quantities of storm water runoff) to dense woodlands (that produce relatively little runoff). If unchecked, nonpoint source pollution and rapid conveyance of wet-weather flows not only threaten to degrade the quality of Fort Lee's water resources, but also could exacerbate regional water quality problems by contributing to cumulative impacts downstream in the James River and ultimately the Chesapeake Bay (Versar 2001).

Previous studies of the Fort Lee portion of the Bailey Creek watershed have identified several problems caused by insufficient management of storm water runoff. The problems identified in the Water Resources Management Plan for Fort Lee (Versar 2001) include the following:

- *Hydrologic modifications.* Modification of natural flow regimes associated with historic and current storm water management practices were the most apparent stressor to the Bailey Creek subwatershed. Development practices have resulted in extensive impervious surfaces and an interconnected system of storm water drains that rapidly convey and concentrate runoff from large areas. Even in areas where recent development (or re-development) has occurred, there are few storm water management facilities that sufficiently detain and diffuse the erosive volume and velocity of the storm water runoff at Fort Lee.
- *Erosion and channel destabilization.* Throughout the cantonment area, storm water is discharged directly to natural surface drainages, primarily Bailey Creek, through a series of outfalls that are frequently in areas where steep slopes increase the velocity and erosive power of the concentrated flows. The increased erosive power of storm water at the installation has caused incision, headcutting, gravel bar formation, sedimentation, and other channel adjustments.
- *Nonpoint source pollution.* The rapid conveyance of storm water to Fort Lee's streams washes nonpoint source pollutants from the installation's roads, rooftops, and lawns. Storm water bypasses the extensive network of riparian buffers along the streams, thereby eliminating much of their natural filtering and storm water retention functions. Therefore, surface water quality could be degraded.
- *Channelization.* Another modification of natural flow regime in the Bailey Creek watershed involves the straightening and armoring of stream channels. Several stream channel segments in the cantonment area have been hardened with concrete or riprap. Because channelization frequently prevents local channel adjustments to compensate for changes in equilibrium, stresses are typically passed on to unchannelized segments, leading to destabilization of the channel above and below the hardened segment.

Fort Lee is developing an Integrated Storm Water Pollution Prevention Plan (SWPPP) that will be used to manage storm water protection efforts and implement effective storm water controls (Fort Lee 2005e). This SWPPP will provide general information regarding all storm water-related activities, NPDES permit requirements, and the requirements that pertain to each portion of the pollution prevention program.

4.1.6.1.4 Hydrogeology/Groundwater

Fort Lee is in Virginia's Coastal Plain. The regional hydrogeologic framework of the Virginia Coastal Plain is described by eight major confined aquifers, eight major confining units, and an uppermost water table aquifer, all of varying permeability and water quality. This framework has been developed on the basis of lithologic and hydrogeologic formations. The major flow boundaries for the Coastal Plain groundwater flow system are the fall line to the west, the freshwater or saltwater interface to the east (Chesapeake Bay and Atlantic Ocean), and crystalline basement rock. Groundwater movement through the unconfined and confined aquifers is generally lateral, with some movement occurring vertically. Groundwater is discharged laterally into a variety of water bodies, including the Chesapeake Bay and the Atlantic Ocean. Recharge of the Coastal Plain groundwater system occurs in the aquifer outcrop zones along the fall line, where precipitation and surface water can infiltrate into unconfined and confined aquifers. The vertical leakage through confining units to underlying confined aquifers is an important mechanism for groundwater recharge.

According to the Fort Lee INRMP, the USGS has indicated that at least one regional aquifer, the Yorktown-Eastover aquifer, might underlie Fort Lee. This aquifer underlies much of the Coastal Plain, and regionally this aquifer is discontinuous because of stream erosion. Water within the deep Yorktown-Eastover aquifer flows east (USACE 1993).

The groundwater investigations conducted as part of the Fort Lee IRP indicate that shallow groundwater flow generally follows the topography and is interconnected with surface water resources. Most of the shallow groundwater originates from precipitation that falls in or near the local watershed. Groundwater is not used as a potable drinking water source for the surrounding area.

The 2006 INRMP for Fort Lee states that groundwater samples are being collected from approximately 100 wells on the installation. The INRMP also states that eight sites are being remediated through the existing INRMP update, and two sites are being remediated under the Resource Conservation and Recovery Act (RCRA). These sites include an old pesticide mixing area, two former landfills, a maintenance building, a field training area, the petroleum training facility, the old fire training pit, an old sewage treatment plant, the underground storage tank (RCRA), and a closed landfill (RCRA).

Fort Lee recently completed the *FY2006 Army Defense Environmental Restoration Program and Installation Action Plan*. This report includes additional information on groundwater monitoring and IRP/MMRP (Military Munitions Response Program) activities on Fort Lee. There are 13 active IRP sites and 2 active MMRP sites. The primary contaminants of concern for the IRP sites are petroleum, oil, and lubricants (POL); benzene, toluene, ethylbenzene, xylene (BTEX); metals; base/neutral/acid (BNAs); VOCs; pesticides; and herbicides. A monitoring and cleanup strategy was developed for each site. Several sites include groundwater monitoring for specific pollutants, as detailed in this report. Unexploded ordnance (UXO) is the primary concern in MMRP areas. Soil was defined as the median of concern in these areas.

4.1.6.1.5 Coastal Zone Management and Chesapeake Bay Initiatives

Fort Lee is one of 66 DoD installations within the Chesapeake Bay watershed. The watershed encompasses nearly 64,000 square miles and stretches from New York to Virginia, covering portions of six states and the District of Columbia. Most of Fort Lee lies within the Chesapeake

Bay drainage basin. The Blackwater Swamp (in the southern portion of Fort Lee) drains into the Chowan Basin, via the Blackwater River; however, the remaining watersheds of Fort Lee discharge to the Appomattox and James rivers, which are tributaries of the Chesapeake Bay. The installation has many programs that are both directly and indirectly applicable to the goals, objectives, and commitments of the Chesapeake Bay Initiative.

Fort Lee is committed to the restoration and protection of the Chesapeake Bay ecosystem. Following the goals outlined in the 1983 and 1987 Chesapeake Bay Agreements, Fort Lee has made significant advances toward achieving the goals of the original agreements. In 1990 DoD and EPA signed a cooperative agreement concerning the Chesapeake Bay. The agreement established a policy of coordination and cooperation between the two entities on Chesapeake Bay activities consistent with the goals, objectives, and commitments established under the 1987 Chesapeake Bay Agreement. In July 1994, the Army signed the *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*. This agreement specifically calls for cooperative actions by agencies and departments to reduce nutrients and toxics, restore habitats, coordinate data collection and research, restore the Anacostia River, and support national service.

To protect the water resources within Fort Lee, timber harvest within the riparian forest buffer zone is carefully controlled. No more than 75 percent of the timber may be harvested within the Chesapeake Bay Resource Protection Area (RPA) buffer; as specified in the regulations adopted by the Virginia Department of Conservation and Recreation under the Chesapeake Bay Preservation Act. Timber in sensitive or unique habitats is usually not harvested.

The goal of the Coastal Zone Management Act (CZMA) is to preserve, protect, develop, and where possible, restore or enhance the resources of the coastal zone of the United States. The CZMA, as it applies to Fort Lee, contains a federal consistency requirement, under which federal actions must be consistent to the maximum extent practicable with the enforceable policies of Virginia's federally approved Coastal Resources Management Program (CRMP). This program focuses on problems associated with polluted runoff, habitat protection, riparian buffers, RPAs, wetlands, fisheries, sustainable development, waterfront redevelopment and encroachment, septic systems, erosion and sediment control, and air pollution control. A coastal zone consistency determination for the Preferred Alternative has been prepared and is in Appendix D.

4.1.6.1.6 Floodplains

A small portion of the Range Area on Fort Lee lies within the 100-year floodplain associated with the Appomattox River. A small parcel (approximately 14 acres) of Army-owned land that is used for water purification exercises is within this floodplain (the rectangular area on Figure 4.1-5 that extends west from the Range Area to the river). Under the current National Flood Insurance Program, no permanent dwellings may be constructed within the 100-year floodplain boundary, although roadways, athletic fields, and similar facilities might be permitted.

Additional information on riparian areas and floodplains is provided in the *Bailey Creek Watershed Delineation and Evaluation* report (Versar and ATR 2005). For this study Bailey Creek and its tributaries were divided into 21 reaches for watershed assessment purposes. Stream reach data were collected for a variety of attributes, including in-stream habitat, vegetative protection, bank erosion, vegetated buffer width, floodplain encroachment, and the presence of road and utility crossings

4.1.6.2 Environmental Consequences

Environmental effects on water resources as a result of the Preferred Alternative primarily relate to the potential for increases in storm water runoff and associated pollutants from land disturbance activities, construction-associated impacts, conversion of pervious areas to impervious areas, potential loss of riparian buffers, and other physical changes to watershed features. Storm water runoff increases flow volumes, velocity, peak flows, and the delivery of sediment and other pollutants to streams. The potential for erosion in an area can be characterized by the interaction of four primary factors: the characteristics of its soils, its vegetative cover, its topography, and its climate. All of these factors also determine the magnitude of storm water runoff. In general, storm water runoff potential increases with decreasing soil moisture retention and vegetative cover and increasing impervious land area, land slope, and precipitation volume. Similarly, erosion potential increases with decreasing soil consolidation and vegetative cover and increasing land slope, precipitation volume, and storm water runoff. An impervious land surface has the effect of decreasing soil moisture retention and vegetative cover to zero.

Several studies have been conducted to characterize watershed conditions and storm water impacts on water resources within Fort Lee. Bailey Creek drains most of Fort Lee and has been the primary focus of these investigations, including the *Bailey Creek Baseline Environmental Survey* (Fluor Daniel 1998) and the *Bailey Creek Watershed Delineation and Evaluation, Fort Lee, Virginia* (Versar and ATR 2005). Background information on water quality and watershed conditions for Bailey Creek and other areas of Fort Lee is summarized in section 4 (Affected Environment). The information contained in these reports was used to qualitatively evaluate potential storm water impacts on water resources on Fort Lee as a result of the proposed action. The Fort Lee Environmental Management Office is using the findings of these reports to guide storm water management efforts and to prioritize restoration efforts; therefore, potential changes to existing (baseline) conditions were assessed on the basis of the storm water information, water quality data, and other information presented in these reports.

4.1.6.2.1 Preferred Alternative

Long-term minor adverse effects on surface water quality, groundwater quality, and riparian areas would be expected. Construction of facilities and infrastructure as a result of the proposed action could increase runoff due to an increase in impervious surface area, increased soil erosion, and increases in sediment and pollutant loads. Proposed facilities would be sited to avoid sensitive environmental areas, including RPAs, to the maximum extent practicable. Any development in wetlands and surface waters would be required to meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit program.

Surface Water Quality

Short- and long-term minor adverse effects would be expected. To comply with federal, state, and installation requirements, Fort Lee would minimize potential impacts through effective storm water planning, the development of adequate infrastructure, and the use of traditional and innovative BMPs. Storm water requirements are addressed under the NPDES program, which includes the development of comprehensive SWPPPs; Virginia's Erosion and Sediment Control Regulations; and other programs as discussed below. It should be noted that, in the absence of state-required storm water management practices and erosion control measures being implemented on a watershed basis, short- and long-term effects would be much greater in severity.

Fort Lee is developing a SWPPP that will be used to comprehensively manage storm water protection efforts and implement effective storm water controls. This general SWPPP will provide information regarding all storm water-related activities, NPDES permit requirements, and the requirements that pertain to each portion of the program. Site-specific storm water plans developed by the construction contractors would provide information relevant to each activity. These plans would become temporary additions to the SWPPP for the duration of the construction activities. Many construction sites on Fort Lee might not actively disturb 5 or more acres of land, but the impacts of more impervious surfaces from construction and changes in storm water could affect more than 5 acres. Therefore, this overarching program would address each project and the cumulative impacts of all activities. Fort Lee has also implemented a Land-Disturbing Activity policy to ensure that any activities with the potential to disturb greater than 10,000 square feet receive appropriate reviews.

Several facilities and structures would be located in the Range Area on Fort Lee. This area is drained by several tributaries to the Appomattox River and is relatively undeveloped compared to other areas of the installation. TA5 is drained by Harrison Creek, and would undergo the greatest amount of development on Fort Lee under the preferred alternative. Most of the other proposed facilities projects would be in the Bailey Creek watershed, except for the southern portion of a large area along Route 630 and a few small areas along the southern boundary of Fort Lee, which are in the Blackwater Swamp watershed. Development of these areas would result in increased runoff into nearby streams due to an increase in impervious cover.

The Bailey Creek Watershed Delineation and Evaluation, Fort Lee, Virginia (Versar and ATR 2005) divided Bailey Creek and its tributaries into 21 reaches for watershed assessment purposes. Each stream reach and corresponding subwatershed (catchment) was investigated to identify the source(s) of runoff, evaluate the effects of storm water management practices, and establish a framework for watershed analysis. Stream reach data were collected for a variety of attributes, including in-stream habitat, vegetative protection, bank erosion, vegetated buffer width, floodplain encroachment, and the presence of road and utility crossings. Catchment data were collected for land use and land cover, potential impacts, storm water infrastructure, infiltration requirements, and other characteristics. A unified approach was used to compile stream reach and catchment data to evaluate current conditions and prioritize storm water management and restoration activities. The proposed facilities and structures are within the Bailey Creek catchments listed in Table 4.1.6-6. Note that the facilities are typically in developed areas within storm water service areas and might occupy only a small portion of a catchment. The priority scores shown in Table 4.1.6-6 identify the areas that should be considered first for remedial action, as well as areas where additional development might result in adverse impacts if effective storm water management practices are not implemented. These scores were developed on the basis of the stream reach and catchment data collected during this study.

Fort Lee personnel are using this information to effectively plan for and manage potential increases in storm water runoff due to the construction of new facilities and structures as a result of the proposed action. These data also provide a framework for future analyses in other watersheds, including the Range Area and TA5 on Fort Lee (Appomattox River drainage) and the Blackwater Swamp watershed. Potential storm water impacts on Fort Lee would be mitigated through the development of site-specific SWPPPs and effective use of targeted storm water controls. SWPPPs describe the BMPs that would be used to minimize effects from increased runoff and soil erosion during site construction. BMPs to control surface erosion and runoff would be followed to minimize adverse effects on surface water and groundwater quality. BMPs

Table 4.1.6-6
Bailey Creek catchments and characteristics

Catchment number	General location	Description	Priority score
12-1-2	Southwest	Large area between Battle Drive and Adams Avenue. Includes a portion of the golf course.	96
12-2-1	Southwest	64.4-acre area. Includes several tributaries to Bailey Creek. Largely undeveloped.	33
7-1-2	Southwest	60.4-acre area contains portions of Grant and Franklin Avenues. One-half developed. Includes large storm water pond.	96
7-3-1	Southwest	Headwaters of Bailey Creek. 30.5-acre area includes portions of Quarters and Evacuation Roads.	80
7-2-2	Southwest	101-acre area. 34th street runs through the center. Formerly developed to a greater extent—several buildings have been removed.	75
7-1-1	Southwest	4.2-acre area drains a small area south of Adams Avenue. Largely undeveloped.	37
12-2-2	Southwest	23.4-acre area drains a small area north of Adams Avenue.	44
14-5-2	Northwest	Third largest catchment (191.3 acres). Bounded on the south and west by Adams Avenue. Highly developed with 25.9% imperviousness.	296
14-5-1	West Central	72-acre area. Drains a largely developed area with 30% imperviousness near the intersection of Mahone and Lee Avenues.	173
14-4-1	Central	53.1-acre area contributes runoff directly to Bailey Creek. Recently constructed base housing is in this area.	120
19-1-2	Southeast	Largest catchment (333 acres), includes a large tributary to Bailey Creek. Northern border is Bailey Creek, bounded on the east by 5th Street. Base housing is in the northern portion.	192
20-1-1	Southeast	127-acre area adjacent to catchment 19-1-2. Contributes runoff directly to Bailey Creek. Power line easement bisects the catchment.	51
14-2-2	North Central	34.7-acre area between 11th and 15th Streets. Northern portion is highly developed. Includes a small tributary to Bailey Creek.	168
19-3-2	Northeast	37.3-acre area that is bordered on the north by Adams Avenue. Developed in the northern portion.	163
19-2-2	Northeast	121.4-acre area bounded by Quartermaster Road on the north. Highly developed with 24.1% imperviousness. Runoff forms a tributary to Bailey Creek.	210
25-2-1	Northeast	45.7-acre area that is bounded on the east by Route 630 and on the south by a power line easement. Bailey Creek flows east through this catchment. Primarily forested.	28
25-2-2	Northeast	86.1-acre area that is bounded on the east by Route 630. Western portion is developed with forested areas to the east and south.	50

Source: Versar and ATR 2005.

for sediment and erosion control are included in the *Virginia Erosion and Sediment Control Law, Regulations, and Certification Regulations* and *Virginia Erosion and Sediment Control Handbook*.

Increased impervious surfaces associated with development cause an increase in volume, velocity, and peak flow rates from runoff in nearby streams. Stream channels naturally attempt to accommodate the increased flows by increasing their cross-sectional area. This occurs through erosion of stream banks or downcutting of the channel beds. Stream channels are normally at a state of equilibrium at flows below the 2-year, 24-hour storm event. Virginia's Storm Water Management Regulations specify evaluating storm water at the 2-year or 1-year storm event for systems where there is a high frequency of bankfull flow conditions, to assess erosion and channel adequacy. Increased volume might translate to flooding when the stream channel is not

adequate to contain the flow. During the 10-year, 24-hour storm event, an increase in volume increases the potential for bank overtopping and flooding.

Virginia's Erosion and Sediment Control Regulations (4 VAC 50-30-40.19) and Storm Water Management Regulations (4 VAC 3-20-81) require that "downstream channels and properties be protected from erosion and damage due to increases in volume, velocity and peak flow rate." Because of this requirement, site-specific BMPs or mitigation measures would be required for each construction site. Low-impact development (LID) practices would also be used to minimize storm water impacts and improve water quality. These practices would include the use of bioretention areas, porous pavement, and minimizing the use of curb and gutter in vegetated swales, where possible. A watershed-based approach would also be implemented to evaluate upstream and downstream concerns and mitigate possible impacts.

Storm Water Management Planning for TA5: A preliminary storm water analysis was conducted in November and December 2006 due to the amount of development proposed for this area (URS 2006, Appendix K). TA5 encompasses approximately 352 acres, of which approximately 96 acres are comprised of wetlands, streams, ponds, and cultural sites which are not available for development. Due to site physical features and security constraints, the buildable area within TA5 encompasses approximately 190 acres of land. This area was divided into four major land use planning zones in order to calculate potential storm water runoff and water quality impacts. A wetland inventory was also performed as part of the study, which resulted in the identification of additional wetland acreage beyond that shown in National Wetlands Inventory (NWI) maps (U.S. Fish and Wildlife Service)

Construction of BRAC facilities and associated infrastructure within the buildable areas of TA5 would result in approximately 42 percent of the land surface being covered with impervious structures, roads and parking lots. Note that the exact extent of impervious areas can only be determined after contractor proposals are received during the BRAC construction phase. As a result, proper management of storm water runoff is critical to the protection of the surrounding environment.

The conceptual approach for managing storm water runoff on TA5 involves:

- Maximizing the use of the natural site topography and water features, due to the limited amount of land available for Best Management Practices (BMPs) facilities;
- Including the use of BMPs such as vegetated swales where feasible, to reduce the loads on Harrison Branch and other receiving waters downstream of TA5; and
- Optimizing the use of structural storm water handling facilities.

The preliminary storm water management plan for TA5, therefore, focuses primarily on the use of constructed wetlands, in combination with enhanced extended detention as well as infiltration, bioretention and biofiltration to treat runoff for both quantity and quality. The conceptual plan also includes management of storm runoff inputs from a portion of the cantonment area immediately to the south and adjacent to Route 36 not currently receiving storm water treatment. A portion of this area's runoff currently contributes flow to the Harrison Branch section on TA5. This approach provides for a net gain in site wetlands, in addition to efficient use of available land surface. Additional information on peak flow, pollutant loading, and BMP calculations is provided in Appendix K. Adequate measures would also be taken to minimize or prevent erosion from steep slopes in this area. This analysis will be refined and storm water management plans for other proposed development areas would be developed during the construction planning stage

in order to provide for adequate storm water control and water quality benefits across the installation. Fort Lee will also be collecting stream and watershed characterization data in the remaining watersheds that drain Fort Lee to provide site-specific information for storm water planning and restoration activities, similar to the Bailey Creek study discussed above.

Sediment. Short- and long-term minor adverse effects would be expected. To comply with federal, state, and installation requirements, Fort Lee would minimize potential impacts through storm water planning, the development of adequate infrastructure, and the use of traditional and innovative BMPs. During the initial development phase, proper erosion and sediment controls would be used to manage construction activities that could result in an increase in the sedimentation in adjacent water bodies. An NPDES permit would be required for those projects disturbing at least 1 acre, and a soil erosion and sediment control plan, as well as a SWPPP, would be required to provide guidance for implementing minimization techniques, for sediment-laden runoff during the construction process. In the long term, an increase in storm water volume from additional impervious surfaces could result in an increase in sediment content. Proper storm water controls, as discussed in the section above, would be implemented as part of the development to minimize the potential effects of sediment loading during wet-weather events. Low-impact development (LID) techniques would also be implemented, where possible, to manage the hydrology and quality of storm water runoff from increased impervious surfaces.

Other Pollutants. Bailey Creek is listed on Virginia's CWA Section 303(d) list of impaired waters (VDEQ 2004). The nontidal portion of Bailey Creek, which includes the portion that flows through Fort Lee, is listed as impaired for fecal coliform bacteria and for high concentrations of PCBs and aldrin in fish tissue. Bailey Bay and the tidal portion of Bailey Creek are listed as impaired for fecal coliform bacteria, *E. coli*, dissolved oxygen, pH, and PCBs in fish tissue. The Blackwater Swamp (from the headwaters downstream to Blackwater River) is listed as impaired for dissolved oxygen, pH, and fecal coliform bacteria. Dissolved oxygen and pH violations in the Blackwater Swamp are suspected to be caused by natural swamp water conditions throughout the watershed (VDEQ 2004). The sources of other water quality problems are unknown. In the future a TMDL study will be conducted to identify the pollutant sources and load reductions required for each listed water body to meet Virginia's Water Quality Standards.

Short- and long-term minor adverse effects would be expected. During the initial development phase, construction activities could result in an increase in sediment-associated pollutants, dissolved solids, and petroleum hydrocarbons in adjacent waterbodies. Measurable effects would be expected to be minimal because the installation would comply with federal, state, and installation regulations, and necessary permits for storm water control would be obtained. Site-specific SWPPPs describing the BMPs to be used to minimize effects from increased runoff during site construction would be prepared.

In the long term, an increase in storm water volume from additional impervious surfaces could result in an increase in nutrients, metals, and other potential contaminants in waterbodies. Proper storm water controls, as discussed above, would be implemented as part of the development to minimize the potential effects of pollutant loading during wet-weather events. LID techniques would also be used, where possible, to manage the hydrology and quality of storm water runoff from impervious surfaces to reduce this adverse effect.

Water Resources Protection

Chesapeake Bay Preservation Act. Short- and long-term minor adverse effects would be expected. In the short term, vegetation in the RPAs could be damaged or destroyed by

construction activities in and near the RPAs. There is also a potential for increased storm water flow and increased scouring in the RPAs due to increased sedimentation from construction site runoff. In the long term, storm water flow would increase because of increased impervious surfaces. The Chesapeake Bay Preservation Act requires that storm water runoff be controlled through the use of effective BMPs and various LID practices to avoid or minimize erosion and to control sediment, nutrients, and pesticides. RPAs and riparian buffers would be preserved to the maximum extent practicable.

Virginia Coastal Resources Management Program (CRMP). Short- and long-term minor adverse effects would be expected. Construction and other activities associated with the proposed action would occur in a manner consistent with the Commonwealth of Virginia's CRMP enforceable policies, to the maximum extent practicable. The CZMA requires identification of potential effects on storm water runoff, habitat protection, riparian buffers, wetlands, fisheries, sustainable development, waterfront redevelopment and encroachment, septic systems, erosion and sediment control, and air pollution control. These resources, primarily storm water runoff, would be adversely affected by the Preferred Alternative. BMPs for storm water management, wetland loss, and stream channel alteration, as well as other mitigation efforts, however, would alleviate these concerns. Consistency of the Preferred Alternative with Virginia's CRMP has been assessed, and the assessment is provided as Appendix D of the EIS.

Groundwater Quality

Long-term indirect minor adverse effects would be expected. Soil surveys would be completed before construction to assess the potential for groundwater contamination and corresponding surface water impacts. Infiltration of increased storm water runoff into the groundwater could increase loads of nitrogen and other contaminants such as soluble metals. However, absorption loss and infiltration of pollutants could be partially alleviated by installing BMPs that facilitate infiltration to groundwater, such as bioretention facilities planted with native, water-tolerant plants. In addition, the reduction in pervious surfaces would reduce groundwater infiltration, which might reduce baseflow conditions during dry periods. The groundwater system below Fort Lee is not used as a potable water supply.

Groundwater will be monitored in the future in conjunction with Fort Lee's IRP, as detailed in the *FY2006 Army Defense Environmental Restoration Program and Installation Action Plan*. This report includes additional information on groundwater monitoring at IRP sites on Fort Lee. Additional impacts on these sites are not expected as a result of the proposed action. Cleanup activities would continue as planned to address legacy pollution problems at these sites in accordance with RCRA and other applicable state and federal regulations.

Floodplains

Long-term minor adverse effects on riparian areas would be expected if encroachment into these areas was required for facility construction. Facilities would be constructed outside riparian areas to the maximum extent practicable. If construction was necessary within the 100-year floodplain, Fort Lee would complete a Joint Permit Application required by the U.S. Army Corps of Engineers and VDEQ. A small portion of the Range Area on Fort Lee lies within the 100-year floodplain associated with the Appomattox River. A small parcel (approximately 14 acres) of Army-owned land that is used for water purification exercises lies in this floodplain. Under the current National Flood Insurance Program, no permanent dwellings may be constructed within the 100-year floodplain boundary, although roadways, athletic fields, and similar facilities might be permitted. Fort Lee would comply fully with EO 11988 (*Floodplain Management*) by ensuring

that its Environmental Management Division would review all project and facility plans for compliance with the EO, Army and installation environmental policies, and applicable laws and regulations.

Cumulative Effects

BRAC facilities proposed to be constructed on the Main Post and the RCI proposed project areas are within the Bailey Creek and Blackwater Swamp watersheds. Adverse cumulative effects would result from the combined short-term increases in sedimentation in local streams from soil disturbance during construction of those facilities and any future soil-disturbing activities on Fort Lee over the next several years, and the long-term increase in storm water runoff due to the combined increase in impervious surface area of the BRAC facilities, the new family housing, and future development. No cumulative effects on water quality in the Chesapeake Bay would be expected from BRAC development on Fort Lee and Fort A.P. Hill and other development in the region. Sediment and other pollutants from streams on Fort Lee and in the area would enter the bay from the James River, while those from development on and near Fort A.P. Hill would enter the bay from the Rappahannock River and York River. The distances separating these source inputs and mixing in the bay would render any potential for a cumulative water quality effect negligible and immeasurable.

Mitigation

No mitigation would be necessary to protect surface water and groundwater quality. BMPs that would be implemented as part of the Preferred Alternative are discussed above.

4.1.6.2.2 No Action Alternative

Surface Water Quality

No effects on storm water quantity would be expected under the No Action Alternative. The percentage of impervious surfaces for each subwatershed on Fort Lee would remain unchanged. The quantity of runoff to the surrounding receiving water bodies would be expected to remain unchanged. The Army would continue to manage Fort Lee in accordance with the CWA, Virginia Storm Water Management Act, Chesapeake Bay Preservation Act, and other applicable laws and regulations.

Sediment. No effects would be expected. Under the No Action Alternative, natural resources and land management programs would continue to maintain vegetative cover and erosion controls as required by federal, state, local, and Army regulations. Erosion problems on the installation would continue to be identified and remediated.

Other Pollutants. No effects would be expected. Existing levels of pollutants would remain unchanged under the No Action Alternative.

Chesapeake Bay Preservation Act. No effects would be expected. The Army would continue to manage Fort Lee in accordance with the Chesapeake Bay Preservation Act, as well as other federal, state, and local efforts to protect the Chesapeake Bay. No RPAs would be disturbed under the No Action Alternative.

Virginia CRMP. Under the No Action Alternative, an evaluation of potential environmental effects concurrent with the enforceable policies of the CZMA would not be required.

Groundwater Quality

No effects on groundwater would be expected under the No Action Alternative. The groundwater system below Fort Lee is not used as a potable water supply. Groundwater will be monitored in the future in conjunction with Fort Lee's IRP, as detailed in the *FY2006 Army Defense Environmental Restoration Program and Installation Action Plan*.

Floodplains

No effects would be expected. A small portion of the Range Area on Fort Lee lies within the 100-year floodplain associated with the Appomattox River. A small parcel (approximately 14 acres) of Army-owned land that is used for water purification exercises lies on this floodplain.

4.1.7 Biological Resources

4.1.7.1 Affected Environment

Fort Lee is in a section of Virginia along the lower James River that is rich in wildlife diversity and abundance. It harbors some of the highest concentrations of bald eagles, wading birds, and fish-eating birds found anywhere in the mid-Atlantic region. It is characterized by abundant amphibian and reptile populations and harbors a significant diversity of neotropical migratory birds.

Southern Virginia can be characterized as an ecological region that is more similar to North Carolina habitats and the southern Coastal Plain than Maryland and the upper mid-Atlantic coast. The ecotone where those regions split occurs generally along the James River. Therefore, the region where Fort Lee is located is considered an area of ecological mixing, where there are numerous biotic groups with southern affinities, as well as those with more northerly affinities. Contributing to these ecological characteristics is the relative integrity of the landscape, allowing for the perpetuation of these diverse communities. Because military installations typically have large contiguous land areas, they are widely recognized as some of the last great refuges for sensitive populations and communities. This feature is even more significant when the installations are embedded in the landscape in a way that ties contiguous forested blocks together. Natural habitats contained within Fort Lee connect habitats occurring along the Appomattox River with those occurring within the Petersburg National Battlefield and the Blackwater Swamp.

Historically, Fort Lee was a woodland and forested wetland area characterized by large pools of standing water and streams traversing the land. Human inhabitants filled many wetlands for farming and housing before military ownership and disrupted the natural pattern of succession. Forestry management practices have kept pioneer species on most of the land. The region's flora and fauna are strongly influenced by the Appomattox River–James River confluence, which is characterized by wetlands, tidal flats, sand, and gravel deposits. Forest and farmland are also predominant environmental influences on the region surrounding Fort Lee.

4.1.7.1.1 Vegetation

A floristic survey was conducted on Fort Lee from spring 2002 through autumn 2003 as part of a 2-year planning-level survey of the major fauna and flora that occur on the installation (AH Environmental Consultants 2004). A total of 314 plant taxa were recorded in the survey; 32 species (14 percent) were considered exotics. Twelve natural or disturbed communities (including wetlands and surface water) were identified: open fields, lawns, and grassed shoulders of

roadways; early successional forest, old fields, and forest edge; oligotrophic upland forest (pine and mixed hardwoods); submesotrophic upland forest (bottomland hardwoods); oligotrophic saturated forest (seepage swamp); oligotrophic saturated emergent wetlands (e.g., bogs, fens); seasonally flooded forest (swamp); seasonally flooded emergent wetlands (marsh); seasonally flooded depressional woodlands; forested, riverine, freshwater tidal shoreline; open, riverine, freshwater tidal shoreline; and open water habitats (e.g., lakes, beaver ponds). A checklist of the species observed is included in Appendix J. Table 4.1.7-1 lists the plant species identified on the installation.

Table 4.1.7-1
Plant species observed at Fort Lee, Prince George County, Virginia

Scientific Name	Common Name
Trees	
<i>Acer negundo</i>	Boxelder
<i>Acer rubrum</i>	Red maple
<i>Acer saccharinum</i>	Silver maple
<i>Ailanthus altissima</i>	Tree of heaven
<i>Betula alleghaniensis</i>	Yellow birch
<i>Betula populifolia</i>	Gray birch
<i>Carpinus caroliniana</i>	Musclewood
<i>Carya cordiformis</i>	Bitternut hickory
<i>Catalpa bignonioides</i>	Common catalpa
<i>Fraxinus pennsylvanica</i> var. <i>subintegerrima</i>	Green ash
<i>Juglans nigra</i>	Black walnut
<i>Liquidambar styraciflua</i>	Sweet gum
<i>Liriodendron tulipifera</i>	Tulip poplar
<i>Pinus taeda</i>	Loblolly pine
<i>Plantanus occidentalis</i>	Sycamore
<i>Populus deltoides</i>	Eastern cottonwood
<i>Prunus serotina</i>	Black cherry
<i>Prunus virginiana</i>	Choke cherry
<i>Quercus alba</i>	White oak
<i>Quercus bicolor</i>	Swamp white oak
<i>Quercus falcata</i>	Southern red oak
<i>Quercus ilicifolia</i>	Scrub oak
<i>Quercus nigra</i>	Water oak
<i>Quercus palustris</i>	Pin oak
<i>Quercus phellos</i>	Willow oak
<i>Quercus velutina</i>	Black oak
<i>Robinia pseudoacacia</i>	Black locust
<i>Salix nigra</i>	Black willow
<i>Sassafras albidum</i>	Sassafras
<i>Ulmus americana</i>	American elm
<i>Ulmus rubra</i>	Slippery elm

Table 4.1.7-1
Plant species observed at Fort Lee, Prince George County, Virginia (continued)

Scientific Name	Common Name
Shrubs/Woody vines	
<i>Alnus rugosa</i>	Speckled alder
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Lindera benzoin</i>	Spicebush
<i>Myrica pensylvanica</i>	Bayberry
<i>Rhus copallina</i>	Shining sumac
<i>Rhus glabra</i>	Smooth sumac
<i>Rubus phoenicolasius</i>	Wineberry
<i>Virburnum dentatum</i>	Southern arrowwood
<i>Viburnum nudum</i>	Possumhaw viburnum
<i>Vitis labrusca</i>	Fox grape
Herbs	
<i>Achillia millefolium</i>	Yarrow
<i>Agrostis alba</i>	Redtop
<i>Alliaria petiolata</i>	Garlic mustard
<i>Ambrosia artemisiifolia</i>	Ragweed
<i>Arundinaria gigantea</i>	Giant cane
<i>Bohemeria cylindrica</i>	False nettle
<i>Carex gynandra</i>	Stamen-pistil sedge
<i>Carex intumescens</i>	Bladder sedge
<i>Carex lurida</i>	Sallow sedge
<i>Carex crinita</i> var. <i>gynandra</i>	Fringed sedge
<i>Cuscuta gronovii</i>	Dodder
<i>Eleocharis intermedia</i>	Matted spikerush
<i>Eleocharis obtusa</i>	Blunt spikerush
<i>Eupatorium serotinum</i>	Late flowering boneset
<i>Eupatorium rugosum</i>	White snakeroot
<i>Glechoma hederacea</i>	Gill-over-the-ground
<i>Glyceria melicaria</i>	Long manna grass
<i>Impatiens duthicae</i>	Jewelweed
<i>Ipomoea hederifolia</i>	Ivyleaf morning glory
<i>Juncus effuses</i>	Common rush
<i>Linaria vulgaris</i>	Butter-and-eggs
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Ludwigia palustres</i>	Water purslane
<i>Mentha piperita</i>	Peppermint
<i>Microstegium vimineum</i>	Wicker microstegium
<i>Oenothera biennis</i>	Evening primrose
<i>Onoclea sensibilis</i>	Sensitive fern
<i>Osmunda cinnamomea</i>	Cinnamon fern
<i>Osmunda regalis</i>	Royal fern
<i>Panicum virgatum</i>	Switchgrass
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Phalaris arundinacea</i>	Reed canary grass
<i>Phragmites australis</i>	Common reed
<i>Phytolacca Americana</i>	Pokeweed
<i>Polygala lutea</i>	Orange milkwort

Table 4.1.7-1
Plant species observed at Fort Lee, Prince George County, Virginia (continued)

Scientific Name	Common Name
Herbs (continued)	
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed
<i>Polygonum punctatum</i>	Dotted smartweed
<i>Rhexia mariana</i>	Maryland meadow beauty
<i>Rhynchospora chalarocephala</i>	Loose headed beakrush
<i>Rhynchospora glomerata</i>	Clustered beakrush
<i>Scirpus cyperinus</i>	Woolgrass
<i>Solidago rugosa</i>	Rough stemmed goldenrod
<i>Solidago canadensis</i>	Canada goldenrod
<i>Toxicodendron radicans</i>	Poison ivy
<i>Typha latifolia</i>	Broad-leaved cattail
<i>Urtica dioica</i>	Stinging nettle
<i>Verbascum thapsus</i>	Common mullein
<i>Woodwardia areolata</i>	Netted chain fern
<i>Woodwardia virginica</i>	Virginia chain fern

Approximately 3,003 acres of the installation are wooded. Most of the forests are about 40 years old, with the exception of the Blackwater Swamp, where trees are much older. The most common type of upland wooded community on Fort Lee is the pine/mixed hardwood stand, which is typical of many vegetated areas surrounding the installation. The community type is characterized by the tree species white oak (*Quercus alba*), southern red oak (*Q. falcata*), willow oak (*Q. phellos*), water oak (*Q. nigra*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), and American holly (*Ilex opaca*) and the shrub species pepperbush (*Clethra* sp.), dangleberry (*Gaylussacia frondosa*), and hillside blueberry (*Vaccinium pallidum*).

Loblolly pine, the predominant pine species on Fort Lee, has historically accounted for approximately 80 percent of Fort Lee's marketable timber. Short-leaf pine (*P. echinata*) and Virginia pine (*P. virginiana*) occur in limited quantities and are usually scattered within the stands of loblolly pine. Mixed hardwood stands generally have oak, hickory, and maple species in a 50:50 ratio of pines to hardwoods and occur near the Blackwater Swamp; along streams such as

Bailey Creek, Cabin Creek, and Bullhill Run; and in areas of poor drainage. Plant communities in the Blackwater Swamp include a bottomland hardwood community containing swamp blackgum (*Nyssa sylvatica*), swamp white oak (*Q. bicolor*), southern red oak, American beech (*Fagus grandifolia*), and various other hardwood species.

Landscaping techniques are used throughout the cantonment area to enhance its natural beauty. Bermuda grass (*Cynodon dactylon*) is the natural grass found on the installation, and maintained grounds are seeded with other species of lawn grasses. Shade trees and shrubs are also planted. Dormant areas of the post have been planted in various species of pine to reduce the amount of grass cutting and to help cleared areas revert to woodland.

4.1.7.1.2 Wildlife

Frequently sighted game animals on Fort Lee include white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), and eastern gray squirrel (*Sciurus carolinensis*).

Hunting of white-tailed deer, wild turkey (*Meleagris gallopavo*), and small game by permit only is allowed for military personnel, civilian employees, military retirees, and accompanied guests. No fishing is permitted in the lakes, streams, and ponds on Fort Lee.

The 2-year planning-level fauna survey was completed in 2004. The survey consisted of inventories of mammals, amphibians, reptiles, birds, and aquatic macroinvertebrates. During the survey, 23 species of mammals were observed or captured. The mammalian fauna is characterized by generalist species that tolerate disturbed habitats and landscapes. Species encountered were as expected for eastern Virginia, and all except the house mouse were native. Most animals were encountered in mixed hardwoods, mixed hardwoods and pine, and grasslands. Eight species of bats have been recorded throughout the installation, none of which are federal or state listed species.

A total of 138 bird species have been identified on Fort Lee. Breeding birds on the installation include 25 residents, 26 temperate migrants, and 36 neotropical migrants. Of the breeding birds, 30 species are listed as species of concern, 16 species are listed as priority species, and 7 of the priority species are listed as high priority on the basis of the conservation-concern scoring system supported by the Partners-In-Flight program. Six of these birds are listed on the U.S. Fish and Wildlife Service (USFWS) *Birds of Conservation Concern 2002 List*.

Field surveys for amphibians and reptiles have identified 13 species of frogs, 8 species of salamanders, 9 species of turtles, 3 species of lizards, and 9 species of snakes. All species that have been found are native species. Additional species could be encountered through further survey work. Two species of conservation concern that occur on Fort Lee are the lesser siren (*Siren intermedia*) and the spotted turtle (*Clemmys guttata*). Both species are in decline in Virginia and elsewhere in their range. In addition, both are subject to population decline due to loss of wetland habitat; fragmentation of their habitat; and, in the case of the spotted turtle, illegal collection for the pet trade.

The aquatic macroinvertebrate component of the survey concluded that the macroinvertebrate communities in Fort Lee streams are characteristic of disturbed streams in the region. These surveys support the conclusion of a previous study that the aquatic macroinvertebrate communities in Bailey Creek and the Blackwater Swamp are indicative of poor to moderate water quality and habitat.

In 1994 the VDCR-DNH completed a natural heritage inventory of Fort Lee (Van Alstine and Fleming 1994) and designated three areas on the installation as conservation zones on the basis of the presence of species or communities that are rare on a global, state, or federal level. The conservation zones on Fort Lee are associated with wetlands. They include the Blackwater Swamp and the Range Area, which contain most of the installation's palustrine wetlands, and the swale area near the intersection of Route 144 and I-295.

4.1.7.1.3 Sensitive Species

No plant species afforded legal protections at either the state or federal level are known to exist on Fort Lee. During a 1993 DNH inventory at Fort Lee (Van Alstine and Fleming 1994), two rare plant species, Virginia thistle (*Cirsium arvense*) and beakrush (*Rhynchospora perplexa*), were found. Virginia thistle has a state rank of S2 (very rare) and has been noted once on the installation. Beakrush has a state rank of S1 (extremely rare) and has also occurred once on the installation. Three watchlist (S3) species were also found on the installation—slender plume grass

(*Saccharum baldwinii*), torrey beakrush (*Rhynchospora torreyana*), and coast violet (*Viola brittoniana*). Several species documented during the 2002 survey occur on DNH's watchlist. This list contains taxa that are uncommon (or of uncertain status) in Virginia and might require additional monitoring or conservation efforts at some future date. These species are the dwarf sundew (*Drosera brevifolia*), pink sundew (*D. capillaris*), tree groundpine (*Lycopodium dendroideum*), and little floating bladderwort (*Utricularia radiata*).

Twelve species of birds found on the Virginia Rare Animal List use Fort Lee for breeding purposes or are likely to be found at the site during winter months. All birds are federally protected under the Migratory Bird Treaty Act, with the exception of pest species (European starling [*Sturnus vulgaris*], house sparrow [*Passer domesticus*], and pigeon [*Columba livia*]) and game species (wild turkey and northern bobwhite [*Colinus virginianus*]), which are managed under state law.

The federally listed threatened/state-listed threatened bald eagle has been documented most recently at the northeastern corner of the expanded Range Area. The nest is in the undeveloped woodland area adjacent to the existing range area. Fort Lee confirmed activity around the nest site in November 2003. However, this site was abandoned later that year before nesting, and the pair is thought to have moved approximately 4 miles west, where an eagle pair was found building a late nest on Petersburg National Battlefield Park. An abandoned nest is normally afforded protection for three consecutive nesting seasons after the last season in which the nest was occupied and any portion of the nest remains. However, the USFWS agreed to exempt Fort Lee from the third year of protection if there was no evidence of eagle activity around the nest as of the early March annual survey conducted by the state. That survey was conducted on March 9, 2005, and showed the nest continuing to deteriorate with no sign of activity. This removes all protective buffers from the site with the exception of protecting the actual nest tree as long as it contains remnants of the original nest. A previously occupied bald eagle nest was in the firing range wetlands conservation area, but that nest was abandoned in 2001. The protective guidelines for that nest were terminated in 2004. As of March 2005, no active bald eagle nest sites remained on Fort Lee.

The state-listed threatened loggerhead shrike (*Lanius ludovicianus*) was documented nesting within the Fort Lee cantonment area in 1997 and was detected up to 2 years later using habitats along the northern range complex. This was the last known coastal plain nesting record for this species. Shrikes are found in the hedgerows and scattered trees and shrubs in open fields, especially in agricultural areas. These habitats have since been destroyed, and there is little chance of recurrence of this species on the installation.

Several DNH-listed rare faunal species were found on the installation during the 1993 DNH inventory. These include mud sunfish (*Acantharchus pomotis*), great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), attenuated bluet (*Enallagma daeckii*), skimming bluet (*E. geminatum*), elegant spreadwing (*Lestes inaequalis*), swamp spreadwing (*L. vigilax*), southern common spreadwing (*L. australis*), barwinged skimmer (*Libellula axilena*), yellow-sided skimmer (*L. flavida*), and blue-faced meadowfly (*Sympetrum ambiguum*). Some of these species were also found during the 2002 survey.

The Blackwater Swamp, at the southern boundary of the installation, has been designated a Threatened and Endangered Species Water because of the documented occurrence of the state-listed endangered blackbanded sunfish (*Enneacanthus chaetodon*). A documented waterbird colony is near the southeasternmost point of the installation, adjacent to the Blackwater Swamp.

This colony contains the great blue heron and the great egret, a state-listed species of special concern. Four great blue heron nests and two great egret nests were found in the vicinity in 2004.

4.1.7.1.4 Wetlands

A wetland survey at Fort Lee conducted between 2003 and 2006 by Versar, Inc., revealed that wetlands make up 722 acres (14 percent) of the total installation area. Five palustrine wetland types and two riverine wetland types occur on the installation. Of the 722 wetland acres, more than 600 acres (83 percent) are forested, including the Blackwater Swamp, the Range Area wetlands, and a few areas along stream channels. VDCR-DNH has designated the Blackwater Swamp and the Range Area wetlands as wetland conservation zones. Tree species within these wetlands include sweetgum, black gum, willow oak, swamp chestnut oak, cherrybark oak, laurel oak, overcup oak, and red maple. Each wetland has a variety of understory species.

The National Wetlands Inventory (NWI) has identified two wetlands within the Fort Lee study limits. One system is identified as palustrine (P), broad-leaved deciduous forest (FO1), semi-permanently flooded (F), or PFO1F, at the northeast corner of Site 2 (Figure 4.1-6). The other system is identified by the NWI as a pond (palustrine, unconsolidated bottom, or PUB) associated with a storm water basin found along the edge of Site 28.

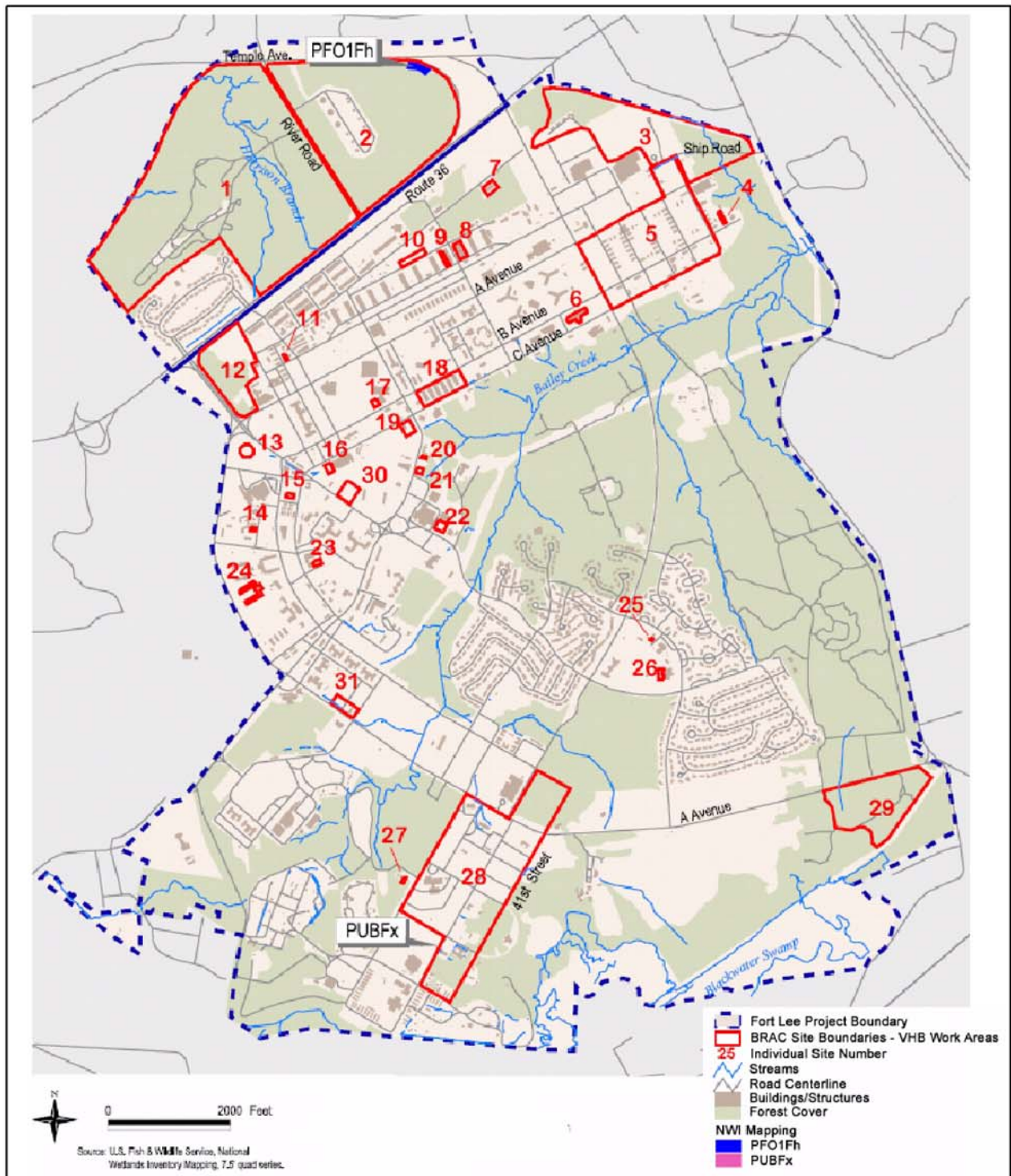
Engineering & Environment, Inc., and Vanasse Hangen Brustlin, Inc., completed a wetlands delineation of BRAC sites on Fort Lee in June 2006, specifically to support planning for the forthcoming BRAC actions. Figure 4.1-5 shows all wetlands and wetland buffer areas on Fort Lee, and Figure 4.1-6 identifies the sites delineated. Wetland maps prepared for the wetland delineation report are included in Appendix J (Engineering & Environment, Inc. and Vanasse Hangen & Brustlin, Inc., 2006).

Most of the study sites consisted of buildings, lawns, and parking areas that were found to have no jurisdictional wetlands. The wetlands were found to vary in quality and character with landscape position and historical disturbances. The majority of wetland systems were found to be associated with natural drainage ways. Table 4.1.7-2 identifies the sites where wetlands were found (using the site numbers shown on Figure 5 of the wetland delineation maps and in Figure 4.1-6) and lists the wetland types and acreages found at the sites. Sites not listed in the table did not have wetlands.

Three general types of wetlands were observed during the delineation, including palustrine forested, broad-leaved deciduous (PFO1); palustrine forested, needle-leaved evergreen (PFO4/5); and palustrine emergent, persistent (PEM1) wetlands.

PFO1 wetlands occur primarily in TA5 and the ASP area and consist of small forested seeps and floodplain systems along Harrison Branch (see wetland maps, Appendix J). Wetland sizes range from less than 0.01 acre to 2.43 acres. Soil saturation was observed within these systems due to lateral groundwater discharge from the side slopes into adjacent channels. Wetlands E and K, the largest of these systems, occur as forested floodplains that are inundated when over bank flooding occurs.

A large ponded wetland occurs in the northeast corner of the site. This 7 acre system is bounded on the north and east sides by Route 144 and the adjacent off-ramp leading to Route 36. Most of the trees within this system are dead, primarily due to long-term inundation. A portion of the



2006 Wetland Inventory Sites

Fort Lee, Virginia

Figure 4.1-6

Table 4.1.7-2
Wetlands on Sites Surveyed in June 2006, Fort Lee

Site Number and Proposed BRAC Construction	Cowardin Classification ^a	Number of Wetlands of Classification Found	Acres of Wetland Classification
1: Ordnance School, Physical Fitness Center, Barracks	PFO1B	10	4.38
	PFO1C	4	0.16
	PFO1E	1	0.24
	PFO1Ex	4	0.16
	PEM1B	1	1.09
2: Ordnance School Training Facilities	PFO1Bx	2	0.03
	PFO1C	1	0.21
	PFO4C	1	7.03
	PFO5Fh	1	0.96
3: No BRAC facilities planned	PEM1A	1	0.18
	PFO1B	1	0.02
5: No BRAC facilities planned	PSS1K	1	0.06
12: Ordnance Museum	PEM1B	1	0.26
	PEM1Cx	1	0.11
28: DeCA Addition, Chapel, AAFES Mini Mall, AIT UPH ^b	PEM1B	1	0.01
	PEM1Bh	1	0.06
	PFO1B	2	0.10
29: No BRAC facilities planned (RCI housing planned)	PFO1B	1	0.72

^a Cowardin Classification System Identifier: P = palustrine; FO1 = forested, broad-leaved deciduous; FO4 = forested, needle-leaved evergreen; FO5 = forested, dead; EM1 = emergent, persistent; SS1 = scrub-shrub, broad-leaved deciduous; A = temporarily flooded; B = saturated; C = seasonally flooded; E = seasonally flooded/saturated; K = artificially flooded; h = diked/impounded; x = excavated. Wetlands listed in the table correspond to figures provided in Appendix J.

^b AIT UPH = Advanced individual training unaccompanied personnel housing.

wetland (Wetland 2A) contains living loblolly pines with sweet-gum and red maple trees (PFO4C) extending off of Wetland 2B to the west running along Route 144.

With the exception of wetland 1J, PEM1 wetlands were observed at locations throughout the study area and vary significantly in size and configuration, however most are low quality features that have either been created or manipulated by man-made activities. These areas are often vegetated with cattails, woolgrass, or soft rush. Wetland 1J occurs within TA5 along Harrison Branch and functions as a seep and floodplain wetland yet lacks a dominance of forest cover. Instead, this system is dominated by emergent species such as deer-tongue switchgrass (*Dichanthelium clandestinum*), microstegium (*Microstegium vimineum*), woolgrass (*Scirpus cyperinus*), and soft rush (*Juncus effusus*) with an occasional alder and sweetbay magnolia sapling (*Magnolia virginiana*). Sweet pepperbush can be found along the wetland fringe.

4.1.7.1.5 Management Programs

The Army's commitment to natural resources management is reflected in *U.S. Army Environmental Strategy into the 21st Century* (U.S. Department of the Army 1992), a strategy built on four pillars that support environmental stewardship and the Army mission. The four pillars represent the four major activity areas, including conservation. The conservation pillar

“focuses on managing Army lands responsibly to ensure long-term natural resource productivity so that the installation can achieve its military mission.” Natural resources management at Fort Lee and Fort A.P. Hill reflects a commitment to environmental stewardship, conservation, and ecosystem management. The Army also manages its natural resources in accordance with the Sikes Act (as amended in the Sikes Act Improvement Act of 1997) and DoD Instruction 4715.3 (*Environmental Conservation Program*), which require that INRMPs be developed and maintained for all Army installations, as well as AR 200-3 (*Natural Resources—Land, Forest and Wildlife Management*). Active natural resources management programs at both installations include Integrated Training Area Management (ITAM), Range Training Lands Assessments (RTLA), Land Rehabilitation and Maintenance (LRAM), and Training Requirement Integration (TRI) programs. Fort Lee, having areas within the Virginia Coastal Zone, ensures that environmental stewardship activities at the installation are consistent with and support the principles of the Coastal Zone Management Act of 1972, as amended, and are implemented in a manner consistent with the Virginia VCRMP.

Historically, the Army’s forest management program at Fort Lee probably diminished biodiversity conservation because it emphasized conversion of multi-species forest to monoculture pine plantations and harvest of higher-value timber at mid-age stages. In addition, the wildlife program has emphasized game species, as has been the case on most public lands in the Nation. Although timber will continue to be harvested on the post to support ecosystem management objectives, recent decreases in forest harvest are possibly reversing that trend by emphasizing older growth, and recent moves to protect non-game wildlife will increase biodiversity or at least reduce downward trends. Management recommendations from the recent planning-level survey of the major fauna and flora that occur within the boundaries of Fort Lee, focus on protecting existing species, enhancing and protecting habitats, using native species and controlling non-native species, and pursuing a multi-species integrated management approach. This is analogous to an ecosystem management approach in which consideration is given not only to natural resources management but also to land use demands and the military mission. Maintaining the diversity of existing habitat types and preserving unique or exemplary natural communities found at Fort Lee, such as the relatively mature, bottomland hardwood forests of the Blackwater Swamp and the seasonally flooded depressional woodlands on the northern half of the Firing Range, are of particular importance.

A recreational hunting program has been established to support Fort Lee's wildlife management mission. Two types of hunting regimes have been designated to control deer herds in coordination with the Virginia Department of Game and Inland Fisheries. Wildlife management days are designed to reduce deer populations before or during rut to maximize the likelihood of significant culls. Recreational hunting days are scheduled during the hunting season for deer, turkey, goose, duck, squirrel, rabbit, quail, dove, and crow. Seasons and bag limits follow state and federal guidelines.

4.1.7.2 Environmental Consequences

4.1.7.2.1 Preferred Alternative

Long-term minor adverse impacts on vegetation, wildlife, and natural habitats would be expected from implementation of the Preferred Alternative. Long-term adverse impacts would result from the permanent loss of currently undeveloped, vegetated wildlife habitat (see Table 4.1.1-1 in section 4.1.1 Land Use) required to implement the Preferred Alternative. Most of the wooded area that would be lost for BRAC development would be in TA5 and the ASP area adjacent to it,

and would result in a loss of portions of contiguous woodlands. The woodlands now in TA5 and the ASP area provide a wildlife “greenway” extending from the north end of the Ranges at River Road southward through Training Area 5 and Petersburg Battlefield and from there to points south or east to the Blackwater Swamp. In particular, the loss of mature forests and natural areas in Training Area 5 would have impacts on a subset of this biotic community, including amphibians, reptiles, and mammals. The loss could similarly result in impacts on priority migratory bird species, especially those that are area-sensitive. In the 1990s, habitat changes on Fort Lee resulted in the displacement of two species of birds (loggerhead shrike, American redstart) that had nested on the installation. Further habitat changes from BRAC development could cause two more species (American kestrel, black and white warbler) that nest on the installation to be displaced to suitable habitats off the installation. In addition, impacts on additional specific faunal populations and certain area-sensitive species could occur due to the fragmentation and loss of the larger contiguous forests within the installation.

Forested communities lost due to the implementation of BRAC in TA5 and the ASP area, however, would total approximately 220 acres, which constitutes less than 10 percent of all forested communities on the installation. Locally, implementation of BRAC would result in the loss of less than 1 percent of forested habitat county-wide. Supporting this assessment, agency comment from the Virginia Department of Forestry states that “no significant impacts to the forests of the Commonwealth [are anticipated]” (Department of Forestry, October 8, 2006).

In addition, due to the anticipated avoidance of almost all wetlands and adjacent 100-foot-wide upland riparian buffers within TA5 and the ASP area, a substantial portion of the older growth, late-successional forest would remain undisturbed. This resulting habitat avoidance would leave wildlife corridors extending from the natural communities north of TA5 (near TA6) to the Petersburg National Battlefield and throughout the eastern portion of TA5 intact. Therefore, implementation of the Preferred Alternative is expected to result in only short- and long-term minor adverse effects to existing vegetation, wildlife, and natural habitats.

Wildlife not lost directly to construction impacts would be displaced within the installation to other habitat areas. Additional development would further concentrate remaining wildlife populations, which could result in increased parasite and disease transmission opportunities, as well as wildlife/vehicle collisions and deer damage complaints. Deer population management through hunting would be reduced because of a reduction in hunting areas, which could result in overcrowding and an overall increase in deer herds.

Additional losses of vegetated areas would result from development at the proposed locations of the Ordnance Museum, the Log University and Field Training, and the Lodging Facility (Figure 2.2-1). Natural vegetation and wildlife habitat in these areas would be lost, and the wildlife of the areas would be eliminated during development or would move to nearby, similar habitats, such as those on the Petersburg National Battlefield and the Range Area north of Route 144. Short-term impacts on wildlife and vegetation would be expected due to the temporary increase in construction traffic and disturbed areas required for staging and storage. Other development proposed to occur on Fort Lee would occur primarily in previously developed areas and would not have appreciable impacts on vegetation or wildlife.

Short- and long-term minor adverse effects on aquatic biota in streams on the installation would be expected from implementation of the Preferred Alternative. Soil disturbance and storm water runoff during construction could result in temporary sedimentation in streams within the installation and downstream should BMPs be improperly designed or constructed, or fail during

construction. It is anticipated that any short-term impacts incurred would cease after construction completion and revegetation. Long-term impacts on aquatic biota, however, could be expected from hydrologic changes in installation and off-post streams due to the additional load of storm water runoff generated by the increased area of impervious surface on the installation (estimated to be as much as 100 acres).

No impacts on sensitive species at Fort Lee would be expected under the Preferred Alternative. A coordination letter was sent to the USFWS in June 2005. The Service replied on July 26, 2006, stating that it had reviewed the project information and believes that the project would not affect federally listed or proposed species or designated critical habitat (see Appendix A).

Short-term minor adverse effects on wetlands would be expected from implementation of the Preferred Alternative. Impacts would primarily consist of temporary storm water runoff and sedimentation due to construction activities. The greatest potential for wetland disturbance would occur from development in Training Area 5 and the ASP area adjacent to Training Area 5, which includes the wooded area between Temple Avenue and Oaklawn Boulevard. Delineated wetlands in these two areas total 14.26 acres (Table 4.1.7-2). According to a preliminary assessment of development and storm water facilities for TA5 and the ASP area conducted in December 2006 (Appendix K), construction of site facilities, associated infrastructure, and storm water management facilities would be expected to result in a loss of less than 2 acres of forested wetlands in TA5. Also according to the preliminary assessment, created wetlands that would function both for storm water treatment and wetland mitigation would be constructed in the area, and the constructed wetlands could more than compensate for the lost wetlands (i.e., more than a 2:1 ratio of wetlands replacement). Fort Lee would meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters.

Construction activities proposed for the Preferred Alternative would avoid the two largest wetland systems on the installation, the Blackwater Swamp and Bailey Creek. In addition, 100-foot buffer areas around wetlands would also be avoided wherever practicable to minimize secondary and cumulative effects on wetlands. Short-term indirect adverse effects on wetlands associated with these two large watershed areas would cease after construction was completed and soils were stabilized to minimize sedimentation from storm water runoff.

Cumulative Effects

Adverse cumulative impacts on biological resources (natural habitats, vegetation, and wildlife) would result from the loss of forested land for family housing under the RCI program, with the majority of new construction under that program proposed to occur in forested habitat in the southeast corner of the installation near Route 630. Mature forested communities in this portion of the cantonment area total approximately 340 acres (Resource Management Associates 2006), of which about 140 acres are planned for RCI development, leaving over 70 percent of these communities intact for wildlife habitat. Similar to TA5, these areas contain substantial riparian wetlands, all of which and 100-foot-wide upland buffers would be avoided to maintain a wildlife corridors to promote movement of species from the remaining wooded areas north of RCI to Blackwater Swamp. Using these planning and development measures, the loss of wooded areas in TA5 and the ASP area, combined with the loss of portions of forest areas in the cantonment area to RCI would be expected to result in minor adverse cumulative impacts on the regional ecology. A wildlife corridor is expected to remain there, however, and it would provide a natural link

between the Blackwater Swamp and Bailey Creek areas. Impacts on proposed RCI areas are evaluated in a separate Environmental Assessment prepared by Fort Lee.

Before BRAC development, timber harvesting would be conducted on both sides of River Road within Training Area 5 and the ASP site. Timber harvests in these areas would result in a 70 percent to 80 percent loss of natural cover, including two of the most pristine mature hardwood blocks on the installation. One is located to the southeast of the ASP site; the other runs through Training Area 5 from the southeast corner to the northwest. Archaeological sites might facilitate the preservation of a forested corridor along the north side of Training Area 5, and it is possible that this corridor could continue along the western edge adjacent to the Petersburg National Battlefield boundary. If left intact, however, the corridor would suffice for only a wildlife movement corridor, primarily for mammals and birds in migration. It would not retain meaningful value as breeding habitat for birds, larger mammals, and amphibians.

When combined, the loss of these three large, forested blocks (TA5, the ASP area, and the proposed RCI sites) would result in a minor adverse effect on area-sensitive species that depend on large, contiguous natural areas. These losses could also extend to the Petersburg National Battlefield and the Range Area north of Temple Avenue. Losses of natural areas off the installation would contribute to the overall loss of biological integrity in the region, and the specific biological resources impacted would depend on the habitats affected.

Additional wooded areas are expected to be lost due to the construction of temporary lodging facilities proposed in the southwest portion of the cantonment area. Most of the additional secondary facilities (e.g., chapels, fitness centers, childcare services) are proposed primarily in developed areas; however, minor additional impacts on adjacent biological resources could occur.

Mitigation

Mitigation measures that the Army is considering for biological resource protection would primarily entail minimizing the loss of natural habitats on Fort Lee through avoidance, where possible. In particular, design and construction planning for Training Area 5 should support the creation of a wildlife corridor to link the North Range Area with the Petersburg National Battlefield and the Blackwater Swamp. Areas with existing environmental constraints (such as for cultural resources and riparian buffers) together with non-obtrusive training areas should be examined for use to create a wildlife corridor, to ensure animal population dispersal, and to minimize habitat fragmentation.

Mitigation for wetlands impacts would be mitigated at an appropriate ratio by the construction of new wetlands on-site or by other means as determined by the U.S. Army Corps of Engineers in a Clean Water Act Section 404 permit. A mitigation plan and permitting requirements would be coordinated with the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality. A plan of development would be submitted to Prince George County to ensure that the requirements of the Chesapeake Bay Preservation Act would be met.

Before implementing any mitigation for habitat or wetland loss, Fort Lee would ensure to the maximum extent practicable the use of BMPs for limiting impacts on biological resources. Examples of BMPs that Fort Lee would implement are provided below.

Best Management Practices for Biological Resources

- Limit land disturbance on each land parcel to no more than what is necessary for the desired use or development.
- Revegetate disturbed areas with native, indigenous vegetation.
- Place contractor staging and mobilization areas inside construction footprints to avoid wetland and natural areas wherever practicable.
- Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats.
- Place protective fencing or signage, as appropriate, around environmentally sensitive areas.
- Promote environmental awareness and conservation through installation communication (e.g., newsletters, newspaper articles, bulletins)

4.1.7.2.2 No Action Alternative

No impacts on biological resources on Fort Lee would be expected under the No Action Alternative. No BRAC-related development would take place under the alternative.

4.1.8 Cultural Resources

4.1.8.1 Affected Environment

Cultural resources are aspects of the physical environment that relate communities to their culture and history. They provide definition for communities and link them to their surroundings. Cultural resources include tangible remains of past activities that show use or modification by people. This type of cultural resource can include prehistoric and historic archaeological sites, buildings, structures, objects, or districts. Cultural resources also include aspects of the natural environment, such as landscapes, specific places, topographic features, or biota, which are a part of traditional lifeways and practices and are associated with community values and institutions.

4.1.8.1.1 Prehistoric and Historic Background of Fort Lee

Prehistoric Period

The Paleoindian Period represents the earliest known human occupation of North America. In the Mid-Atlantic region, dating from 12,000 to 8,000 B.C., Paleoindians appear to have used a general strategy of hunting and gathering, relying on large and small game, fish, and plant foods. It also appears that they lived in small, mobile groups that moved around to exploit specific and isolated resource locales, with a focus on quarry sites for stone tool materials. The Archaic Period dates from 8,000 to 1,000 B.C. and is noted by a shift to a heavier reliance on small game and an increased emphasis on plant foods compared to the Paleoindian Period. As the Archaic Period came to an end, people in the Mid-Atlantic region were focusing more on using riverine resources and were beginning to cultivate native plants. Settlement patterns show a focus on large river valleys and an increased use of mudflats, salt marshes, and freshwater swamps. Finally, the Woodland Period dates from 1,000 B.C. to A.D. 1,600. Greater sedentism continued to develop, with two prominent site types—large base camps and small, briefly occupied foray camps. Development of new projectile point morphologies and new pottery types exhibiting different shapes and decorations continued throughout the Woodland Period. With ceramics came the

ability to store food and an increase in food production. Populations in the region grew, and permanent or semi-permanent villages were occupied (Versar 2005b).

Contact Period

The Contact Period refers to the interval during which Native American and European societies first encountered one another. Intermittent interaction started with European exploration, trade, and fishing activities along the Atlantic Coast. Direct contact began after 1570 and became sustained cultural interaction with the English settlement of Jamestown in 1607. Interaction between the colonists and the Native Americans was at first cooperative, but it degenerated over the ensuing 40 years, culminating in the destruction of the Powhatan Confederacy in the James Valley in 1646 (Versar 2005b).

Historic Period

Fort Henry (which eventually became Petersburg) was built on the Appomattox River in 1646 in response to continued uprisings of Native Americans. The fort was built to establish an English presence in the frontier and also to create a base of trade. By 1750 Prince George County was no longer a frontier area; settlement, farming, and improved transportation had transformed the county into a commercial area. During the 1800s Petersburg's role as an important commercial center continued to grow. To support an economy based on tobacco manufacturing and transport, cotton manufacturing, and flour mills, major improvements in transportation routes occurred (Versar 2005b).

The Civil War came to Prince George County in mid-summer 1862, when Union General McClellan advanced his troops up the James River and established a base at Harrison's Landing. During the war, Petersburg served as a main supply route for the Army of Northern Virginia. The Union's Commanding General Grant determined that capturing Petersburg would cut supply lines to the Confederate Army and end the war. A 10-month siege of Petersburg ensued, and much of the land surrounding present-day Fort Lee and Petersburg National Battlefield served as the field and front lines for the armies. Prince George County suffered severe losses during the Petersburg siege. The county slowly recovered from the economic devastation through timbering, peanut agriculture, and railroads. By the 1900s agriculture was once again the base of Prince George County's economy (Versar 2005b).

In the summer of 1917, construction began on a newly established cantonment camp for the National Army just east of Petersburg. When the site was selected, about half of it was being used for agriculture. Brush and woods were cleared, swamps and pools drained, roads constructed, and water and sewer systems installed. Within 3 months 700 buildings had been constructed, mostly temporary wooden structures. For the next year the camp underwent almost constant alteration and expansion. The military took occupation of Camp Lee in August 1917, and the first recruits arrived in September. Infantry men, including African-American infantry, were trained at Camp Lee in the new warfare being practiced in World War I, including the use of machine guns, gas, trench construction, grenades, signaling, and liaison (Versar 2005b). After the war the camp was closed in 1921. Some of the land went for use as a federal prison, some was incorporated into Petersburg National Military Park, and the rest was given to the Commonwealth of Virginia for a wildlife preserve. All the buildings at the camp except David House were razed (Versar 2005b).

In response to increasing military tensions and Germany's further aggressions, President Roosevelt and Congress passed the first National Defense Appropriation Act in 1940 and ordered the construction of a second Camp Lee at its previous site. Camp Lee became the center of basic

and advanced training of quartermaster personnel. By the end of the war, 300,000 men had received training at the facility (Versar 2005b). Camp Lee was redesignated Fort Lee in 1950 to recognize the permanent status of the installation. The 1962 reorganization of the Army established Fort Lee as a Class I military installation under the Second Army. Camp A.P. Hill and Camp Pickett were designated major subordinate organizations of Fort Lee until 1974, when they were redesignated as forts. In 1966 Fort Lee became a Class I installation under the First Army, and in 1973 it came under the control of the U.S. Army Training and Doctrine Command (Versar 2005b).

4.1.8.1.2 Cultural Resources Compliance at Fort Lee

A number of federal statutes address cultural resources and federal responsibilities regarding them. The long history of legal jurisdiction over cultural resources, dating back to the 1906 passage of the Antiquities Act (16 U.S.C. 431-433), demonstrates a continuing concern on the part of Americans for their cultural resources. Foremost among these statutes is the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470). Section 106 of the NHPA requires federal agencies to take into account the effect of federal undertakings on *historic properties*. Historic properties are cultural resources that are included in or eligible for inclusion in the National Register of Historic Places (NRHP). To be eligible for inclusion in the NRHP, a cultural resource must demonstrate a significant degree of physical integrity and meet one or more of the NRHP criteria for significance with respect to historical associations, cultural characteristics, and future research potential. The regulations that implement Section 106 (36 CFR Part 800) describe the process for identifying and evaluating cultural resources; assessing effects of federal actions on historic properties; and consulting to avoid, reduce, or mitigate adverse effects. The NHPA does not require preservation of historic properties, but it does ensure that federal agency decisions concerning the treatment of these resources result from meaningful consideration of cultural and historic values, and identification of options available to protect the resources.

The federal government recognizes its unique relationship with Native American tribal governments and respects tribal sovereignty and self-government. Various federal statutes that establish and define a trust relationship with tribes have been enacted. These statutes, along with Executive Orders, include NEPA; the NHPA; the American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996); the Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001); Executive Order 13007, *Indian Sacred Sites* (61 FR 26771); Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249); and the *Executive Memorandum on Government-to-Government Relations with Native American Tribal Governments* (59 FR 22951). They call on agencies to consult with Native American tribal leaders and others knowledgeable about cultural resources important to them. The U.S. Army and U.S. Army Corps of Engineers take government-to-government consultation very seriously, and they initiated consultation with tribes at the beginning of the EIS process (see section 4.1.8.1.4). Consultation has continued throughout development of the EIS.

Fort Lee has an Integrated Cultural Resource Management Plan (ICRMP), which directs cultural resource management actions and decisions for the installation (Versar 2005b). The ICRMP and standard operating procedures (SOPs) contained therein ensure compliance with the legislation discussed above. A Programmatic Agreement (PA) addressing BRAC activities and the protection of historic properties is being developed for signature by Fort Lee and the Virginia State Historic Preservation Officer (SHPO). Fort Lee is consulting with Petersburg National Battlefield and other interested parties in preparation of the PA.

4.1.8.1.3 Cultural Resources at Fort Lee

Overview

Fort Lee's cultural resource management program operates under the guidance of the ICRMP prepared for the military reservation. The ICRMP was revised in October 2005, and Fort Lee is awaiting its approval (Versar 2005b). The ICRMP sets forth the cultural resources inventory and management issues facing the installation and presents SOPs to ensure installation-wide compliance with historic preservation legislation and policies and protection of cultural resources.

Fort Lee has undergone extensive studies to identify historic properties, including archaeological sites and architectural properties. Approximately 4,000 acres, or 70 percent of the installation, have been inventoried for archaeological resources (Versar 2005b). This acreage represents all the area that has not been developed and retains integrity. The remaining acreage is in the developed portions of the installation, where it is considered very unlikely that archaeological resources remain. During inventory, 116 archaeological sites have been identified, and all have been evaluated for eligibility for listing on the NRHP. Twenty-five of the sites are eligible for listing, and the remaining 87 are not eligible. Of the eligible sites, 10 are prehistoric, 5 are historic, and 10 have both prehistoric and historic components. Included in the eligible historic sites is a complex of fortifications built to prepare inductees for trench warfare during World War I. The fortifications include trenches, shelters, dugouts, artillery centers, and other related features.

Architectural inventories have also been conducted. Sixty temporary wooden structures and other buildings dating to World War II were inventoried (Versar 2005b). These structures are covered under a nationwide Programmatic Memorandum of Agreement that has evaluated this type of structure at the national level and allows for the destruction of the structures without further mitigation actions. Most of these structures at Fort Lee have already been demolished. Twelve other buildings have been recorded and evaluated. Of the 12, 10 have been determined not eligible for the NRHP and 2 have been determined eligible (Versar 2005b). An additional 35 buildings have been recorded and evaluated recently for the proposed BRAC realignment (Versar 2006). All of these buildings have been determined not eligible for listing on the NRHP.

Cultural Resources in the Areas of Potential Effect

Neither of the two NRHP-eligible buildings, numbers 3206 and 4300, would be included in the BRAC realignment activities. Those buildings included in the realignment activities have been evaluated, and none are eligible for the NRHP (Versar 2006).

All the proposed construction areas and the VRA have been surveyed for archaeological resources or are in areas that have been heavily disturbed by previous construction activities. Five NRHP-eligible archaeological sites are included in Training Area 5, between Routes 36 and 144. These sites include: 44PG160, a prehistoric camp for resource procurement and processing; 44PG195, a prehistoric camp for resource procurement and processing and temporary habitation; 44PG196, a prehistoric camp for resource procurement and processing; 44PG197, a multi-component site that was used prehistorically for resource procurement and processing and also contains historic artifacts; and a portion of 44PG299, World War I training earthworks. One NRHP-eligible site is outside, but adjacent to, the large construction area proposed in the southeast portion of the installation. This site, another portion of 44PG299, is a large concentration of World War I training fortifications and earthworks. Some of the earthworks go right up to the edge of the area delineated for construction.

Petersburg National Battlefield, which is listed on the NRHP, is adjacent to Fort Lee's western boundary next to Training Area 5. Although most of the park is south of Route 36, a small but important section is north of Route 36. This northern section is one of the most visited areas of the park and the first stop on the battlefield tour. In this area are the park's main visitor center, library, museum, and battlefield fortifications. Confederate Battery 5 and the location where the Union's *Dictator* mortar was found are highly visited attractions that are accessed by a heavily used trail system that connects the visitor center with these historic sites. Many guided ranger tours, interpretive programs, and school education programs occur in this section of the park. During the scoping period, a representative of the park submitted concerns that new construction in Training Area 5 could introduce visual and noise impacts on the historic resources and the visitor experience in this section of the park.

4.1.8.1.4 Native American Resources at Fort Lee

Fort Lee has initiated consultation under NEPA and NHPA with potentially interested tribes by sending a letter describing the Preferred Alternative and asking for comments or concerns that the tribes might have. The letters were sent on June 5, 2006, to the North Carolina Eastern Band of the Cherokee Nation, the United Keetoowah Band of the Cherokee Indians of Oklahoma, the Tuscarora Nation of New York, and the Virginia Council on Indians. No response has yet been received from any of the tribes. Though not representing any Federally recognized Indian tribes, the Virginia Council on Indians responded on June 23, 2006, with a letter stating their concerns regarding the potential effects of ground-disturbing activities on Native American archaeological resources. They requested that the Council be consulted on any such projects. There are no known resources on Fort Lee that are considered of traditional importance to any tribe.

4.1.8.1.5 Pending Investigations and Compliance

Fort Lee conducts its cultural resource management in accordance with applicable federal legislation and guidance from the ICRMP (Versar 2005b). The installation has no existing PAs with the Virginia SHPO and the Advisory Council on Historic Preservation (ACHP); however, a PA is being developed specifically to address the proposed BRAC activities. The installation has conducted cultural resource inventories and evaluations in preparation for potential BRAC realignment activities. If, however, any BRAC-related activities were to occur in an area that has not been inventoried for cultural resources, before any activity began in that area the installation would determine whether any resources would be adversely affected and would consult with the Virginia SHPO in compliance with Section 106 of the NHPA. Any adverse effects would be avoided, minimized, or mitigated, as determined in consultation with the SHPO and in accordance with the installation's ICRMP and the pending BRAC PA.

4.1.8.2 Environmental Consequences

The proposed BRAC activities would likely have a long-term significant adverse impact on the Petersburg National Battlefield. Detailed information on the locations and characteristics of facilities in Training Area 5 is needed to conduct a thorough analysis of impacts on Petersburg National Battlefield. Without that information, it can be determined only that impacts would occur. Although unanticipated adverse effects on historic properties from the BRAC activities are possible, compliance with applicable federal legislation, and the installation's ICRMP, and the pending BRAC PA would mitigate those effects.

4.1.8.2.1 Preferred Alternative

Long-term minor adverse impacts on cultural resources would result from implementing the Preferred Alternative at Fort Lee. The Preferred Alternative would result in building renovation and new construction activities in a number of project areas within and adjacent to the Fort Lee cantonment. Also, a VRA is proposed for the portion of the installation north of Route 144.

Two buildings have been determined eligible for listing on the NRHP, but neither of these buildings is included in the area of BRAC realignment activities. All the buildings proposed for renovation have been evaluated for NRHP listing, and all have been determined not eligible (Versar 2006). Thus, there would be no adverse effects from renovation activities at Fort Lee.

All the areas proposed for construction activities or new operations (such as the VRA) at Fort Lee either have been inventoried for archaeological resources or are in areas that have been heavily disturbed through previous construction activities. Only one construction area, Training Area 5 between Routes 36 and 144, contains NRHP-eligible archaeological sites. There are five sites in this area—three with prehistoric resources (site numbers 44PG160, 44PG195, and 44PG196), one with both prehistoric and historic resources (44PG197), and one with historic resources (44PG299). In accordance with Section 106 of the NHPA, the installation's ICRMP, and the draft PA, all five sites would be fenced during construction activities to ensure avoidance and protection. Best management practices would also be implemented to protect the sites, including measures to prevent damage from changes in erosion patterns both during and after construction, training and instruction of construction workers on the importance of cultural resources and the need to avoid and protect the resources located near where they are working, and periodic monitoring of the five sites to ensure that avoidance and protection measures are effective. Thus, there would be no adverse effects on these five archaeological sites from construction of facilities and associated infrastructure in Training Area 5.

The large construction area proposed in the southeast portion of the cantonment does not contain any historic properties. However, a portion of one NRHP-eligible site (site number 44PG299, World War I fortifications and earthworks) is outside, but adjacent to, the boundary of the construction area. In accordance with Section 106 of the NHPA, the installation's ICRMP, and the draft PA, this site would be fenced during construction activities to ensure avoidance and protection. Best management practices would be implemented to protect the site from changes in erosion patterns, both during and after construction. Periodic monitoring of the site would be conducted to ensure that avoidance and protection measures are effective. Construction workers would receive training and instruction on the importance of cultural resources and the need to avoid those resources located near where they are working. Thus, there would be no impacts on this archaeological site from construction of facilities and associated infrastructure in this area.

If avoidance and protection of the five sites discussed above are not feasible, measures would be implemented in accordance with Section 106 of the NHPA, the installation's ICRMP, and the PA to mitigate the adverse effects on the sites. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region. Implementation of the mitigation measures would reduce the adverse impacts on the sites to less than significant.

Construction and operation of new facilities in Training Area 5 would have long-term minor adverse impacts on Petersburg National Battlefield. Operations at heavy vehicle maintenance

facilities (or highbays) that would be constructed in Training Area 5 and the existing ASP area would introduce loud noise levels. The construction of buildings visible from the park would result in modern intrusions into the viewshed and setting of the park. Exterior lighting on buildings and in parking areas near the park boundary would add to night sky light pollution. These impacts would adversely affect the historic setting of the battlefield, adversely affect people's appreciation and understanding of the property and its historic context, and adversely affect the visitor's experience of the park and its attractions. Fort Lee is working with Petersburg National Battlefield and the Virginia SHPO to identify measures to avoid, reduce, and mitigate these impacts on the park to the maximum extent possible. Mitigation measures for noise impacts that the Army is considering include locating noise-producing buildings or activities away from the battlefield, orienting buildings and activities to reduce noise effects, and locating buildings between the battlefield and sources of noise. Mitigation measures for visual impacts that the Army is considering include locating taller buildings away from the battlefield and maintaining vegetative buffers between development and the battlefield. Best management practices to reduce light pollution, as discussed in section 4.1.2.2.1, would be implemented. The measures that will be implemented will be defined in the PA being developed pursuant to Section 106 of the NHPA between Fort Lee, the Virginia SHPO, and the ACHP, and they will ensure that there would be only minor adverse impacts on historic properties. The PA is being developed in consultation with the Petersburg National Battlefield and other consulting parties.

When conducting ground-disturbing activities, there is always the possibility that buried archaeological resources will be discovered or unanticipated adverse effects will occur on historic properties that were to be avoided. In accordance with best management practices, construction workers would be trained to recognize when archaeological resources have been discovered or when unanticipated adverse effects have occurred, and instructed to halt construction activities and notify the installation. Although unanticipated adverse effects on historic properties from the BRAC activities are possible, compliance with Section 106 of the NHPA, the installation's ICRMP, and the BRAC PA would ameliorate any unanticipated effects, and any adverse impacts in these cases would be minor.

Cumulative Effects

Cumulative adverse effects on NRHP-eligible resources could result if such resources are physically disturbed during development of BRAC facilities, family housing under the RCI program, or projects included in the Fort Lee Master Plan. Federal legislation and the Fort Lee ICRMP would be followed under all of these projects to avoid or mitigate any unanticipated impacts. Thus any adverse cumulative impacts that would occur would be considered minor. Impacts on the setting of Petersburg National Battlefield from the BRAC action would be in addition to modern developments that have already been constructed surrounding the battlefield. Petersburg National Battlefield preserves and protects only a small portion of the lands involved in one of the Civil War's most significant campaigns, the siege of Petersburg in the final year of the war. Increasing urbanization in the surrounding cities and counties, which the BRAC action would contribute to, would have an adverse effect on the more broadly defined battlefield and preclude additional preservation of the siege-line and its setting.

Mitigation

Mitigation measures that the Army is considering for avoiding, minimizing, and mitigating impacts on historic properties at Fort Lee are listed below.

- Fence sites 44PG160, 44PG195, 44PG196, 44PG197, and 44PG299 during nearby construction activities
- Conduct periodic monitoring of the five sites to ensure that avoidance and protection measures are effective.
- If avoidance and protection of the five sites are not feasible, measures would be implemented in accordance with Section 106 of the NHPA, the installation's ICRMP, and the PA to mitigate the adverse effects on the sites. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region.
- Consult with Petersburg National Battlefield and the Virginia SHPO to identify measures to avoid, reduce, and mitigate visual and noise impacts on the park from BRAC facilities and activities in Training Area 5. Mitigation measures for noise impacts could include locating noise-producing buildings or activities away from the battlefield, orienting buildings and activities to reduce noise effects, and locating buildings between the battlefield and the noise-source to block noise. Mitigation measures for visual impacts could include locating taller buildings away from the battlefield and maintaining vegetative buffers between developments and the battlefield to reduce visual impacts. The measures to be implemented would be defined in the PA being developed pursuant to Section 106 of the NHPA between Fort Lee and the Virginia SHPO, and in consultation with the Petersburg National Battlefield.

4.1.8.2.2 No Action Alternative

Under the No Action Alternative there would be no impacts on important cultural resources at Fort Lee. There would be no demolition or renovation of buildings, no construction activities, and no use of new range areas. Therefore, no effects would occur on historic properties at Fort Lee as a result of this alternative.

4.1.9 Socioeconomics

4.1.9.1 Affected Environment

This section describes the contribution of Fort Lee to the economy and the social conditions in the region. The socioeconomic indicators used for this study include regional economic activity (employment and income), population, housing, and quality of life (availability of public and social services, recreational opportunities, and community facilities). In addition, environmental justice and protection of children are discussed. These indicators characterize the region of influence (ROI) that would be most affected by the proposed action at Fort Lee.

An ROI is a geographic area selected as a basis on which economic and social impacts of the proposed action are analyzed. The criteria used to determine the ROI are the residency distribution of Fort Lee employees; the commuting patterns, distances, and times; and the location of businesses providing goods and services to Fort Lee, its personnel, and their dependents. On the basis of these criteria, the ROI for the socioeconomic environment is defined as Chesterfield, Dinwiddie, and Prince George Counties, and the independent cities of Colonial Heights, Hopewell, Petersburg, and Richmond. The ROI covers an area of 1,296 square miles in southeastern Virginia. Fort Lee is in Prince George County and is bordered by the tri-cities of Colonial Heights, Hopewell, and Petersburg. The city of Richmond, which is the capital of Virginia, is about 25 miles north of Fort Lee. The tri-cities are the principal support communities

for the post, although the Richmond area is the principal commercial and services center for the region as a whole.

The baseline year for socioeconomic data is 2005, the date of the BRAC Commission's announcement of the Fort Lee realignment. Where 2005 data are not available, the most recent data available are presented. Projections beyond 2005 are also provided, as appropriate, to illustrate trends.

4.1.9.1.1 Economic Development

Employment and Industry

Fort Lee is one of the largest employers in the ROI. The installation is home to nearly 3,200 military personnel and equally as many family members and about 600 unaccompanied Soldiers. About 2,300 Soldiers and their families live off-post. On a daily basis between 3,000 and 4,200 students are trained at Fort Lee. The installation employs about 3,000 civilians. Fort Lee contributes more than \$700 million annually to the local economy (Fort Lee 2006b).

In addition to Fort Lee, Prince George County has a strong agricultural base, a small-scale industrial park, and one of the largest Food Lion distribution centers on the East Coast. Hopewell is heavily based on industry and is home to large chemical plants owned by Honeywell Corporation, Smurfit-Stone Container Corporation, and Hercules Corporation. Colonial Heights and Chesterfield County have a high percentage of white-collar office workers and professionals and a large retail base. Chesterfield County is also home to a large DuPont manufacturing facility that is expanding operations and creating 50 new jobs (Commonwealth of Virginia 2006). Petersburg has a historical district, light manufacturing, small businesses, and is home to Virginia State University. Dinwiddie County has a strong agricultural base. Prominent industries in Richmond include health care services (the city has 14 hospitals) and manufacturing (Philip Morris, Wyeth, and International Paper Company) (VEDP 2006).

The primary sources of employment are services, government, and trade. These three industries accounted for about 75 percent of regional employment. The largest source of jobs in the ROI was the service industry, which provided 37 percent of the total employment. Government accounted for 24 percent of employment, while trade accounted for 14 percent. Manufacturing provided for 8 percent, and the financial and construction industries each accounted for 6 percent (VEDP 2006).

The ROI labor force totaled 318,485 in 2005 (BLS 2006). The unemployment rate in the region was 4.1 percent, up from 2.2 percent in 2000, reflecting the national trend of rising unemployment rates. During the same time period, the United States unemployment rate increased from 4.0 to 5.1 percent (BLS 2006). Within the ROI there were wide disparities in the unemployment rate. In 2005 Chesterfield County had a low unemployment rate of 2.9 percent, whereas the city of Richmond had a rate of 5.3 percent, Hopewell had a rate of 5.7 percent, and Petersburg had the highest rate at 7.3 percent. Table 4.1.9-1 lists labor force information for the ROI.

Income

In 2003 the per capita personal income (PCPI) in the ROI was \$32,207, up 9 percent from 2000 (BEA 2006). The United States PCPI was \$31,472, up 5 percent from 2000. As with the unemployment rate, within the ROI there were large disparities in per capita income levels.

**Table 4.1.9-1
Fort Lee ROI labor force statistics**

	Civilian labor force	Employed	Unemployed	Unemployment rate
2005				
Chesterfield County	159,546	154,853	4,693	2.9%
Dinwiddie County	12,834	12,321	513	4.0%
Prince George County	14,327	13,698	629	4.4%
Colonial Heights City	9,282	8,913	369	4.0%
Hopewell City	10,421	9,827	594	5.7%
Petersburg City	14,430	13,380	1,050	7.3%
Richmond City	97,645	92,450	5,195	5.3%
ROI	318,485	305,442	13,043	4.1%
2000				
Chesterfield County	141,459	138,938	2,521	1.8%
Dinwiddie County	11,965	11,716	249	2.1%
Prince George County	13,144	12,809	335	2.5%
Colonial Heights City	8,565	8,373	192	2.2%
Hopewell City	9,813	9,535	278	2.8%
Petersburg City	13,832	13,662	470	3.4%
Richmond City	94,849	92,351	2,498	2.6%
ROI	293,627	407,384	6,543	2.2%

Source: BLS 2006.

Chesterfield County and the city of Richmond had income levels of \$34,428 and \$33,705, respectively, whereas Prince George County (including the city of Hopewell) had a PCPI of \$23,502. Table 4.1.9-2 details per capita income information for the ROI, state, and nation.

Population

Population characteristics in the ROI are provided for the baseline year, 2005. To illustrate trends, historical data are presented for 1990 and 2000 and projections for 2010.

In 2005 the ROI population totaled 617,630, an increase of 5 percent over the 2000 population of 588,264 (U.S. Census Bureau 1990, 2000). Population declined in the cities of Petersburg and Richmond during this period. However, the other five jurisdictions comprising the ROI (Chesterfield, Dinwiddie, and Prince George Counties and the cities of Colonial Heights and Hopewell) experienced population growth ranging from 2 percent to 11 percent, resulting in a net population increase for the ROI. Chesterfield and Prince George Counties grew by 11 percent, Dinwiddie County by 3 percent, the city of Colonial Heights by 4 percent, and the city of Hopewell by 2 percent. Dinwiddie County is experiencing some of the growth of Prince George and Chesterfield Counties as space becomes increasingly limited in those counties (DA 2006). Population projections indicate that Chesterfield will continue to experience very strong growth, with an estimated population increase of 9 percent by 2010. The other jurisdictions comprising the ROI are projected to have either modest growth or a decline. The ROI as a whole is projected to have about a 4 percent population increase by 2010. For comparison, the state of Virginia's population is projected to increase by 6 percent by 2010 (U.S. Census Bureau 2000). Table 4.1.9-3 presents population data for the ROI.

Table 4.1.9-2
Fort Lee ROI per capita personal income

	PCPI	
2000		
Chesterfield County	\$32,221	
Dinwiddie County + Colonial Heights City + Petersburg City	\$24,506	
Prince George County + Hopewell City	\$22,565	
Richmond City	\$29,853	
ROI	\$29,534	
Virginia	\$31,087	
United States	\$29,845	
2004		
		Percent change, 2000–2004
Chesterfield County	\$34,428	7%
Dinwiddie County + Colonial Heights City + Petersburg City	\$26,729	9%
Prince George County + Hopewell City	\$23,502	4%
Richmond City	\$33,705	13%
ROI	\$32,207	9%
Virginia	\$33,730	9%
United States	\$31,472	5%

Source: BEA 2006.

Note: BEA compiled the data and presented Dinwiddie County, Colonial Heights City, and Petersburg City as one jurisdiction, and Prince George County and Hopewell City as another. BEA did not provide separate data for each of these cities and counties

Table 4.1.9-3
Fort Lee ROI population trends

City or county	1990	2000	2005^a	2010	Percent change, 1990–2000	Percent change, 2000–2005	Percent change, 2005–2010
Chesterfield County	209,600	259,900	288,880	316,000	24%	11%	9%
Dinwiddie County	20,280	24,530	25,390	26,300	10%	4%	4%
Prince George County	27,390	33,050	36,730	36,000	21%	11%	-2%
Colonial Heights City	16,060	16,900	17,570	17,200	5%	4%	-2%
Hopewell City	23,100	22,350	22,690	21,700	-3%	2%	-4%
Petersburg City	37,070	33,740	32,600	30,400	-9%	-3%	-7%
Richmond City	202,710	197,790	193,780	191,600	-2%	-2%	-1%
ROI	538,210	588,260	617,640	639,200	9%	5%	3%

Sources: VEDP 2006.

Note: 2010 projections might not include the Fort Lee BRAC action, which could explain the projected population decrease in several jurisdictions.

4.1.9.1.2 Sociological Environment

Housing

On-Post Housing. Fort Lee has 1,208 family housing units on-post. On-post housing is fully occupied, and the average wait time for on-post housing is 6 to 12 months (DA 2006). The units consist of single-family homes, duplexes, and quadplexes with two- to five-bedrooms. These properties are in five distinctly identifiable communities—Harrison Villa, Jackson Circle, Jefferson Terrace, Madison Park, and Monroe Manor. Most of Fort Lee's family housing is in the southeastern portion of the cantonment area. The only exception is the Jackson Circle neighborhood, which is to the northwest directly across Route 36 from the installation's main gate. The Jefferson Terrace and Madison Park neighborhoods are under renovation and construction with phased completion dates between 2006 and 2009. Fort Lee has only 10 permanent party bachelor housing units. There are 15 permanent Advanced Individual Trainee barracks with 2,713 bed space capacity and 3 temporary modular barracks with 288 bed space capacity (DA 2006).

Off-Post Housing. Table 4.1.9-4 presents available housing data for the ROI as of the 2000 Census. It should be noted that housing stock and housing prices in the ROI have risen at varying rates since that time. However, 2005 housing data published by a reliable source such as the U.S. Census Bureau is not yet available for all jurisdictions. Anecdotal evidence suggests that the average rent in Petersburg increased at the national average of 3 percent annually, rents in Prince George County have nearly doubled since 2000, and home prices in Prince George County have risen dramatically (Sweeney, personal communication, 2006; Prince George County Administrator's Office, personal communication, 2006). Census 2005 housing data was available for Chesterfield County and Richmond, but not for the other ROI jurisdictions. Chesterfield County median value of owner-occupied housing units rose from \$119,300 in 2000 to \$179,300 in 2005, a 50 percent increase, and median gross rent increased from \$717 to \$818, a 14 percent increase. Home values in Richmond increase from \$87,400 to \$149,400, a 71 percent increase, and rent increased from \$540 to \$697, a 29 percent increase over the 5-year period (U.S. Census Bureau 2005).

There were 243,466 housing units in the ROI in 2000, of which 227,468 (93 percent) were occupied (U.S. Census Bureau 2000). Of the occupied units, about two-thirds are owner occupied, and one-third are renter occupied. The median value of owner-occupied housing units ranged from \$68,000 in Petersburg City to \$119,000 in Chesterfield County—about the same as or less than the national median home value of \$119,600. Median gross rent ranged from \$495 in Petersburg City to \$717 in Chesterfield County. For comparison, the national median gross rent was \$602. Of the vacant units, about 6,300 were identified as available to rent and about 2,600 were for sale.

The number of housing units in the ROI increased by 10 percent (about 23,000 units) between 1990 and 2000, and by 6 percent (about 13,700 units) between 2000 and 2004. Chesterfield, Dinwiddie, and Prince George Counties experienced very strong housing growth between 1990 and 2000, with the number of housing units in each county increasing by more than 20 percent (Table 4.1.9-5). This strong growth continued through 2004, with Chesterfield County increasing its housing stock by 11 percent and Dinwiddie and Prince George Counties by 8 percent. The city of Colonial Heights had an 11 percent increase between 1990 and 2000, and, so far, a 3 percent increase between 2000 and 2004. The cities of Hopewell, Petersburg, and Richmond had little or no growth (U.S. Census Bureau 1990, 2000, 2006b). This housing market data reflects the

**Table 4.1.9-4
Fort Lee ROI housing data (2000)**

	Chesterfield County	Dinwiddie County	Prince George County	Colonial Heights City	Hopewell City	Petersburg City	Richmond City	ROI
Quantity								
Total housing units	97,707	9,707	10,726	7,340	9,749	15,955	92,282	243,466
Occupied housing units	93,772	9,107	10,159	7,027	9,055	13,799	84,549	227,468
Owner-occupied	75,874	7,214	7,418	4,871	5,067	7,107	39,008	146,559
Renter-occupied	17,898	1,893	2,741	2,156	3,988	6,692	45,541	80,909
Vacant housing units	3,935	600	567	313	694	2,156	7,733	15,998
For rent	1,616	135	124	138	239	947	3,113	6,312
For sale only	965	83	101	60	184	250	949	2,592
Other	1,354	382	342	115	271	959	3,671	7,094
Homeowner vacancy rate	1.3	1.1	1.3	1.2	3.5	3.4	2.4	N/A
Rental vacancy rate	8.3	6.7	4.3	6.0	5.7	12.4	6.4	N/A
Quality								
Units lacking complete plumbing facilities	256	156	36	6	26	114	454	1,048
Percent	0.3	1.7	0.4	0.1	0.3	0.8	0.5	0.4
Units lacking complete kitchen facilities	366	41	120	43	53	83	546	1,252
Percent	0.4	0.5	1.2	0.6	0.6	0.6	0.6	0.5
Cost								
Median value of owner occupied units	\$119,300	\$86,800	\$114,100	\$94,700	\$77,000	\$68,100	\$87,400	\$87,400
Median gross rent	\$717	\$566	\$609	\$619	\$512	\$495	\$540	\$566

Source: U.S. Census Bureau 2000.

**Table 4.1.9-5
Fort Lee ROI Housing Units**

City or County	Year 1990	Year 2000	Year 2004	Change in number of units, 1990–2000	Percent change, 1990–2000	Change in number of units, 2000–2004	Percent change, 2000–2004
Chesterfield County	77,329	97,707	108,794	20,378	26%	11,087	11%
Dinwiddie County	8,023	9,707	10,444	1,684	21%	737	8%
Prince George County	8,640	10,726	11,590	2,086	24%	864	8%
Colonial Heights City	6,592	7,340	7,588	748	11%	248	3%
Hopewell City	9,625	9,749	9,909	124	1%	160	2%
Petersburg City	16,196	15,955	15,879	-241	-1%	-76	-0.5%
Richmond City	94,141	92,282	92,976	-1,859	-2%	694	1%
ROI	220,546	243,466	257,180	22,920	10%	13,714	6%

Source: U.S. Census Bureau 1990, 2000, 2006b

population growth, discussed above in section 4.1.9.1.1. Chesterfield, Dinwiddie, and Prince George Counties and the city of Colonial Heights all had moderate to strong population growth between 1990 and 2005.

Law Enforcement, Fire Protection, and Medical Services

The Fort Lee Directorate of Emergency Services provides for the protection of lives and property on the installation through the Fort Lee Police Department and the Fort Lee Fire and Emergency Services Division. The Police Department oversees policing operations, patrols, general and absent without leave investigations, training, and traffic accident and criminal investigations. The Fort Lee Police Department has about 120 military law enforcement officers and civilian personnel. The Fort Lee Fire and Emergency Services Division is currently authorized 48 personnel, although 57 personnel are required at this time (Fort Lee PMO 2006). Fort Lee has two fire stations; one of the stations was replaced in 2006. The fire department responds to emergencies involving structures, facilities, transportation equipment, hazardous materials, and natural and man-made disasters; directs fire prevention activities; and presents public education programs. The Fort Lee Fire and Emergency Services Division has mutual aid agreements with Prince George and Dinwiddie Counties and the cities of Colonial Heights, Hopewell, and Petersburg (Fort Lee PMO 2006). City, county, and state police departments provide law enforcement in the ROI. There were about 1,800 total city and county law enforcement employees (officers and civilians) for the seven-county ROI as of 2004 (DOJ–FBI 2006). Fire protection in the ROI is provided by 18 career or volunteer fire departments with a total of 59 fire stations. The majority of the fire departments (12 departments or 67 percent) are volunteer and the remaining 6 departments are career (NFPA 2005; USFA 2006).

The Kenner Army Health Clinic (KAHC) on Fort Lee provides outpatient primary health care services for adults and children. Services provided are general medical care including family practice and internal medicine. A pharmacy, laboratory, and radiology center are also available. Limited specialty care services include optometry, orthopedics, physical therapy, preventative medicine, and social work (Kenner Army Health Clinic 2006).

The ROI has about 3,000 practicing physicians and about 500 dentists. There are 19 hospitals in the ROI, with nearly 5,200 total patient beds. Fourteen of the hospitals are in the city of Richmond. Richmond has been designated a Prime Medical Center by the American Medical Association, meaning that virtually all modern medical services are available. The Virginia Commonwealth University Medical Center in Richmond is a world-renowned teaching and research hospital with a level one trauma center and provides comprehensive medical services (VEDP 2006). Chesterfield County has two hospitals that provide general medical and surgical services along with a trauma center and special services. Hopewell City has the John Randolph Hospital, which offers a full range of medical care (except obstetrics) including 24-hour emergency care. Petersburg City has the Southside Regional Medical Center, which provides general and emergency services and the Poplar Springs Hospital, which is a private psychiatric facility (VEDP 2006).

Schools

Most school districts receive funding from state and local property taxes. Federal Impact Aid is a federal program that provides funding for a portion of the costs associated with educating children of military personnel. The U.S. Department of Education provides federal impact aid to school districts that have federal lands within their jurisdiction. This federal impact aid is authorized under Public Law 103-282 as payment in lieu of taxes that would have been paid if the land were not held by the federal government. School districts receive federal impact aid for each federally connected student whose parent or parents live on or work on federal property. When military children attend public schools, enrollment is increased, but local tax revenue is not generated because families live and shop on federal property, which is not taxed. The federal

government acts as the local taxpayer by funding the Federal Impact Aid program for local school districts (DoD 2005a). The amount of federal impact aid a school receives is dependent on the number of *federal* students the district supports in relation to the total district student population. Schools receive more federal impact aid for those students whose parents both live and work on federal property. Total federal impact aid varies year by year according to congressional appropriations for the program. In FY 2004 federal impact aid ranged from \$450 to \$2,200 per student (DoD 2005a).

Children living on-post attend schools in the Prince George County Public School District. Bus service is provided from the housing areas on-post to the schools. In 2005 about 1,200 schoolchildren living on-post attended Prince George County public schools (Fort Lee 2005a). The Prince George School District has five elementary schools, one middle school (grades 6–7), one junior high school (grades 8–9), one high school (grades 10–12), and a vocational technical center.

Children of military personnel residing off-post attend the school district for the area in which they live. In addition to Prince George County Public Schools, Fort Lee has Memorandums of Agreement with the following school districts: Chesterfield County Public Schools, Dinwiddie County Public Schools, Colonial Heights Public Schools, Hopewell Public Schools, and Petersburg Public Schools (Fort Lee School Liaison Officer, personal communication, 2006). These six school districts have 58 elementary schools, 19 middle schools, and 15 high schools (NCES 2005; VEDP 2006). Total enrollment for the 2005–2006 school year was about 35,800 students. The student-to-teacher ratio in the primary schools ranged from 12:1 to 17:1, and for secondary schools, the ratio ranged from 7:1 to 13:1 (VEDP 2006). Some of these school districts, in particular those in counties experiencing strong population growth, have schools operating at or above capacity (Chesterfield, Dinwiddie, Prince George). Portable classrooms are used to house the students in Chesterfield County, Dinwiddie County, Prince George County, Colonial Heights, and Richmond to maintain low student-to-teacher ratios and small class sizes (Marlow, personal communication, 2006; Maranzano, personal communication, 2006; Nicholson, personal communication, 2006; Colonial Heights Public Schools Superintendents Office, personal communication, 2006; Hyslop, personal communication, 2006; Davis, personal communication, 2006; Richmond Public Schools Operation Office, personal communication, 2006). Chesterfield County Public School District is using portable classrooms and has plans to build five more schools (two elementary, two middle, and one high school) (Chesterfield County Public Schools 2006). Dinwiddie County Public Schools also is operating classrooms in temporary modulars or trailers, and is constructing one high school and one elementary school (Dinwiddie County Public Schools 2006). Prince George County Public School District is planning to build a new elementary school by 2008 (Fort Lee School Liaison Office 2006).

Family Support and Social Services

Fort Lee Army Community Service (ACS) is a human service organization that has a number of programs and services in place to assist employees and their families. Army Family Team Building provides educationally based programs and training to Soldiers and their family members to help families adapt to Army life. The Mobilization and Deployment Program provides family assistance to support units, Soldiers, and families in preparing for pre-deployment, deployment, and post-deployment. Army Emergency Relief provides emergency financial assistance to Army personnel and their families for such things as food, rent, medical bills, or other essential needs. The Financial Readiness Program provides budget counseling, checkbook management, and money management guidance. The Employment Readiness Program helps military family members find employment. The Family Readiness Program and

New Parent Support Program provide preventative and educational programs and other support services to Soldiers and family members to identify and prevent family violence and enhance parenting skills and family cohesiveness. The Exceptional Family Members Program provides support services to family members that have medical, psychological, or educational-related special needs (Fort Lee 2006b).

Fort Lee Child and Youth Services Division has facilities and programs to support families. The Child Development Center provides day care for children aged 6 weeks through kindergarten. The School Age Services program provides before and after school care during the school year and a weekly camp program through the summer for children in first through fifth grade. In-home daycare is provided through the Family Child Care program (DA 2006; Fort Lee 2006b).

The region has a number of shelters and assistance programs for individuals and families in need of the following: temporary placement because of a lack of fixed, regular, or adequate residence; financial assistance; protection from abuse or neglect; and assistance to persons with disabilities. The Virginia Department of Social Services operates through the county or city local social service departments and provides assistance to all citizens of Virginia, including active duty military personnel stationed in the state and their families. Virginia Department of Social Service programs include adult and child protective services, child care, adult day care, assisted living facilities, financial assistance, food stamps, low-income energy assistance, support for adults and children with special health care needs or disabilities, domestic violence, and substance abuse counseling (VDSS 2006).

Shops, Services, and Recreation

On-post shopping includes the commissary and post exchange, which offer a wide variety of food, clothing, and household goods; a military clothing store; the PXtra, which sells furniture, video rentals, convenience and food items, music, and limited household goods; a shoppette; a thrift store; and an office supply store. Service operations include a barber and beauty shop; a bank and a credit union; travel agency; cellular phone sales and service; laundry and dry cleaning; computer repair; and a post office. Fort Lee also has two food courts, a Burger King, and two dining clubs (the Regimental Club and the Lee Club) that offer lunch, dinner, Sunday brunch, and catering services (Fort Lee 2006b). The Regimental Club also holds Bingo games several times a week (Versar 2005a).

The three-county, four-city ROI provides ample opportunity for shopping, with plazas, malls, and downtown shopping areas. Financial, real estate, automotive, travel, and other service establishments are readily available. Residents of Fort Lee and the ROI have easy access to a vast array of shopping and services available in the metropolitan Richmond area.

On-post athletic facilities include fitness centers (with basketball, volleyball, racquetball/handball, exercise rooms, and weightlifting equipment), swimming pools, a bowling center, a 27-hole golf course and pro-shop, and hunting and fishing. Other recreational opportunities include a theater group, an auto crafts facility, picture framing classes, movies, and a youth center and sports teams for children (Fort Lee 2006b). The Sports Office, Building 4320, offers fitness classes in aerobics, yoga, karate, cardio-kick, and circuit weight training. Outdoor tennis courts, basketball courts, and volleyball fields are available in various areas on-post for drop-in play. For large-capacity sporting events, the installation has the Williams Stadium, which seats more than 5,000 and has a quarter-mile track, and Nowak Field, which has a seating capacity of about 1,500 and is suitable for softball and football. Batting cages were installed at Nowak Field and are open for weekend practice. Fort Lee has a hunting program and is open to

bird watching, nature photography, horseback riding, and general nature enjoyment outside of the hunting season. Fort Lee has rifle and pistol, skeet and trap, and archery ranges (Versar 2005a).

The Fort Lee Youth Development Program, integrated into the Middle School and Teen program, offers karate, dance, art, group piano keyboarding, and golf lessons; and art, soccer, and cheerleading camps. Fort Lee also has a Boys and Girls Club, and Youth Sports teams including soccer, baseball and T-ball, flag football, tackle football, cheerleading, and basketball (DA 2006; Fort Lee 2006b).

The ROI has many different types of recreation opportunities. The area has many Civil War era sites, as well as parks, athletic complexes, museums, community theater, hiking, and water sports. The James and Appomattox Rivers are in close proximity to Fort Lee, and the coastal beaches at Virginia Beach are about a 2-hour drive. The ROI is home to several professional sports teams. The city of Richmond has a symphony orchestra and theaters that host touring Broadway plays. Two major amusement parks, Busch Gardens in Williamsburg and Paramount's Kings Dominion north of Richmond, are both less than 1 hour's drive from the ROI, as well as the historic Colonial Williamsburg (VEDP 2006).

4.1.9.1.3 Environmental Justice

Environmental justice addresses race, ethnicity, and the poverty status of populations within the ROI. On February 11, 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The order is designed to focus the attention of federal agencies on the human health and environmental conditions in minority and low-income communities. Environmental justice analyses are performed to identify potential disproportionately high and adverse impacts from proposed actions and to identify alternatives that might mitigate these impacts.

Minority populations are identified as Black or African American and not of Hispanic origin; American Indian and Alaska Native; Asian; Native Hawaiian and other Pacific Islander; Hispanic; persons of some other race; and persons of two or more races. Minority populations should be identified where either the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). In 2000 42 percent of the ROI population was of a minority race or ethnicity. The population of the state of Virginia was 30 percent minority (U.S. Census Bureau 2000). Within the ROI, the city of Petersburg has a minority population of 82 percent and the city of Richmond has a minority population of 62 percent. Table 4.1.9-6 presents race and ethnicity data for the ROI.

Poverty thresholds as established by the Census Bureau are used to identify low-income populations (CEQ 1997). Poverty status is reported as the number of persons or families with income below a defined threshold level. The 2000 Census defines the poverty level as \$8,794 of annual income, or less, for an individual and \$17,603 of annual income, or less, for a family of four. As of 2000, the Census Bureau classified 12 percent of the ROI residents as living in poverty, higher than the 10 percent poverty rate for the state of Virginia. Within the ROI, the cities of Hopewell, Petersburg, and Richmond have high poverty rates ranging from 15 percent to 21 percent. Poverty status characteristics for the ROI are presented in Table 4.1.9-6.

Table 4.1.9-6
Fort Lee ROI race, ethnicity, and poverty data

	Chesterfield County	Dinwiddie County	Prince George County	Colonial Heights City	Hopewell City	Petersburg City	Richmond City	ROI
White	75%	64%	59%	88%	61%	18%	38%	58%
Black or African American	18%	34%	32%	6%	33%	79%	57%	36%
American Indian and Alaskan Native	0.3%	0.2%	0.4%	0.2%	0.3%	0.2%	0.2%	0.3%
Asian	2%	0.3%	2%	3%	1%	1%	1%	2%
Native Hawaiian and other Pacific Islander	0.04%	0.03%	0.15%	0.08%	0.07%	0.02%	0.03%	0.04%
Some other race	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.2%	0.1%
Two or more races	1%	1%	2%	1%	2%	1%	1%	1%
Hispanic or Latino origin	3%	1%	5%	2%	3%	1%	3%	3%
Percent minority	25%	36%	41%	12%	39%	82%	62%	42%
Persons living in poverty	5%	9%	8%	6%	15%	20%	21%	12%

Source: U.S. Census Bureau 2000.

4.1.9.1.4 Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), seeks to protect children from disproportionately incurring environmental health risks or safety risks. 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 might diminish protection from standard safety features; and their behavior patterns might make them more susceptible to accidents. Because of these factors, President Clinton 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. President Clinton 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.

Children have been present at Fort Lee either as dependents living in family housing or as occasional visitors. The Army has taken precautions for their safety by a number of means, including using fencing, limiting access to certain areas, and providing adult supervision. Children are not allowed entry to operational or training areas of the installation.

4.1.9.2 Environmental Consequences

4.1.9.2.1 Preferred Alternative

Economic Development

Methodology. The economic effects of implementing the proposed action are estimated using the Economic Impact Forecast System (EIFS) model (see Appendix E), a computer-based economic tool that calculates multipliers to estimate the direct and indirect effects resulting from a given action. Changes in Fort Lee employment and spending represent the direct effects of the action.

On the basis of the input data and calculated multipliers, the model estimates ROI changes in sales volume, income, employment, and population, accounting for the direct and indirect effects of the action. Note that the model does not project a specific distribution of population by age, it does not project a specific distribution of the population among the counties and cities comprising the ROI, and it does not project distribution of employees among occupational categories. The model projects an estimated total increase in population, employment, income, and sales volume for the region as a whole.

For purposes of the EIFS analysis, a change is considered significant if it falls outside the historical range of ROI economic variation. To determine the historical range of economic variation, the EIFS model calculates a rational threshold value (RTV) profile for the ROI. This analytical process uses historical data for the ROI and calculates fluctuations in sales volume, income, employment, and population patterns. The positive and negative historical extremes for the ROI become the thresholds of significance (i.e., the RTVs) for social and economic change. If the estimated effect of an action falls above the positive RTV or below the negative RTV, the effect is considered to be significant. Appendix E discusses this methodology in more detail and presents the model input and output tables developed for this analysis.

EIFS Model Results. Long-term minor and significant beneficial effects and long-term minor adverse effects would be expected. The realignment of Fort Lee would create beneficial impacts on long-term job creation, income generation, and spending. An estimated 10,300 direct jobs could be created as a result of direct expenditures associated with realignment activities, generating increases in local income and spending (Table 4.1.9-7). ROI income could increase by about \$336 million as a result of direct jobs generated by realignment activity. Sales volume increases directly attributable to realignment could total more than \$427 million (Table 4.1.9-7). Direct job creation, income generation, and spending related to the proposed action would also result in secondary job creation, income generation, and spending. An estimated 5,800 secondary jobs could be created, increase income by \$250 million, and sales volume could increase by more than \$1.1 billion (Table 4.1.9-7). In total (direct plus indirect), the proposed action could create an estimated 16,000 jobs, an increase of 4 percent. In addition, income generation could increase by more than \$586 million, or 3.8 percent, and total sales volume could increase by more than \$1.5 billion, or 7 percent (Table 4.1.9-7). These increases in income and business sales volume would not exceed historical fluctuations (the EIFS model RTVs) and would be considered minor. The percentage change in employment would be 4.12 percent, which would slightly exceed the positive historical RTV of 4.09 percent, resulting in significant long-term beneficial effects.

The regional economy would experience significant demographic changes from the Fort Lee realignment. From a purely economic perspective, these changes would be positive, as manifested by job and income growth projected by EIFS. Realignment of Fort Lee would also generate additional population and job growth in the neighboring counties and cities within the ROI. The EIFS model estimated that the ROI population could grow by about 17,500, a 3 percent increase, which would exceed historical growth rates (Table 4.1.9-7). The ability of the ROI to accommodate this economic and population growth would depend on many factors, including the degree to which local infrastructure—including roads, environmental management systems, and public services—is also enhanced to meet the demand of the additional population. A high growth rate would be largely beneficial to the economy; however, labor, material, and housing shortages could result if expansion occurred too rapidly or if increases in infrastructure investment, including housing, lagged behind employment and population growth. Over time, the ROI economy would respond to the new demands by increasing the labor force and supply of goods and services and housing.

**Table 4.1.9-7
Fort Lee EIFS model output**

Indicator	Projected change	Percentage change	RTV range
Direct sales volume	\$427,084,800		
Induced sales volume	\$1,148,858,000		
Total sales volume	\$1,575,943,000	7.12%	-6.83% to 13.54%
Direct income	\$336,107,600		
Induced income	\$250,577,500		
Total income	\$586,685,100	3.81%	-5.11% to 12.18%
Direct employment	10,308		
Induced employment	5,876		
Total employment	16,184	4.12%	-2.82% to 4.09%
Local population	17,586		
Local off-post population	11,609	3.05%	-1.02% to 1.59%

The jobs created under the proposed action would increase the local population. This population increase would exceed historical fluctuations in the ROI and result in significant beneficial impacts on the local economy. ROI population is estimated by EIFS to increase by about 17,500, a 3 percent increase (Table 4.1.9-7). The new population would be comprised of the incoming military (permanent party and students) and their dependents, and civilians relocating for employment plus their dependents. Using the US Census Bureau demographic characteristics for the United States, about 11,200 of the 17,500 persons would be working adults.⁷ The remaining 6,300 would be children, of which about 4,700 would be of primary or secondary school age.

The population increase directly resulting from new jobs created at Fort Lee include the incoming permanent party military personnel and their dependents, the military students, and the increase in civilian and contractor personnel at Fort Lee and their dependents. Fort Lee's permanent party military population would increase by a projected 1,386. Permanent party military personnel would bring an estimated 2,689 family members (928 spouses, 1,761 children, of which 1,233 would be of school age) (Fort Lee Plans, Analysis and Integration Directorate 2006c). About 40 percent of these Soldiers and their family members could be housed on-post, and 60 percent would need to find housing in the surrounding communities.

Fort Lee's military TDY student population would increase by 4,674 (average daily load). These students would be on temporary duty to Fort Lee and would not be permitted to bring spouses or other family members. The Advanced Individual Training (AIT) students (2,497 of the 4,674 total

⁷ The EIFS model does not project population by age. These demographic projections are estimates. For the purpose of this study, Census data was used to calculate an estimate of the number of adults and children that could move into the ROI. The calculations were derived from age statistics from the US Census Bureau 2004 American Community Survey, *United States General Demographic Characteristics*. It was assumed that persons moving to the ROI included persons of working age, not too near retirement (less than 55 years of age), and their dependents (spouses and/or children). Based on the national Census data, of the population between 0 and 55, 64 percent is of working age (ages 20 to 55) and 36 percent are children (ages 0 to 19), 75 percent of which are school age. Multiplying the EIFS estimated population increase of 17,500 times 64 percent equals about 11,200 persons of working age. Multiplying 17,500 times 36 percent equals about 6,300 children, of which about 4,700 (6,000 * .75) would be of school age.

students) would be housed in on-post barracks (Fort Lee Plans, Analysis and Integration Directorate 2006d).

Fort Lee's permanent party civilian personnel (including contractor employees) are estimated to increase by 2,123. These civilian and contractor personnel would bring an estimated 3,459 family members (1,507 spouses and 1,952 children, of which about 1,152 would be of school age) (Fort Lee Plans, Analysis and Integration Directorate 2006d).

Table 4.1.9-8 shows Fort Lee's BRAC estimated population projections by year. The table identifies military employees, civilian employees, and military students. It also lists numbers for spouses, children, and school age children.

Table 4.1.9-8
Fort Lee Installation BRAC Population Projections

	2009	2010	2011	Total
Military personnel	902	338	146	1,386
Civilian personnel	1,179	854	90	2,123
Total military and civilian	2,081	1,192	236	3,509
Military spouses	604	226	98	928
Civilian spouses	837	606	64	1,507
Military children	1,145	430	186	1,761
Military children of school age	802	301	130	1,233
Civilian children	1,084	785	83	1,952
Civilian children of school age	640	463	49	1,152
Total family members	3,670	2,047	431	6,148
Total military students	2,944	1,199	531	4,674
AIT students	767	1,199	531	2,497
Total	8,695	4,438	1,198	14,331

Source: Fort Lee Plans, Analysis and Integration Directorate 2006d

Note: Subject to change.

Sociological Environment

With the projected population growth, the region would require some additional infrastructure investment to maintain the current level of public services, including teacher-student ratios, per capita hospital beds, and number of fire and police personnel per resident. Historically, public services such as schools, law enforcement, fire protection, and health care facilities have expanded to meet the needs of the region's growing population. For certain counties within the ROI (Chesterfield, Dinwiddie, and Prince George), keeping up with growth has been a major challenge; however, public services were able to accommodate the needs of the rapidly growing region. School districts in the ROI have recently either constructed new facilities or expanded capacity at existing facilities. Police and fire departments have also expanded their programs and increased their personnel and their vehicle inventory to accommodate population growth. Property and sales taxes have provided some funding for these public services. The following identify the anticipated effects for each of the key components of the sociological environment.

Housing. Short-term significant and long-term minor adverse effects would be expected. The incoming population would increase the demand for ROI housing. About 60 percent of the permanent party military personnel (about 830) and about 50 percent of the TDY military student

population (about 2,340) would be looking for housing in the ROI, as well as civilians attracted to the new jobs who would move into the ROI from outside the region. A portion of this new housing demand would be met by family housing and barracks on Fort Lee. New permanent party housing units and barracks for the AIT students would be constructed on Fort Lee and would be ready for occupancy when the Soldiers arrive. About 555 of the accompanied permanent party military personnel could be housed in these new units, and the 2,497 incoming AIT students would be housed in the new on-post barracks.

Recent population growth has spurred new housing development in the ROI, particularly in Chesterfield, Dinwiddie, and Prince George Counties and the city of Colonial Heights. The realignment action at Fort Lee would create an additional demand for new housing. Housing shortages could result if expansion occurred too rapidly or if increases in infrastructure investment, including housing, lagged behind employment and population growth. Adverse effects could also materialize in terms of housing costs and commuting distance. If affordable housing in close proximity to the installation is not available, Soldiers and civilians would have to live farther from the installation than they might prefer, until new housing is available and housing prices stabilize. Housing costs in the ROI have risen substantially since 2000, and that trend would be expected to continue with increased housing demand because of BRAC. Fort Lee is working with the Crater Planning District Commission to keep them informed of the proposed action, and advanced planning and preparation could reduce the potential impacts.

Law Enforcement, Fire Protection, Medical Services. Short-term significant and long-term minor adverse effects would be expected. To accommodate future population levels, public services would have to expand to meet resulting demand. There would be a need for additional law enforcement, fire protection, and medical services. In the short-term, there could be decreased levels of service if additional funding and sufficient facilities and personnel are not in place to serve the increased population. Over time, public support services could adapt to the demands of the increased population base, funded by new tax revenues. Expansion of law enforcement, fire-fighting, and medical services (i.e., increasing staff or acquiring new facilities or equipment) would be necessary to maintain service levels and emergency response times. To accommodate the sustained increase in demand that would occur under the proposed action, proper planning would need to be implemented to ensure that public sector capacity is not exceeded.

The Fort Lee Police Department and Fire and Emergency Services Division projected their requirements for the BRAC-related action. The police department would need an additional 12 law enforcement personnel. The Fort Lee Fire and Emergency Services Division would require 29 additional personnel, to include firefighters, emergency medical technicians, fire inspectors, a deputy fire chief, training officer, and administrative staff. Fort Lee would need a new fire station to be completed by FY 2011, although no funding has been approved yet. On the basis of the additional population, square footage of building space, and type of building space to be constructed, the fire department also would need an additional aerial truck, heavy rescue truck, fire engine, and two additional medic units (ALS heavy use), to adequately serve the population and to have the proper equipment to handle emergencies in large structure, multistory buildings that would be constructed on Fort Lee (Fort Lee PMO 2006).

The ROI community outside of Fort Lee also would need additional law enforcement and fire department staff. With an estimated increase in local off-post population of about 11,600 (see Table 4.9-7), and using a rate of 3.4 law enforcement personnel per 1,000 inhabitants, an estimated additional 39 law enforcement employees could be needed to serve the new ROI

population.⁸ Using a rate of 2.7 firefighters per 1,000 inhabitants, an additional 31 firefighters could be needed to serve the new ROI population.⁹

The incoming Soldiers and their dependents would also create new demand for medical services. The KAHC on Fort Lee has estimated the need for additional staff and has submitted the request for approval and funding. Shortly after the announcement of the 2005 BRAC recommendations, the U.S. Army North Atlantic Regional Medical Center (NARMC) conducted an in-depth analysis on the requirement for health care services at Fort Lee. Due to the quality and quantity of Network providers and hospitals in the local area, the increased workload associated with the population growth did not warrant re-establishing an inpatient facility at Fort Lee. In order to support the population growth, KAHC would expand the services currently available. Specifically, a new Consolidated Medical and Dental Clinic would be constructed to support the growing training population. Additional staff would be hired to support the expansion of current services. The U.S. Army Health Facilities Planning Agency is working with the staff at KAHC to identify alterations and additions to the current facility that would improve the utilization and efficiency of all the medical buildings at Fort Lee. Currently, there are no plans for additional services within KAHC. KAHC will continue to refer patients requiring continued care within the Military Health System to MacDonald Army Health Center, Fort Eustis; Naval Medical Center, Portsmouth; and Walter Reed Army Medical Center, Washington, D.C. HealthNet Federal Services, the local TRICARE partner, is actively engaged with KAHC and the local medical community to ensure all services are available within the local network (Kenner Army Health Clinic Deputy Director 2006).

Additional medical service capacity in the ROI would be needed, such as additional hospital beds, long-term care facilities, physicians, physician's assistants, nurses, home health aides, nursing aides, and orderlies. With an estimated increase in local off-post population of about 11,600, and using the national rate of 2.8 community hospital beds per 1,000 persons, an estimated additional 32 community hospital beds could be needed in ROI; using the national rate of 27 active physicians per 10,000 population, about 31 more physicians could be needed; using the national rate of about 79 nurses per 10,000 population, about 92 more nurses could be needed (NCHS 2006).¹⁰

Schools. Short- and long-term significant adverse effects would be expected. The incoming population could increase the number of school children in the ROI by an estimated 4,700.¹¹ This would mean more classrooms, teachers, and administrative staff would be needed in local schools. A number of the school districts in the ROI are operating schools at or above capacity.

⁸ The rate of law enforcement personnel per 1,000 inhabitants is based on annual data reported to the Department of Justice—Federal Bureau of Investigations' Uniform Crime Report (UCR) program. The rate is based on data reported to the UCR program by law enforcement agencies throughout the United States, does not reflect a recommended rate or some defined law enforcement standard, and should be viewed only as a guide (DOJ—FBI 2006). The rate reported for the Southern Division of the United States, which includes Virginia, was used for this EIS analysis.

⁹ The rate of firefighters per 1,000 inhabitants is taken from the National Fire Protection Association's *U.S. Fire Department Profile Through 2004*. The rate is based on data reported to the National Fire Protection Association by fire departments throughout the United States, and does not reflect a recommended rate or some defined fire protection standard (NFPA 2005). The national rate of volunteer firefighters per 1,000 inhabitants was used for this EIS, because the majority of the fire departments in the ROI are volunteer departments.

¹⁰ The rate of hospital beds per 1,000 population and physicians and nurses per 10,000 population is based on national data from the U.S. Department of Health and Human Services National Center for Health Statistics reported in *Health, United States, 2005* (NCHS 2006). These rates are national averages used for projection purposes in this study, and do not reflect a recommended rate or some defined standard.

¹¹ This 4,700 includes the estimated 2,685 children projected by Fort Lee to be the school-age dependents of the military, civilian, and contractor personnel moving to the ROI because their jobs would be transferred to Fort Lee.

Some school districts are using temporary modular units or trailers as classrooms for students and are constructing new schools to meet capacity requirements. An increase of 20 to 30 students in a school can mean a new classroom, and an increase of 300 students could mean a new school (DoD 2005b). It should be noted that the statistic of 20 to 30 students equating to one new classroom assumes the students are all in the same grade. If the students are dispersed among several grades (e.g., 10 in second grade, 10 in third grade, and 10 in fifth grade), several new classrooms could be required. Therefore, with a potential 4,700 new students in the ROI, this could equate to a minimum of about 188 new classrooms or 16 new schools in the ROI, as well as new teachers and assistants. The impact depends on where the families would reside. If these students would reside in a school district with schools operating at or above capacity, then portable classrooms or other accommodations could be needed until schools could be expanded or new schools could be constructed; if students reside in a district that has room for additional students, then no portable classrooms or construction would be necessary. However, most of the school districts in the ROI are using portable trailers as classrooms because of capacity issues. Only the cities of Hopewell and Petersburg do not use temporary classrooms. One school district has indicated the possibility of schools having to use their cafeterias or auditoriums for classrooms (Maranzano, personal communication, 2006). Fort Lee is conferring with the potentially affected school districts on potential student increases so that the schools have as much time as possible to prepare.

In the long term, public support services would be expected to adapt to the demands of the increased population base, funded by new property tax revenues and potential additional federal aid, but not without facing significant financial and facility challenges in the short term. The Federal Impact Aid Program would provide some funding to local schools to compensate for the increased burden. Federal Impact Aid, however, only pays a portion of a child's education cost. The per pupil expenditure in the ROI (Fiscal Year 2005) ranged from \$7,467 in Chesterfield County to \$12,201 in Richmond. Per pupil federal funding ranged from \$387 in Chesterfield County to \$1,414 in Richmond County, and this included all sources of federal funding, not just Federal Impact Aid. The majority of revenue (42 percent) came from local sources. Federal funding contributed 8 percent (VDOE 2006). Federal Impact Aid also does not provide for school construction costs (Maranzano, personal communication, 2006). The Seven Rivers Coalition for Military Growth, a coalition of school districts across the nation that would be affected by the BRAC actions, is pursuing federal funding to financially assist the impacted school districts. The funding would be a separate funding stream from Federal Impact Aid. As of the writing of this EIS, no funding has been secured, but meetings with Congressional appropriations committees and the Office of Management and Budget have occurred (Maranzano, personal communication, 2006). Chesterfield, Dinwiddie, and Prince George county school districts and the cities of Colonial Heights, Hopewell, and Petersburg school districts are part of the Seven Rivers Coalition.

The National Defense Authorization Act for Fiscal Year 2006 (Public Law 109-163, January 6, 2006, Section 572), Congress approved \$7 million to be dispensed by the DoD to the school districts that are most heavily impacted by an increase (or reduction) in military students due to BRAC (and other Army initiatives) (DoD 2005a). The law provides for financial assistance through September 30, 2010 to local education agencies that meet the eligibility requirements (eligibility depends on the number of military dependent students). In the National Defense Authorization Act for Fiscal Year 2007 (Public Law 109-364, October 17, 2006, Section 574), Congress required that the Secretary of Defense prepare a report to Congress with a plan to provide assistance to local educational agencies that experience growth in the enrollment of military dependent students as a result of base realignments or closures, force structure changes, or the relocation of a military unit. The report will identify the military installations affected by

the above-listed events, the total number of military students arriving or departing from these military installations, and when they will be arriving or departing. The report also will include recommendations to provide funding assistance and outreach to affected local educational agencies (Public Law 109–364, Section 574, 2006).

Family Support and Social Services. Short- and long-term significant adverse effects would be expected. The incoming population would increase demand for family support and social services on- and off-post. Additional personnel or facilities would need to be acquired. On the basis of comments made at the Fort Lee BRAC EIS scoping meeting, the social service office in Prince George County provides assistance to many military families. This office is understaffed. An increase in population is expected to increase applications for Food Stamps and the need for social workers to handle incidents of substance abuse, domestic violence, child protective services, and financial services. Prince George County Department of Social Services has estimated they would need 3 to 5 more social workers and about 5,000 additional square feet of space (Gandel, personal communication, 2006). Off-post family and social services in the ROI would be expected to be overburdened until new budgets could be approved so that additional personnel or facilities could be acquired.

Fort Lee ACS has developed a 5-year plan on the basis of the estimated population increase under the proposed action. ACS has requested an increase in staff for social workers, financial planners, and outreach staff, and an expansion of the existing ACS building (McComas, personal communication, 2006). A new Soldier support center is one of the proposed facilities to be constructed on-post (see Table 2.2-2).

Shops, Services, and Recreation. Short- and long-term minor adverse effects would be expected. The incoming population would increase the demand for shopping, recreation, and service facilities. Fort Lee would construct new dining facilities and exchange service outlet store (see Table 2.2-2). The communities surrounding Fort Lee offer many retail services, recreational opportunities, and places to shop. In the long term, the incoming population would stimulate the development of new service and recreation facilities in the ROI, such as grocery and retail stores, restaurants, fitness centers, dry cleaners, movie theaters, and other recreational facilities.

Environmental Justice

No adverse effects would be expected. Realignment of Fort Lee would not create disproportionately high or adverse human health or environmental effects on minority or low-income populations in the ROI. The proposed realignment activities at Fort Lee are not actions that have the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination because of their race, color, national origin, or income level. Low-income populations could benefit from the creation of new jobs associated with implementation of this alternative.

Protection of Children

Short- and long-term minor adverse effects on the protection of children could occur. During the development period there would be many construction sites in the installation cantonment area. Because construction sites can be enticing to children, construction activity could pose an increased safety risk. During construction, safety measures stated at 29 CFR Part 1926, *Safety and Health Regulations for Construction*, and *Army Regulation 385-10, Army Safety Program*, would be followed to protect the health and safety of residents on Fort Lee, as well as construction workers. It is recommended that barriers and “No Trespassing” signs be placed

around construction sites to deter children from playing in these areas and that construction vehicles and equipment be secured when not in use.

A new training area would be constructed adjacent to the Jackson Circle housing area. The training area should be limited access, posted with “No Trespassing” signs, with a fence or other type of walled-barrier to divide the housing area from the training area to prevent children from entering the training area.

Cumulative Effects

Long-term significant beneficial and minor adverse cumulative effects would be expected. The past action of the establishment and continued operation of Fort Lee itself continues to have positive impacts on the local economy. The proposed action of realignment would be expected to significantly add to these beneficial economic impacts by increasing population, employment, income, and sales volume in the ROI. The expected substantial increase in population under the proposed realignment action could also have long-term minor adverse effects, depending on the ability of the ROI to accommodate this economic and population growth, with adverse effects resulting from possible labor, housing, and material shortages, which could lead to price increases or declines in service, until the local economy would respond to the new demands by increasing the labor force and supply of goods and services and housing.

A future action that could also add to the beneficial economic effects of realignment is the construction and renovation of housing on Fort Lee under the Residential Communities Initiative (RCI), which would be expected to increase employment, income, and sales volume in the ROI during the RCI development period (2007–2017). Additional increases in employment and sales volumes in the ROI could also occur from other current actions and those planned for the near future. The Fort Lee Master Plan details 30 projects to be implemented at the installation. Fort Lee also has developed seven projects required in support of the mobilization/power projection mission of the installation. An additional 32 projects have been developed to address shortfalls and to support the mobilization power projection mission. These projects include (not all 69 projects are listed here) the following: classrooms, indoor and field firing ranges, Army Reserve training center, dining facility, auditoriums, nonautomotive skill center, library, exchange service station, recreation center, youth support facility, an outdoor pool, parking facilities, vehicle marshalling area, deployment operations building, motor pool area, and vehicle wash facility.

There are a number of other economic development projects (in progress or proposed) in the ROI that could have short- and long-term impacts on the local economy and sociological conditions. These projects include construction of several new primary or secondary schools in the ROI; expansion of the DuPont manufacturing facility in Chesterfield County; development of the waterfront in downtown historic Petersburg; renovation and development of the Hopewell historic district; and numerous housing, road, and retail and commercial expansion projects throughout the ROI.

These proposed projects in and of themselves would be anticipated to have beneficial economic effects in terms of employment, income generation, and sales. The beneficial economic effects would be expected to last for the duration of the actions (most of the Fort Lee actions are estimated to be completed by 2011), but they could extend beyond that. Also, reasonably foreseeable actions, such as continued improvements to infrastructure and construction of new commercial or industrial facilities and residential homes would be expected to occur in the future.

These actions, combined with the expected impacts from the proposed realignment action at Fort Lee, could have long-term significant beneficial and minor adverse cumulative effects on the ROI. Due to the size of the action, the realignment of Fort Lee would be the driver behind the significant economic impacts; the other known and proposed projects would be expected to add to the projected growth in regional employment, income, sales volume, and population. The adverse effects could result from the sustained demand from the increased population on the region's infrastructure and the local economy's ability to expand to meet the demand.

Socioeconomic Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on socioeconomics. Best management practices for the protection of children and personnel, some examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on socioeconomics.

Best Management Practices for Socioeconomics

- Secure construction vehicles and equipment when not in use.
- Place barriers and “No Trespassing” signs around construction sites where practicable.
- Place fence or other barrier between Jackson Circle family housing area and the proposed new training area, limiting access to authorized personnel only.
- In addition, Fort Lee and the Army would provide information to local school districts about funding available through the Federal Impact Aid program and the National Defense Authorization Act for Fiscal Year 2006.

4.1.9.2.2 No Action Alternative

No effects would be expected on the economic or sociological environment. The changes in population and economic activity that would occur under the proposed action would not be implemented under the No Action Alternative. The housing market and public services (e.g., schools, police, fire, medical, social services) would continue to respond as they have in the past to ROI population changes as needed.

4.1.10 Transportation

This section describes the existing transportation systems near Fort Lee, the effects associated with implementing the Preferred Alternative, and potential mitigation measures, if required.

4.1.10.1 Affected Environment

Fort Lee is in Prince George County, Virginia along Route 36 between Petersburg and Hopewell. East of the installation is the main area of Petersburg National Battlefield and the city of Petersburg. South and southeast of the installation are undeveloped or lightly developed areas of Prince George County, through which I-295 passes. Northeast of the installation is the city of Hopewell, which is largely developed. Just a few miles north and northwest of the installation, across the Appomattox River, are Chesterfield County and Colonial Heights. Highway access to Fort Lee is available regionally via I-95, I-295, and U.S. Route 460. Secondary routes surrounding Fort Lee include Routes 36 (Oaklawn Boulevard), 106, 109, 144 (Temple Avenue), 630, 634, 645, 646, and 725. The primary transportation network on Fort Lee consists of four gates and a roadway network that provides ground vehicle access to all functional areas. The

installation has direct access to freight rail service. However, there is no public rail transportation, air transportation, or access to navigable water on Fort Lee.

4.1.10.1.1 Gates and On-post Transportation Systems

Fort Lee has four active gates and one planned gate for access into and out of the installation (Table 4.1.10-1). The four gates providing primary access to Fort Lee are the Lee Avenue Gate, Sisisky Boulevard Gate, Adams Avenue Gate, and Mahone Avenue Gate.¹² The River Road Gate is a planned gate to allow for future access via Route 36 and River Road. The Lee Avenue Gate and Sisisky Boulevard Gate provide access to the north side of the post via Route 36. The Adams Avenue Gate is in the southeast corner of the Main Post Area and provides access to the main family housing areas. The Mahone Avenue Gate is on the southwest corner of the installation.

**Table 4.1.10-1
Gates at Fort Lee**

Gate	Description
Lee Avenue (Main) gate	Access via Route 36
Sisisky gate	Access via Routes 36 and 144
Adams Avenue (Golf Course) gate	Access via Routes 630 and 634
Mahone Avenue gate	Access via U.S. 460 and Hickory Hill Road
River Road gate	Future access via Route 36 at River Road

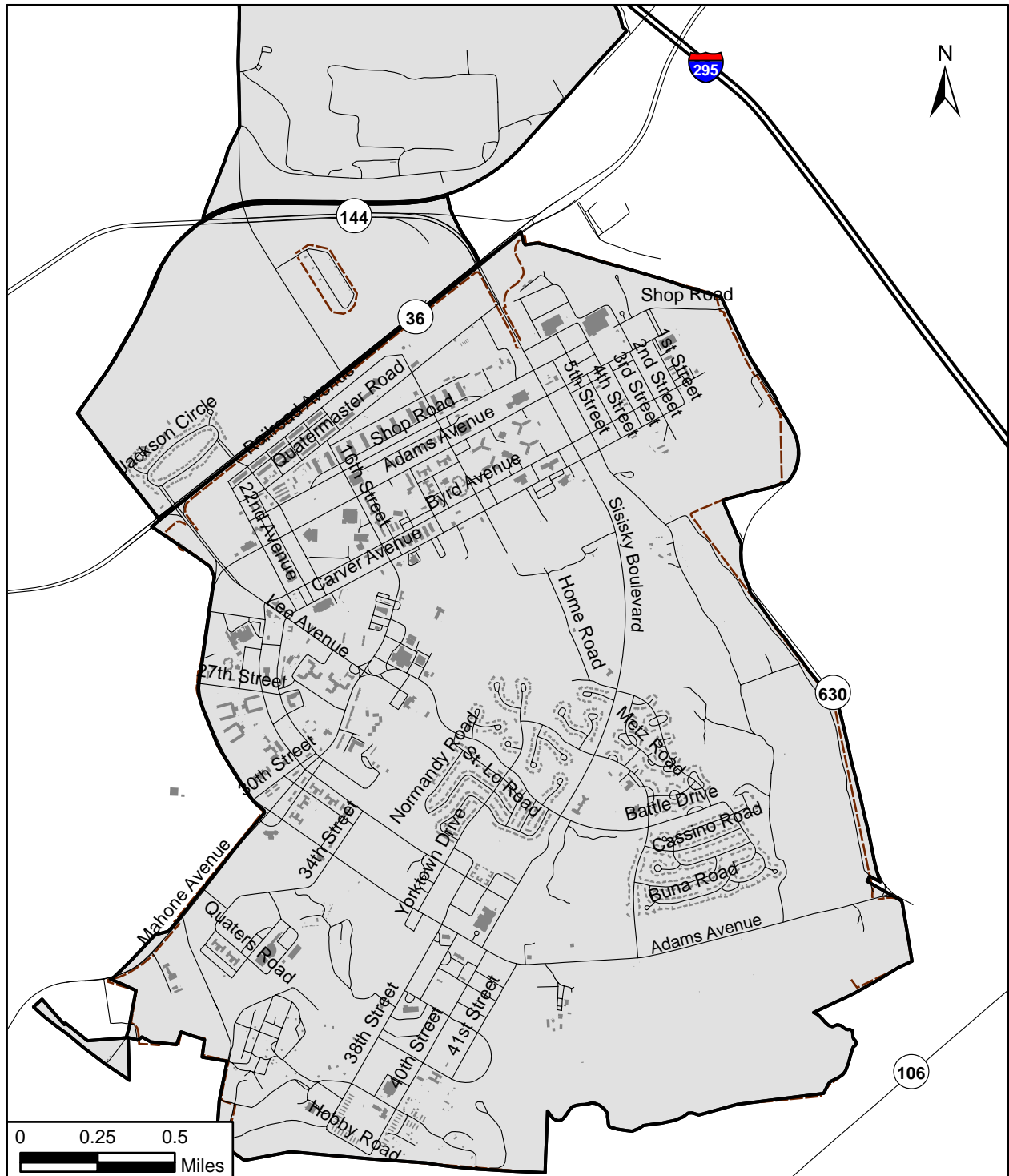
The on-post road network forms a grid pattern within a circumferential primary system. Two radial roadways link the major gates with major facilities on-post (Figure 4.1-7). High-density areas on the post are laid out with additional grid based roadway system. In all, the post has approximately 109 miles of paved roads. The roadways on Fort Lee are classified as primary road, secondary roads, and tertiary roads. Primary roads serve as main arteries carrying traffic onto and off the post and connecting main parts of the installation. The primary roads include the following:

- Lee Avenue/Battle Drive from the Main Gate to Sisisky Boulevard
- Sisisky Boulevard from Route 36 to Adams Avenue and 40th Street
- Shop Road/Adams Avenue from Shop Road Gate to Adams Avenue Gate

Secondary roads feed traffic to the primary roads, and provide for direct movement between areas of the installation. Tertiary roads provide access to all other activity areas and facilities.

Parking capacity at Fort Lee is sufficient for existing demand. Parking at family housing areas is provided by driveways or by parallel parking on looped residential streets. Barracks and larger facilities have dedicated parking lots. Parallel parking is provided on some nonresidential streets. Pedestrian traffic is accommodated by a system of sidewalks along many streets and walkways between buildings. Troop pathways are provided between barracks dining areas and other foot traffic high-volume areas.

¹² The Sisisky Boulevard Gate is closed temporarily for upgrades and the Shop Road Gate is being used, but it has limited capacity and is primarily for heavy vehicles and cargo trucks (Sweeney 2005).



LEGEND

- Installation Property
- Road
- Security Perimeter Line
- Building

Transportation Network

Fort Lee, Virginia

Figure 4.1-7

Source: Fort Lee GIS, 2006.

4.1.10.1.2 Rail, Air and Water Transportation

Fort Lee has direct access to freight rail service. The installation is in proximity to the junction of two East Coast mainlines. A 3,400-foot-long section of government-owned track connects the installation to the City Point Branch line. The City Point Branch line is part of the Strategic Rail Corridor Network connection system. The closest city to Fort Lee served by public rail transportation, via Amtrak, is Ettrick. Amtrak provides regular service to Ettrick via its Carolinian/Piedmont and Silver Service/Palmetto routes (Amtrak 2006). Ground transportation between Ettrick and the installation (approximately 15 minutes driving time) is available via private vehicle, bus, limousine, taxi, or rental car. Petersburg Area Transit (PAT) provides regular service to Fort Lee via the Blandford Route (PAT 2006). The PAT bus network includes the metropolitan Petersburg area and connects to the Richmond public transportation systems.

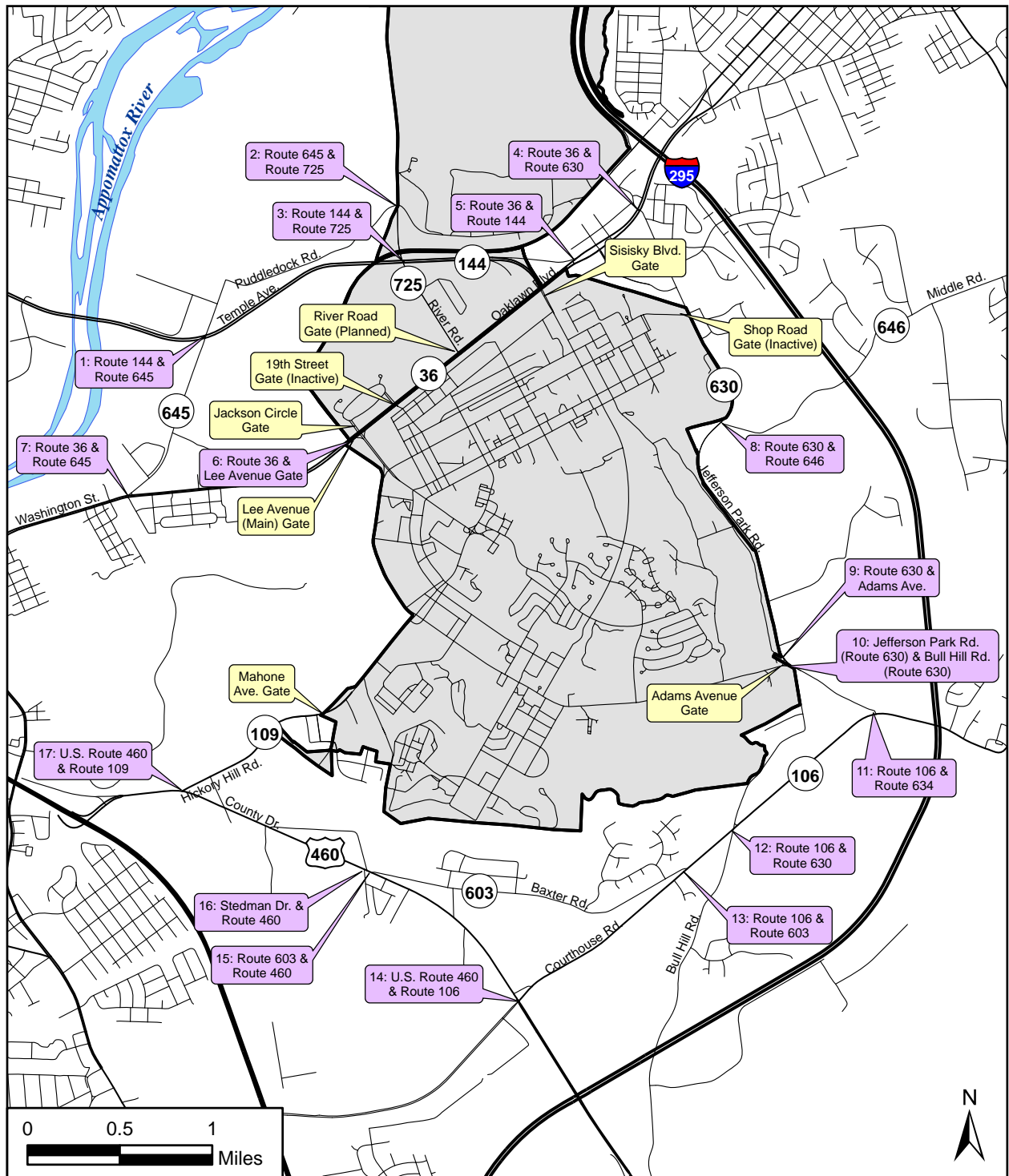
The Richmond International Airport is east of Richmond, approximately 20 miles north of Fort Lee. Direct access from Fort Lee is provided by I-295. The airport is a modern facility served by seven major airlines. There are nonstop flights to 22 destinations, including the airline hub cities of Atlanta, Philadelphia, Pittsburgh, Cleveland, Detroit, and Chicago. Fort Lee does not have an active airfield and does not support either military or private access to the installation via the air. Felker Army Airfield at Fort Eustis, Virginia, accommodates Fort Lee's mission for rotary-wing aircraft operations. The aviation mission is to provide support to Fort Lee and its tenant activities. Aviation activities include MEDEVAC, helicopter sling-load operations training, and aircraft crash-site training (USACHPPM 2002).

There is no access to navigable water on Fort Lee. Deepwater Terminal at Port of Richmond is the closest shipping point. It is on the James River, approximately 15 miles north of the installation.

4.1.10.1.3 Off-Post Traffic

This section outlines current (2006) traffic conditions on the roadways and intersection surrounding Fort Lee. Traffic volumes and Levels of Service (LOS) for eleven major roadways and seventeen major intersections adjacent to Fort Lee are assessed (Figure 4.1-8, Tables 4.1.10-2 and 4.1.10-3). These roadways and intersections are within the region of interest (ROI), adjacent to Fort Lee, and were selected on the basis of their potential to be affected by implementing the Preferred Alternative.

Average daily traffic (ADTs) and peak-hour traffic volumes were assessed for existing roadway conditions (Table 4.1.10-4). Traffic volumes are highest along the four lane roadways; Washington Street/Oaklawn Boulevard (Route 36), Temple Avenue (Route 144), and Winfield Road/County Drive (Route 460). These roadways operate as primary roadways around this area. Two-lane arterial roadways, including Jefferson Park Road (Route 630) and Courthouse Road (Route 106), carry a moderate amount of traffic but not as much as the four-lane roadways. Two-lane collector roadways, such as Puddledock Road and Baxter Road, carry the least amount of vehicles.



Gates and Intersections

Fort Lee, Virginia

Figure 4.1-8

Source: Fort Lee GIS, 2006.

Table 4.1.10-2
Roadways of interest surrounding Fort Lee

Roadway	Number of lanes	Description
Oaklawn Boulevard / Washington Street (Route 36)	4	Primary arterial highway accessing the Fort Lee gates Interchanges at I-95 and I-295
Courthouse Road (Route 106)	2	Primary highway southeast of Fort Lee
Mahone Avenue / Hickory Hill Road (Route 109)	2	Primary highway entering and exiting at the Fort Lee Mahone Avenue Gate
Temple Avenue (Route 144)	4	Primary arterial highway that ends at Fort Lee's Sisisky Gate
County Drive (Route 460)	4	Primary arterial highway, south of Fort Lee
Baxter Road (Route 603)	2	Secondary highway connecting Route 460 to Route 106
Jefferson Park Road (Route 630)	2(4)	Secondary highway west of Fort Lee boundary accessing the Adams Avenue and Shop Road Gate
Allin Road (Route 634)	2	Secondary highway connecting Route 106 to Route 630
Puddledock Road (Route 645)	2	Secondary highway connecting Route 144 to Route 725
Middle Road (Route 646)	2	Secondary highway branching off from Route 630
River Road (Route 725)	2	Secondary highway intersecting Route 144 and ending at Route 36

Source: Baker 2006

Table 4.1.10-3
Intersections of interest surrounding Fort Lee

Number	Intersection	Type
1	Puddledock Road and Temple Ave	Signalized
2	River Road and Puddledock Road	Unsignalized
3	River Road and Temple Avenue	Signalized
4	Jefferson Park Road and Oaklawn Boulevard	Signalized
5	Temple Avenue and Oaklawn Boulevard	Signalized
6	Lee Avenue and Oaklawn Boulevard (Main Gate)	Signalized
7	Puddledock Road and Washington Street	Signalized
8	Jefferson Park Road and Middle Road	Unsignalized
9	Jefferson Park Road and Adams Avenue	Unsignalized
10	Jefferson Park Road Bull Hill Road	Unsignalized
11	Allin Road and Courthouse Road	Signalized
12	Bull Hill Road and Courthouse Road	Unsignalized
13	Baxter Road and Courthouse Road	Unsignalized
14	Courthouse Road and County Drive	Signalized
15	Baxter Road and County Drive	Unsignalized
16	Stedman Drive and County Drive	Unsignalized
17	Hickory Hill Road and County Drive	Signalized

Source: Baker 2006

Level of Service (LOS) is a qualitative measure of the operating conditions of an intersection or other transportation facility. There are six LOS (A through F) defined; LOS A represents the best operating conditions with no congestion, and LOS F is the worst with heavy congestion. Roadways and intersections with LOS E or F would have traffic conditions at or above capacity. Traffic patterns would be congested, unstable, and normally unacceptable to individuals

Table 4.1.10-4
2006 roadway traffic volumes and level of service

Facility	From	To	2006 ADT	2006 AM peak	2006 PM peak	Existing (2006) LOS
Washington Street /Oaklawn Blvd (Route 36)	Puddledock Road (Route 645)	Lee Avenue (Ft. Lee Gate)	17800	1203	1294	B
Oaklawn Blvd (Route 36)	Lee Avenue (Ft. Lee Gate)	Temple Avenue (Route 144)	18700	1243	1385	A
Oaklawn Blvd (Route 36)	Temple Avenue (Route 144)	Jefferson Park Road (Route 630)	36100	2250	2840	E
Hickory Hill Road (Route 109)	County Drive (Route 460)	Mahone Avenue (Ft. Lee Gate)	9800	882	746	D
Courthouse Road (Route 106)	County Drive (Route 460)	Baxter Road (Route 603)	7900	669	656	B
Courthouse Road (Route 106)	Baxter Road (Route 603)	Bull Hill Road (Route 630)	9900	882	765	C
Courthouse Road (Route 106)	Bull Hill Road (Route 630)	Allin Road (Route 634)	7900	747	562	B
Temple Avenue (Route 144)	Puddledock Road (Route 645)	River Road (Route 725)	26900	1523	2381	B
Temple Avenue (Route 144)	River Road (Route 725)	Oaklawn Blvd (Route 36)	21900	1202	1985	B
Winfield Road (Route 460)	Crater Road (Route 301)	Hickory Hill Road (Route 109)	20500	1815	1636	B
County Drive (Route 460)	Hickory Hill Road (Route 109)	Baxter Road (Route 603)	11700	942	1027	B
County Drive (Route 460)	Baxter Road (Route 603)	Courthouse Road (Route 106)	9000	755	751	A
Baxter Road (Route 603)	County Drive (Route 460)	Courthouse Road (Route 106)	3300	307	232	A
Jefferson Park Road (Route 630)	Adams Avenue (Ft. Lee Gate)	Middle Road (Route 646)	9900	809	851	C
Jefferson Park Road (Route 630)	Middle Road (Route 646)	Oaklawn Blvd (Route 36)	12100	869	1171	B
Allin Road (Route 634)	Bull Hill Road (Route 630)	Courthouse Road (Route 106)	6200	538	488	B
Puddledock Road (Route 645)	Washington Street (Route 36)	Temple Avenue (Route 144)	6200	337	560	B
Puddledock Road (Route 645)	Temple Avenue (Route 144)	River Road (Route 725)	2900	178	221	A
Middle Road (Route 646)	Jefferson Park Road (Route 630)	Takach Road (Route 647)	8300	604	794	C
River Road (Route 725)	Temple Avenue (Route 144)	Puddledock Road (Route 645)	5600	406	356	A

Source: Baker 2006

attempting to access and use roadways and intersections with LOS E or F (TRB 1999) (Table 4.1.10-5).

LOS were assessed for existing roadway conditions (Table 4.1.10-5 and Table 4.1.10-6). Existing traffic conditions on roadway segments range from LOS A through LOS E. The only roadway operating with an unacceptable LOS would be Oaklawn Boulevard between Temple Avenue and Jefferson Park Road. All but four of the signalized intersections, operate with an acceptable LOS under the existing conditions (Table 4.1.10-6). The four signalized intersections operating with an LOS E or F are Temple Avenue and Puddledock Road, Oaklawn Boulevard and Temple Avenue, Oaklawn Boulevard and Jefferson Park Road, and Oaklawn Boulevard and Lee Avenue. The only unsignalized (stop-controlled) intersections operating with an unacceptable level of service is the intersection of Jefferson Park Road and Middle Road (Table 4.1.10-7).

Table 4.1.10-5
Description of traffic level of service (LOS)

Level of Service	Description
A	<i>(Free flow conditions)</i> Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream with a high level of physical and psychological comfort. The effects of minor accidents or breakdowns are easily absorbed at this level.
B	<i>(Reasonably free flow conditions)</i> The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and breakdowns are still easily absorbed.
C	<i>(Stable operations)</i> Traffic flows are approaching the range in which small increases in traffic will cause substantial deterioration in service. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require additional care and vigilance. Minor accidents may still be absorbed, but the local deterioration in service will be substantial with delay forming behind any blockage. The driver now experiences a noticeable tension due to the additional vigilance required for safe operation.
D	<i>(High density, but stable flow. Bordering unstable flow)</i> Small increases in traffic could cause substantial deterioration in service. Freedom to maneuver within the traffic stream is severely limited, and the driver experiences drastically reduced physical and psychological comfort levels. Even minor accidents can be expected to create substantial delays because the traffic stream has little space to absorb disruptions.
E	<i>(Very unstable operations)</i> Virtually no usable gaps exist within the traffic stream. This means that any disruption, such as a vehicle entering from a ramp or changing lanes, causes following vehicles to slow or stop to admit the vehicle disrupting the flow. Any incident can be expected to produce substantial delay. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort is extremely poor.
F	<i>(Forced or breakdown flow)</i> Such conditions generally exist for a number of reasons such as traffic accidents, recurring points of congestion, or peak hour conditions that exceed the current design of the facility. LOS F is used to identify that point where the facility has reached maximum capacity and a complete breakdown of service occurs.

Table 4.1.10-6
Existing (2006) level of service—signalized intersection

Intersection	Existing LOS (2006)
Allin Road and Courthouse Road	B
Puddledock Road and Washington Street	C
Courthouse Road and County Drive	C
Hickory Hill Road and County Drive	C
River Road and Temple Avenue	D
Puddledock Road and Temple Avenue	E
Jefferson Park Road and Oaklawn Boulevard	E
Lee Avenue (Main Gate and Oaklawn Boulevard)	F
Temple Avenue and Oaklawn Boulevard	F

Source: Baker 2006

Table 4.1.10-7
Existing (2006) level of service—unsignalized intersections

Intersection	Existing LOS (2006)
River Road and Puddledock Road	B
Baxter Road and Courthouse Road	C
Baxter Road and County Drive	C
Stedman Drive and County Drive	C
Jefferson Park Road and Adams Avenue	C
Bull Hill Road and Courthouse Road	C
Jefferson Park Road Bull Hill Road	D
Jefferson Park Road and Middle Road	F

* LOS represents the worst turn movement

Source: Baker 2006

Accident data for 7 of the 17 intersections within the ROI was reviewed for years 2002–2005 (Table 4.1.10-8). Information was not available for the eight remaining intersections. The Institute of Transportation Engineers (ITE) recommends that intersections with an accident rate of more than two accidents per million entering vehicles should be reviewed (ITE 1999). All the intersections identified have accident rates below the ITE threshold. Therefore, accidents are not considered to be an issue of concern at these intersections.

Table 4.1.10-8
Accident data for intersections adjacent to Fort Lee (2002–2005)

Intersection	Accidents per million entering vehicles
Jefferson Park Road and Middle Road	0.13
Oaklawn Boulevard and Temple Avenue	0.32
River Road and Temple Avenue	0.19
Puddledock Road and Temple Avenue	0.39
Jefferson Park Road and Bull Hill Road (Allin Road)	1.4
Bull Hill Road and Courthouse Road	0.66
Allin Road and Courthouse Road	0.72

Source: Baker 2006

4.1.10.2 Environmental Consequences

The principal effects on the transportation system expected due to the Preferred Alternative would be for vehicular traffic in the area surrounding Fort Lee. The primary criterion used to quantify these effects is the LOS for roadways and intersections near the post. Transportation resources at Fort A.P. Hill and nonroadway transportation are also assessed. Specifically, this section

- Documents operational changes on Fort Lee that potentially affect travel to and from the post
- Forecasts future travel patterns and traffic volumes near Fort Lee for years the 2015 and 2026
- Identifies deficiencies on major routes near Fort Lee in 2015 and 2026
- Discusses of the effects on modes of transportation other than vehicular

4.1.10.2.1 Preferred Alternative

Short- and long-term significant adverse effects on vehicle-based transportation resources at Fort Lee would be expected with the implementation of the Preferred Alternative. These effects would be directly related to adding personnel at Fort Lee. In addition, short-term minor adverse effects would be expected due the use of on-road construction vehicles during the periods of construction. The effects on railway, air, or public transportation at Fort Lee would be negligible. Because the primary effects associated with the Preferred Alternative would be expected for vehicular traffic near Fort Lee, this was the primary focus of the analysis.

The increased travel demand resulting from the Preferred Alternative would have significant adverse effects on traffic in the Fort Lee area in both the short term (2015) and long term (2026). In gauging the level of these effects, it is important to note that although the implementation of the Preferred Alternative would increase traffic and decrease LOS at all the roadways, and intersections in the area would eventually degrade to unacceptable levels simply due to existing traffic growth in the areas.

Traffic Generation and Distribution

The Richmond Regional Travel Demand Model was used to estimate average traffic growth on individual roadway of interest without the Preferred Alternative. These average growth rates were used to determine the future-baseline traffic volumes and LOS on surrounding roadways (Table 4.1.10-9 and Table 4.1.10-10). These are the rates of growth expected for the roadways of interest without the implementation of the Preferred Alternative. In addition, Tables 4.1.10-10 and 4.1.10-11 outline the existing traffic volume for each roadway segment and the traffic volume due to expected growth in the area without the Preferred Alternative.

New vehicle trips associated with the implementation of the Preferred Alternative were calculated and distributed across the roadway network. Trip generation rates, specific to Fort Lee, were developed on the basis of gate traffic counts collected by VDOT in January 2006. There are approximately 30,000 daily trips through the installation gates. During both the peak hours, about 2,700 vehicles either enter or exit the post. A rate of 3.48 trips per day, and 0.32 trips per peak hour for each employee and off-post student was estimated. These are comparable to rates found in the ITE'S *Trip Generation Manual*, (ITE 2003). The Preferred Alternative would add approximately 19,600 daily trips and 1,800 trips during each peak hour. This would constitute approximately 65 percent increase in trips on and off the installation over existing conditions.

**Table 4.1.10-9
2006, 2015, and 2026 roadway level of service**

Facility	From	To	Existing (2006) LOS	2015 LOS	2026 LOS
Oaklawn Blvd (Route 36)	Lee Avenue (Ft. Lee Gate)	Temple Avenue (Route 144)	A	B	B
County Drive (Route 460)	Baxter Road (Route 603)	Courthouse Road (Route 106)	A	B	B
Baxter Road (Route 603)	County Drive (Route 460)	Courthouse Road (Route 106)	A	B	B
Puddledock Road (Route 645)	Temple Avenue (Route 144)	River Road (Route 725)	A	B	B
River Road (Route 725)	Temple Avenue (Route 144)	Puddledock Road (Route 645)	A	A	A
Washington Street /Oaklawn Blvd (Route 36)	Puddledock Road (Route 645)	Lee Avenue (Ft. Lee Gate)	B	C	C
Courthouse Road (Route 106)	County Drive (Route 460)	Baxter Road (Route 603)	B	B	C
Courthouse Road (Route 106)	Bull Hill Road (Route 630)	Allin Road (Route 634)	B	C	C
Temple Avenue (Route 144)	Puddledock Road (Route 645)	River Road (Route 725)	B	C	C
Temple Avenue (Route 144)	River Road (Route 725)	Oaklawn Blvd (Route 36)	B	B	B
Winfield Road (Route 460)	Crater Road (Route 301)	Hickory Hill Road (Route 109)	B	B	B
County Drive (Route 460)	Hickory Hill Road (Route 109)	Baxter Road (Route 603)	B	B	B
Jefferson Park Road (Route 630)	Middle Road (Route 646)	Oaklawn Blvd (Route 36)	B	C	C
Allin Road (Route 634)	Bull Hill Road (Route 630)	Courthouse Road (Route 106)	B	C	C
Puddledock Road (Route 645)	Washington Street (Route 36)	Temple Avenue (Route 144)	B	C	C
Courthouse Road (Route 106)	Baxter Road (Route 603)	Bull Hill Road (Route 630)	C	C	C
Jefferson Park Road (Route 630)	Adams Avenue (Ft. Lee Gate)	Middle Road (Route 646)	C	C	D
Middle Road (Route 646)	Jefferson Park Road (Route 630)	Takach Road (Route 647)	C	C	D
Hickory Hill Road (Route 109)	County Drive (Route 460)	Mahone Avenue (Ft. Lee Gate)	D	E	E
Oaklawn Blvd (Route 36)	Temple Avenue (Route 144)	Jefferson Park Road (Route 630)	E	E	F

Source: Baker 2006

Table 4.1.10-10
2015 roadway traffic volumes and level of service

Facility	From	To	Existing (2006) ADT	Average annual growth rate	2015 ADT without BRAC	2015 ADT with BRAC	Traffic volume due to BRAC	Traffic volume due to growth	Percent traffic volume due to BRAC	LOS
Washington Street/Oaklawn Boulevard (Route 36)	Puddledock Road (Route 645)	Lee Avenue (Fort Lee Gate)	17800	1.5%	20200	23900	3700	2400	15.5%	C
Oaklawn Boulevard (Route 36)	Lee Avenue (Fort Lee Gate)	Temple Avenue (Route 144)	18700	2.0%	22100	27300	5200	3400	19.0%	B
Oaklawn Boulevard (Route 36)	Temple Avenue (Route 144)	Jefferson Park Road (Route 630)	36100	1.5%	41000	50800	9800	4900	19.3%	E
Hickory Hill Road (Route 109)	County Drive (Route 460)	Mahone Avenue (Fort Lee Gate)	9800	0.0%	9800	11800	2000	0	16.9%	E
Courthouse Road (Route 106)	County Drive (Route 460)	Baxter Road (Route 603)	7900	1.0%	8600	8700	100	700	1.1%	B
Courthouse Road (Route 106)	Baxter Road (Route 603)	Bull Hill Road (Route 630)	9900	1.0%	10800	10900	100	900	0.9%	C
Courthouse Road (Route 106)	Bull Hill Road (Route 630)	Allin Road (Route 634)	7900	1.0%	8600	8700	100	700	1.1%	C
Temple Avenue (Route 144)	Puddledock Road (Route 645)	River Road (Route 725)	26900	1.0%	29300	30900	1600	2400	5.2%	C
Temple Avenue (Route 144)	River Road (Route 725)	Oaklawn Boulevard (Route 36)	21900	1.0%	23900	25400	1500	2000	5.9%	B
Winfield Road (Route 460)	Crater Road (Route 301)	Hickory Hill Road (Route 109)	20500	1.0%	22300	23500	1200	1800	5.1%	B
County Drive (Route 460)	Hickory Hill Road (Route 109)	Baxter Road (Route 603)	11700	2.0%	13800	14700	900	2100	6.1%	B
County Drive (Route 460)	Baxter Road (Route 603)	Courthouse Road (Route 106)	9000	2.0%	10600	11600	1000	1600	8.6%	B
Baxter Road (Route 603)	County Drive (Route 460)	Courthouse Road (Route 106)	3300	1.0%	3600	3600	0	300	0.0%	B
Jefferson Park Road (Route 630)	Adams Avenue (Fort Lee Gate)	Middle Road (Route 646)	9900	1.0%	10800	12600	1800	900	14.3%	C
Jefferson Park Road (Route 630)	Middle Road (Route 646)	Oaklawn Boulevard (Route 36)	12100	1.0%	13200	16500	3300	1100	20.0%	C
Allin Road (Route 634)	Bull Hill Road (Route 630)	Courthouse Road (Route 106)	6200	1.0%	6800	9100	2300	600	25.3%	C
Puddledock Road (Route 645)	Washington Street (Route 36)	Temple Avenue (Route 144)	6200	1.5%	7000	7100	100	800	1.4%	C
Puddledock Road (Route 645)	Temple Avenue (Route 144)	River Road (Route 725)	2900	1.5%	3300	4300	1000	400	23.3%	B
Middle Road (Route 646)	Jefferson Park Road (Route 630)	Takach Road (Route 647)	8300	2.0%	9800	12000	2200	1500	18.3%	C
River Road (Route 725)	Temple Avenue (Route 144)	Puddledock Road (Route 645)	5600	1.0%	6100	6200	100	500	1.6%	A

Source: Baker 2006

Table 4.1.10-11
2026 roadway traffic volumes and level of service

Facility	From	To	2006 ADT	Average annual growth rate	2026 ADT without BRAC	2026 ADT with BRAC	2026 ADT due to BRAC	2026 ADT due to Growth	Percent due to BRAC	LOS
Washington Street/Oaklawn Boulevard (Route 36)	Puddledock Road (Route 645)	Lee Avenue (Fort Lee Gate)	17800	1.5%	23100	27200	4100	5300	15.1%	C
Oaklawn Boulevard (Route 36)	Lee Avenue (Fort Lee Gate)	Temple Avenue (Route 144)	18700	2.0%	26200	32900	6700	7500	20.4%	B
Oaklawn Boulevard (Route 36)	Temple Avenue (Route 144)	Jefferson Park Road (Route 630)	36100	1.5%	46900	56800	9900	10800	17.4%	F
Hickory Hill Road (Route 109)	County Drive (Route 460)	Mahone Avenue (Fort Lee Gate)	9800	0.0%	9800	11500	1700	0	14.8%	E
Courthouse Road (Route 106)	County Drive (Route 460)	Baxter Road (Route 603)	7900	1.0%	9500	9500	0	1600	0.0%	C
Courthouse Road (Route 106)	Baxter Road (Route 603)	Bull Hill Road (Route 630)	9900	1.0%	11900	12100	200	2000	1.7%	C
Courthouse Road (Route 106)	Bull Hill Road (Route 630)	Allin Road (Route 634)	7900	1.0%	9500	9500	0	1600	0.0%	C
Temple Avenue (Route 144)	Puddledock Road (Route 645)	River Road (Route 725)	26900	1.0%	32300	33700	1400	5400	4.2%	C
Temple Avenue (Route 144)	River Road (Route 725)	Oaklawn Boulevard (Route 36)	21900	1.0%	26300	27700	1400	4400	5.1%	B
Winfield Road (Route 460)	Crater Road (Route 301)	Hickory Hill Road (Route 109)	20500	1.0%	24600	25600	1000	4100	3.9%	B
County Drive (Route 460)	Hickory Hill Road (Route 109)	Baxter Road (Route 603)	11700	2.0%	16400	17200	800	4700	4.7%	B
County Drive (Route 460)	Baxter Road (Route 603)	Courthouse Road (Route 106)	9000	2.0%	12600	13400	800	3600	6.0%	B
Baxter Road (Route 603)	County Drive (Route 460)	Courthouse Road (Route 106)	3300	1.0%	4000	4000	0	700	0.0%	B
Jefferson Park Road (Route 630)	Adams Avenue (Fort Lee Gate)	Middle Road (Route 646)	9900	1.0%	11900	14300	2400	2000	16.8%	D
Jefferson Park Road (Route 630)	Middle Road (Route 646)	Oaklawn Boulevard (Route 36)	12100	1.0%	14500	18600	4100	2400	22.0%	C
Allin Road (Route 634)	Bull Hill Road (Route 630)	Courthouse Road (Route 106)	6200	1.0%	7400	7500	100	1200	1.3%	C
Puddledock Road (Route 645)	Washington Street (Route 36)	Temple Avenue (Route 144)	6200	1.5%	8100	8100	0	1900	0.0%	C
Puddledock Road (Route 645)	Temple Avenue (Route 144)	River Road (Route 725)	2900	1.5%	3800	5800	2000	900	34.5%	B
Middle Road (Route 646)	Jefferson Park Road (Route 630)	Takach Road (Route 647)	8300	2.0%	11600	13600	2000	3300	14.7%	D
River Road (Route 725)	Temple Avenue (Route 144)	Puddledock Road (Route 645)	5600	1.0%	6700	6800	100	1100	1.5%	A

Source: Baker 2006

It was assumed that peak hour trips would be predominately commuter based. The distribution of new personnel likely to settle in each surrounding jurisdiction was based on recent census information. A total of 3,153 new off-post households would distribute to the surrounding jurisdictions (Table 4.1.10-12). The number of households would be equal to the number of permanent personnel expected to live off-post, which includes all civilian employees, contractors and 60 percent of permanent military personnel.

Table 4.1.10-12
Distribution of off-post households

Jurisdiction	Distribution %	Off-post households
Chesterfield County	24.0%	756
Colonial Heights	3.7%	116
Dinwiddie County	3.0%	93
Hopewell	3.3%	105
Petersburg	12.9%	407
Prince George County	53.1%	1,675
Total	100.0%	3,152

Source: Baker 2006

The new trips were assigned a gate according to the location of new facilities and the likelihood of personnel using certain gates (Table 4.1.10-13). This distribution assumes that

- Vehicles accessing the Main Gate and Sisisky Gate would be bound for or originating from all surrounding jurisdictions
- ehicles accessing the A Gate would be bound for or originating from Prince George County
- Vehicles accessing the Mahone Avenue Gate would be bound for or originating from all jurisdictions except Hopewell
- Vehicles accessing the new River Road Gate would distribute to the surrounding jurisdictions in the proportions expected based on Table 4.1.10-12.

Table 4.1.10-13
Distributions of BRAC trips to Fort Lee gates

Gate	Daily	AM peak	PM peak
Lee	4900	450	450
Sisisky	6700	610	610
A Avenue(Golf)	3400	310	310
Mahone	2000	180	180
River Road	2700	250	250
Total	19,600	1,790	1,790

Source: Baker 2006

This gate distribution was further refined by applying a directional distribution in and out of each gate for each peak hour on the basis of the direction ratios found in the VDOT gate counts.

Short-term (2015) Vehicular Traffic

Future baseline traffic, without the implementation of the Preferred Alternative, was estimated for the year 2015. The trip distribution volumes for the new BRAC-related activities were then added to the 2015 baseline traffic to develop the projected volumes on the roadways of interest. The computed average daily traffic, peak-hour volumes, and resulting LOS for the studied roadway links are shown in Table 4.1.10-9. The ADT for the year 2006 is shown for comparison. The ADT for each of all the roadways would be expected to increase throughout the study area. These increases in traffic volume would be due to both regional growth and the implementation of the Preferred Alternative. As with the existing (2006) conditions, the only new roadway link that would operate with an unacceptable LOS for the year 2015 with the implementation of the Preferred Alternative would be Hickory Hill Road (Route 109) from County Drive (Route 460) to Mahone Avenue (Ft. Lee Gate). Vehicles associated with the Preferred Alternative would account for 16.9 percent of the ADT on this roadway segment in the year 2015. This segment currently operates with an acceptable LOS. Therefore, the implementation of the Preferred Alternative was considered to contribute appreciably to the future adverse traffic conditions on this roadway segment.

LOS was developed for all intersections of interest in 2015 (Table 4.1.10-14 and Table 4.1.10-15). These LOS include the existing traffic, traffic due to growth, and traffic due to the implementation of the Preferred Alternative. In addition to the five intersections that have an unacceptable in the year 2006, the following five intersections would be expected to have an unacceptable LOS in the year 2015:

- Temple Avenue and River Road
- County Drive and Hickory Hill Road
- Jefferson Park Road and Adams Avenue
- Jefferson Park Road and Bull Hill Road
- Courthouse Road and Bull Hill Road

Table 4.1.10-14
2006, 2015, and 2026 level of service—signalized intersection

Intersection	Existing LOS (2006)	2015 LOS	2026 LOS
Allin Road and Courthouse Road	B	C	D
Puddledock Road and Washington St	C	D	D
Courthouse Road and County Drive	C	D	E
Hickory Hill Road and County Drive	C	E	F
River Road and Temple Avenue	D	E	F
Jefferson Park Road and Oaklawn Blvd	E	F	F
Puddledock Road and Temple Ave	E	E	F
Lee Avenue (Main Gate and Oaklawn Blvd	F	F	F
Temple Avenue and Oaklawn Blvd	F	F	F

Bold indicates Preferred Alternative appreciably contributes to the unacceptable LOS in the year 2015

Source: Baker 2006

Table 4.1.10-15
2006, 2015, and 2026 level of service—unsignalized intersections

Intersection	Existing LOS (2006)	2015 LOS	2026 LOS
River Road and Puddledock Rd	B	C	C
Baxter Road and Courthouse Road	C	C	D
Baxter Road and County Drive	C	C	E
Stedman Drive and County Drive	C	D	E
Jefferson Park Road and Adams Avenue	C	F	F
Jefferson Park Road Bull Hill Rd	C	F	F
Bull Hill Road and Courthouse Rd	D	E	F
Jefferson Park Road and Middle Road	F	F	F

Bold indicates Preferred Alternative appreciably contributes to the unacceptable LOS in the year 2015

Source: Baker 2006

The increase in traffic due to the Preferred Alternative on the roadway segments approaching these five intersections would be comparable to that of growth alone (Table 4.1.10-10). Therefore, the implementation of the Preferred Alternative was considered to contribute appreciably to the future adverse traffic conditions at these intersections.

Long-term (2026) Vehicular Traffic

Future baseline traffic, without the implementation of the Preferred Alternative, was estimated for the year 2026. The trip distribution volumes for the new BRAC-related activities were then added to the 2026 baseline traffic to develop the projected volumes on the roadways of interest. The computed average daily traffic, peak-hour volumes, and resulting LOS for the studied roadway links are shown in Table 4.1.10-11. The average daily traffic for the year 2006 is shown for comparison. The ADT for each of all the roadways is expected to increase throughout the study area. These increases in traffic volume between 2015 and 2026 would be due only to regional growth and not the implementation of the Preferred Alternative. Because there would be no BRAC-related development after the year 2011, traffic due to the Preferred Alternative in 2026 would be the same as in the year 2015.

In addition to the one roadway segment in the year 2006 and 2015, Middle Road from Jefferson Park Road to Takach Road would operate with an unacceptable LOS for the year 2026. Because the short-term (2015) LOS on this roadway was adequate even with the implementation of the Preferred Alternative, regional growth was considered the primary contributor to this unacceptable traffic condition.

LOS was developed for all intersections of interest for 2026 (Tables 4.1.10-13 and 4.1.10-14). These LOS include the existing traffic, traffic due to growth, and traffic due to the implementation of the Preferred Alternative. In addition to the 10 intersections that have an unacceptable in the year 2006 and 2015, the intersections of County Drive and Courthouse Road, County Drive and Baxter Road, and County Drive and Stedman Drive would be expected to have an unacceptable LOS in the year 2026. Because the short-term (2015) LOS for these intersections was adequate even with the implementation of the Preferred Alternative, regional growth was considered the primary contributor to these unacceptable traffic conditions.

Roadway and Intersection Upgrades Analysis

Capacity shortcomings, where the implementation of the Preferred Alternative was considered to contribute appreciably to the future adverse traffic conditions, have been carried forward to identify roadway and intersection upgrades that would be possible solutions to these deficiencies. Notably – the upgrades identified in this section eliminate adverse traffic conditions attributable to both regional growth and the BRAC action at roadway and intersections past the horizon year 2026. A brief description, planning level cost estimates and the resulting levels of service (LOS) are provided for each potential roadway or intersection improvement.

Hickory Hill Road (Rte 109) - from County Drive (US 460) to Mahone Avenue (Gate). In 2015, Hickory Hill Road is expected to operate at LOS E and D in the AM and PM peak hours, respectively. Since Hickory Hill Road provides a direct entrance to Fort Lee, increasing capacity to and from the gate would give Fort Lee flexibility in gate operations during periods of higher Force Protection. Widening Hickory Hill Road to four lanes (two lanes in each direction) would allow the roadway to operate at LOS B in 2015 and 2026 and solve the capacity deficiency. The total cost of this measure was estimated to be \$1,500,000.

Temple Avenue and River Road. This intersection operates at LOS C in the AM Peak Hour and LOS D in the PM Peak Hour in 2006. This intersection is expected to worsen to LOS D in the AM Peak Hour and LOS F in the PM Peak Hour by 2026. The intersection would require separate left and right turn lanes for the northbound and southbound approaches. With these improvements, the intersection would operate at LOS C for both peak hours in 2026. The total cost of this measure was estimated to be \$1,460,000.

Jefferson Park Road and Adams Avenue and Jefferson Park Road/Allin Road and Bull Hill Road. Both of these stop-controlled intersections currently have minor approaches operating at LOS C for AM Peak Hour and LOS B for the PM Peak Hour. These intersections are expected to worsen to LOS E and LOS F by 2026. Both of these intersections meet signal warrants in 2015 and have operational problems. Given the proximity of these two intersections, less than 250 feet apart, any improvements and signalization would need to be coordinated between the two intersections or the intersections would need to be realigned into one intersection. Adding signals to both intersections and left turn lanes to northbound Allin Road at Bull Hill and to northbound Jefferson Park at Adams Avenue. The two signals would be coordinated to operate at an acceptable LOS and prevent queuing into the upstream signal. The two signalized intersections would operate at LOS B or better for both peak periods in 2026. The total cost of this measure was estimated to be \$1,470,000.

Courthouse Road and Bull Hill Road. This stop-controlled intersection currently has minor approach movements operating at LOS D in the AM and PM peak hours, and is expected to worsen to LOS E and F in the AM and PM peak hours, respectively, by 2026. The intersection meets signal warrants in 2015. Courthouse Road and Bull Hill Road meet at a severe skew creating very acute left turn movements. Currently, the intersection has a unique layout with very little storage for left turning vehicles. Signalizing the intersection would compound any problems. The intersection would need to be reconfigured prior to signalization. The realignment of Bull Hill Road to intersect Courthouse Road at two separate locations would eliminate the skew problem at the existing intersection and provide for full turn access at the two new intersections. Both intersections would need to be signalized and provide left and right turn lanes to and from Courthouse Road. The new intersections are expected to operate at LOS B or better for both peak periods. The total cost of this measure was estimated to be \$2,760,000.

County Drive and Hickory Hill Road. This intersection currently operates at LOS C for both peak hours and is expected to worsen to LOS F for the AM Peak Hour and LOS D for the PM Peak Hour in 2026. The addition of a second eastbound left turn lane on County Drive at the intersection and improvements to the traffic signal timings would improve the operation to LOS B in both peak periods. The total cost of this measure was estimated to be \$1,500,000.

Rail Access, Public Transit, and Air Traffic

Neither the short-term nor the long-term component of this alternative would have any effects on rail access or air traffic at Fort Lee or Fort A.P. Hill. A small increase in the number of individual using the public transit in the area of Fort Lee would be expected with the implementation of the Preferred Alternative. Efforts to increase the transit mode share would most likely involve the addition of new services that would further increase public transit capacity—primarily to currently unserved areas where considerable numbers of Fort Lee employees reside.

Construction Traffic

Traffic congestion would increase at Fort Lee due to additional construction vehicles and traffic delays near construction sites. These effects would be temporary in nature and would end with the construction phase of the Preferred Alternative. The condition of the local on-post and off-post road infrastructure would be sufficient to support any increase in construction vehicle traffic. In addition, road closures or detours to accommodate utility system work would be expected, creating short-term traffic delays. Such effects would be minimized by directing all construction vehicles to access the installation via the gates closest to the project site, minimizing construction vehicle movement during peak traffic hours, and placing construction staging areas where they would least interfere with traffic. In addition, worker truck routes would be identified to limit traffic in the cities of Petersburg, Hopewell, and Fredericksburg. All construction traffic controls would be carefully planned. All construction vehicles would be equipped with backing alarms, two-way radios, and Slow Moving Vehicle signs when appropriate.

Cumulative Effects

Construction of BRAC facilities, new family housing under the RCI program, and numerous facilities associated with the Fort Lee master planning effort would occur simultaneously. Traffic attributable to these actions would occur concurrently. Other construction and development projects would produce some measurable amounts of traffic. In addition, the Tri-cities MPO takes into account the effects of all past, present, and reasonably foreseeable projects in the region and associated traffic during the development of the regional traffic model. The traffic forecasts for this analysis took the increase in background traffic resulting from regional growth in population and employment into consideration. As a result, the traffic impacts shown for the Preferred Alternative naturally take into consideration cumulative effects.

Mitigation

The Defense Access Roads (DAR) program, authorized in 23 U.S.C. 210, provides a means by which the federal government may pay its fair share of the cost of highway improvements needed for adequate highway service to defense and defense-related installations. Administered jointly with the Federal Highway Administration (FHWA), the DAR program provides a means for DoD to work with state and local authorities who execute the projects. Funding for DAR projects is obtained through Military Construction Program funds appropriated by Congress.

Fort Lee has prioritized transportation projects identified as needed to mitigate the traffic impacts due to BRAC Implementation. These projects have been submitted by Fort Lee for possible

funding from sources such as the DAR Program, the Tri-Cities Area MPO, and VDOT. A Commonwealth of Virginia grant has been approved for traffic improvements at the Shop Road Gate and the Mahone Avenue Gate (Anderson 2007).

4.1.10.2.2 No Action Alternative

Under the No Action Alternative, no effects on transportation resources would be expected. Existing, short-term, and long-term traffic conditions would remain as described in section 4.1.10.1.

4.1.11 Utilities

4.1.11.1 Affected Environment

Utility systems available at Fort Lee are potable water, sanitary sewer, storm water drainage, electric, natural gas, telephone, cable, and solid waste disposal. The capacities of the systems are sufficient to support existing operations at the installation. In some cases, the conveyance systems are aging and beginning to show signs of wear, but all systems are functional at acceptable levels (Versar 2005c). The potable water, wastewater collection and treatment, and electricity systems have been privatized. The natural gas system is owned by Fort Lee; however, the gas supply and distribution system maintenance is contracted to private contractors. Fort Lee has a central Computerized Energy Control System for managing heating, air conditioning and power requirements in large buildings.

4.1.11.1.1 Potable Water Supply

Water is supplied to Fort Lee by both Virginia American Water in Hopewell and the Appomattox River Water Authority in Petersburg. The Hopewell District of the Virginia American Water Company owns the potable water supply infrastructure at Fort Lee and provides the installation with up to 3 mgd of water. The Virginia American Water Company is responsible for all system operation and maintenance. Water storage at Fort Lee consists of four 300,000-gallon, elevated tanks at 2nd Street, 20th Street, 34th Street, and 41st Street. Virginia American also supplies water to Fort Lee from a 1-million-gallon, in-ground reservoir at Pumping Station Number 1 on Petersburg National Battlefield property.

Water demand on the installation averages slightly more than 1 mgd for the baseline population of approximately 8,000. The water supply can support an effective population of approximately 20,000, assuming an average rate of water consumption of 125 gallons per capita per day and an additional 15 percent for unaccounted-for water.

4.1.11.1.2 Sewer and Wastewater

The sanitary sewer collection system at Fort Lee is composed of approximately 265,000 linear feet of 6-inch to 30-inch gravity sewers and approximately 880 collection system manholes. Sewer line material, the majority of which were installed during the 1950s includes terra cotta, reinforced concrete, cast iron, ductile iron or PVC (Real Property Master Plan, Fort Lee Long Range Component, May 2003). The wastewater collection system at Fort Lee was privatized in February 2006 and is owned, maintained, and operated by Old Dominion Utility Services, Inc., a subsidiary of American State Utility Services, Inc., of California.

Wastewater from Fort Lee is transported to the city of Hopewell's primary treatment plant. The plant has a hydraulic limit of 70 mgd and a design capacity of 50 mgd. A contract between Fort Lee and the city of Hopewell limits Fort Lee's contribution to the treatment plant at 2.5 mgd average-flow processed, which is considerably more than the installation's 2006 volume contribution of 0.93 mgd (Lerose 2006). The primary treatment plant, however, is nearing capacity and the city is evaluating elimination of the plant and movement of all treatment to a regional facility as part of its nitrogen reduction project. The regional plant has more than adequate capacity to accept Fort Lee's wastewater. Fort Lee sewage is transmitted to the treatment plant by the Hopewell pumping station, which was completed in 1978 and has a capacity of 8.5 mgd, of which approximately 1.5 mgd is used by sewage-generating sources other than Fort Lee.

In 1998, a comprehensive wastewater study and detailed analysis of the infiltration, peak flow rate, and total inflow volume was conducted at 15 locations at Fort Lee. The study identified locations exhibiting severe infiltration and high-priority areas of inflow into the sanitary sewer system, and made several recommendations to control infiltration and inflow.

Septic tank systems not served by the above gravity collection system are operational at the following locations: Range Area (North of Route 36); Rod and Gun Club (Near Virginia Power Substation); Outdoor Recreation Building (Adjacent to Rod and Gun Club); Adams Avenue Gate House. All centralized and septic systems have sufficient existing capacity.

4.1.11.1.3 Energy Sources

Electricity

Fort Lee receives electric power from Dominion Virginia Power at 13.2 kilovolts (kV) at two primary voltage delivery points near the northeast corner of the installation. Dominion Virginia Power owns and operates the substation, and the 13.2-kV distribution switching station is owned and operated by Fort Lee. The electric distribution system includes 29 circuit-miles of overhead and 63 circuit-miles of underground primary distribution lines. The Prince George Electric Cooperative provides secondary-voltage electric service to the golf course area (Defense Energy Support Center 2001a, cited in Versar 2005a).

Natural Gas

Fort Lee owns the on-post natural gas system; Johnson Controls, Inc., maintains the gas distribution system; and Columbia Gas of Virginia, which obtains its natural gas supply in bulk from Washington Gas, supplies the gas to the installation. The installation has a contractual maximum daily limit of 3.2 million cubic feet of gas with Columbia Gas. The system is master metered. Columbia Gas's responsibility for the system ends at a measurement point near Pender Avenue on-post, beyond which Fort Lee is responsible for the gas piping infrastructure.

Fort Lee's natural gas system was installed in the 1950s and had major upgrades in 1969, 1989, 1998, 1999, and 2000. The system has cathodic protection, and an annual gas leak survey is conducted (Defense Energy Support Center 2001b, cited in Versar 2005a). Approximately 90 percent of heating on the installation is natural gas, with electricity and fuel oil accounting for the remaining 10 percent.

4.1.11.1.4 Storm Water Collection System

Most storm water on Fort Lee's cantonment area is collected through a system of natural and man-made channels and piped storm sewers that convey the water to Bailey Creek. Small areas of the Main Post drain to the Blackwater Swamp in the southern portion of the installation and to Harrison Creek in the northern portion of the installation, as well as other small streams and tributaries. Information on storm water quality is in the Water Resources section (section 4.1.6).

4.1.11.1.5 Solid Waste

Fort Lee's solid waste is collected by a refuse contractor, Mark Dunning Industries of Alabama, and is disposed of off-post in a landfill operated by Waste Management, Inc., approximately 18 miles from the installation. All organizations and housing areas on Fort Lee are serviced by the refuse contract. At the current rate of solid waste generation at Fort Lee and in the surrounding community, the landfill is projected to have a remaining lifespan of 15 years. Mark Dunning Industries also provides recycling service to the installation.

The installation monitors the solid waste collected from housing units separately from that of nonhousing units. On average, housing units generate approximately 110 tons of solid waste per month and nonhousing units generate approximately 475 tons of solid waste per month.

Construction and demolition (C&D) debris generated at Fort Lee is hauled off-site by contract to landfills that accept the debris.

4.1.11.1.6 Communication Systems

Communication services at Fort Lee are provided by Verizon and AT&T. Cable television is provided by Adelphia Communication Corporation.

4.1.11.2 Environmental Consequences

4.1.11.2.1 Preferred Alternative

Long-term minor adverse and beneficial impacts on utility systems serving Fort Lee would be expected under the Preferred Alternative. Beneficial effects would be expected from utility system upgrades made to accommodate the additional personnel and functions moving to the post. Adverse effects would result from the additional demand placed on all utility systems.

The potable water and wastewater systems have sufficient capacity to meet the increased demand that the BRAC action would produce. The effective population for the utility systems would increase from a baseline of 6,420 to 14,123 in 2011. The potable water system, with a capacity of 3 mgd, is sufficient for an effective population of 20,606; and the wastewater system, with a capacity of 2.5 mgd, is sufficient for an effective population of 25,000. However, the recommendations for controlling infiltration and inflow to Fort Lee's sanitary sewer system from the 1998 comprehensive wastewater study should be further investigated for controlling the wet-weather flows from Fort Lee. Privatized utility systems would continue to be operated, maintained, and expanded as necessary by the respective system owners.

The natural gas system has a maximum daily delivery limit of 3.2 million cubic feet. The gas system equipment is sized on the basis of an hourly volume delivery, and both the contractual

limit of 3.2 million cubic feet per day and the equipment hourly volume capacity could prove to be insufficient for the post-BRAC effective population. Fort Lee would identify additional sources for the supply of natural gas to increase the contracted volume of gas to 7 million cubic feet. In addition, new facilities would have new, sufficiently sized distribution equipment installed, and the exiting distribution system would be upgraded to handle the additional volume of gas delivered to the installation.

Fort Lee would minimize demand increases on the systems by installing water-conserving devices such as low-flow shower heads, faucets, and toilets in new facilities; coordinating with the city of Hopewell to ensure that its regional wastewater treatment plant has sufficient capacity to meet post-BRAC demands; and installing fixtures and heating systems in compliance with the Energy Policy Act of 2005 (Public Law 109-58) with specified goals for increased use of renewable energy sources, advanced utility metering and procurement of energy efficient equipment and building systems in all applicable contracts. The storm water collection system would be expanded as necessary to accommodate the additional volume of storm water that would be generated by the additional area of impervious surface on the installation (which could be as much as 100 acres). (Impacts on storm water and stream water quality in Bailey Creek and other drainages are discussed under Water Resources (section 4.1.6).) BMPs to control surface erosion and runoff generation would be installed in accordance with state regulations and development would adhere to the principles of low-impact development. All vertical building construction projects starting with the Fiscal Year 2008 would be expected to achieve the SILVER level of Leadership in Energy and Environmental Design (LEED) of the U.S. Green Building Council (Memo dated January 5, 2006 from Deputy Assistant Secretary of the Army). This rating system is based on sustainable design and development concepts and assesses the degree to which the design of a building successfully incorporates consideration of matters such as sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. Use of the LEED rating system improves the environmental and economic performance of facilities through the use of established and advanced industry principles, practices, materials, and standards.

Solid waste generated under the Preferred Alternative would not be substantial in terms of overall monthly or yearly quantity or area landfill capacity. Table 4.1.11-1 provides an estimate of the C&D debris that would be generated at Fort Lee by construction under the Preferred Alternative.

As per requirements stipulated in memorandum ACSIM, DAIM-ZA, 06 Feb 06, SAB, a minimum of 50 percent of the estimated 10,256 tons of construction and demolition debris would be diverted from Army-owned, noninstallation-operated landfill sites. As a result of this sustainable management of waste in military construction, renovation, and demolition activities, approximately 5,128 tons of construction and demolition debris would be disposed of in various landfill sites in the area.

The overall quantity of 5,128 tons of C&D debris equates to a yearly average (on the basis of 4 years of construction activity) of 1,282 tons, or a monthly average of approximately 107 tons. Existing residential and nonresidential solid waste generation is 585 tons per month. Most of the BRAC actions involve construction and renovation, which have a much lower solid waste generation rate (the *C&D Factor* in Table 4.1.11-1) than demolition. Area landfill lifespans would be reduced from their current estimates because of solid waste generated under the Preferred Alternative, but capacities are sufficient to handle the short-term waste that would be generated from construction and the long-term operational waste from the increased population on-post.

Table 4.1.11-1
Estimates of construction and demolition debris generated
at Fort Lee as a result of implementing the Preferred Alternative

Construction type	Admin area (ft²)	C&D factor (lb/ft²)	Estimated waste (lb)	Estimated waste (tons)
Construction	3,633,900	4.4	15,989,160	7,995
Renovation	226,100	20	4,522,000	2,261
Demolition	0	115	0	0
GROSS TOTAL	3,860,000		20,511,160	10,256
Amount Recycled (50%)	N/A	N/A	10,255,580	5,128
NET TOTAL C&D DEBRIS GENERATED	N/A	N/A	10,255,580	5,128

Cumulative Effects

Both the BRAC action and the RCI program on Fort Lee would generate solid waste from facility construction, renovation, and demolition. It is estimated that the BRAC action would generate 5,128 tons of C&D debris (Table 4.1.11-1). The RCI program would generate 16,172 tons of C&D debris after recycling an estimated 35 percent of C&D debris generated (EAP 2006). The combined total of C&D debris generated by the BRAC action and RCI program is estimated as 21,300 tons. In addition, Master Plan projects at Fort Lee would generate C&D debris over the duration of the implementation of the projects.

The BRAC program would be implemented over approximately 4 years, and the RCI program would be implemented over 6 years. The monthly additional amount of solid waste that would be generated during the time that both programs were active would be approximately 332 tons (the additional monthly quantity of solid waste from the RCI program during the 4 concurrent years of BRAC activity would be 225 tons). C&D debris from the two programs and Master Plan projects would result in a cumulative reduction in the lifespan of the area landfills. Similarly, both the BRAC action and the RCI program would result in additional facilities that would require utility service, and, therefore, the two programs would result in a cumulative increase in demand on all installation facilities.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on utility systems. Best management practices required as part of DoD policy and the Commonwealth of Virginia, examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on utility systems.

Best Management Practices for Utility Systems

- **Potable Water.** Install water-efficient control devices, such as low-flow showerheads, faucets, and toilets, in all new facilities.
- **Energy.** Install energy-efficient interior and exterior lighting fixtures and controls in all new and renovated facilities. All new facilities would be built to comply with Energy Policy Act of 2005 with specified goals for increased use of renewable energy sources,

advanced utility metering, and procurement of energy efficient equipment and building systems in all applicable contracts. In addition, all vertical building construction projects starting with the Fiscal Year 2008 would be expected to achieve the SILVER level of LEED of the U.S. Green Building Council.

- **Solid Waste.** To achieve the goal of recycling 50 percent of the construction and demolition debris as stipulated in memorandum ACSIM, DAIM-ZA, 06 Feb 06, SAB, provide required training for in-house staff on materials eligible for recycling and methods of achieving the goal for staff involved. Incorporate these requirements in all contracts awarded to outside contractors.

4.1.11.2.2 No Action Alternative

No impacts on utility systems would be expected at either Fort Lee under the No Action Alternative. Facilities for BRAC would not be constructed and neither the population of Fort Lee nor demand on its utility systems would increase.

4.1.12 Hazardous and Toxic Materials

4.1.12.1 Affected Environment

Specific environmental statutes and regulations govern hazardous material and hazardous waste management activities at Fort Lee. For the purpose of this analysis, the terms *hazardous waste*, *hazardous materials*, and *toxic substances* include those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the RCRA, and the Toxic Substances Control Act (TSCA). In general, they include substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, might present substantial danger to public health or welfare or to the environment when released into the environment.

4.1.12.1.1 Storage and Handling Areas

The environmental division of Fort Lee maintains records of all active and former underground storage tanks (USTs) and aboveground storage tanks (ASTs) within the installation boundary. Fort Lee has two underground bulk petroleum storage tank sites on the east side of the installation. One of the sites, the Fuel Dispensing Facility (FDF), supports military vehicles operating on or passing through the installation. The second site, the Army and Air Force Exchange Service Station (AAFES), provides commercial sales to owners of privately owned vehicles authorized AAFES privileges (Fort Lee 2006e).

The USTs at the FDF include two 10,000-gallon gasoline tanks; one 10,000-gallon JP-8 tank, one 10,000-gallon diesel tank, and one 20,000-gallon diesel tank. These USTs are constructed of fiberglass and were manufactured in 1994. The AAFES contains four 12,000-gallon gasoline USTs constructed of fiberglass-clad steel in 1996. In addition to the bulk storage sites, there are eight other active USTs that range in size from 550 gallons to 8,000 gallons; they are used to store diesel and #2 fuel oil (Fort Lee 2006e).

Each of the regulated USTs on the installation is in compliance with corrosion protection, spill or overfill protection, and leak detection requirements (Fort Lee 2006e).

Fort Lee has two AST sites, the Petroleum Training Facility (PTF) and the Military in the Field (MIF) Training Facility, that store bulk petroleum to support training missions for military fuel handlers and petroleum specialists. The PTF contains 11 ASTs that store JP-8 and range in size from 42,000 gallons to 420,000 gallons. The MIF contains 38 collapsible bladders that range in size from 900 gallons to 50,000 gallons for diesel fuel storage (Fort Lee 2006e).

In addition to the above, there are 48 ASTs and 8 USTs throughout the installation. These tanks, which range in size from 275 gallons to 8,000 gallons, are used to store diesel, heating fuel, or used oil collected from Army agencies and offices (Fort Lee 2006e).

4.1.12.1.2 Hazardous Waste Disposal

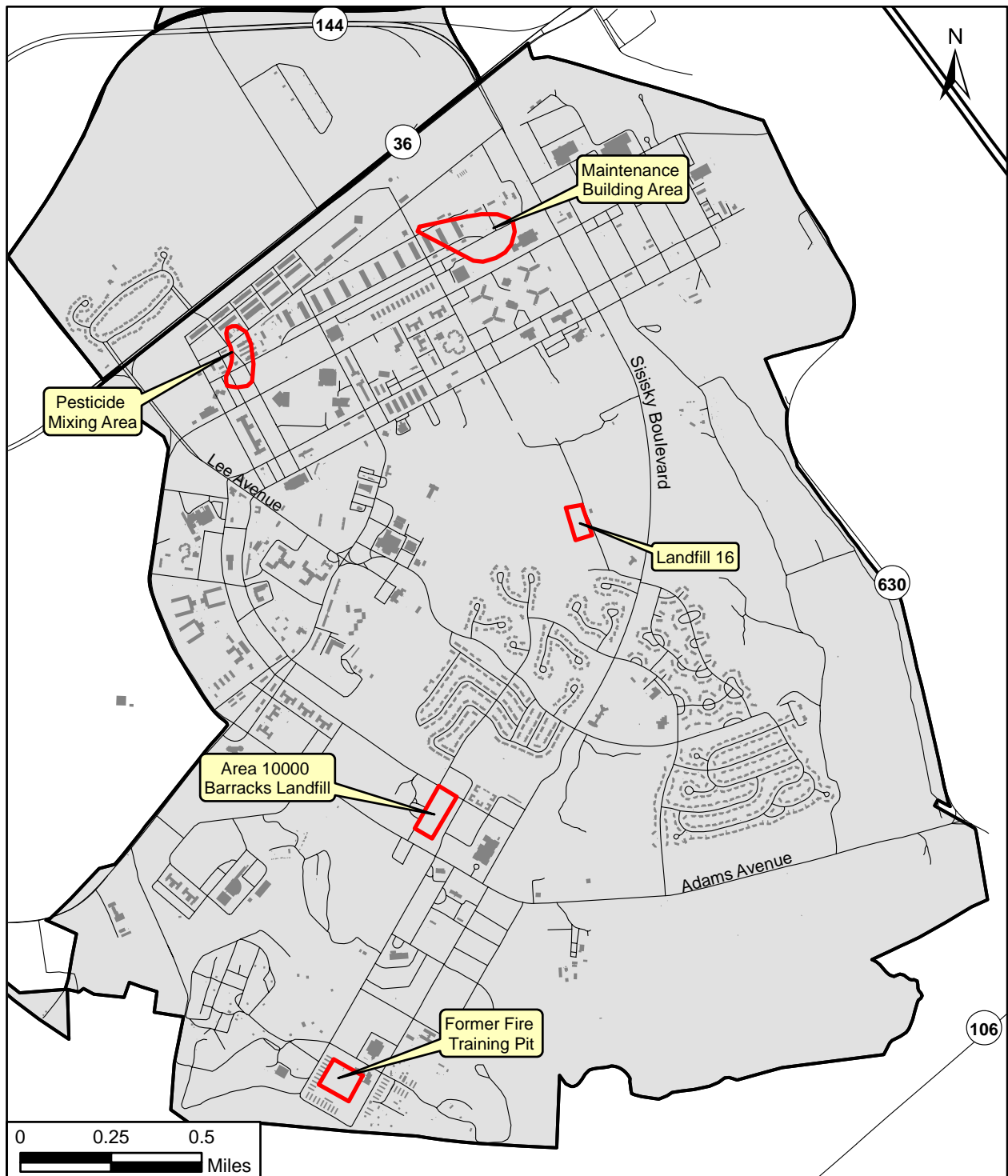
Fort Lee is a RCRA Large Quantity Generator of hazardous waste (identification number VA7210020502). Several waste storage facilities, including less-than-90-day and satellite accumulation facilities, are present throughout the installation. Fort Lee has contracts with the Defense Reutilization and Marketing Office (DRMO) near Richmond to handle the transportation and disposal of hazardous waste. All hazardous waste is manifested. Occasionally, the services of a licensed commercial contractor are used for disposal. The installation generates hazardous waste, including spent solvents, cleaning fluids, batteries, paints, fuel mixtures, aerosols, and other organic compounds. In accordance with state and federal waste regulations, hazardous waste is transported off-site for proper disposal within 90 days. No hazardous waste is disposed of within the installation itself. Fort Lee is in full compliance with applicable EPA, DoD, and Virginia Division of Hazardous Waste regulations, and all hazardous wastes are managed in accordance with the *Fort Lee Hazardous Waste Management Plan* (Fort Lee 2005 DEL-EMO 2005).

4.1.12.1.3 Site Contamination and Cleanup

Fort Lee is listed under the Virginia Department of Environmental Quality Federal Facilities Installation Restoration Program as VA7210020502. The Fort Lee *Installation Action Plan* (IAP) is used to track Defense Environmental Restoration Sites. There are 32 IRP sites at Fort Lee, of which 20 have been recommended for no further action (NFA). The remaining IRP sites include a maintenance building area, landfills, a former sewage treatment plant, an outdoor recreation area, which includes three former landfills, and a pesticides mixing area. See Figure 4.1-9 for the locations of IRP sites and their proximity to proposed construction locations. Studies have shown that these sites are contaminated with various solvents and POL, pesticides, and VOCs. These sites have undergone various remedial activities, which are documented in the IAP including remedial investigations, feasibility studies, remedial design, remedial action, or long-term monitoring. In addition, environmental studies are scheduled to begin at four other landfills, a petroleum lab/firefighter training pit and an open detonation area (Fort Lee 2006d).

Soil and groundwater suspected of contamination, or wastes that are generated, must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations.

These include, but are not limited to, the Virginia Waste Management Act (*Virginia Code* sections 10.1-1400 *et seq.*), the Virginia Hazardous Waste Management Regulations (9 VAC 20-60), the Virginia Solid Waste Management Regulations (9 VAC 20-80), Virginia Regulations for the Transportation of Hazardous Materials (9 VAC 20-110). Applicable Federal laws and regulations include the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the



LEGEND

- Installation Property
- Road
- Building
- IRP Site

Source: Fort Lee GIS, 2006.

IRP Sites

Fort Lee, Virginia

Figure 4.1-9

U.S. Department of Transportation Rules for Transportation of Hazardous materials, 49 CFR Part 107.

4.1.12.1.4 Asbestos

Two categories are used to describe asbestos-containing material (ACM). *Friable ACM* is defined as any material containing more than 1 percent asbestos (as determined by polarized light microscopy) that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. *Non-friable ACM* is material that contains more than 1 percent asbestos and does not meet the criteria for friable ACM.

Asbestos surveys conducted in 1986, 1990, 1991, 2002, and 2003 identified ACM in many buildings on the installation. Asbestos was determined to be present primarily in floor tile mastic, duct mastic, pipe mastic, joint compound and tape, roofing material, pipe insulation, transite panel, fireproofing material, fiberboard, duct expansion fabric, furnace gaskets, vinyl floor tile, boiler insulation, vent flashings, door insulation, and caulking (Versar 2003).

Structures that are demolished, renovated, or removed must be surveyed beforehand for ACM. If ACM is found, the Army must follow the requirements of 9 VAC 20-80-640 as well as other requirements in the Virginia Solid Waste Management Regulations (9 VAC 20-80).

ACM is unlikely in the recently rebuilt Harrison Villa and Jackson Circle housing areas.

4.1.12.1.5 Polychlorinated Biphenyls

PCBs are industrial compounds used in electrical equipment, primarily capacitors and transformers, because they are electrically nonconductive and remain stable at high temperatures. Because of their chemical stability, PCBs persist in the environment, bioaccumulate in organisms, and become concentrated in the food chain. The disposal of PCBs is regulated by TSCA, which regulates the removal and disposal of contaminated equipment containing PCBs at concentrations greater than 50 ppm.

There are several PCB contaminated transformers on the installation. Transformers located on the installation are owned by Dominion Virginia Power. Installation records indicate that these transformers are inspected regularly, and the installation maintains inspection records (Fort Lee 2005b). In addition, some light ballast containing PCBs are still in service on the installation.

4.1.12.1.6 Lead-Based Paint

Current Army policy calls for controlling lead-based paint (LBP) by using in-place management rather than mandated removal procedures. In-place management is used to prevent deterioration over time of those surfaces likely to contain LBP, followed by replacement as necessary. Maintenance staff are given instructions on routine cleaning procedures to capture LBP fragments from suspected locations. Under U.S. Army Engineering and Housing Support Center Technical Note 420-70-2 (Lead-Based Paint: Hazard Identification and Abatement), the demolition and removal of architectural components require that LBP be characterized and disposed of in accordance with applicable federal, state, and local solid waste management regulations. LBP must be encapsulated and removed in accordance with Army, Housing and Urban Development, and Occupational Safety and Health Administration (OSHA) guidelines, which cover contractor training, notification requirements, use of personal protective equipment, and approved disposal

methods. In addition, the Army must follow the requirements of 9 VAC 20-60-26 1 as well as other requirements in the Hazardous Waste Management Regulations.

Fort Lee conducted LBP surveys of a representative sampling of housing units in all housing communities in 1992, 1994, and 1995. Survey results determined that LBP was present in housing units in each housing community. LBP was most commonly found on painted wood and metal surfaces around interior windows and doors; on closet wall and shelves; and on exterior door frames, window sills and frames, porch columns, and shed doors (Dewberry and Davis 1992, 1994, 1995). Since the LBP surveys, two of the housing areas (Harrison Villa and Jackson Circle) have been demolished and rebuilt. Lead-based paint in these housing areas is unlikely.

4.1.12.1.7 Pesticides

Fort Lee has an *Installation Pest Management Plan* that includes the specific procedures for pest management, mixing and use of pesticides, and disposal of pesticide containers (Fort Lee 2005c). The installation pest management coordinator maintains documentation of pesticides applied and stored at the installation. All pesticides used at the installation are approved by the Preventive Medicine Service. All pesticides are applied under the direction of military-certified applicators, as required in AR 200-3. Most tenant organizations use licensed private contractors for pesticide and herbicide application. Pesticides used at the installation include insecticides, fungicides, rodenticides, disinfectants, and plant growth regulators. Pesticides are used primarily in family housing, barracks, office and administrative areas, and golf course areas. Herbicides are used to maintain the golf course and to control weeds along sidewalks, curbs, parking lots, gutters, and substations. Pre-emergents are used as needed for weed control. Insecticides are usually used to control cockroaches, but other insects such as flies, spiders, ants, fleas, bees, wasps, ticks, beetles, and termites are occasionally treated (Fort Lee 2005d).

Chlordane was used at the installation before EPA's ban on its use. Chlordane was used for termite control in accordance with the pest management plan. There is no known site contamination associated with chlordane use. Chlordane is generally not considered to be a hazardous waste if it was applied for its intended use as a pesticide, as opposed to storage, disposal as waste material, or migration to its current location from the application site. Although this pesticide is not considered a hazardous waste as defined by the Solid Waste Disposal Act, materials leaching chlordane at concentrations greater than 0.03 milligrams per liter upon excavation are defined as hazardous by the Toxic Characteristic under RCRA and must be dealt with in compliance with applicable laws.

4.1.12.1.8 Ordnance

AR 385-63 and U.S. Army Training and Doctrine Command (TRADOC) Regulation 385-2 require weapons ranges within Army installations to comply with established safety standards. Fort Lee has one impact area that encompasses approximately 1,300 acres. This area includes most of the Firing Range Wetlands Conservation Zone. Fort Lee has eight firing ranges that direct fire into the impact area. The installation is in the process of increasing its Range Training Area through the acquisition of 275 acres of land north of the existing range area. This land was originally part of Fort Lee, and the safety fan for the existing M16A2 Rifle range extends into this surrounding vicinity. Proposed uses of this land include a multipurpose machine gun range and an AT4 anti-armor range area (Fort Lee DPWL-EMO 2005). Activities that involve munitions and explosives of concern (MEC) are located north of the cantonment area.

4.1.12.2 Environmental Consequences

4.1.12.2.1 Preferred Alternative

Long-term minor beneficial effects would be expected related to ACM and LBP present in existing buildings that would be demolished or renovated. ACM and LBP would be handled in a manner consistent with applicable rules and regulations, and thus no environmental or health effects from the removal, handling, and disposal of these materials would be expected during demolition, renovation, or construction activities. Before initiating renovation activities, the potential for environmental impacts of special hazards such as ACM and LBP would be evaluated and addressed as specified in the appropriate regulatory requirements. Demolition that involves LBP or ACM would be evaluated for compliance with the OSHA standard at 29 CFR 1926.62; EPA and Housing and Urban Development (HUD) standards; and state, federal, and Army regulations. Measures to control airborne asbestos and lead dust would be implemented. Contractors certified in the management of ACM and LBP would be used to evaluate and remove these materials. All construction debris that contains ACM and LBP would be disposed of at licensed disposal facilities in accordance with applicable laws.

Long-term minor adverse effects could result from an increase in the use of hazardous materials. Additional potentially hazardous materials that could be found on-post during BRAC-related activities include pesticides, solvents, paints, asphalt, lubricants, fuel and motor oils for vehicles and equipment. A detailed inventory of hazardous materials and approximate quantities used by the OMEMS from Redstone Arsenal is provided in Appendix F. An increase in the overall volume of these wastes generated and the amount of storage required would be anticipated. Construction of additional hazardous material storage space is expected.

Long-term negligible adverse effects could result from incidental spills associated with the use of hazardous materials. Established controls such as spill containment, emergency response and clean-up procedures would limit the impact of such spills.

No effects would be expected from hazardous waste disposal. The installation is a large-quantity generator of hazardous wastes and has established procedures for managing and disposing of hazardous wastes. The current hazardous waste disposal procedures would continue with implementation of the preferred alternative. All hazardous wastes would be managed in accordance with the installation's *Hazardous Waste Management Plan* and RCRA requirements. The hazardous waste generated by the OMEMS from Redstone Arsenal are minimal. Approximately 280 pounds of cleaning solvents were generated in 2004 and approximately 4 pounds of gas detector tubes were generated in 2005 (Roberts, personal communication, 2006).

Long-term minor adverse effects could result from an increase in storage capacity requirements for POL. Any construction of new storage facilities to handle storage requirements from BRAC actions would be done in accordance with applicable laws regarding construction materials, leak protection, monitoring, and spill containment.

No effects from pesticide use would be expected on Fort Lee. Pesticides from an approved products list would continue to be used at the installation and would be applied in accordance with the *Installation Pest Management Plan*. Pesticide residues, including those from chlordane, that are present in the soils of lawns and maintained areas included in the proposed BRAC areas are not considered a hazardous waste if the pesticides were at their current location for the

intended use. Excavated soils would have to be tested for pesticides. Excavated soils with test results above regulatory limits would be properly disposed of in accordance with applicable laws.

No adverse environmental or health effects related to MEC would be expected from BRAC construction. The proposed construction areas are not known to have any MEC. Finding ordnance during construction activities would cause operations to cease; however, once minimum separation distances or fragmentation zones are determined by qualified EOD personnel construction outside these areas could resume. It is likely that identified ordnance would either be destroyed in-place, taken to a location designated for disposal or temporarily placed in a properly rated explosive magazine until destroyed by EOD personnel. The installation would provide specific instructions and requirements regarding ordnance-related procedures to site workers. All live-fire training at Fort Lee associated with BRAC-related activities would be conducted in established training areas.

Cumulative Effects

No cumulative effects on hazardous or toxic materials would be expected from implementation of the Preferred Alternative.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on hazardous and toxic materials. Environmental and health risks as detailed in section 4.1.12.2 would be controlled by implementing existing programs, policies, regulations, and SOPs. Best management practices required as part of DoD and Fort Lee policy and the Commonwealth of Virginia, examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on hazardous and toxic materials.

Best Management Practices for Hazardous and Toxic Materials

- *Contamination.* Any soil suspected of contamination, or wastes that are generated, would be tested and disposed of in accordance with applicable laws and regulations. These include, but are not limited to, the Virginia Waste Management Act (Virginia Code sections 10.1-1400 *et seq.*) and the Virginia Hazardous Waste Management Regulations (9 VAC 20-60).
- *Demolition or Renovation of Structures.* All structures to be demolished, renovated, or removed would be checked beforehand for asbestos-containing materials and lead-based paint. If asbestos-containing materials were found, the Army would follow the requirements of 9 VAC 20-80-640 and other requirements in the Virginia Solid Waste Management Regulations. If lead-based paints were found, the Army would follow the requirements of 9 VAC 20-60-261 and other requirements in the Virginia Hazardous Waste Management Regulations.
- *Pollution Prevention.* The Army would implement pollution prevention principles in all construction activities, including reduction of waste materials at the source, re-use of materials, and recycling of solid wastes. Hazardous waste generation would be minimized and all hazardous wastes would be handled appropriately.
- *Remediation.* The Army would honor all CERCLA obligations at active and closed ERP sites at the installation. The installation's remedial project manager would be contacted before any land, soil, or groundwater disturbance at or near ERP sites to ensure that all

remedies in place would remain intact and that long-term monitoring wells would not be disturbed.

- *Petroleum Contamination.* In the event that petroleum contamination was discovered during project excavation, the incident would be reported to DEQ's Piedmont Regional Office. Disposal of any contaminated soils and groundwater would be accomplished in accordance with applicable DEQ guidelines.

4.1.12.2.2 No Action Alternative

No effects on hazardous and toxic substance, or from their use, storage, or disposal would be expected from implementation of the No Action Alternative.

4.1.13 Cumulative Effects Summary

CEQ regulations define a *cumulative impact* as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” Cumulative effects would result from the concurrent implementation of the proposed BRAC action, the Residential Communities Initiative (privatization of family housing), Master Plan projects, Range Development Plan projects, and off-post regional projects and growth. Adverse cumulative effects on land use, aesthetic and visual resources, air quality, water resources, biological resources, cultural resources, regional socioeconomics, transportation resources, and utilities at Fort Lee would be expected. Beneficial cumulative effects on regional socioeconomics and utilities would be expected.

4.1.13.1 Land Use

An adverse cumulative effect on land use would result from the combined loss of Training (Field) areas at Fort Lee. The BRAC action would result in the loss of Training (Field) land in Training Area 5 and the RCI action would result a loss of Training (Field) land in Training Areas 10, 13, and 14. The total amount of land converted from field training land to other uses would be approximately 470 acres. No other cumulative effects on Fort Lee land use or surrounding land uses would be expected. Land bordering the installation where BRAC facilities would be constructed is in land uses (developed, agricultural, or transportation routes) that are compatible with the proposed development.

4.1.13.2 Aesthetic and Visual Resources

No cumulative effects on aesthetics or visual resources on Fort Lee would be expected. Other projects conducted at Fort Lee, including RCI and non-BRAC Master Plan construction and renovation projects planned through 2011 (those that would occur concurrently with BRAC construction, which by law must be completed by September 14, 2011), would alter other areas of the installation, but the viewshed and land use changes due to these projects would essentially maintain the same character of an active military installation. An adverse cumulative effect on the aesthetics of the area near Fort Lee's TA5 and the ASP area would be expected. BRAC development between Route 144 (Temple Ave.) and Route 36 (Oaklawn Blvd.) would alter the landscape along the stretches of those routes that pass by Fort Lee property, which are currently forested. After BRAC implementation those stretches of road could be nearly completely developed. Other development in the area (north of the Petersburg National Battlefield at the

northernmost point where Fort Lee property adjoins it, for instance) is already intensifying the urban character of the region, and BRAC development would contribute to that change.

4.1.13.3 Air Quality

Impacts on air quality are primarily due to the use of heavy construction equipment for ground clearing and facility construction and renovation. Construction of BRAC facilities and of new family housing under the RCI program would occur simultaneously. Pollutant emissions attributable to the two actions would occur concurrently within the same AQCR. Other construction and development projects will, of course, occur within the Fort Lee region, and all of the projects would produce some measurable amounts of air pollutants. The Commonwealth of Virginia takes into account the effects of all past, present, and reasonably foreseeable projects in the region and associated emissions during the development of the SIP. Estimated emissions generated by the Preferred Alternative would conform to the SIP. Therefore, this alternative would not contribute to significant adverse cumulative air quality impacts.

4.1.13.4 Noise

No cumulative effects on the noise environment would be expected.

4.1.13.5 Geology and Soils

No cumulative effects on geology or soils would be expected.

4.1.13.6 Water Resources

BRAC facilities proposed to be constructed on the Main Post and the RCI proposed project areas are within the Bailey Creek and Blackwater Swamp watersheds. Adverse cumulative effects would result from the combined short-term increases in sedimentation in local streams from soil disturbance during construction of those facilities and any future soil-disturbing activities on Fort Lee over the next several years, and the long-term increase in storm water runoff due to the combined increase in impervious surface area of the BRAC facilities, the new family housing, and future development. No cumulative effects on water quality in the Chesapeake Bay would be expected from BRAC development on Fort Lee and Fort A.P. Hill and other development in the region. Sediment and other pollutants from streams on Fort Lee and in the area would enter the bay from the James River, while those from development on and near Fort A.P. Hill would enter the bay from the Rappahannock River and York River. The distances separating these source inputs and mixing in the bay would render any potential for a cumulative water quality effect negligible and immeasurable.

4.1.13.7 Biological Resources

Adverse cumulative impacts on biological resources would result from the loss of forested land for family housing under the RCI program, with the majority of new construction under that program proposed to occur in forested habitat in the southeast corner of the installation near Route 630. Mature forested communities in this portion of the cantonment area total approximately 340 acres, of which about 140 acres are planned for RCI development, leaving over 70 percent of these communities intact for wildlife habitat. Similar to TA5, these areas contain substantial riparian wetlands, all of which and 100-foot-wide upland buffers would be avoided to maintain a wildlife corridors to promote movement of species from the remaining

wooded areas north of RCI to Blackwater Swamp. Using these planning and development measures, the loss of wooded areas in TA5 and the ASP area, combined with the loss of portions of forest areas in the cantonment area to RCI would be expected to result in minor adverse cumulative impacts on the regional ecology, including a minor adverse effect on area-sensitive species that depend on large, contiguous natural areas. A wildlife corridor is expected to remain there, however, and it would provide a natural link between the Blackwater Swamp and Bailey Creek areas. Impacts on proposed RCI areas are evaluated in a separate Environmental Assessment prepared by Fort Lee.

4.1.13.8 Cultural Resources

Cumulative adverse effects on NRHP-eligible resources could result if such resources are physically disturbed during development of BRAC facilities, family housing under the RCI program, or projects included in the Fort Lee Master Plan. Federal legislation and the Fort Lee ICRMP would be followed under all of these projects to avoid or mitigate any unanticipated impacts. Thus any adverse cumulative impacts that would occur would be considered minor. Impacts on the setting of Petersburg National Battlefield from the BRAC action would be in addition to modern developments that have already been constructed surrounding the battlefield. Petersburg National Battlefield preserves and protects only a small portion of the lands involved in one of the Civil War's most significant campaigns, the siege of Petersburg in the final year of the war. Increasing urbanization in the surrounding cities and counties, which the BRAC action would contribute to, would have an adverse effect on the more broadly defined battlefield and preclude additional preservation of the siege-line and its setting.

4.1.13.9 Socioeconomics

Long-term significant beneficial and minor adverse cumulative effects would be expected. The past action of the establishment and continued operation of Fort Lee itself continues to have positive impacts on the local economy. The proposed action of realignment would be expected to significantly add to these beneficial economic impacts by increasing population, employment, income, and sales volume in the ROI. The expected substantial increase in population under the proposed realignment action could also have long-term minor adverse effects, depending on the ability of the ROI to accommodate this economic and population growth, with adverse effects resulting from possible labor, housing, and material shortages, which could lead to price increases or declines in service, until the local economy would respond to the new demands by increasing the labor force and supply of goods and services and housing.

The construction and renovation of housing on Fort Lee under the RCI program, Fort Lee Master Plan projects, and other development projects in the ROI would also be expected to increase employment, income, and sales volume in the ROI. These actions, combined with the expected impacts from the proposed realignment action at Fort Lee, could have long-term significant beneficial and minor adverse cumulative effects on the ROI. Due to the size of the action, the realignment of Fort Lee would be the driver behind the significant economic impacts; the other known and proposed projects would be expected to add to the projected growth in regional employment, income, sales volume, and population. The adverse effects could result from the sustained demand from the increased population on the region's infrastructure and the local economy's ability to expand to meet the demand.

4.1.13.10 Transportation

Construction of BRAC facilities, new family housing under the RCI program, and numerous facilities associated with the Fort Lee master planning effort would occur simultaneously. Traffic attributable to these actions would occur concurrently. Other construction and development projects would produce some measurable amounts of traffic. In addition, the Tri-cities MPO takes into account the effects of all past, present, and reasonably foreseeable projects in the region and associated traffic during the development of the regional traffic model. The traffic forecasts for this analysis took the increase in background traffic resulting from regional growth in population and employment into consideration. As a result, the traffic impacts shown for the Preferred Alternative naturally take into consideration cumulative effects.

4.1.13.11 Utilities

Beneficial and adverse cumulative effects on utility systems would be expected. Utility system upgrades would be made to accommodate the BRAC expansion, Master Plan projects, and family housing expansion. The expansions, however, would also create substantial new demands for electricity, natural gas, sewer, water, and solid waste disposal.

Both the BRAC action and the RCI program on Fort Lee would generate solid waste from facility construction, renovation, and demolition. It is estimated that the BRAC action would generate 5,128 tons of C&D debris. The RCI program would generate 16,172 tons of C&D debris after recycling an estimated 35 percent of C&D debris generated. The combined total of C&D debris generated by the BRAC action and RCI program is estimated as 21,300 tons. In addition, Master Plan projects at Fort Lee would generate C&D debris over the duration of the implementation of the projects.

The BRAC program would be implemented over approximately 4 years, and the RCI program would be implemented over 6 years. The monthly additional amount of solid waste that would be generated during the time that both programs were active would be approximately 332 tons. C&D debris from the two programs and Master Plan projects would result in a cumulative reduction in the lifespan of the area landfills.

4.1.13.12 Hazardous and Toxic Materials

No cumulative effects on hazardous or toxic materials would be expected from implementation of the Preferred Alternative.

4.1.14 Mitigation Summary

Table 4.1.14-1 provides a summary of mitigation measures that the Army would potentially employ to minimize, avoid, or compensate adverse environmental effects of implementing the Preferred Alternative. Mitigation does not include legal, regulatory, or policy-driven environmental protections required to comply with Federal and state laws, or Army and Fort Lee policies. Only those resource areas for which mitigation has been determined to be necessary are discussed below.

Table 4.1.14-1
Recommended Mitigation Measures for BRAC Actions at Fort Lee

Aesthetics and Visual Resources
Continue consultation with the Petersburg National Battlefield to identify measures to minimize visual impacts to the battlefield (for example, the retention or creation of a visual vegetative buffer).
Noise
Locate and orient the heavy vehicle maintenance facilities (highbays) at Fort Lee to minimize noise exposure to Petersburg National Battlefield and the Jackson Circle family housing area.
Install noise control devices on outdoor equipment.
Place the highbay facilities as far away from sensitive noise receptors as feasible.
Water Resources
Meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters.
Reduce the hydrologic impacts of increased storm water runoff and sediment and any loss of wetland water quality functions with created wetlands or some other means, as determined by the Commonwealth of Virginia.
Biological Resources
Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats. In particular, design and construction planning for Training Area 5 should support the creation of a wildlife corridor to link the North Range Area with the Petersburg National Battlefield and the Blackwater Swamp. Areas with existing environmental constraints (such as for cultural resources and riparian buffers) together with non-obtrusive training areas could be used to create a viable wildlife corridor and mitigate population dispersal problems that could be created by habitat fragmentation.
Place protective fencing or signage, as appropriate, around environmentally sensitive areas.
Fort Lee would meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the Virginia Water Protection Permit (VWPP) program for unavoidable impacts on wetlands and surface waters.
Replace any wetlands lost at an appropriate ratio, as determined by the U.S. Army Corps of Engineers and the Commonwealth of Virginia.
Cultural Resources
Fence sites 44PG160, 44PG195, 44PG196, 44PG197, and 44PG299 during nearby construction activities.
Conduct periodic monitoring of the five sites to ensure that avoidance and protection measures are effective.
If avoidance and protection of the five sites are not feasible, a PA would be developed between Fort Lee and the Virginia SHPO to determine measures to be implemented to mitigate the adverse effect. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region.
Consult with Petersburg National Battlefield and the Virginia SHPO to identify measures to avoid, reduce, and mitigate visual and noise impacts on the park from BRAC facilities and activities in Training Area 5. A PA would be developed between Fort Lee, the National Park Service, and the Virginia SHPO to define the measures to be implemented. Mitigation measures for noise impacts could include locating noise-producing buildings or activities away from the battlefield, orienting buildings and activities to reduce noise effects, and locating buildings between the battlefield and the noise-source to block noise. Mitigation measures for visual impacts could include locating taller buildings away from the battlefield and planting vegetation to reduce visual impacts.
Transportation
Continue to coordinate with VDOT and the MPO to address traffic impacts and capacity deficiencies associated with the BRAC action. Prioritize transportation projects identified as needed to mitigate the traffic impacts due to BRAC Implementation. Seek funding for priority projects from sources such as the DAR Program, the Tri-Cities Area MPO, and VDOT.

4.1.15 Unavoidable Adverse Environmental Impacts

Implementation of the Preferred Alternative would result in a variety of adverse environmental effects, as detailed in sections 4.1.1 through 4.1.12. Some of the effects could be minimized, avoided, or compensated for through mitigation, but others would be unavoidable. The principal unavoidable adverse effects on the environment are the following.

- **Land Use:** Unavoidable loss of Training (Field) land areas in order to accommodate incoming BRAC actions in a manner that would best serve the military mission at Fort Lee.
- **Air Quality:** Unavoidable emissions of air pollutants associated with facility construction and Soldier training activities.
- **Noise:** Unavoidable generation of noise from Soldier training activities.
- **Biological Resources:** Unavoidable loss of natural habitat to accommodate incoming BRAC actions in a manner that would best serve the military mission at Fort Lee.

4.2 FORT A.P. HILL

4.2.1 Land Use

4.2.1.1 Affected Environment

4.2.1.1.1 Regional Geographic Setting and Location

Fort A.P. Hill is in Caroline and Essex counties approximately 70 miles north of Fort Lee, Virginia. The political jurisdictions surrounding the installation are Caroline County, Essex County, King George County, Spotsylvania County and the towns of Port Royal and Bowling Green (Figure 4.2-1). The location of the installation is shown in Figure 1.1-1.

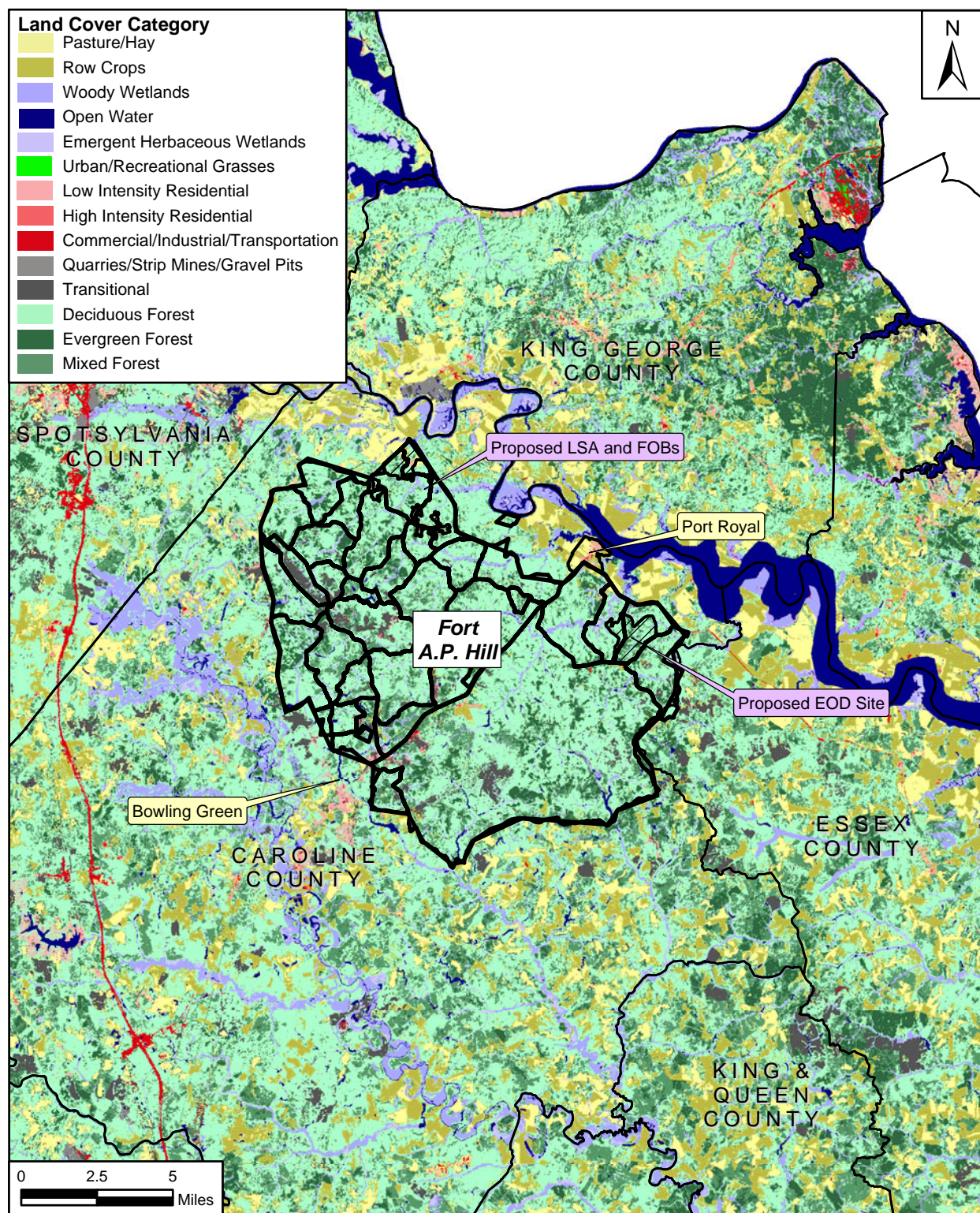
4.2.1.1.2 Installation Land Use

Fort A.P. Hill is a field training installation in the northeastern portion of Caroline County, Virginia. The Army owns 75,794 acres of the installation, and the Army leases approximately 111 acres from two private individuals (Fort A.P. Hill 2000). Most of the installation (approximately 85 percent) is forested and is primarily used to conduct training exercises. The remaining acreage is divided among varying sized grassland, shrub, and agricultural areas. Overall land use can be divided into several major categories: Training and Range areas (72,921 acres or 96 percent of the installation that are predominantly woodlands), and Administration, Family Housing and Airfield areas (3,165 acres). The cantonment area is in the southwest quadrant clustered along Route 301 with a headquarters, support buildings, and related facilities.

The only areas of the installation that are of concern with respect to the Preferred Alternative are the Pender Camp area at the northern boundary, where a LSA is proposed to be created, areas to the south of Pender Camp where one to seven FOBs would be established for additional training and for facilities to support the LSA mission, and the proposed EOD site near the east-central boundary of the installation. Only these areas are discussed below.

Pender Camp area is a field training area that has been inactive for some time. The camp is mostly cleared of forest and is grass covered. Aging, cracked, cement tent pads exist in the central portion of the camp. Wooden platforms used as targets and small, low-lying boxes for satellite communication are dispersed throughout the camp. A field for helicopter maneuvers occupies the western side of the camp adjacent to a large wetland area. A Quonset hut sits in the middle of the camp. The area was previously used for military training purposes and it is served by basic utilities (Figure 4.2-2). The entire camp is surrounded by forested areas, and the area is served by unimproved roads. The area to the south of Pender Camp, where the proposed FOBs would be, is forested training areas. Proposed FOB 1 (Rappahannock Camp) and proposed FOB 2 are served by basic utilities (Figure 4.2-3).

The proposed EOD site occupies approximately 1,200 acres of predominantly forested land, and much of it is steep land that slopes down to the northeast toward a tributary of the Rappahannock River. Most of the area is previously undisturbed, but electric and telephone lines run along Hampton Trail that passes through the proposed site (Figure 4.2-4).



Surrounding Land Use

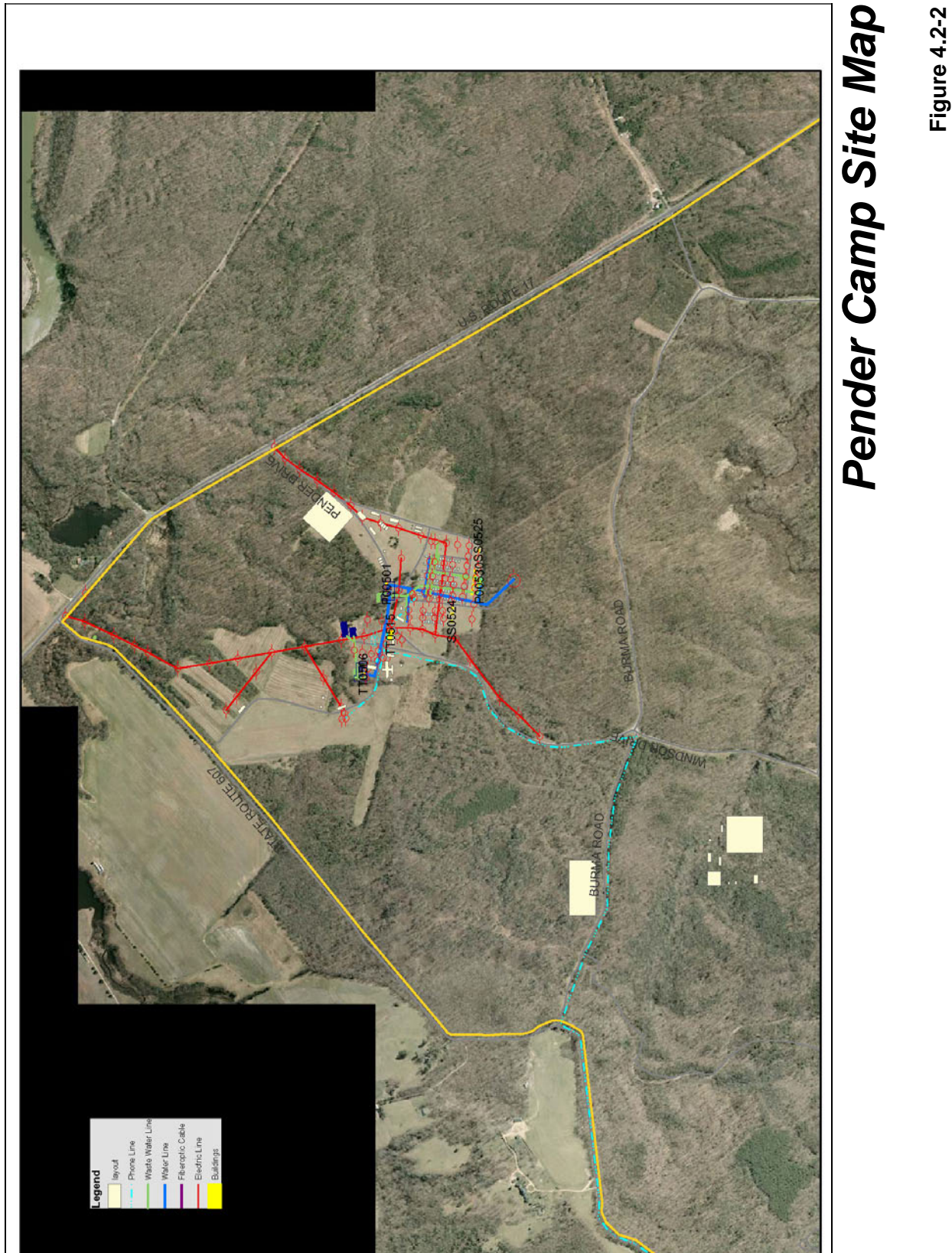
Fort A.P. Hill, Virginia

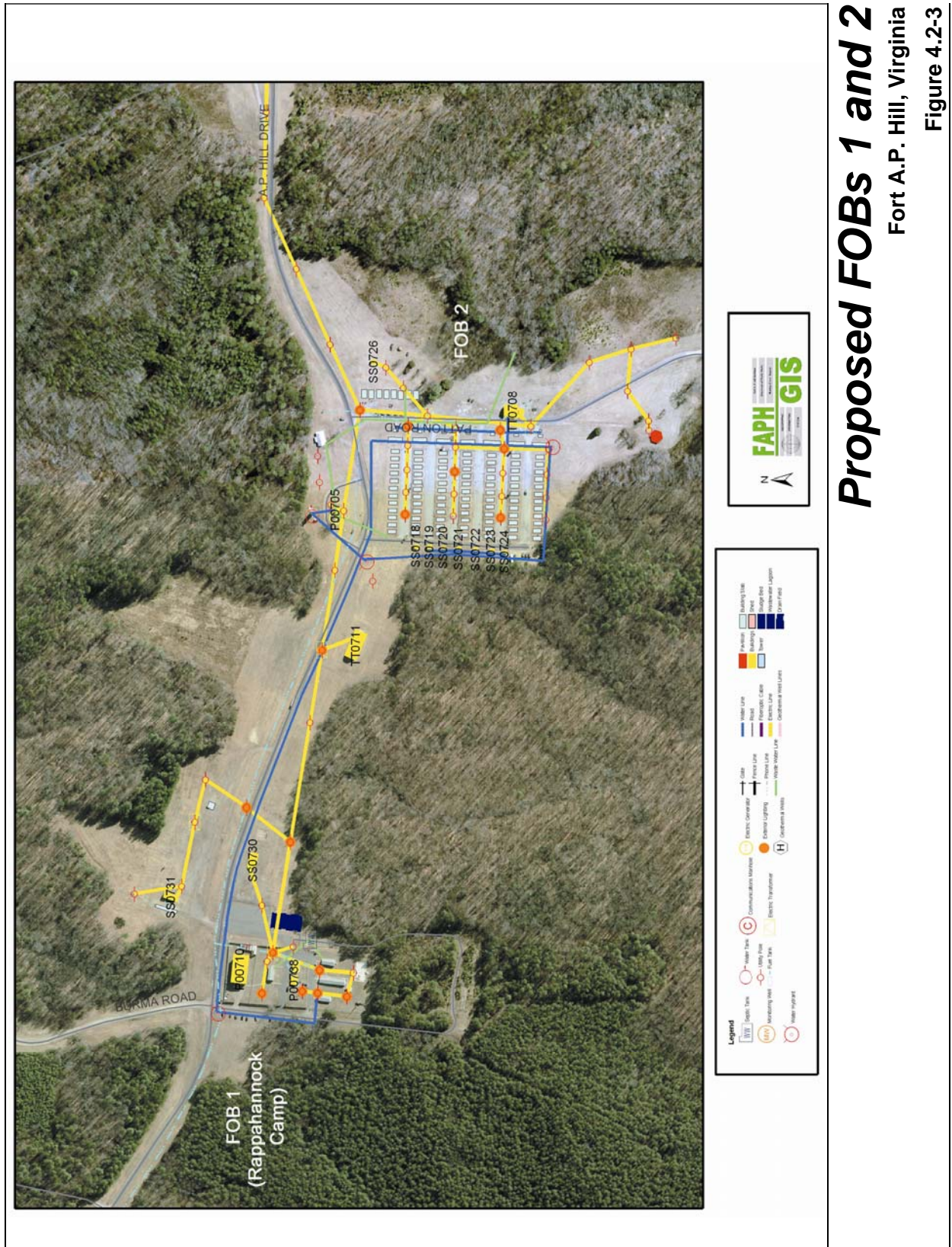
Figure 4.2-1

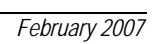
Source: USGS NLCD, 1999.

Fort Lee and Fort A.P. Hill, Virginia

February 2007







4.2.1.1.3 Surrounding Land Use

North of Pender Camp on Fort A.P. Hill, the land bounded by the Rappahannock River, Portobago Creek, and Snow Creek is collectively known as the *Corridor*. Caroline County land use to the north of the Pender Camp area of Fort A.P. Hill is primarily undeveloped woodland and sparsely populated rural areas that are zoned as agricultural reserve and floodplain/open space. It is an important area of Caroline County with respect to recreation land use and environmental conservation. It is in the watershed of the Rappahannock River, a significant tributary of the Chesapeake Bay and a scenic river that is used for recreation and water supply. The Corridor area is separated from the rest of the county by Fort A.P. Hill, resulting in a funneling of commercial traffic into other jurisdictions such as Fredericksburg and Tappahannock. As economic development in Northern Virginia increases and if the planned construction of a commuter station near Fredericksburg occurs, the Corridor will come under scrutiny for possible development opportunities, particularly for residential land use.

The off-post developed area nearest to the proposed EOD site is the Port Royal settlement, which is approximately 4 miles north of the proposed site in Caroline County. The Caroline County Comprehensive Plan designates Port Royal as a secondary-growth area for the county. The Port Royal Community Plan projects low- to medium-density residential development along the boundaries of the settlement shared with Fort A.P. Hill. The consistent increase in growth pressures indicates continued commercial development at the intersection of Routes 17 and 301, as well as along the respective corridors. Port Royal is committed to protecting the small-town character of the community through use of Traditional Neighborhood Designs (TND) and LID techniques (Port Royal 2004). To the south of Fort A.P. Hill from Route 310 to the Essex County boundary, land uses are predominantly Agricultural Preservation and Flood Plain/Open Space. To the west, Fort A.P. Hill is bordered by low-density residential and at the intersection of Route 301 and Route 2, public government and commercial developments are in place (Caroline County 2004b). The Caroline County Comprehensive Plan discourages future commercial land use along the Route 301 and Route 2 corridors (Caroline County 2004a). The town of Bowling Green is approximately 2 miles southwest of Fort A.P. Hill at the intersections of Route 301 and Route 207 and Route 2. Bowling Green has approximately 71 percent vacant/undeveloped land, approximately 21 percent of land used for low to moderate density residence, and 8 percent devoted to commercial or institutional land uses. The town is in the process of developing future land use proposals to update its comprehensive plan.

The northern portion of Essex County east of the proposed EOD site is designated as an agricultural preservation area, which creates an effective buffer zone for Fort A.P. Hill. An agricultural preservation designation prohibits commercial development and restricts residential development to low-density land use. Subdivisions are limited to 1–5 lots and restrict development to one lot per 20 acres. Possible perpetual conservation easements are under consideration by current land owners adjacent to Fort A.P. Hill (Allen 2006).

4.2.1.1.4 State Coastal Management Program

The Virginia Coastal Zone Management Program is discussed in section 4.1.6, Water Resources (Fort Lee).

4.2.1.1.5 Current and Future Development in the Region

A commuter rail station is planned to be constructed near Fredericksburg, northwest of Fort A.P. Hill, and Caroline County anticipates that it would result in increased development pressure within the Corridor, primarily in the form of large-lot development (Caroline County 2004a).

4.2.1.2 Environmental Consequences

4.2.1.2.1 Preferred Alternative

A long-term minor adverse effect on surrounding land use would be expected. As the proposed EOD site at Fort A.P. Hill would be established within the post's training areas, there would be no change to land uses at the installation. The proposed EOD site, however, is close enough to the installation border and the Port Royal settlement that use of the area for the explosion of large charges could create an incompatibility with the nearby residential area because transition between the land uses does not provide an adequate buffer for noise. Further discussion of the noise implications of the proposed EOD site is in the Noise section (section 4.2.4).

No land use incompatibilities would be expected from development of the Pender Camp area as an LSA or from the development of other FOBs for training exercises or support facilities because all the areas would remain as Training/Range land use areas. Any development one or more FOBs near the Pender Camp area to support the LSA mission would be placed in an area that has been previously disturbed and used for training support activities. The establishment of permanent facilities to support the EOD mission would not change the land use on the installation, as it is currently classified as Training/Range land use, and would not affect surrounding land uses.

No impacts on regional land use planning or zoning at Fort A.P. Hill would be expected.

Cumulative Effects

A minor adverse cumulative effect on surrounding land use would result from operation of an Asymmetrical Warfare Group (AWG) demolition range near the proposed EOD site. Both the AWG range and EOD training area would be used for explosives detonation, and noise from the operations would exacerbate the noise nuisance in nearby residential land use. Further discussion of noise issues is provided in section 4.2.4. Other future projects at Fort A.P. Hill would likely not affect surrounding land uses and would be addressed in separate environmental documents.

Mitigation

No mitigation for implementation of the Preferred Alternative would be necessary.

4.2.1.2.2 No Action Alternative

No impacts would be expected to on-post or off-post land use under the No Action Alternative. Land use configurations would remain as described in section 4.2.1.1.

4.2.2 Aesthetic and Visual Resources

Aesthetics and visual resources are the natural and man-made features of a landscape. They include cultural and historic landmarks, landforms of particular beauty or significance, water

surfaces, and vegetation. Together these features form the overall impression that a viewer receives of an area or its landscape.

4.2.2.1 Affected Environment

The proposed Pender Camp area and EOD sites are undeveloped areas within the boundaries of Fort A.P. Hill. Neither of the sites are visible from off the installation.

4.2.2.2 Environmental Consequences

4.2.2.2.1 Preferred Alternative

Long-term minor adverse effects on the visual environment would be expected. Facilities erected to support the LSA would alter the character of Pender Camp, which currently is a relatively unused area with very few structures on Fort A.P. Hill. Establishment of other FOBs for training or LSA support facilities would likewise introduce minor changes to the character of the areas. Facilities proposed for the EOD site would also change the character of the area, especially if permanent facilities were established on previously undisturbed areas. The Preferred Alternative would have associated structures and lights for night operations. The increase in exterior lights on buildings, parking lots, and training areas would add to light pollution levels in the immediate vicinity (IDA 2006). The potential increase in light pollution is the primary driver of the *adverse* qualification of the visual affects assessment. Being a military installation with a training mission, the visual effects of facilities established to support the training mission would not be inherently adverse, but any light pollution that might reach surrounding, nonmilitary areas could have a minor adverse effect. More counties are following Virginia Outdoor Lighting Task Force recommendations to form an outdoor lighting ordinance that address concerns regarding wasted energy, glare, urban sky glow, and safety hazards to humans and wildlife (VOLT 2006). Recommendations to minimize or avoid light pollution include motion sensors, light shields, low pressure sodium (LPS) or low-lumen (low-light-output) lights and judicious placement of fewer lights (IDA 2006).

Cumulative Effects

No cumulative effects on the aesthetics or visual resources of Fort A.P. Hill would be expected. Other future projects would be for military use and would maintain the field training nature of the installation.

Mitigation

No mitigation for implementation of the Preferred Alternative would be necessary.

4.2.2.2.2 No Action Alternative

No effects on aesthetics and visual resources would be expected at Fort A.P. Hill under the No Action Alternative because there would be no changes to existing aesthetic and visual environment.

4.2.3 Air Quality

4.2.3.1 Affected Environment

4.2.3.1.1 Attainment Status

Implementation of the proposed action would generate additional emissions at Fort A.P. Hill within the Northeastern Virginia Intrastate AQCR (AQCR 224). EPA designates AQCR 224 as an attainment area for all criteria pollutants, and it is not located in the OTR. Therefore, a formal conformity analysis is not required.

4.2.3.1.3 Local Ambient Air Quality

Existing ambient air quality conditions near Fort A.P. Hill can be estimated from measurements conducted at air monitoring stations close to the installation. The most recently available data from nearby monitoring stations is tabulated below (Table 4.2.3-1). With the exception of the 8-hour O₃ standards, most recent air quality measurements are below the NAAQS (USEPA 2006a, VDEQ 2005a).

Table 4.2.3-1
Monitored concentrations of criteria pollutants near Fort A.P. Hill

Pollutant	Monitoring station	Monitored data
CO		
8-hour maximum (ppm)	NA	NA
1-hour maximum (ppm)	NA	NA
NO_x		
Annual arithmetic mean (ppm)	NA	NA
O₃		
8-hour maximum (ppm)	U.S. Geological Survey Center Caroline County	0.082
PM_{2.5}		
Annual arithmetic mean (µg/m ³)	NA	NA
24-hour maximum (µg/m ³)	NA	NA
PM₁₀		
Annual arithmetic mean (µg/m ³)	West Point Elementary School	23
24-hour maximum (µg/m ³)	King William County	49
SO₂		
Annual arithmetic mean (ppm)	Big Meadows, National Park	0.002
24-hour maximum (ppm)	Service	0.027
3-hour maximum (ppm)	Madison County	0.022

Sources: USEPA 2006a, VDEQ 2005a

Note:

NA = Not monitored in the region

4.2.3.1.3 Existing Installation Emissions

On the basis of installation's potential to emit, Fort A.P. Hill is not a major source of any criteria pollutants. Stationary sources of air emissions at Fort A.P. Hill include boilers, generators, degreasers, gasoline dispensers, and other various sources. Fort A.P. Hill operates under a synthetic minor Stationary Source Permit to Operate (Permit # 40306). VDEQ issued this permit on November 22, 2002 (VDEQ 2002). As part of the permit requirements, the installation must submit annual comprehensive emission statements. Table 4.2.3-2 summarizes 2005 on-post emissions from stationary sources.

Table 4.2.3-2
2005 stationary source total emissions (tpy)

Installation	SO ₂	CO	PM ₁₀	PM _{2.5}	NO _x	VOC	Total HAP
Fort A.P. Hill	13.1	N/A	0.5	0.15	4.8	1.4	N/A

Source: Fort A.P. Hill 2006

4.2.3.2 Environmental Consequences

Air quality impacts would be considered minor unless the estimated emissions would contribute to a violation of any federal, state, or local air regulation; or contribute to a violation of Fort A.P. Hill's air operating permit.

4.2.3.2.1 Preferred Alternative

Short- and long-term minor adverse effects on air quality would be expected from implementation of Preferred Alternative. These effects would be primarily due to nonroad vehicle and fugitive dust emissions during the construction phases and ongoing operational emission due to emergency backup generators, heating boilers and other internal combustion sources at Fort A.P. Hill. The Preferred Alternative would not cause or contribute to a violation of any federal, state, or local air regulation, or contribute to a violation of Fort A.P. Hill's air operating permit.

Implementation of the Preferred Alternative would introduce a limited number of new sources of air emissions at Fort A.P. Hill. There would be limited construction and operation of permanent facilities on-post. Therefore, the addition of new boilers, emergency generators, or other point sources of air emissions would also be limited. Fugitive dust and emission from heavy construction equipment would be on a much smaller scale when compared to those outlined for Fort Lee. The same reasonable precautions to keep dust from becoming airborne outlined in section 4.1.3.2.1 would be taken. There would be a small increase in vehicular traffic and subsequent mobile air emissions. Additional permanent personnel would be stationed on the installation, and student Soldiers would be transported to Fort A.P. Hill from Fort Lee and back again periodically to conduct necessary training activities. Air emissions associated with the additional permanent personnel and transporting student Soldiers would be extremely small. There would be an increase in range activities and subsequent air emissions due to the use of off-road training vehicles and the additional use of munitions.

Cumulative Effects

The Commonwealth of Virginia takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the SIP. Estimated emissions generated by the

preferred alternative are expected to be *de minimis* and would not be regionally significant. Below these thresholds, it is understood that a project of this limited size and scope would not interfere with the states timely attainment of the NAAQS or threaten the attainment status of the region. Therefore, it would not contribute to cumulative adverse effects on air quality.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on air quality. Best management practices required as part of DoD and Fort A.P. Hill policy and the Commonwealth of Virginia, examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on air quality.

Best Management Practices for Air Quality

Fugitive Dust Control. The grading and site-preparation phases of constructions would generate fugitive dust emissions. Fort A.P. Hill's air-operating permit does not outline specific installation-wide limitations on construction-phase emissions of criteria pollutants. Virginia's Administrative Code (9 VAC 5-40-90 and 9 VAC 5-50-90) does require reasonable precautions to prevent particulate matter from becoming airborne. Such precautions can include, but would not be limited to, the following:

- Using water or chemicals for dust control when demolishing existing buildings or structures, construction operations, grading roads, or clearing land.
- Applying water or suitable chemicals on dirt roads, materials stockpiles, and other surfaces that could create airborne dust.
- Paving roadways and maintaining them in a clean condition.
- Installing and using hoods, fans, and fabric filters to enclose and vent the handling of dusty material, including the implementation of adequate containment methods during sandblasting or other similar operations.
- Covering open equipment for conveying or transporting material likely to create objectionable air pollution when airborne.
- Promptly removing spilled or tracked dirt or other materials from paved streets.

Open Burning. Project activities would likely include the burning of construction or demolition material or land-clearing debris. Therefore, open burning might require a permit for this activity (9 VAC 5-40-5600 et seq). The Virginia Administrative Code provides for, but does not require, the local adoption of a model ordinance concerning open burning. The model ordinance includes, but is not limited to, the following:

- All reasonable effort must be made to minimize the amount of material burned with the number and size of the debris piles.
- The material to be burned must consist of brush, stumps, and similar debris waste and lean-burning demolition material.
- The burning must be at least 500 feet from any occupied building unless the occupants have given prior permission, other than a building on the property on which the burning is conducted.
- The burning must be conducted at the greatest distance practicable from highways and air fields.

- The burning must be attended at all times and conducted to ensure the best possible combustion with a minimum of smoke being produced.
- The burning must not be allowed to smolder beyond the minimum period of time necessary for the destruction of the materials.
- The burning must be conducted only when the prevailing winds are away from any city, town or built-up area.

Before construction, Fort A.P. Hill would contact the appropriate state and local agencies and acquire necessary open burning permits when required.

Regulatory Review and Air Permit Requirements

The new facilities would be equipped with emergency generators and other stationary sources of air emissions. These sources of air emissions would be subject to federal and state air permitting requirements. These requirements include, but would not be limited to, nonattainment NSR, PSD, Title V, NSPS, and NESHAP. Table 4.2.3-3 outlines the some of these regulations and how they may effect the action at Fort A.P. Hill.

Table 4.2.3-3
Air quality regulatory review
for proposed stationary sources at Fort A.P. Hill

Regulation	Project status
New Source Review	Fort A.P. Hill would not become a major source of air emissions and is not in an attainment region. Therefore, NSR would not apply to the new facilities.
Prevention of Significant Deterioration (40 CFR Part 52)	Potential emissions would not exceed the 250-tpy PSD threshold. Therefore, the project would not be subject to PSD review.
Title V	Fort A.P. Hill is not a major source of air emissions under the Title V provisions. As such, it operates under a synthetic minor air-operating permit.
National Emission Standards for Hazardous Air Pollutants (40 CFR Parts 61 and 63)	Potential HAP emissions would not exceed NESHAP thresholds. Therefore, the use of MACT would not be required.
New Source Performance Standards (40 CFR Part 60)	Emergency generators are not included in NSPS. However, any boilers rated equal to or greater than 10 million BTUs installed would have to comply with NSPS.
VDEQ Construction Permits	VDEQ may require a general construction permit prior to construction of the new facilities.

4.2.3.2.2 No Action Alternative

The No Action Alternative would result in no changes in ambient air quality conditions. No BRAC-related construction activities would be undertaken at Fort A.P. Hill, and no BRAC-related changes in operations or traffic would take place. Air quality conditions would remain as described in section 4.2.3.1.

4.2.4 Noise

4.2.4.1 Affected Environment

4.2.4.1.1 Existing Ambient Noise Levels

The following discussion of conditions that exist within the areas around Fort A.P. Hill deals primarily with noise levels, and compatible and incompatible land uses. The examination of existing conditions focuses on aircraft operations, small-arms ranges, large weapons firing, and demolition.

The noise generated by military aircraft and weapons at Fort A.P. Hill extends to areas outside the installation boundary. The noise from industrial-type operations and the movement of heavy military vehicles does not have a considerable effect on the surrounding civilian communities or military housing areas at Fort A.P. Hill (USACHPPM 1999). Fort A.P. Hill, though not subject to local noise policies or ordinances, has no existing activities that conflict with the local standards and guidelines affecting human health and safety.

Fort A.P. Hill has one Army airfield (AAF), one drop zone (DZ), one assault airstrip, and many authorized landing zones (LZ) to support aviation training for both rotary and fixed-wing aircraft. In 1994 an estimated 2,600 aircraft movements were reported at Fort A.P. Hill. Fixed-wing aircraft operations are conducted primarily at the Fort A.P. Hill DZ. The 800-acre DZ is in the northwest portion of the installation (adjacent to Mahone Camp and the Heth Area) and is approximately 4,100 meters (4,484 yards) long. An assault airstrip is within the boundaries of the DZ. In addition, the U.S. Army Night Vision Laboratory uses the DZ and assault airstrip for night vision research.

Rotary-wing aircraft operations can be accommodated throughout the installation. The 70-acre AAF, on the southeast side of the main gate on Route 301, is used only for rotary-wing operations. In addition, there are eight Flight Training Areas and several landing pads for helicopters throughout the installation, including the U.S. Army National Guard Headquarters Area, Range 25, and Acors Fields, and at Cooke, Heth, Pender, Longstreet, and Wilcox Camps. The daily number of operations at the AAF is low (fewer than 10 per day). Therefore, DNL is an inappropriate metric to describe aircraft noise. Effects associated with aircraft noise are due to single, intrusive events off the installation and not the overall noise environment described by DNL. The three places where residents are most likely to be exposed to aircraft noise from Fort A.P. Hill training operations are along the boundary east of Range 25, on the western boundary near Long Branch, and on the eastern boundary north of Supply.

Ongoing efforts to minimize noise due to aircraft operations are in place for Fort A.P. Hill. No fly zones have been established around Bowling Green, Port Royal, and the Wildlife Refuge. The minimum altitude for military aircraft flying over land adjacent to the boundary is 1,200 feet above ground level. During this training, aircraft are 400–500 feet above ground level as they cross Fort A.P. Hill's eastern boundary. Helicopter traffic has been routed along the boundary rather than over private property. Pilots' adherence to this rule was documented in a 1992 noise measurement study (AEHA 1992).

The common Army small-arms are the M16 rifle (5.56 mm ammunition), the M240 (7.62 mm) and M249 (5.56 mm) machine guns, and the .50-caliber machine gun. The firing lines of Fort A.P. Hill's small-arms ranges are at least 1,300 feet from any installation boundary (Figure 4.2-

5). At this distance, people are not annoyed by small-arms fire. The only exception is if the range is enclosed by concrete walls and reflective overhead baffles. In that case, annoyance can be found out to 500 meters (547 yards) behind the firing line. No such ranges exist at Fort A.P. Hill.

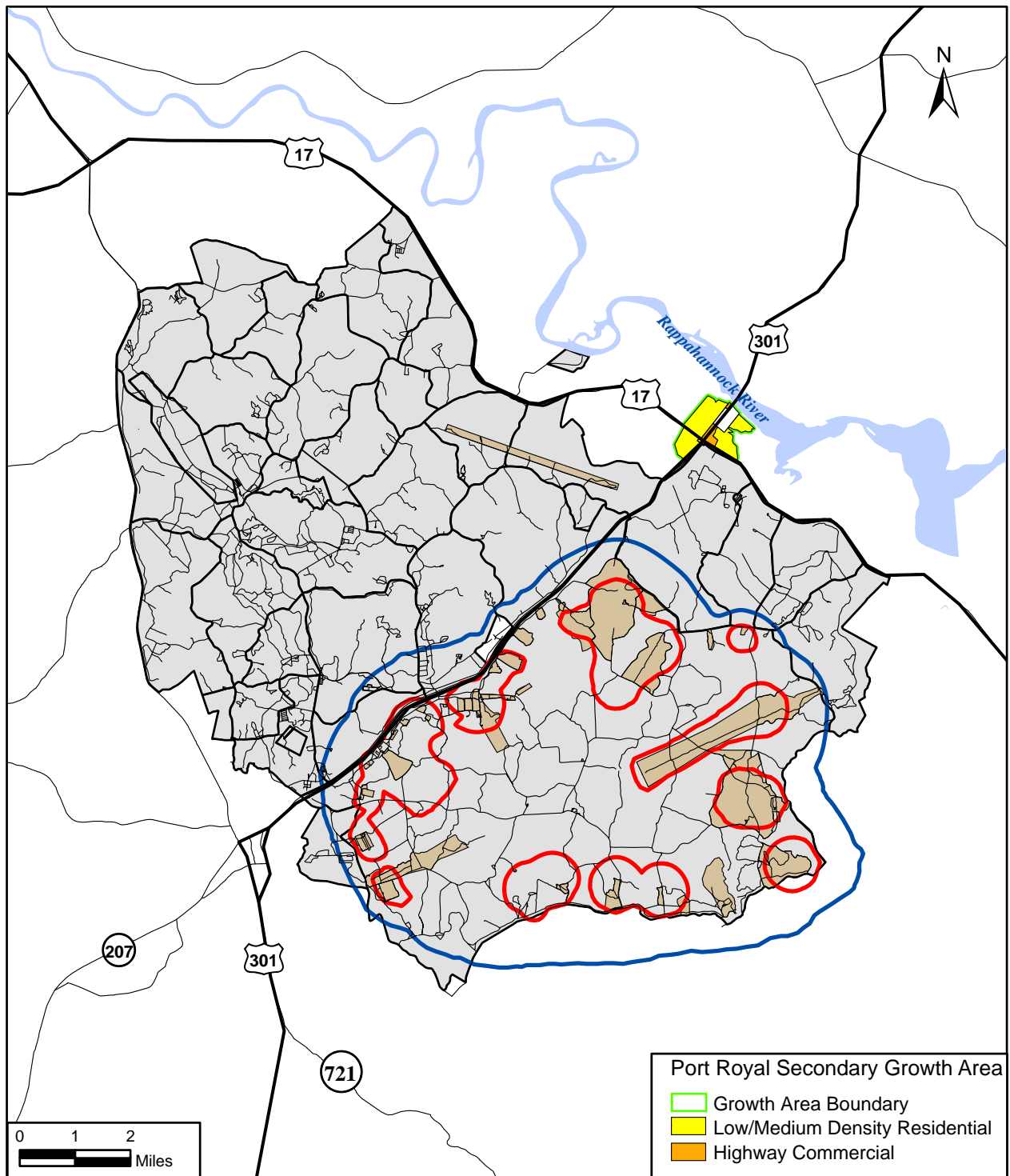
The existing small-caliber weapons noise contours are shown Figure 4.2-5. Noise zone II extends beyond the eastern boundary approximately 1,100 meters (1,203 yards), beyond the southern boundary 700–1,700 meters (766–1,859 yards), and beyond the western boundary less than 300 meters (328 yards). Noise zone III extends beyond the southern boundary less than 400 meters (437 yards).

Ongoing efforts to minimize noise due to small-arms ranges are in place for Fort A.P. Hill. Small-arms ranges have been located to provide adequate distance from the installation boundary such that the weapons fired (the 5.56 mm, 7.62 mm, and .50-caliber machine gun) should not be disturbing.

Large-caliber weapons and demolitions are assessed using CDNL for land use planning and peak levels to evaluate the potential for concern and complaint. The existing large-caliber weapons CDNL contours are shown in Figure 4.2-6. Noise zone II extends beyond the southern boundary less than 300 meters (328 yards). Noise zone III is completely contained within the installation boundary. During periods of intense training, the short-term CDNL at a particular range would be expected to be larger than that depicted here. Such periods of intense activity can lead to complaints, particularly when artillery firing takes place at night. At night people are more likely to be at home than during the day, background noise levels are lower than during the day, and temperature inversions carry low-frequency sound farther than during the day. As expected, some noise complaints have been documented and investigated after large-caliber training events.

The existing large-caliber weapons peak level contours are shown in Figure 4.2-7. The existing 115-dBP contour extends beyond the northeastern and eastern boundary less than 2,400 meters (2,625 yards) and beyond the southern boundary less than 3,200 meters (3,500 yards). The 130-dBP noise contour extends beyond the southern boundary less than 1,200 meters (1,312 yards). The contours indicate that a moderate probability of receiving noise complaints exists for these areas. Figure 4.2-8 shows peak noise contours for the Mine Clearing Line Charge (MICLIC). The MICLIC is detonated only a few times a year, if at all. It is shown as a separate item because of its size and infrequency. The contours indicate that there is a moderate probability of receiving noise complaints when the MICLIC is detonated. As expected, some noise complaints have been documented and investigated after MICLIC training events.

Ongoing efforts to minimize noise due to artillery and demolitions are in place for Fort A.P. Hill. To protect its neighbors from annoying levels of demolitions noise, Fort A.P. Hill imposes weight limits on its demolition ranges. Before 1999, Fort A.P. Hill allowed charges up to 400-lb explosive weight to be detonated in the interior while maintaining lower weight limits at demolition ranges closer to the boundary. Fort A.P. Hill has voluntarily established limits on the net explosive weight allowed on various demolition ranges. All demolitions training is restricted to less than or equal to 100-lb equivalent TNT. This limit drops to 50-lb equivalent TNT at dusk or in overcast and cloudy conditions. Exceptions to these limits are unlikely and are granted case by case. In addition, the MICLIC is fired toward the north to ensure that the higher noise levels that come from the side of the MICLIC are not directed toward the nearest homes (Fort A.P. Hill 1999).

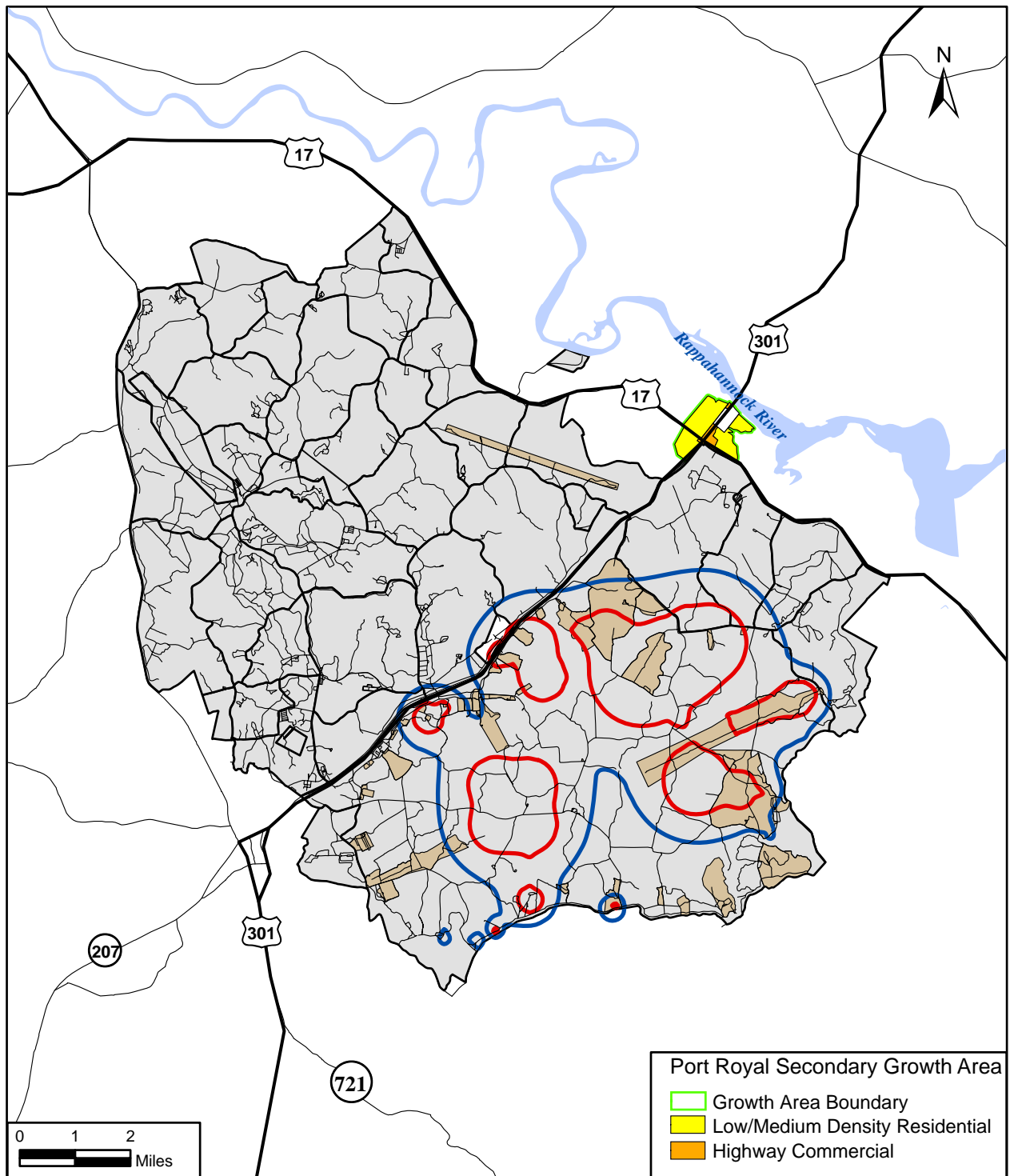


Existing Small Arms Range Noise Contours

Fort A.P. Hill, Virginia

Figure 4.2-5

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.



LEGEND

- Installation Property
- Road
- Live Fire Range

Noise Zones

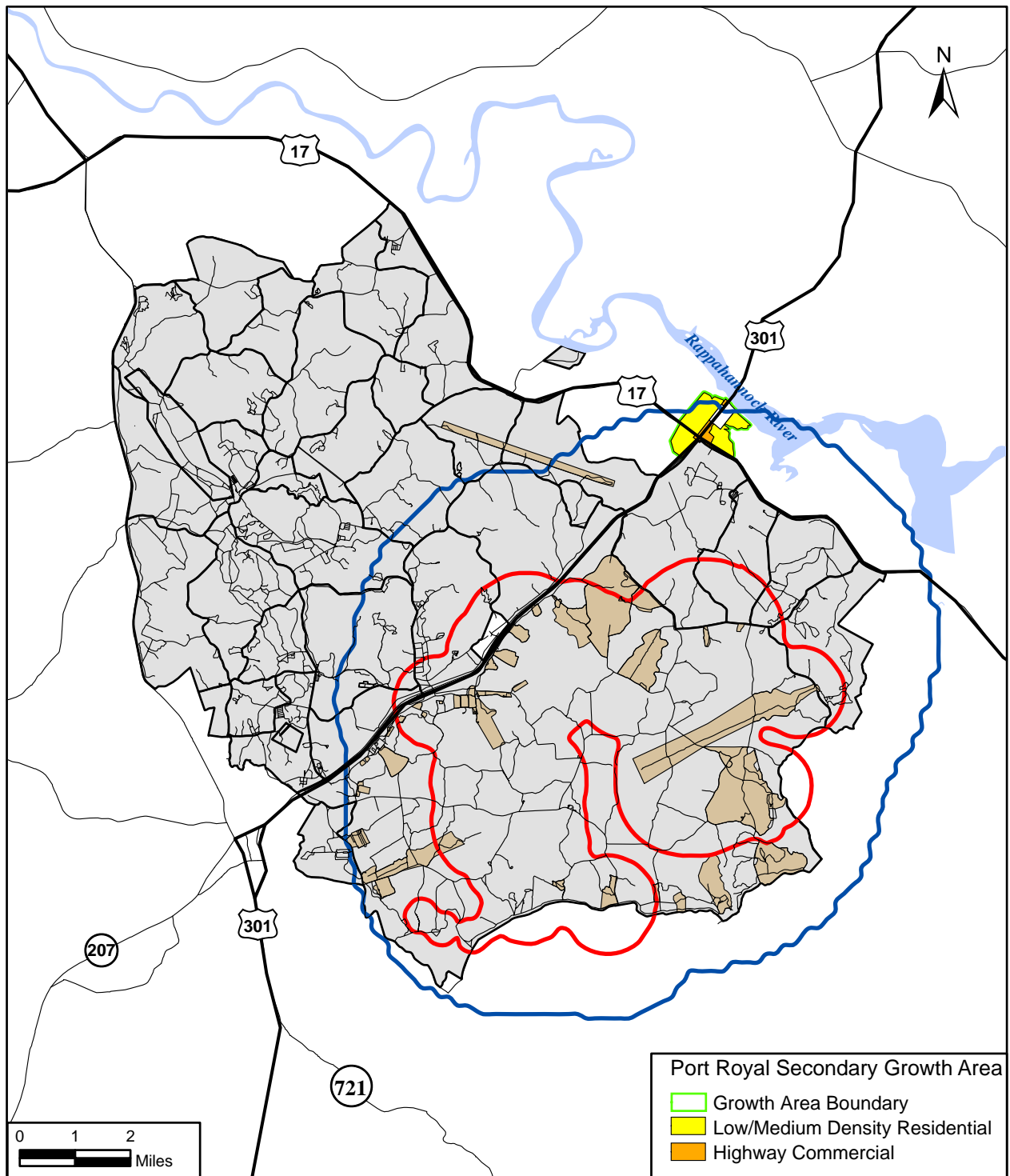
- Zone II
- Zone III

Existing Large Caliber and Demolitions Noise (CDNL) Contours

Fort A.P. Hill, Virginia

Figure 4.2-6

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.



LEGEND

- Installation Property
- Road
- Live Fire Range

Noise Zones

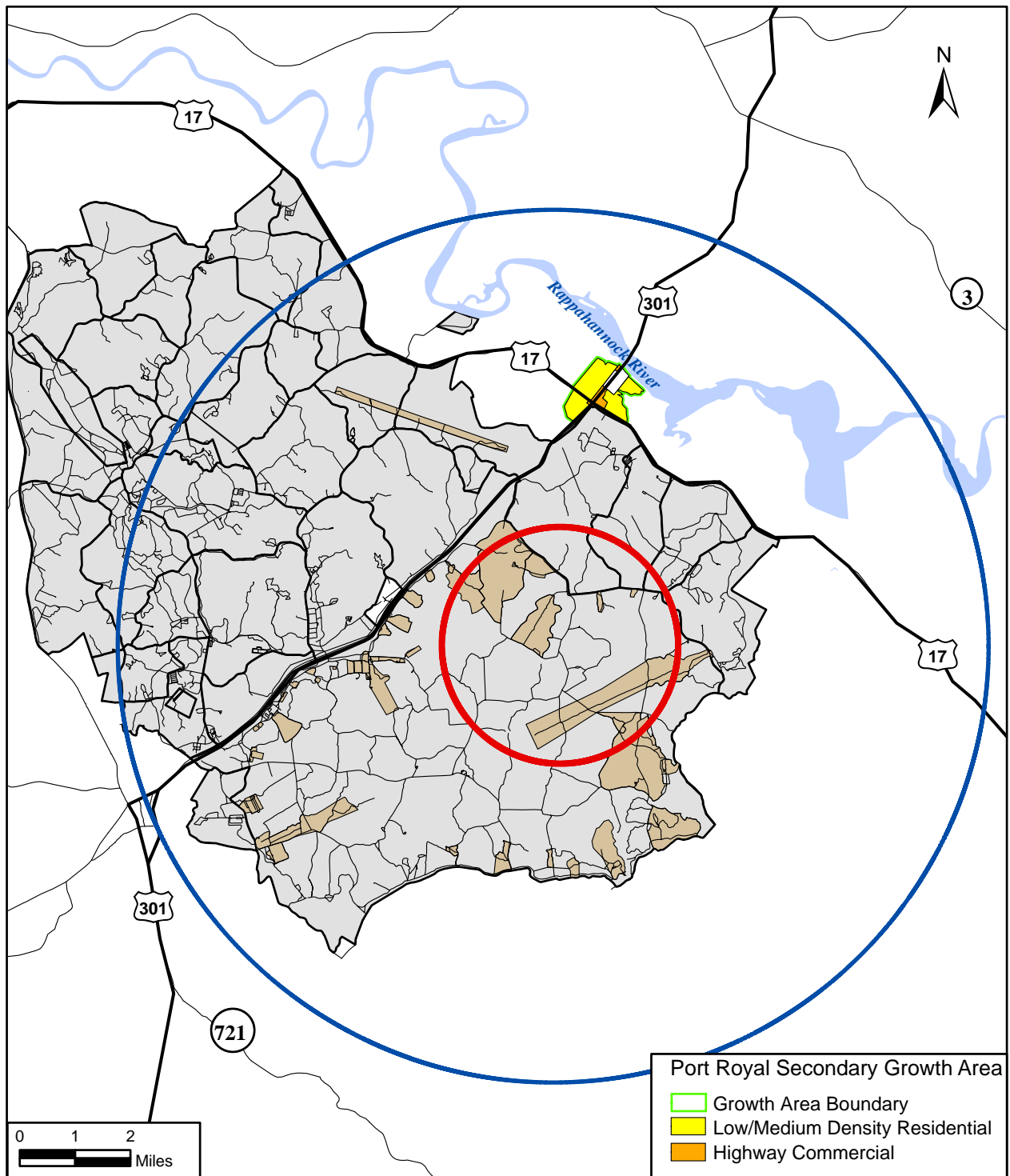
- 115 dB
- 130 dB

**Existing Large Caliber and Demolitions
Noise (Peak Level) Contours**

Fort A.P. Hill, Virginia

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.

Figure 4.2-7



Existing Mine Clearing Line Charge Noise (Peak Level) Contours

Fort A.P. Hill, Virginia

Figure 4.2-8

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.

4.2.4.2 Environmental Consequences

4.2.4.2.1 Preferred Alternative

Short- and long-term minor adverse effects on the noise environment at Fort A.P. Hill would be expected with the implementation of the Preferred Alternative. The effects would be primarily due to heavy equipment noise during construction and the operation of the proposed EOD range.

Noise from Construction Activities

The Preferred Alternative would require construction activities at Fort A.P. Hill. Both the types on levels of construction noise would be similar to those outlined for Fort Lee (section 4.1.4). The quantity and duration of construction activities, however, would be much less than that outlined for Fort Lee. Although construction-related noise effects would be minor, the following best management practices would be used to reduce these already-limited noise effects further:

- Construction would predominately occur during normal weekday business hours in areas adjacent to noise-sensitive land uses such as residential areas, recreational areas, and any off-post areas.
- Construction equipment mufflers would be properly maintained and in good working order.
- Residents adjacent to construction areas would be notified of the duration of construction activity before beginning work.

Noise from Aircraft and Small-arms Activities

There would be no new aircraft training or associated noise at Fort A.P. Hill with the implementation of the Preferred Alternative. The changes to small-arms training activities due to the Preferred Alternative would not include new small-arms ranges or changes in small-arms weapons used. The small-caliber weapon peak levels noise contours would remain unchanged with the implementation of the Preferred Alternative. Therefore, both aircraft noise and small-arms range noise would remain as described in section 4.2.4.1.

Noise from EOD Range Activities

The primary change in the noise environment at Fort A.P. Hill would be due to the addition of an EOD range. The new EOD range would be approximately 1 mile inside the eastern boundary of Fort A.P. Hill and would facilitate demolitions training with TNT charges of 25 pounds or less. The estimated types and number of charges expected are outlined in Table 4.2.4-1.

**Table 4.2.4-1
New demolitions charges due to the Preferred Alternative**

Type of charge	TNT equivalent weight (lb)	Frequency (Charges/Year)
C4	0.5	9,000
C4	1.25	6,032
TNT	0.25	2,400
TNT	1.0	400
81 mm mortar	2.5	4,468
105 mm Howitzer shell	14	500
TNT	25	184

The CDNL contours for Fort A.P. Hill with the implementation of the Preferred Alternative are shown in Figure 4.2-9. There would be no increase in the off-post areas within noise zone III. In addition to extending 300 meters (328 yards) beyond the southern boundary, noise zone II would extend beyond both the northern and eastern boundaries approximately 600 meters (656 yards) with the implementation of the Preferred Alternative. Within these areas, an increase in the overall noise environment would be anticipated. Individuals within these areas would be exposed to acoustical events that are both louder and more frequent when compared to existing conditions. These newly exposed areas are low-density residential, undeveloped, or agricultural. There is no substantial growth anticipated for these areas (Caroline County 2001). Due to the limited nature of both existing and future land use in noise zone II, the changes in the existing noise environment would constitute only a minor increase in the areas of normally incompatible land use surrounding Fort A.P. Hill.

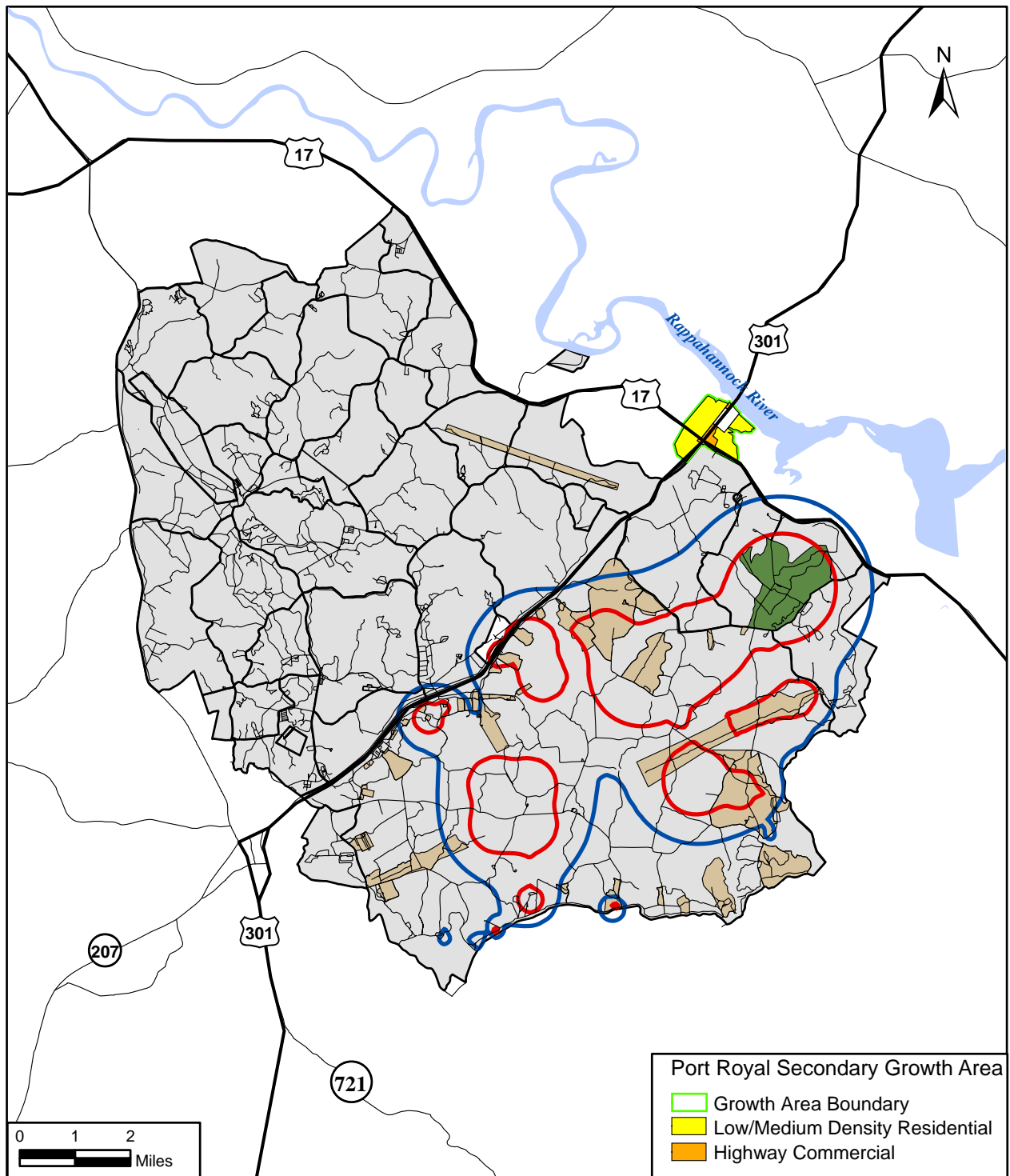
AR 200-1 states that Zone II noise levels are normally incompatible with residential land uses unless the dwellings are built in such a way that interior Noise Level Reduction (NLR) levels are 25 dB. Because residences that might not have NLR levels of 25 dB already exist in this area, Fort A.P. Hill has further assessed what mitigation steps could be taken to alleviate community annoyance. If necessary, Fort A.P. Hill would expand the perimeter noise monitoring system to add a noise monitor in the area of concern. The monitors would allow the installation to evaluate operations under varied weather conditions and assess how noise levels can impact neighbors off-post. Mission permitting, locations or scheduling of training activities could be adjusted to lower off-post noise levels. The installation would continue to promote an open dialogue with neighboring localities to include rezoning reviews; education and outreach with local communities; and a comprehensive, proactive, noise-complaint management program.

The implementation of the Preferred Alternative would introduce approximately 700 demolition-training activities greater than or equal to 14 lb at the proposed EOD range. The large-caliber weapons peak noise contours for Fort A.P. Hill with the implementation of the Preferred Alternative are shown in Figure 4.2-10. The 130-dBP noise contour would extend 400 meters (437 yards) off the eastern boundary of the installation. Within these areas, an increase in the overall noise environment is anticipated. Individuals within these areas would be exposed to acoustical events that are both louder and more frequent when compared to existing conditions. The 115-dBP noise contour would extend 5,000 meters (5,468 yards) (an additional 2,500 meters [2,734 yards] over the existing conditions) off the eastern boundary of the installation. The level of concern and complaints associated with individual acoustical events would be moderate within this area. Due to the limited frequency of the loud acoustical events, the changes in the existing noise environment would constitute only a minor increase in the areas of normally incompatible land use surrounding Fort A.P. Hill.

Demolition noise is expected to dominate the soundscape for all on-range personnel. Army personnel would don adequate personal hearing protection to limit exposure and ensure compliance with federal health and safety regulations.

Vibration from EOD Range Activities

The impulsive sound pressure from firing large weapon systems and detonating explosive charges can cause structures to vibrate. This vibration is perceived by the occupants as the rattling of loose windows and objects on shelves. During the comment period, several homeowners expressed concern about vibration causing damage to their residences in the Historic District of Port Royal. Comments received incorporated concerns about both airborne and ground-borne vibrations.



LEGEND

- Installation Property
- Road
- Live Fire Range
- Proposed EOD Site

Noise Zones

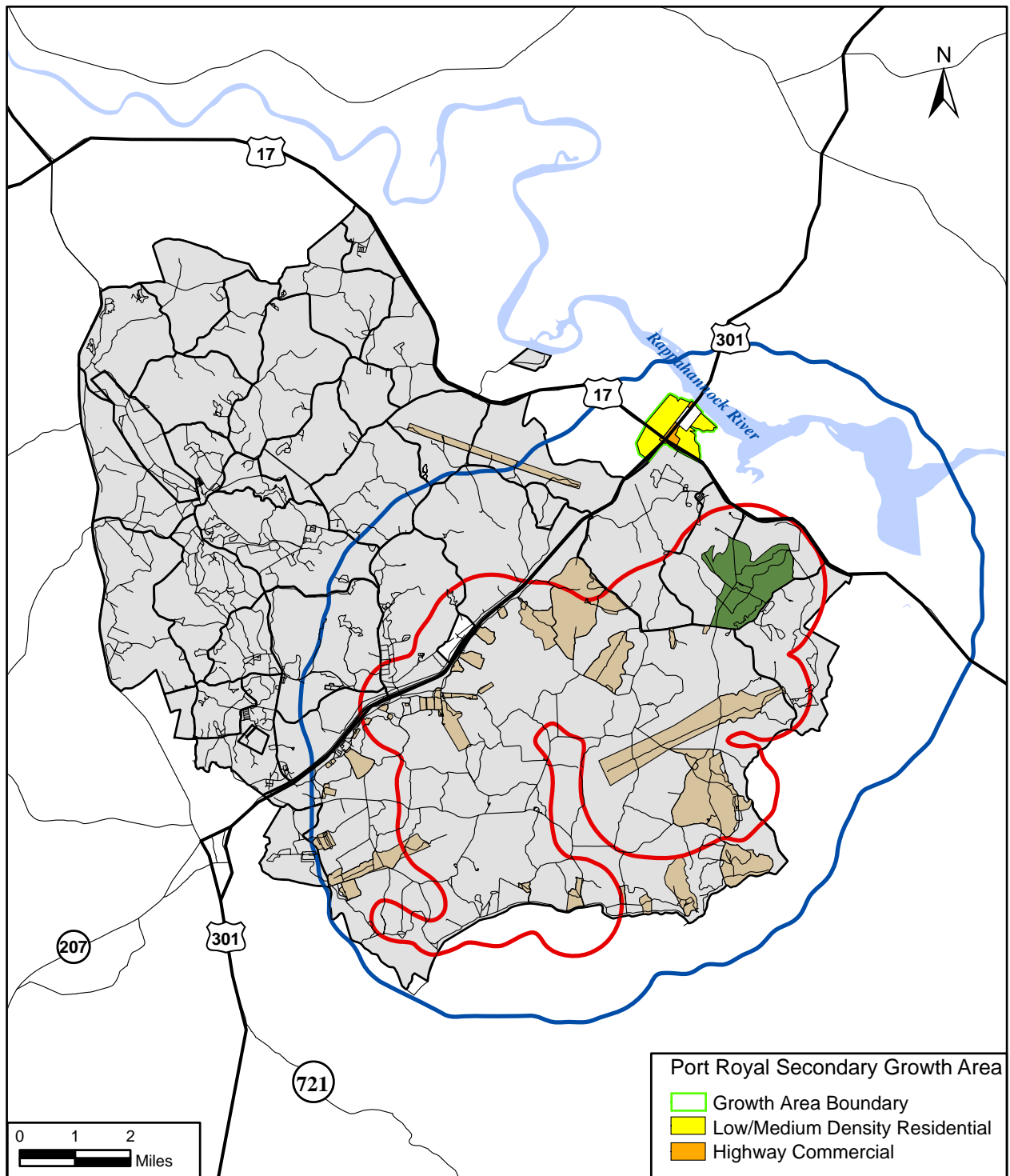
- Zone II
- Zone III

Preferred Alternative Large Caliber and Demolitions Noise (CDNL) Contours

Fort A.P. Hill, Virginia

Figure 4.2-9

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.



LEGEND

Noise Zones

- Installation Property
- Road
- Live Fire Range
- Proposed EOD Site
- 115 dB
- 130 dB

Preferred Alternative Large Caliber and Demolitions Noise (Peak Level) Contours

Fort A.P. Hill, Virginia

Figure 4.2-10

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.

Airborne Vibrations. The level of airborne vibrations generated by the activities at the proposed EOD range at Fort A.P. Hill would be anticipated to be great enough to introduce vibration levels just barely perceptible by individuals and to generate concern from homeowners. However, the levels of airborne vibration would not be great enough to cause actual physical damage to structures outside the installation, including those within the boundaries of the Port Royal Historic District.

Airborne vibrations, their effects on structures, and peak sound levels are strongly correlated. Structural shaking or window rattling by airborne vibration might, in some cases, annoy occupants and cause possible damage (e.g., glass and plaster cracks). The worst-case, peak sound levels expected in the Port Royal Historic District associated with the proposed EOD range would be expected to reach approximately 120 dBP (Figure 4.2-11). These levels are great enough to introduce vibration levels just barely perceptible by individuals and to generate concern from homeowners (Table 4.2.4-2).

Table 4.2.4-2
Effects of airborne vibrations on structures

Response	Vibration level (inches per second)	Peak sound level (dBP)
Concern by homeowner about structural rattling and possible damage	0.1	120
Glass and plaster cracks Worst-case*	0.5	134
Structural damage to lightweight superstructure	>2.0	175

Source: Siskind 1989*

Worst case = Poorly fitted loose window glass and stressed plaster walls.

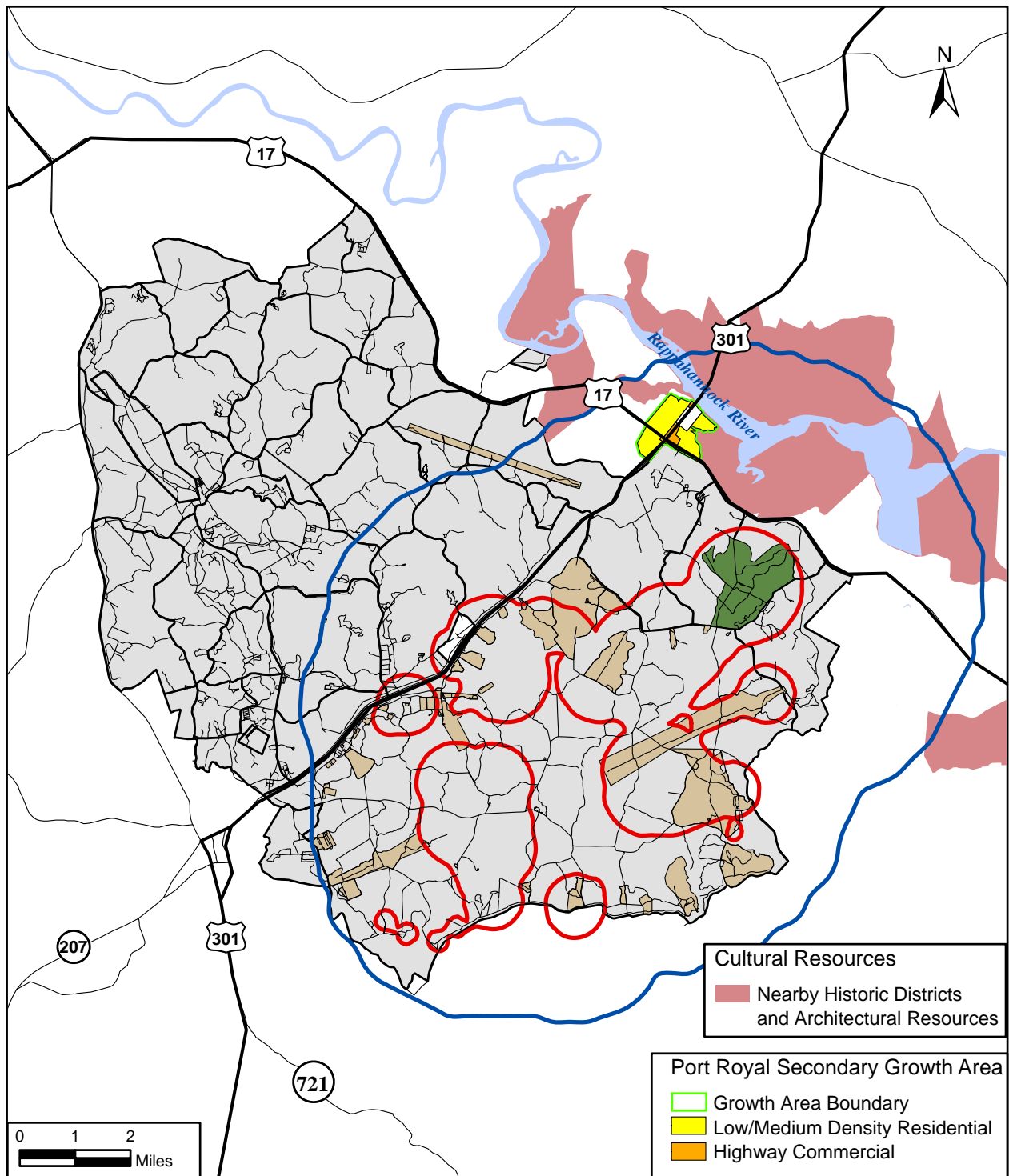
If airblast causes any damage, it would primarily manifest itself in the form of fractured window glass. Damage such as plaster cracking is very rare, but when it occurs, it is always accompanied by window breakage (AIG 1990). The probability of window breakage for differing levels of noise and vibrations are summarized in Table 4.2.4-3. The threshold level used to evaluate window damage claims against the Army (U.S. Army 1994a) is 136.5 dBP. This level is more conservative than the 140 dBP used by the U.S. Bureau of Mines (Bureau of Mines 1980b). The level of airborne vibrations generated by the activities at the proposed EOD range is not anticipated to exceed these thresholds off the installation. Therefore, no structural damage due to airborne vibration is anticipated with the establishment of the EOD range at Fort A.P. Hill.

Table 4.2.4-3
Probability of window breakage at different peak sound levels

Pressure (pounds per square foot)	Sound pressure level (dBP)	Probability of breakage, panes per million pane- events*
1	128	0.28
10	148	5,000
100	168	380,000

* Number of windowpanes per million windowpanes broken for each event.

Source: FAA 1976



LEGEND

Installation Property
Road
Live Fire Range
Proposed EOD Site

Noise Zones

115 dBP Contour - Clearly Audible
136.5 dBP Contour - Zone for Potential for Vibration Damage to Structures

Area Potentially Affected by Vibrations Generated at the Proposed EOD Range
Fort A.P. Hill, Virginia

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.

Figure 4.2-11

Since 1996, Fort A.P. Hill has received three claims of structural damage to houses in the Port Royal area. In 1997 the Army performed vibration measurements and a structural survey in response a reported claim near to their MICLIC site. During the survey, it was determined that the vibrations from worst-case demolition events (250-, 315-, and 1700-pound charges) were only a fraction of what would be necessary to cause a window to crack (CHPPM, 1997). Demolitions at the proposed EOD range would be limited to 25-pound charges—a full order of magnitude smaller than the smallest charge used during the survey. This empirical investigation is additional confirmation that the training activities at the proposed EOD range would not damage structures off the installation.

Ground-borne Vibration. The effects of ground-borne vibrations on the structures within the Port Royal Historic District would be negligible. Although house shaking is commonly blamed on ground-borne vibration, the effects to structures from vibration due to demolition-type activities are predominantly related to airborne vibration. Studies of vibration indicate that ground-borne vibration dominates house vibration at scaled distances of less than 50 feet (Northwestern University 1981). That is, for a 100-pound charge, the ground-borne vibration is the dominant cause of house vibration if the house is less than 500 feet from the detonation point. The training activities at the proposed EOD range at Fort A.P. Hill would be limited to charges of 25-pounds and less. Therefore, airborne vibrations are anticipated to be the dominant cause of vibrations in the areas beyond approximately 125 feet from the point of detonation. This would be true regardless of minor variations in the ability of different soils to transport ground-borne vibrations.

Humans can typically perceive ground-borne vibrations of as low as 0.08 to 0.20 inches per second (Argonne 1993). A summary of typical vibration levels and the response of both humans and structure to them are listed in Table 4.2.4-4. The maximum ground-borne vibration level recommended by the U.S. Bureau of Mines (Bureau of Mines 1980a) to prevent threshold damage for structures is 0.5 inches per second. The threshold level at which minor structural damage can begin to occur in 0.01 percent of structures is set at 2.0 inches per second. The maximum predicted ground vibration at 1.25, 2.5, and 5 miles for a 500-pound bomb is 0.00926, 0.00333, and 0.00119 inches per second. These are well below the threshold of human perception. The charges outlined for the proposed EOD range at Fort A.P. Hill would be limited to 25 pounds. Therefore, any ground-borne vibrations generated in the Port Royal Historic District would not be perceptible by humans or have any effect on architectural structures.

Table 4.2.4-4
The response of humans and structures to typical
levels of ground-borne vibrations

Response	Ground vibration (inches per second)
Human:	
Perceptible	0.08
Noticeable	0.2
Unpleasant	0.38
Disturbing	0.8
Objectionable	1.3
Structure:	
Minor damage (fine cracks in plaster)	5.4
Major damage	7.6

Source: Argonne 1993

The Port Royal Historic District is composed of several structures with varied types of construction and architectural styles built throughout the 18th and early 19th centuries. The age of the buildings would indicate that their structural components (i.e., timber framing, brickwork, window glass, chimneys) are more susceptible to structural damage for a variety of reasons. Natural forces and mechanisms that cause structural damage include:

- Ratio of inside to outside surface and air temperatures.
- Range of inside and outside humidity. Temperature and humidity influence the amount of shrinking of wood frame members, which is a major source of cracking of interior surfaces.
- Intensity, duration, and direction of wind.
- Uneven settling of building foundation.
- Room volume, wall, and ceiling area (high walls and cathedral ceilings). The larger the surface area of a wall or ceiling, the more likely it is to crack from expansion and shrinkage.
- Orientation and partial shading of wall from sunlight (uneven heating causes uneven expansion of walls).
- Type of skin, frame, exterior materials, and interior finish.
- History of patching.
- Presence of water leaking from or condensing on interior pipes and from external sources into building structure (U.S. Air Force 1990).

Cumulative Effects

A minor adverse cumulative effect on the noise environment outside of the boundaries of Fort A.P. Hill would be expected. Within the same time frame as the Preferred Alternative, there is a reasonably foreseeable action that, when combined with the Preferred Alternative, might have cumulative effects on the noise environment surrounding Fort A.P. Hill. Fort A.P. Hill is proposing construction and use of one indoor firing range, one 800-meter (875-yard) firing range, and one demolition range for AWG mission-essential training. The AWG was created to take a broader look at current and evolving asymmetric threats to U.S. forces to devise countermeasures to these threats and deny potential enemies the ability to exploit gaps in U.S. capabilities. The purpose of constructing and operating AWG-specific firing and demolition ranges is to provide a specialized training in weapons qualification and operations designed to augment the full-spectrum training, planning, and execution of countermeasures to asymmetric warfare offered at the proposed Asymmetric Warfare Center. The AWG training ranges would provide facilities for up to 150 persons simultaneously participating in training activities and operations.

The proposed AWG indoor firing range would be within Training Area 22B east of Longstreet Camp in the northwestern portion of Fort A.P. Hill. The range would accommodate .45 caliber, 9 mm, 12 gauge, 5.56 mm, 7.62 mm, and laser-mounted weaponry. The proposed AWG 800-meter (875-yard) firing range would be on 226 acres between Ranges 33 and 34. The flat, noninstrumented range would provide capabilities for 10 shooters using a fixed firing line. These two small-arms ranges would be internal to the installation and would not introduce training activities that would change the small-arms peak noise contours off the installation.

The proposed AWG demolition range would be near the proposed EOD range in the eastern portion of post within the borders of Training Area 25C east of Route 301 and North Range Road. The demolition range would be used to train individual Soldiers on the techniques of handling

and exploding light explosives charges up to 10 pounds of TNT. With the establishment of the AWG range, independent of the Preferred Alternative, no increases in incompatible land uses are expected in the vicinity of Port Royal and its primary and secondary growth areas as outlined in the latest Caroline County Comprehensive Plan (Caroline County 2001).

The large-caliber weapons CDNL contours for Fort A.P. Hill with the Preferred Alternative and the establishment of the AWG ranges are shown in Figure 4.2-12. There would be no increase in the off-post areas within noise zone III. With the two activities combined, noise zone II would extend beyond the eastern boundary approximately 1,300 meters. The newly exposed areas are predominantly undeveloped and low-density residential. Therefore, cumulative impacts on the noise environment surrounding Fort A.P. Hill would be minor. Fort A.P. Hill prepared an environmental assessment under NEPA for the proposed AWG action.

The threshold level used to evaluate window damage claims against the Army (U.S. Army 1994a) is 136.5 dBP. As with the Preferred Alternative, the level of airborne vibrations generated by the activities at the proposed EOD in addition to the AWG range is not anticipated to exceed this threshold. Therefore, no structural damage due to airborne vibration is anticipated with the establishment of the AWG and the EOD range at Fort A.P. Hill (Figure 4.2-13).

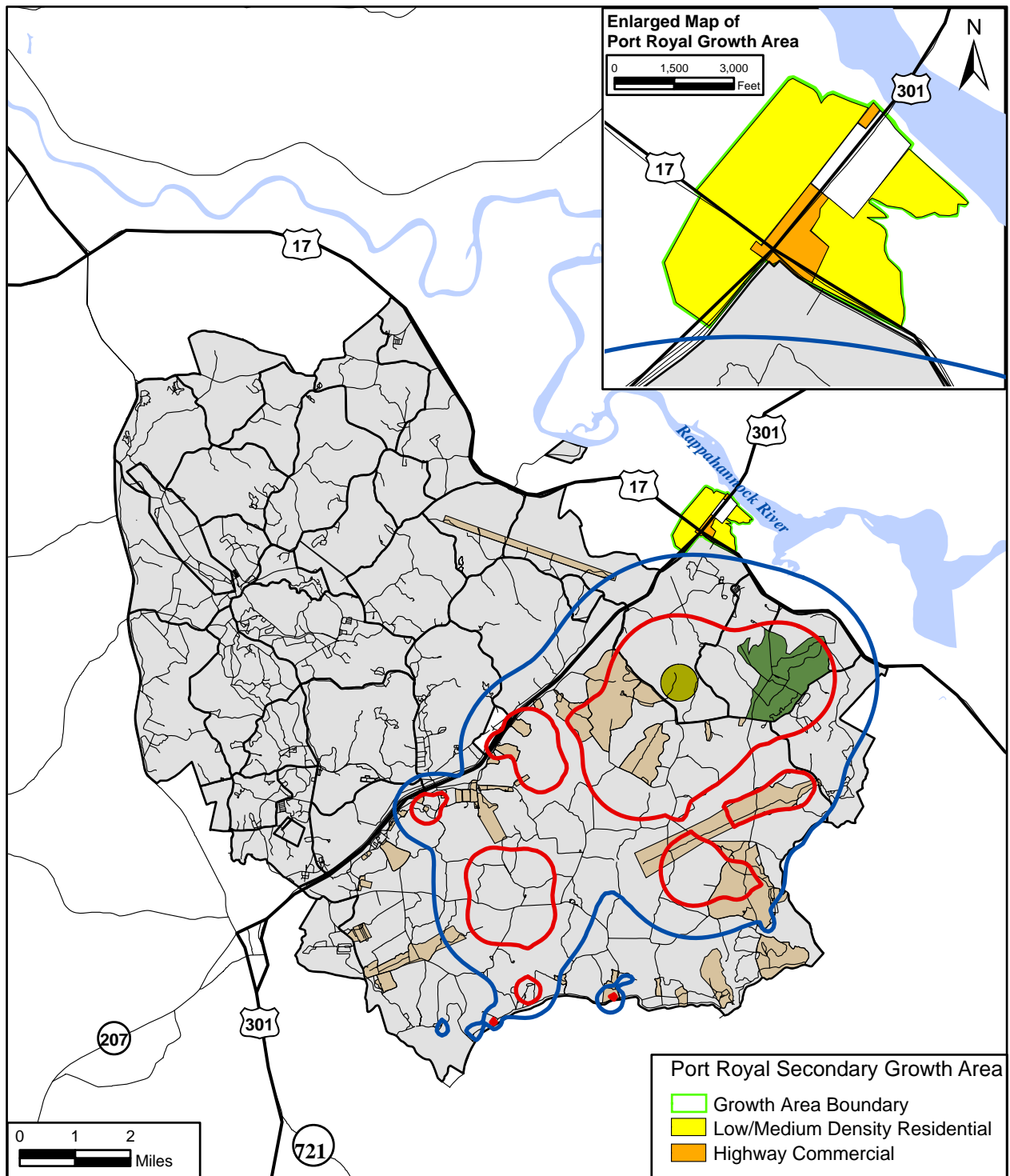
The large-caliber weapons peak noise contours for Fort A.P. Hill with the implementation of the Preferred Alternative and the establishment of the AWG ranges are shown in Figure 4.2-14. The 130-dBP and 115-dBP noise contours for the combined condition (AWG and the Preferred Alternative) would be the same as those for the Preferred Alternative condition (Figure 4.2-10). Fort A.P. Hill would not, therefore, expect that operation of the two ranges would result in a cumulative (i.e., greater) effect with respect to concern and complaints from individual acoustical events than operation of the EOD range alone.

This analysis outlines the existing noise environment, effects of additional BRAC-related training activities, and the proposed AWG range activities. In addition, the metrics used in the analysis, particularly CDNL, naturally take into account all past, present, and reasonably foreseeable noise. The changes due to the Preferred Alternative, when combined with the AWG action, would increase in noise levels and associated areas of incompatible land use surrounding Fort A.P. Hill. The noise environment of the installation would be adversely affected locally by other future mission-related construction projects, and noise from such projects would be addressed under separate environmental analysis documents.

Mitigation

New demolitions activities introduced at Fort A.P. Hill would be within existing noise-control policies and procedures. These policies and procedures apply to all existing and future ranges at Fort A.P. Hill, including the proposed EOD and AWG ranges. The largest charge for the proposed operations would be 25 lb and would be detonated relatively infrequently (approximately 200 times per year). This would be much lower than the in-place 100-lb limit for demolitions at the installation.

In addition to the specific noise-education efforts outlined in section 4.2.4.1, Fort A.P. Hill maintains, and updates every 5 years, an Environmental Noise Management Plan that outlines all the efforts to minimize noise at Fort A.P. Hill. These measures include complaint management



LEGEND

- Installation Property
- Road
- Live Fire Range
- Proposed EOD Site
- Proposed AWG Site

Noise Zones

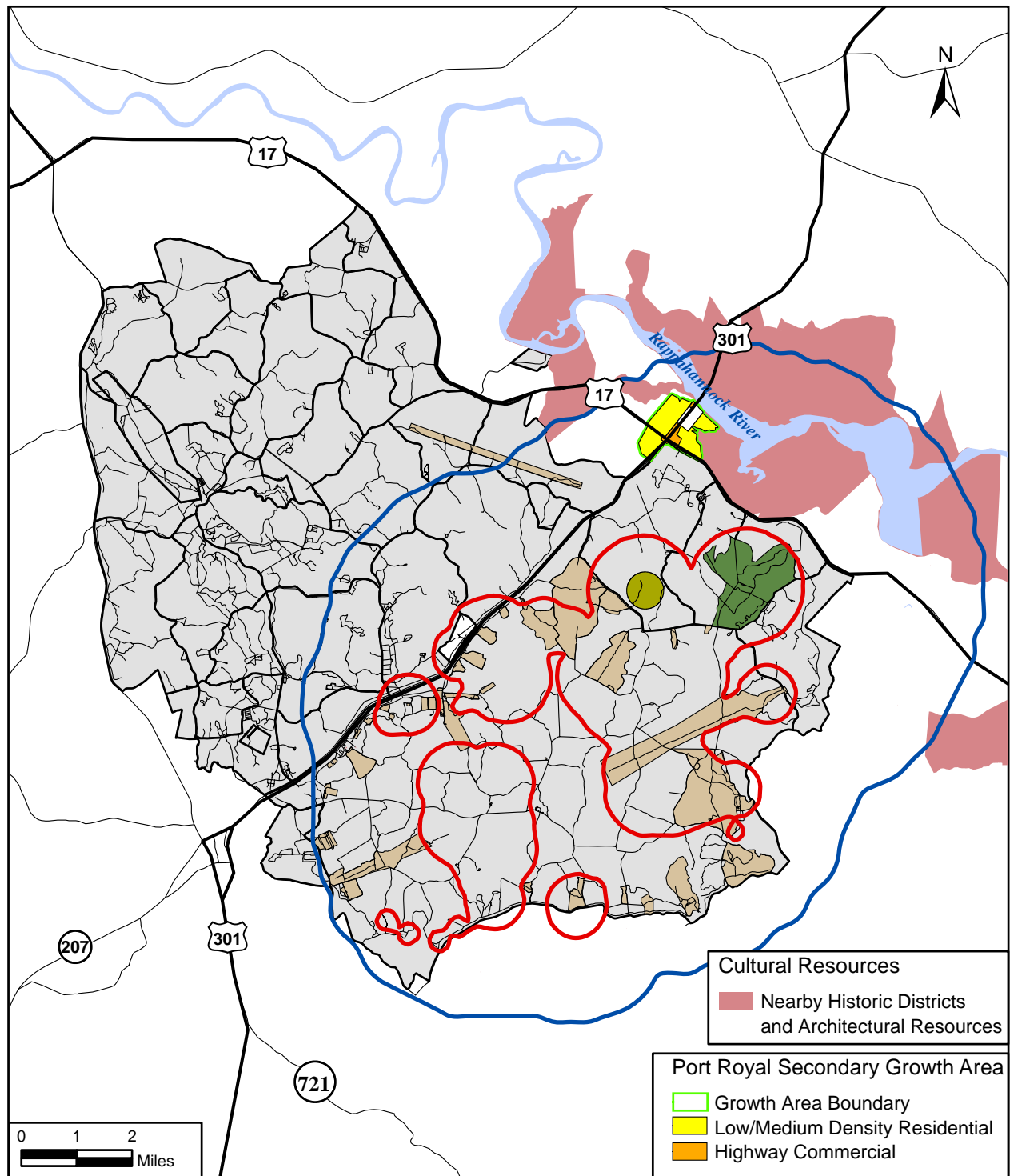
- Zone II
- Zone III

Preferred Alternative and AWG Large Caliber and Demolitions Noise (CDNL) Contours

Fort A.P. Hill, Virginia

Figure 4.2-12

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.



LEGEND

- Installation Property
- Road
- Live Fire Range
- Proposed EOD Site
- Proposed AWG Site

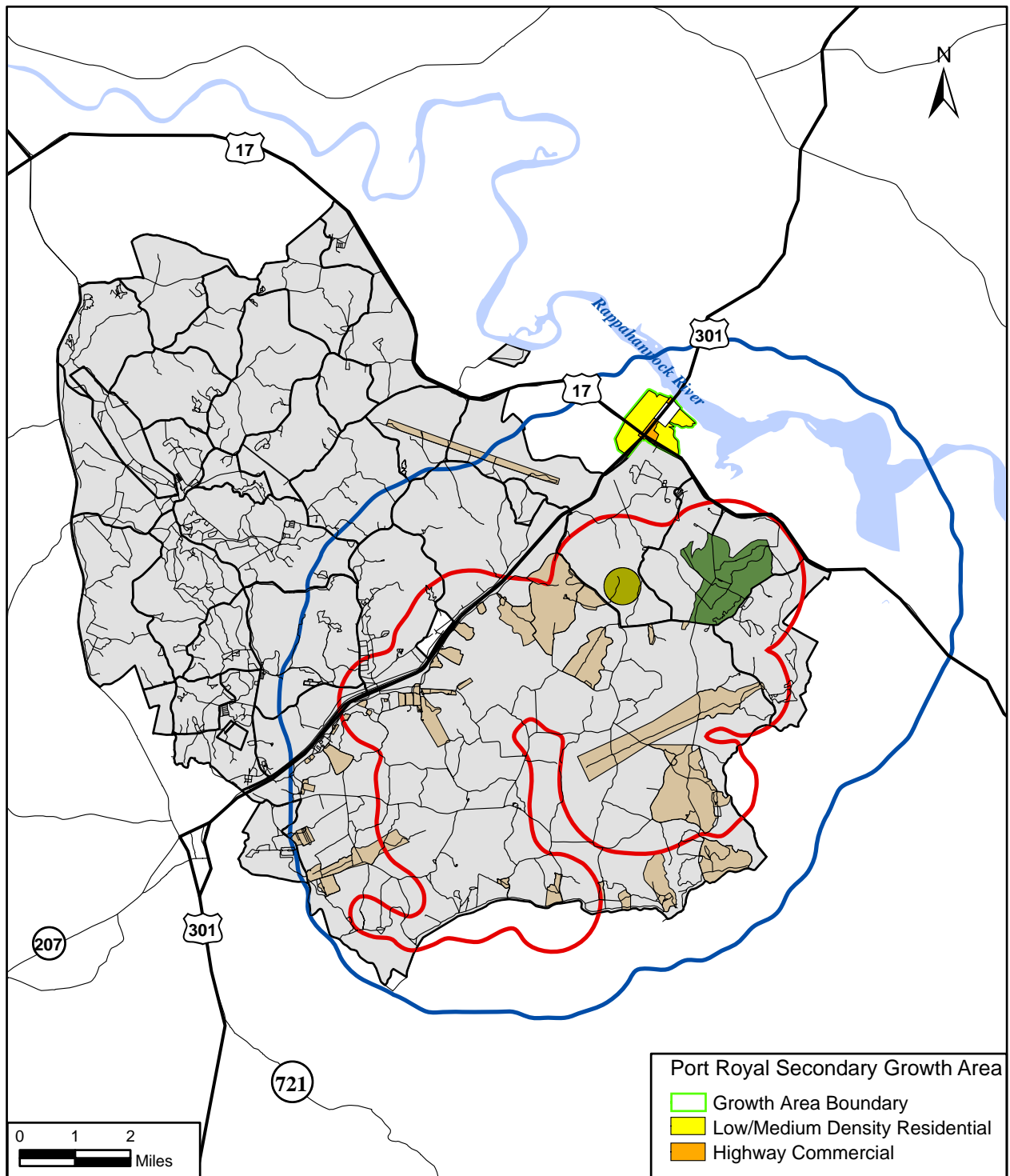
Noise Zones

- 115 dBP Contour - Clearly Audible
- 136.5 dBP Contour - Zone for Potential for Vibration Damage to Structures

Area Potentially Affected by Vibrations Generated at the Proposed EOD Range & AWG Range
Fort A.P. Hill, Virginia

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.

Figure 4.2-13



LEGEND

Installation Property	Noise Zones
Road	115 dB
Live Fire Range	130 dB
Proposed EOD Site	
Proposed AWG Site	

Preferred Alternative and AWG Large Caliber and Demolitions Noise (Peak Level) Contours

Fort A.P. Hill, Virginia

Figure 4.2-14

Sources: Fort A.P. Hill GIS, 2006; USACHPPM, 2006.

and investigation, community outreach and education, pre-notification for unusually loud events, and the Installation Compatible Use Zone Program (USACHPPM 1999).

Zone II noise levels are normally incompatible with residential land uses unless the dwellings are built in such a way that interior NLR levels are 25 dB. Because residences that might not have NLR levels of 25 dB already exist in this area, Fort A.P. Hill has further assessed what mitigation steps could be taken to alleviate community annoyance. If necessary, Fort A.P. Hill would expand the perimeter noise monitoring system to add a noise monitor in the area of concern. The monitors would allow the installation to evaluate operations under varied weather conditions and assess how noise levels can affect neighbors off-post. Mission permitting, locations or scheduling of training activities could be adjusted to lower off-post noise levels. The installation would continue to promote an open dialogue with neighboring localities to include rezoning reviews; education and outreach with local communities; and a comprehensive, proactive, noise-complaint management program.

4.2.4.2.2 No Action Alternative

No impact on the ambient noise environment would be expected under the No Action Alternative. No BRAC-related construction, changes in traffic, or changes in military operations at Fort A.P. Hill would be expected. Ambient noise conditions would remain as described in section 4.2.4.1.

4.2.5 Geology and Soils

4.2.5.1 Affected Environment

4.2.5.1.1 Geologic and Topographic Conditions

Fort A.P. Hill is within the Atlantic Coastal Plain Physiographic Province. Land features range from smooth uplands and plateaus to V-shaped stream valleys and ravines that rise abruptly from floodplains. The dominant geomorphic process is active riverine erosion of surface land features, such as rolling terrain that has been influenced by the effects of fluvial dissection by rivers and streams and deposition during overbank flooding. The elevations on Fort A.P. Hill vary considerably—from 10 feet above msl in the northeast to 242 feet above msl at the intersection of A.P. Hill Drive and Shackleford Road (Paciulli, Simmons & Associates 2004).

4.2.5.1.2 Soils

There are 26 unique soil series on Fort A.P. Hill, three of which form the bulk of the soils on the lands of the proposed LSA, FOBs, and EOD site (USDA 2006). The predominant soil types within these series on the proposed areas are listed on Table 4.2.5-1, along with their status as prime farmland, erodibility potential, hydric status, drainage, permeability, water capacity, shrink-well potential, and flooding and ponding frequency. These predominant soil types are briefly described below:

- *Altavista*. Altavista is moderately well drained, nearly level, and gently sloping soils on stream terraces and old floodplains. The surface layer is fine sandy loam about 8 inches thick. The subsurface layer is fine sandy loam 4 inches thick. The subsoil extends to 42 inches and is clay loam and sandy clay loam in the upper 20 inches and sandy loam in the lower 7 inches. Slopes are 0 to 6 percent.

- *Kempsville*. Kempsville is moderately steep to very steep and very deep. Typically, the surface layer is sandy loam from 7 to 17 inches thick with a moderately low content of organic matter. The seasonal high water table is at a depth of more than 6 feet.
- *Wickham*. Wickham is nearly level to moderately steep, well-drained soils on stream terraces. The surface layer is fine sandy loam about 6 inches thick. The subsoil is from 6 to 50 inches thick, sandy clay loam in the upper and middle part, and sandy loam in the lower part. From 50 to 78 inches it is sand and loamy sand. Slopes range from 0 to 25 percent.

None of the predominant soil series on the proposed sites are considered hydric or contain hydric inclusions, as shown on Table 4.2.5-1. Two of the soil types are highly erodible, two are not highly erodible, and three are potentially highly erodible soils (USDA 2006). All of the soils have a moderate permeability, a moderate or high water capacity, and low shrink-swell factor. Flooding and ponding are not a problem on the soils.

Table 4.2.5-1
Primary Soil Series on Areas of Interest at Fort A.P. Hill

Map Symbol	Name	Prime Farmland	Erodibility	Hydric or Hydric Inclusions	Drainage	Permeability	Water Capacity	Shrink Swell	Flooding/Ponding
1A	Altavista fine sandy loam, 0 to 2 percent slopes, very rarely flooded	PF	NHE	No	MWD	M	H	L	VRF/No
1B	Altavista fine sandy loam, 2 to 6 percent slopes, very rarely flooded	PF	PHE	No	MWD	M	H	L	VRF/No
10E	Kempsville-Emporia-Remlik complex, 15 to 50 percent slopes	NPF	HE	No	WD	M	M	L	No/No
11B	Kempsville-Emporia complex, 2 to 6 percent slopes	PF	PHE	No	WD	M	M	L	No/No
11C	Kempsville-Emporia complex, 6 to 10 percent slopes	SI	HE	No	WD	M	M	L	No/No
29A	Wickham fine sandy loam, 0 to 2 percent slopes, very rarely flooded	PF	NHE	No	WD	M	M	L	VRF/No
29B	Wickham fine sandy loam, 2 to 6 percent slopes, very rarely flooded	PF	PHE	No	WD	M	M	L	VRF/No

PF - Prime Farmland

NPF - Not Prime Farmland

SI - Farmland of Statewide Importance

H - High

NHE - Not Highly Erodible

PHE - Potentially Highly Erodible

HE - Highly Erodible

M - Moderate

MWD - Moderately Well Drained

WD - Well Drained

VRF - Very Rarely Flooded

L - Low

4.2.5.1.3 Prime Farmland Soils

Prime farmland soils are protected under the Farmland Protection Policy Act (FPPA) of 1981 (7 CFR Part 658; Natural Resources Conservation Service [NRCS] Final Rule, Farmland Policy, July 5, 1984; proposed revisions published on January 8, 1987). Background information on the FPPA and Prime Farmland soils is in section 4.1.5.1.3.

Fort A.P. Hill has 17 soil series identified as prime farmland. Of the soils that occur on the proposed areas, five qualify as Prime Farmland and one qualifies as a Prime Farmland of Statewide Importance. The location of the proposed EOD site has 338 acres of Prime Farmland and 343 acres of Prime Farmland of Statewide Importance. The proposed LSA site has 709 acres of Prime Farmland and 93 acres of Prime Farmland of Statewide Importance (USDA 2006).

4.2.5.2 Environmental Consequences

4.2.5.2.1 Preferred Alternative

Short-term minor adverse effects on soils would occur during preparation of the LSA site, FOBs, and EOD site for their military training purposes. No effects on geology or topography would occur, and because of the long-term use of the area for military purposes, the soils on the sites would not qualify as Prime Farmland soils and no effects on Prime Farmland would occur. A SWPPP would minimize soil erosion both during and after construction. Erosion control measure would be implemented as recommended by the Fort A. P. Hill *E&S Plan*, and in accordance with the SWPPP areas with slopes of 6 percent or greater are designated Highly Erodable Land (HEL) and would be avoided for development.

Cumulative Effects

No cumulative effects on geology or soils would be expected.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on soils. Best management practices, including limiting land disturbance on each parcel to no more than what is necessary for the desired use, using temporary crossing bridges or mats to minimize soil compaction where parking and stacking are unavoidable, and following erosion and sediment control measures for storm water control (see section 4.2.6.2.1), would adequately limit the adverse impact of the Preferred Alternative on soils.

4.2.5.2.2 No Action Alternative

No effects on geology, topography, soils, or Prime Farmland would occur under the No Action Alternative.

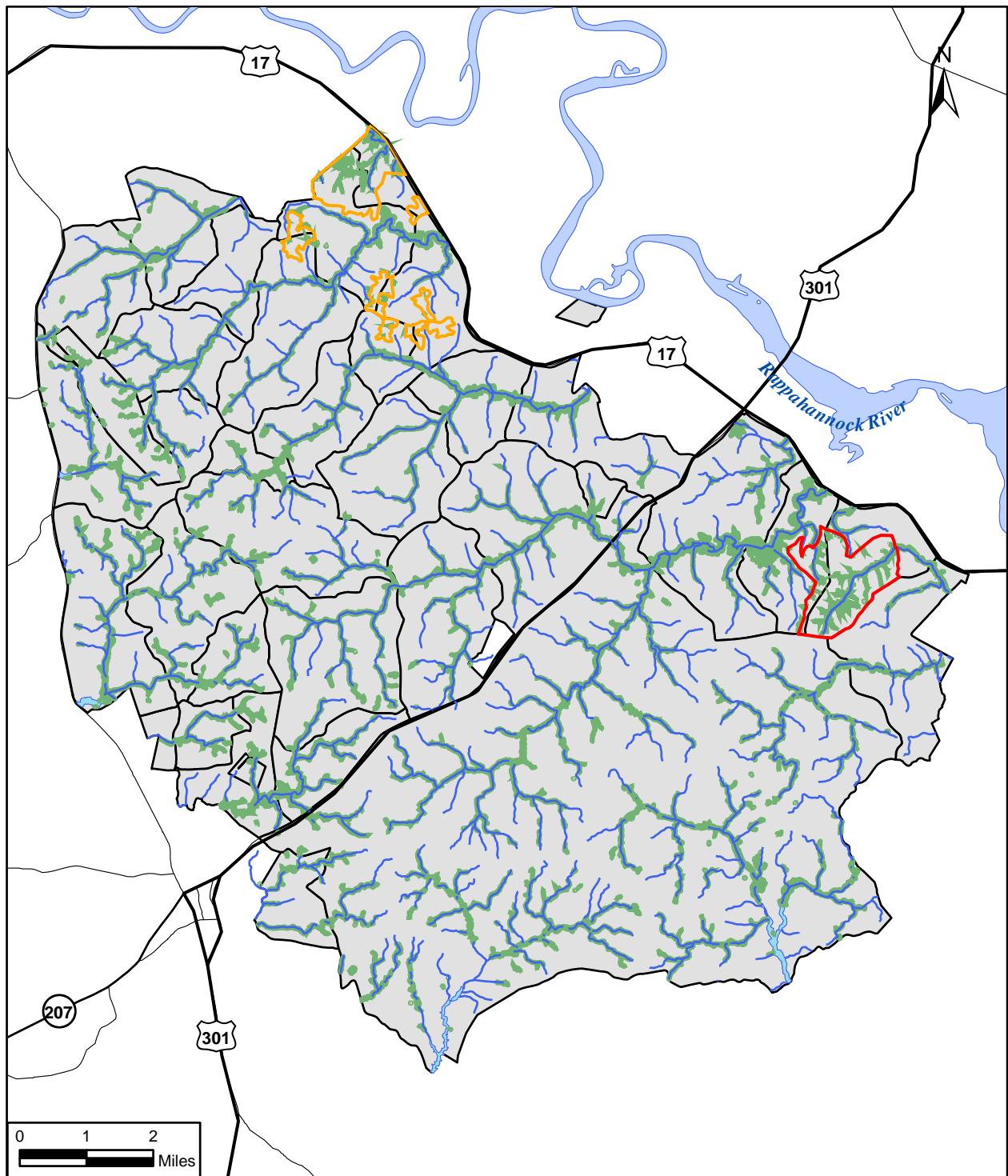
4.2.6 Water Resources

4.2.6.1 Affected Environment

4.2.6.1.1 Watershed Characterization

Watersheds and Subwatersheds

The northern portion of Fort A.P. Hill is drained by tributaries to the Rappahannock River (HUC 02080104), and the southern portion is drained by tributaries to the Mattaponi River (HUC 02080105) (Figure 4.2-15). The total area and percent area of each major watershed and its percentage of the total watershed area within Fort A.P. Hill are presented in Table 4.2.6-1.



LEGEND

- | | |
|-----------------------|--------------|
| Installation Property | River/Stream |
| LSA/FOB Site | Wetland |
| EOD Site | |
| Surface Water | |

Surface Water Features

Fort A.P. Hill, Virginia

Figure 4.2-15

Source: Fort A.P. Hill GIS, 2006.

Table 4.2.6-1
Watershed area information: Fort A.P. Hill

Watershed¹	Total surface (Acres)	Area within installation (Acres)	Percentage of total watershed area within installation	Percentage of installation within watershed
Rappahannock River	127,995	48,587	38%	65%
Upper Mattaponi River	46,489	8,610	19%	11%
Maracossic Creek/Beverly Run (Mattaponi River system)	87,733	17,794	20%	24%

Note:

From VA watersheds coverage— vawatbod.shp

Fort A.P. Hill water bodies ultimately flow into the Chesapeake Bay. Approximately 20 lakes and ponds are also located on the installation, including Travis Lake, Bowies Pond, Lonesome Gulch Pond, Buzzard Pond, Beaver Dam Pond, Maxey Gregg Pond, Delos Lake, Smoots Pond, and White Lake. The major streams within the installation that drain to the Mattaponi River are Meadow Creek, Turkey Track Creek, Cattle Creek, Reynolds Run, Maracossic Creek, Smoots Run, and Beverly Run. Streams within the Rappahannock River watershed that drain the northern and eastern portions of Fort A.P. Hill are Ware Creek, Mount Creek, Goldenvale Creek, Portabago Creek, and Mill Creek. The watersheds of all of these streams are primarily within the installation's boundaries. Several streams that flow into the Rappahannock River to the north drain the northeastern 75 percent of the installation, and streams on the southwestern 25 percent of the installation drain to the Mattaponi River to the south, within the Chesapeake Bay watershed. The Mattaponi River is part of the York River drainage.

Flows and Exchanges

There are a few USGS flow gages near Fort A.P. Hill. The closest gages are USGS 01674500 on the Mattaponi River near Beulahville, Virginia (1941–2004) and USGS 01674000 on the Mattaponi River near Bowling Green, Virginia (1942–2004). The INRMP for Fort A.P. Hill discusses stream flow rates for various streams within each major drainage. Each of the largest streams in the Mattaponi drainage, Smoots Run, and Beverly Run, has an estimated annual discharge of approximately 48 cubic feet per second (cfs). The smaller drainages that feed the Mattaponi River, including Cattlet Creek, Maracossic Creek, Meadow Creek, and Turkey Creek, each have a mean annual discharge of approximately 35 cfs. The larger streams within the Rappahannock River Basin are Mill Creek, Mount Creek, and Portabago Creek. The mean annual discharge for these streams is estimated at 56 cfs. Smaller streams in the Rappahannock watershed include Goldenvale Creek, Peumansend Creek, and Ware Creek, all of which are estimated to have a mean annual discharge of approximately 35 cfs. Unnamed tributaries were estimated to have mean annual discharges of less than 35 cfs.

4.2.6.1.2 Surface Water Quality

Water Quality Standards

The VDEQ defines surface water quality standards that protect designated uses of surface waters in Virginia. The water quality standards consist of three components: use designations, general and numeric water quality criteria necessary to protect those uses, and an antidegradation statement. Water quality standards have the dual purposes of establishing the water quality goals for a specific water body and serving as the regulatory basis for establishing water quality-based

treatment controls and strategies beyond the technology-based levels of treatment required by Sections 301(b) and 306 of the CWA. State freshwater criteria apply to streams within Fort A.P. Hill. All streams in Virginia, including those flowing through the installation, are minimally assigned the following designated uses: recreation (e.g., swimming, boating); propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish).

Virginia water quality standards contain general criteria statements and a wide range of numeric water quality criteria for pesticides and PCBs, VOCs, acid- and base-extractable organics, other organics, metals, pH, and inorganics, as well as conventional pollutants such as total dissolved solids. Table 4.2.6-2 lists numeric water quality criteria for which standards are in place and that are of particular interest for Fort A.P. Hill water bodies, based on the state's 2004 Section 303(d) list (see below). Note that VDEQ is also developing nutrient criteria for surface waters. Water bodies on Fort A.P. Hill are Class III waters (Nontidal Waters Coastal and Piedmont Zones).

Table 4.2.6-2
Virginia surface water quality standards for Class III waters: Parameters of interest for Fort A.P. Hill impaired waters

Parameter	Units	Field parameters/ Pathogens	Aquatic life— freshwater acute	Aquatic life— freshwater chronic	Human health— public water supplies	Human health— all other surface waters
Water temperature (maximum) ^a	°C	32	—	—	—	—
Dissolved oxygen ^b	mg/L	4.0 (min.) / 5.0 (daily avg.)	—	—	—	—
pH	SU	6.0–9.0	—	—	—	—
Fecal coliform bacteria ^c	#/100 mL	200/400	—	—	—	—
<i>E. coli</i> ^d	#/100 mL	126/235	—	—	—	—

Notes:

^a Nontidal waters (Coastal and Piedmont Zones).

^b Estuarine waters (Tidal Water-Coastal Zone to Fall Line) and Non-tidal waters (Coastal and Piedmont Zones).

^c The Virginia fecal coliform bacteria standard for primary contact recreational waters is as follows: "Fecal coliform bacteria shall not exceed a geometric mean of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a calendar month nor shall more than 10 percent of the total samples taken during any calendar month exceed 400 fecal coliform bacteria per 100 ml of water."

^d The Virginia *Eschevichia coli* standard for primary contact recreational waters (freshwaters) states that *E. coli* shall not exceed a geometric mean of 126 per 100 ml for two or more samples over any calendar month and shall not exceed a single sample maximum of 235 per 100 ml.

303(d) Listed Waters

Section 303(d) of the CWA requires states to identify and develop a list of water bodies that are impaired and for which technology-based and other required controls have not resulted in attainment of water quality standards. Fort A.P. Hill includes one stream that was listed on Virginia's 2004 Section 303(d) list of impaired waters (Table 4.2.6-3). The development of

TMDLs is required for water bodies listed on the 303(d) list. TMDLs and load reductions are required for the pollutants of concern for each listed water body. VDEQ is developing TMDLs in accordance with a 10-year EPA consent decree schedule (for water bodies originally listed on the 1998 303(d) list).

Table 4.2.6-3
303(d) listed water bodies within Fort A.P. Hill

Installation	303(d) listed water body	Extent	Use impaired	Impairment cause
Fort A.P. Hill	Ware Creek	Headwaters to the confluence of an unnamed tributary	Aquatic life	pH

There is only one impairment listing for streams on Fort A.P. Hill. Ware Creek is listed as impaired for not supporting the Aquatic Life use due to low-pH conditions, which were recorded at VDEQ's 2002 freshwater probabilistic monitoring station 3-WAE005.95. The impaired segment includes the headwaters of Ware Creek downstream to the confluence of an unnamed tributary, which is just downstream from Burma Road. The fact sheet states that low pH levels can be caused by natural conditions and that this segment is a low-lying coastal plain environment with no riffles and slow-moving pools that are subject to low-pH conditions. A pH TMDL is due by 2016.

In-Stream Water Quality

Table 4.2.6-4 lists the VDEQ surface water monitoring stations are on streams that drain Fort A.P. Hill. Two stations, Mill Creek and Ware Creek, are on streams within Fort A.P. Hill; all other stations are outside the installation.

Table 4.2.6-4
VDEQ water quality monitoring stations within or near Fort A.P. Hill

Station ID	Stream	Location
Fort A.P. Hill		
8-BEV003.16	Beverly Run	Rt. 721
8-BEV006.78	Beverly Run	Rt. 630
8-BEV008.47	Beverly Run	Rt. 665
3-DCT000.39	Doctor Branch	General Forest Road
3-GLL001.98	Goldenvale Creek	Rt. 17
3-GLL006.78	Goldenvale Creek	Jeb Stuart Road
3-MIC008.55	Mill Creek	Fort A.P. Hill property
3-MIC001.66	Mill Creek	Rt. 17 (sign "Peumansend Creek")
3-MIC006.46	Mill Creek	Rolling Road
3-MTC001.94	Mount Creek	Rt. 17
3-WAE000.72	Ware Creek	Rt. 17
3-WAE005.95	Ware Creek	Fort A.P. Hill property

The Fort A.P. Hill INRMP states that the water quality of the streams, ponds, and lakes within the installation is generally within the expected range for coastal plain water bodies. According to the INRMP, the water quality data available indicate that water quality in the Mattaponi River generally supports the fishable and swimmable goals of the CWA. Water quality data for the lower Rappahannock River indicate that the watershed encompassing Caroline County meets the goals of the CWA. However, data for the watersheds in the surrounding counties indicate significant water quality violations for fecal coliform bacteria due to point sources (sewage discharges) in nearby watersheds, according to the Fort A.P. Hill INRMP (Fort A.P. Hill 2000).

Streams on Fort A.P. Hill that could be affected by the proposed project areas were identified using Figure 4.2-13 and available stream and watershed coverages. The proposed action includes limited construction of facilities and structures at sites in the northern and eastern areas of Fort A.P. Hill to support training operations. Potentially affected streams in the northern area are Mount Creek, West Mount Creek, and tributaries. Mill Creek, Portobago Creek, and associated tributaries (southeast of Mill Creek) could also be affected in the eastern portion of the installation. None of these streams are included on Virginia's 2004 303(d) list of impaired waters. VDEQ monitoring data are available for three stations on Mill Creek (see Table 4.2.6-4).

4.2.6.1.3 Pollutant Sources

Pollutant sources are typically characterized as point or nonpoint sources under the CWA. Point sources, according to 40 CFR 112.3, are defined as any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. The NPDES Program, under CWA Sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources. Nonpoint sources are generally precipitation-driven and occur as overland flow carries pollutants, often attached to sediment, into streams. However, nonpoint sources may also include non-precipitation-driven events such as contributions from groundwater; septic systems; direct deposition of pollutants from wildlife, livestock, or atmospheric fallout; or various military training activities.

Point Sources

Fort A.P. Hill has four existing VPDES permits, as shown in Table 4.2.6-5. Two are individual wastewater treatment plant permits, and two are general permits—one for discharges associated with industrial activity and the other for discharges from construction sites.

Table 4.2.6-5
VPDES permits for Fort A.P. Hill

VPDES number	Permit type	Description
VA0032034	Individual	Wilcox Wastewater Treatment Plant
VPA00008	Individual	Cooke Wastewater Treatment Plant
VAR051092	General	POL industrial general permit
VAR103678	General	General permit for storm water discharges from construction sites

Nonpoint Sources

Nonpoint sources represent contributions from diffuse, non-permitted sources. The only exception to this definition is cases where storm water collection systems have been constructed to manage storm water flows from larger areas. Storm water discharges from these systems (such as from MS4s) are regulated as point sources because storm water runoff is delivered to the receiving water body through a conduit.

The proposed training areas at Fort A.P. Hill are currently undeveloped. Runoff associated with the training areas could cause nonpoint source issues, such as sedimentation and erosion, although the information available for these areas is too limited to characterize existing water quality and watershed conditions.

Storm Water Management

Construction storm water impacts are regulated through the installation's NPDES storm water general permit for construction activities. Fort A.P. Hill is primarily used as a training area, and therefore storm water management activities are usually site-specific. Storm water management activities typically include implementing BMPs and erosion and sediment control structures to reduce runoff and sedimentation. SWPPPs for construction areas and other land disturbance activities on Fort A.P. Hill were developed to maximize the potential benefits of pollution prevention and sediment and erosion control measures. These plans provide the framework for reducing soil erosion and minimizing pollutants in storm water during construction, and they include the development and implementation of storm water controls and other BMPs.

4.2.6.1.4 Hydrogeology/Groundwater

Fort A.P. Hill is in Virginia's Coastal Plain, approximately 40 miles west of the Chesapeake Bay between the Rappahannock and Mattaponi rivers. The regional hydrogeologic framework of the Virginia Coastal Plain is described by eight major confined aquifers, eight major confining units, and an uppermost water table aquifer, all of varying permeability and water quality. This framework has been developed on the basis of lithologic and hydrogeologic formations. The major flow boundaries for the Coastal Plain groundwater flow system are the fall line to the west, the freshwater or saltwater interface to the east (Chesapeake Bay and Atlantic Ocean), and crystalline basement rock. Groundwater movement through the unconfined and confined aquifers is generally lateral, with some movement occurring vertically. Groundwater is discharged laterally into a variety of water bodies, including the Chesapeake Bay and the Atlantic Ocean. Recharge of the Coastal Plain groundwater system occurs in the aquifer outcrop zones along the fall line, where precipitation and surface water can infiltrate into unconfined and confined aquifers. The vertical leakage through confining units to underlying confined aquifers is an important mechanism for groundwater recharge. Note that the groundwater system below Fort A.P. Hill is the sole source of potable water for the installation.

4.2.6.1.5 Coastal Zone Management and Chesapeake Bay Initiatives

Fort A.P. Hill is one of 66 DoD installations within the watershed. The Chesapeake Bay watershed encompasses nearly 64,000 square miles and stretches from New York to Virginia, covering portions of six states and the District of Columbia. Fort A.P. Hill is within the Chesapeake Bay watershed and is drained by the Rappahannock and Mattaponi rivers. The installation has many programs that are both directly and indirectly applicable to the goals, objectives, and commitments of the Chesapeake Bay Initiative.

Fort A.P. Hill is committed to the restoration and protection of the Chesapeake Bay ecosystem. Following the goals outlined in the 1983 and 1987 Chesapeake Bay Agreements, Fort A.P. Hill has made significant advances toward achieving the goals of the original agreements. In 1990 DoD and EPA signed a cooperative agreement concerning the Chesapeake Bay. The agreement established a policy of coordination and cooperation between the two entities on Chesapeake Bay activities consistent with the goals, objectives, and commitments established under the 1987 Chesapeake Bay Agreement. In July 1994 the Army signed the *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*. This agreement specifically calls for cooperative actions by agencies and departments to reduce nutrients and toxics, restore habitats, coordinate data collection and research, restore the Anacostia River, and support national service.

To protect the water resources within Fort A.P. Hill, timber harvest within the riparian forest buffer zone is carefully controlled. No more than 75 percent of the timber may be harvested within the Chesapeake Bay Resource Protection Area (RPA) buffer, as specified in the regulations adopted by the Virginia Department of Conservation and Recreation under the Chesapeake Bay Preservation Act. In addition, Fort A.P. Hill has implemented a 50-foot no harvest buffer around streams. Timber in sensitive or unique habitats is usually not harvested.

The goal of the CZMA is to preserve, protect, develop, and where possible restore or enhance the resources of the coastal zone of the United States. The CZMA, as it applies to Fort A.P. Hill, contains a federal consistency requirement, under which federal actions must be consistent to the maximum extent practicable with the enforceable policies of Virginia's federally approved CRMP. This program focuses on problems associated with polluted runoff, habitat protection, riparian buffers, RPAs, wetlands, fisheries, sustainable development, waterfront redevelopment and encroachment, septic systems, erosion and sediment control, and air pollution control. A coastal zone consistency determination for the Preferred Alternative has been prepared and is in Appendix D.

4.2.6.1.6 Floodplains

A small portion (approximately 28 acres) of the Rappahannock River Basin's 100-year floodplain lies in the northern part of the proposed LSA at Pender Camp on Fort A.P. Hill. All other areas are located outside Federal Emergency Management Agency-designated 100-year floodplain areas. The Fort A.P. Hill INRMP includes additional information on the installation's program for maintaining riparian areas and RPAs (Fort A.P. Hill 2000).

4.2.6.2 Environmental Consequences

Environmental effects on water resources as a result of the Preferred Alternative primarily relate to the potential for increases in storm water runoff and associated pollutants from land disturbance activities, construction-associated impacts, conversion of pervious areas to impervious areas, potential loss of riparian buffers, and other physical changes to watershed features. Storm water runoff increases flow volumes, velocity, peak flows, and the delivery of sediment and other pollutants to streams. The potential for erosion in an area can be characterized by the interaction of four primary factors: the characteristics of its soils, its vegetative cover, its topography, and its climate. All of these factors also determine the magnitude of storm water runoff. In general, storm water runoff potential increases with decreasing soil moisture retention and vegetative cover and increasing impervious land area, land slope, and precipitation volume. Similarly, erosion potential increases with decreasing soil consolidation and vegetative cover and

increasing land slope, precipitation volume, and storm water runoff. An impervious land surface has the effect of decreasing soil moisture retention and vegetative cover to zero.

4.2.6.2.1 Preferred Alternative

Long-term minor adverse effects on surface water quality, groundwater quality, and riparian areas would be expected. Construction of facilities and infrastructure as a result of the Preferred Alternative could increase runoff due to an increase in impervious surface area, increased soil erosion, and increases in sediment and pollutant loads. Proposed facilities would be sited to avoid sensitive environmental areas, including RPAs, to the maximum extent practicable. Any development in wetlands and surface waters would be required to meet federal and state requirements for avoidance, minimization, and mitigation under the CWA (Sections 401 and 404) and the VWPP program.

Surface Water Quality

Short- and long-term minor adverse effects would be expected. To comply with federal, state, and installation requirements, Fort A.P. Hill would minimize potential impacts through effective storm water planning, the development of adequate infrastructure, and the use of traditional and innovative BMPs. Storm water requirements are addressed under the NPDES program, which includes the development of comprehensive SWPPPs; Virginia's Erosion and Sediment Control Regulations; and other programs as discussed below. It should be noted that, in the absence of state-required storm water management practices and erosion control measures being implemented on a watershed basis, short- and long-term effects would be much greater in severity.

Virginia's Erosion and Sediment Control Regulations (4 VAC 50-30-40.19) and Storm Water Management Regulations (4 VAC 3-20-81) require that "downstream channels and properties be protected from erosion and damage due to increases in volume, velocity and peak flow rate." Because of this, site-specific BMPs or mitigation measures would be required for each construction site. A watershed-based approach would also be implemented to evaluate upstream and downstream concerns and mitigate possible impacts.

Sediment. Short- and long-term minor adverse effects would be expected. To comply with federal, state, and installation requirements, Fort A.P. Hill would minimize potential impacts through storm water planning, the development of adequate infrastructure, and the use of traditional and innovative BMPs. During the initial development phase, proper erosion and sediment controls would be used to manage construction activities that could result in an increase in the sedimentation in adjacent water bodies. An NPDES permit would be required for those projects disturbing at least 1 acre, and a soil erosion and sediment control plan, as well as a SWPPP, would be required to provide guidance for implementing minimization techniques for sediment-laden runoff during the construction process. In the long term, an increase in storm water volume from additional impervious surfaces could result in an increase in sediment content. Proper storm water controls, as discussed in the section above, would be implemented as part of the development to minimize the potential effects of sediment loading during wet-weather events. LID techniques would also be implemented, where possible, to manage the hydrology and quality of storm water runoff from increased impervious surfaces.

Other Pollutants. Fort A.P. Hill water bodies that are adjacent to the proposed training areas are not listed as impaired on Virginia's 303(d) list.

Short- and long-term minor adverse effects would be expected. During the initial development phase, construction activities could result in an increase in sediment-associated pollutants, dissolved solids, and petroleum hydrocarbons in adjacent water bodies. Measurable effects would be expected to be minimal because the installation would comply with federal, state, and installation regulations and necessary permits for storm water control would be obtained. Site-specific SWPPPs describing the BMPs to be used to minimize effects from increased runoff during site construction would be prepared.

In the long term, an increase in storm water volume from additional impervious surfaces could result in an increase in nutrients, metals, and other potential contaminants in water bodies. Proper storm water controls, as discussed above, would be implemented as part of the development to minimize the potential effects of pollutant loading during wet-weather events. LID techniques would also be implemented, where possible, to manage the hydrology and quality of storm water runoff from impervious surfaces to reduce this adverse effect.

Water Resources Protection

Chesapeake Bay Preservation Act. Short- and long-term adverse effects would be expected. In the short term, vegetation in the RPAs could be damaged or destroyed by construction activities in and near the RPAs. There is also a potential for increased storm water flow and increased scouring in the RPAs due to increased sedimentation from construction site runoff and, in the long term, increased impervious surfaces. The Chesapeake Bay Preservation Act requires that storm water runoff be controlled through the use of effective BMPs to avoid or minimize erosion and to control sediment, nutrients, and pesticides.

Virginia CRMP. Short- and long-term adverse effects would be expected. Construction and other activities associated with the proposed action would occur in a manner consistent with the Commonwealth of Virginia's CRMP enforceable policies, to the maximum extent practicable. The CZMA requires identification of potential effects on storm water runoff, habitat protection, riparian buffers, wetlands, fisheries, sustainable development, waterfront redevelopment and encroachment, septic systems, erosion and sediment control, and air pollution control. These resources, primarily storm water runoff, would be adversely affected by the Preferred Alternative. BMPs for storm water management, wetland loss, and stream channel alteration, as well as other mitigation efforts, however, would alleviate these concerns. Consistency of the Preferred Alternative with Virginia's CRMP has been assessed, and the assessment is provided as Appendix D of the EIS.

Groundwater Quality

Long-term indirect minor adverse effects would be expected. Soil surveys would be completed before construction to assess the potential for groundwater contamination and corresponding surface water impacts. Infiltration of increased storm water runoff into the groundwater could increase loads of nitrogen and other contaminants such as soluble metals. However, absorption loss and infiltration of pollutants could be partially alleviated by installing BMPs that facilitate infiltration to groundwater, such as bioretention facilities planted with native, water-tolerant plants. In addition, the reduction in pervious surfaces would reduce groundwater infiltration, which might reduce baseflow conditions during dry periods.

The groundwater system below Fort A.P. Hill is the sole source of potable water for the installation. The fuel and chemical storage areas that might be located at Fort A.P. Hill would be constructed to minimize any potential risk of groundwater contamination. The installation would

adhere to state and federal regulations regarding the siting, construction, operation, and maintenance of fuel and chemical storage areas. Groundwater samples would be collected, as required, to monitor groundwater conditions and contaminant levels.

Floodplains

Long-term minor adverse effects on riparian areas would be expected if encroachment into these areas was required for facility construction. Facilities would be constructed outside riparian areas to the maximum extent practicable. If construction was necessary within the 100-year floodplain, Fort A.P. Hill would complete a Joint Permit Application required by the U.S. Army Corps of Engineers and VDEQ. A small portion (approximately 28 acres) of the Rappahannock River Basin's 100-year floodplain lies in the northern part of the proposed LSA at Pender Camp on Fort A.P. Hill. Under the current National Flood Insurance Program, no permanent dwellings are permitted to be constructed within the 100-year floodplain boundary, although roadways, athletic fields, and similar facilities might be permitted. Fort A.P. Hill would comply fully with EO 11988 (*Floodplain Management*) by ensuring that its environmental division would review all project and facility plans for compliance with the EO, Army and installation environmental policies, and applicable laws and regulations.

Cumulative Effects

No cumulative effects on water resources would be expected. Other future projects on Fort A.P. Hill could result in erosion and sedimentation in streams, and separate environmental documents would analyze the effects of those actions. No cumulative effects on water quality in the Chesapeake Bay would be expected from BRAC development on Fort A.P. Hill and Fort Lee and other development in the region. Sediment and other pollutants from streams on Fort A.P. Hill and in the area would enter the bay from the Rappahannock River and York River, while those from development on and near Fort Lee would enter the bay from the James River. The distances separating these source inputs and mixing in the bay would render any potential for a cumulative water quality effect negligible and immeasurable.

Mitigation

No mitigation measures would be necessary to minimize, avoid, or compensate for adverse effects on water resources.

4.2.6.2.2 No Action Alternative

Surface Water Quality

No effects on storm water quantity would be expected under the No Action Alternative. The percentage of impervious surface for each watershed on Fort A.P. Hill would remain unchanged. The quantity of runoff to the surrounding receiving water bodies would be expected to remain unchanged. The Army would continue to manage Fort A.P. Hill in accordance with the CWA, Virginia Storm Water Management Act, Chesapeake Bay Preservation Act, and other applicable laws and regulations.

Sediment. No effects on sediment would be expected under the No Action Alternative. Natural resources and land management programs would continue to maintain vegetative cover and erosion controls as required by federal, state, local, and Army regulations. Erosion problems on the installation would continue to be identified and remediated.

Other Pollutants. No effects on other pollutants would be expected under the No Action Alternative. Existing levels of pollutants would remain unchanged under the No Action Alternative.

Chesapeake Bay Preservation Act. No effects would be expected on the Chesapeake Bay Preservation Act under the No Action Alternative. The Army would continue to manage Fort A.P. Hill in accordance with the Chesapeake Bay Preservation Act, as well as other federal, state, and local efforts to protect the Chesapeake Bay. No RPAs would be disturbed under the No Action Alternative.

Virginia CRMP. Under the No Action Alternative, an evaluation of potential environmental effects concurrent with the enforceable policies of the CZMA would not be required.

Groundwater Quality

No effects on groundwater would be expected under the No Action Alternative. Note that the groundwater system below Fort A.P. Hill is the sole source of potable water for the installation.

Floodplains

No effects on floodplains would be expected under the No Action Alternative.

4.2.7 Biological Resources

4.2.7.1 Affected Environment

Fort A.P. Hill has 57,000 acres of managed forest in a natural belt of mixed southern pine and hardwood on the uplands, and almost pure hardwoods in the creek bottoms. When the Army acquired the installation, approximately 14,000 acres were cleared agricultural land. Through military ownership, ecological succession of farmland to subcomplex stands of pine trees has occurred in a short period. Generally, the installation has vegetative communities characteristic of Virginia's Upper Coastal Plain.

4.2.7.1.1 Vegetation

Fort A.P. Hill's natural vegetation lies within a belt of natural forest cover composed of mixed southern pine and hardwoods on the uplands and nearly pure hardwoods on the creek bottoms. Natural ecological succession on abandoned farmland has resulted in the occurrence of pure stands of pine. On better soils there is a relatively heavy underbrush of honeysuckle, greenbrier, blackberry, sumac, huckleberry, holly, and mountain laurel underneath pioneer tree species. Underbrush and the forest cover in many instances are heavy enough to present a problem in troop training.

The Pender Camp area and areas designated for FOBs 1 through 6 and 8 are characterized as mesotrophic forest, which supports a canopy of American beech, northern red oak (*Quercus rubra*), white oak (*Q. alba*), black oak (*Q. velutina*), tulip poplar (*Liriodendron tulipifera*), hickories (*Carya* spp.), sweetgum, and white ash (*Fraxinus americana*). The understory consists of the shrubs mountain-laurel (*Kalmia latifolia*), flowering dogwood (*Cornus florida*), redbud (*Cercis canadensis*), and spicebush (*Lindera benzoin*). The herbaceous layer is populated by moisture-loving species such as showy orchid (*Orchis spectabilis*), putty-root (*Aplectrum hyemale*), lily-leaved twayblade (*Liparis lilifolia*), perfoliate bellwort (*Uvularia perfoliata*), jack-

in-the-pulpit (*Arisaema triphyllum*), black cohosh (*Cimicifuga racemosa*), and several ferns (Fleming and Van Alstene 1994).

A Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDCR-DNH)-recommended conservation site, the Mount Creek Slopes site, is southeast of the Pender Camp area (Fleming and Van Alstene 1994). It is one of 18 conservation sites recommended by VDCR-DNH on Fort A.P. Hill. The conservation site encompasses an area of steep topography where downcutting by Mount Creek and one of its tributaries as they approach the Rappahannock River valley has resulted in entrenched ravine systems with almost bluff-like slopes along the streams. A number of the steeper slopes and narrow ravines support exceptionally mature hardwood forests dominated by American beech, oaks, and tulip poplar; their diameter at breast height (dbh) exceeds 30 inches. The largest trees in the stands exceed 40 inches dbh. Although the stands are not entirely original growth and are now fragmented, they are among the most impressive late seral upland hardwood forests remaining in the Virginia Coastal Plain. The boundaries of the Mount Creek Slopes conservation site encompass small parts of the proposed LSA area at the southeastern corner.

Training Areas 26 and 27 are predominately pine forest with some interspersed hardwood stands. Mill Creek, to the northeast and downslope of the site, supports wetlands that appear to have some tidal influence because of their proximity to the Rappahannock River. Open water is very limited in the wetlands and consists primarily of the stream channel. Northeast of the proposed EOD site is another of the 18 VDCR-DNH-recommended conservation sites on Fort A.P. Hill, the Mill Creek Slopes site. The site was recommended as a conservation site because of the presence of a bald eagle (*Haliaeetus leucocephalus*) nest discovered in 1990. The area was judged to have a low potential to support eagle roosting and foraging, however, because bald eagles prefer mature or standing dead timber along open water or flooded areas for these activities. The conservation site encompasses all areas within 0.5 mile of the bald eagle nest site and portions of two Training Area units (Training Areas 25 and 26); the proposed EOD site is in Training Area 26a and Training Area 27.

4.2.7.1.2 Wildlife

The cooperative agreement between Fort A.P. Hill and the USFWS lists 130 avian species, 39 species of mammals, and 30 recorded species of fish present on the installation. Limited data are available on the number of reptile and amphibian species, but 48 species are expected to occur in this area. Of the total number of avian, mammalian, and fish species known to exist at Fort A.P. Hill, 20 bird, 10 mammal, and 16 fish species are recognized as game species.

Common mammal species include white-tail deer (*Odocoileus virginiana*), opossum (*Didelphis virginiana*), southern flying squirrel (*Glaucomys volans*), striped skunk (*Mephitis mephitis*), muskrat (*Ondatra zibethica*), woodchuck (*Marmota monax*), raccoon (*Procyon lotor*), eastern mole (*Scalopus aquaticus*), eastern gray squirrel (*Sciurus carolinensis*), cottontail rabbit (*Sylvilagus floridanus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes fulva*), and meadow jumping mouse (*Zapus hudsonius*).

Common bird species at the installation include red-tailed hawk (*Buteo jamaicensis*), great-horned owl (*Bubo virginianus*), Eastern screech owl (*Megascops asio*), whip-poor-will (*Caprimulgus vociferus*), American goldfinch (*Carduelis tristis*), red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), yellow-billed cuckoo (*Coccyzus americanus*), Eastern wood-pewee (*Contopus virens*), American crow (*Corvus*

brachyrhynchos), red-eyed vireo (*Vireo olivaceus*), prairie warbler (*Dendroica discolor*), yellow warbler (*Dendroica petechia*), pine warbler (*Dendroica pinus*), common yellowthroat (*Geothlypis trichas*), gray catbird (*Dumetella carolinensis*), ovenbird (*Seiurus aurocapilla*), wood thrush (*Hylocichla mustelina*), Eastern bluebird (*Sialia sialis*), wild turkey (*Meleagris gallopavo*), mourning dove (*Zenaida macroura*), song sparrow (*Melospiza melodia*), northern mockingbird (*Mimus polyglottos*), carolina chickadee (*Poecile carolinensis*), white-breasted nuthatch (*Sitta carolinensis*), carolina wren (*Thryothorus ludovicianus*) and eastern kingbird (*Tyrannus tyrannus*). All of these species would be expected to be present primarily in upland areas.

Common species encountered in wetlands and open water areas include wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), red-winged blackbird (*Agelaius phoeniceus*), green heron (*Butorides virescens*), belted kingfisher (*Ceryle alcyon*), and prothonotary warbler (*Protonotaria citrea*).

Approximately 50 reptile and amphibian species are expected to occur at Fort A.P. Hill. Several of the probable and known reptilian species include the northern copperhead (*Agkistrodon contortrix mokasen*), northern black racer (*Coluber constrictor constrictor*), eastern kingsnake (*Lampropeltis getulus*), eastern garter snake (*Thamnophis sirtalis*), eastern box turtle (*Terrapene carolina*), and snapping turtle (*Chelydra serpentina*).

Several of the known species of amphibians include spotted salamander (*Ambystoma maculatum*), red-spotted newt (*Notophtalmus viridescens*), Northern cricket frog (*Acris crepitans*), American toad (*Bufo arnericanus*), Fowler's toad (*Bufo woodhousei*), green treefrog (*Hyla cinerea*), spring peeper (*Pseudacris crucifer*), bullfrog (*Rana catesbeiana*), pickerel frog (*Rana palustris*) and carpenter frog (*Rana virgatipes*).

Electro-shocking surveys at Fort A.P. Hill have identified a total of 37 species of fishes that inhabit the installation's streams, lakes and ponds. Species observed in the ponds and lakes include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), channel catfish (*Ictalurus punctatus*), golden shiner (*Notemigonus crysoleucas*), creek chubsucker (*Erimycon* sp.), white sucker (*Catostomus comersoni*), eastern mudminnow (*Umbra pygmaea*), and mosquito fish (*Gambusia affinis*). Species found in streams include redbfin pickerel (*Esox americanus*), mud sunfish (*Acantharchus pomotis*), creek chub (*Semotilus atromaculatus*), tessellated darter (*Etheostoma olmstedii*) and American eel (*Anguilla rostrata*).

4.2.7.1.3 Sensitive Species

Several rare plant species that receive legal protection at the federal or state level have been documented to occur on Fort A.P. Hill. They include swamp pink (*Helonias bullata*), small whorled pogonia (*Isotria medeoloides*), and American ginseng (*Panax quinquefolius*). Both swamp pink and small whorled pogonia are listed federally as threatened and in Virginia as endangered. American ginseng has no federal status but is state-listed as threatened, in part due to harvesting pressures. In addition, the New Jersey rush (*Juncus caesariensis*), a state rare plant that has no legal status, has also been documented to occur at Fort A.P. Hill. New Jersey rush has no legal status at the state or federal level, but the DNH monitors it as a state species of special concern because of its rarity within the Commonwealth. DNH documented 16 plants, 5 invertebrates, and 1 amphibian species on the installation that are considered rare.

Swamp pink occurs in semi-permanently to permanently saturated, forested wetland habitats. Small whorled pogonia is a diminutive orchid species usually found within relatively mature, mesic, upland hardwood-dominated forests on nearly level terrain, particularly within colluvial soils of stream terraces. Like small whorled pogonia, American ginseng is usually found in mesic, hardwood-dominated forests within steep, sheltered ravines. New Jersey rush grows in both forested and open, wet, springy bogs; swamps; and borders of wet woods. In certain instances, New Jersey rush has been found in close association with swamp pink.

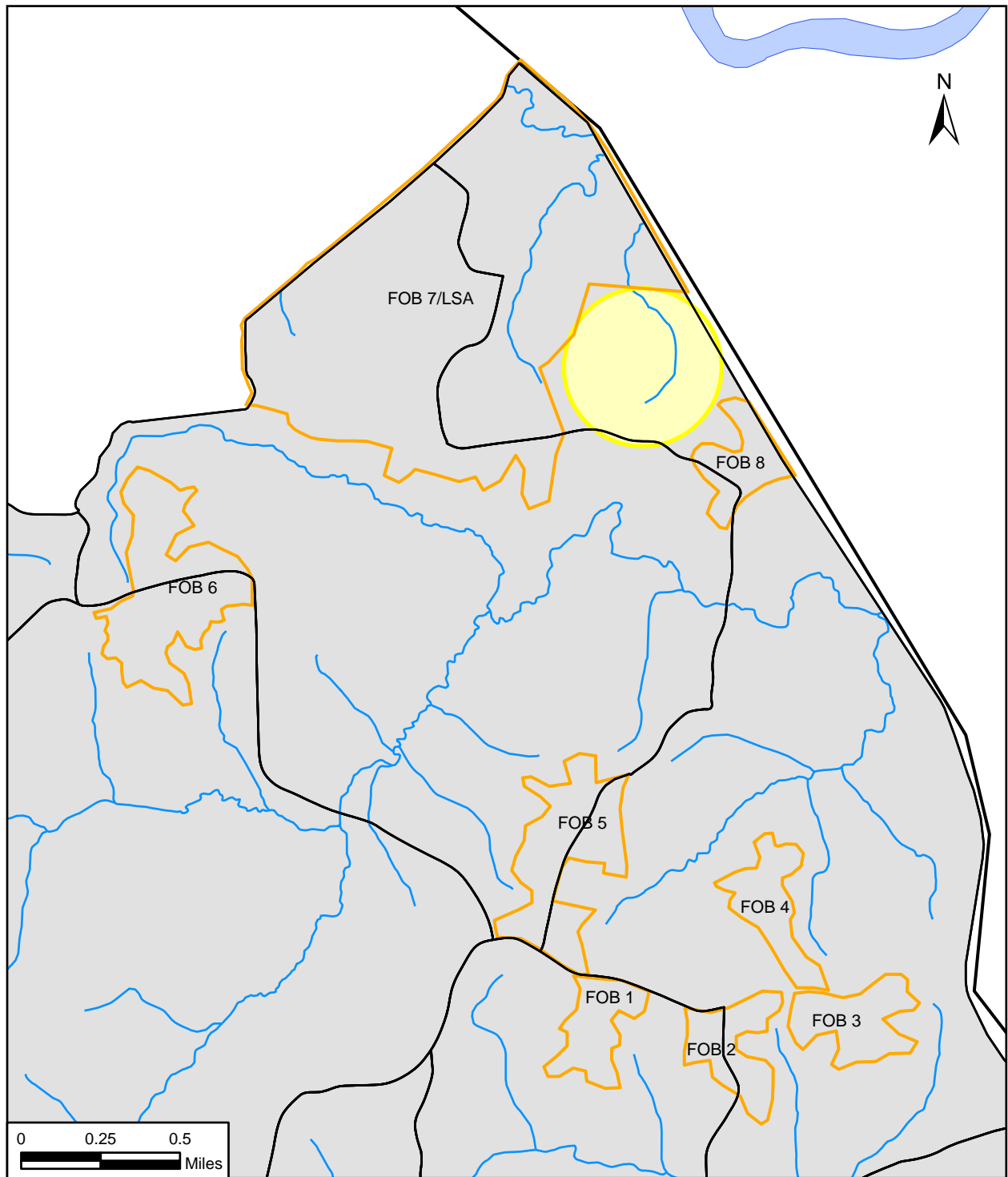
American ginseng is a mountain species that is scattered in forests of the mesotrophic type characteristic of the Pender Camp area (Fleming and Van Alstene 1994). During a 2006 flora survey of the Pender Camp area, ginseng was found in two small areas in the western portion of the area (USGS quadrangle: Rappahannock Academy) (Engineering and Environment 2006). Two centuries of exploitation for medicinal purposes and export to the Far East have led to the decline and rarity of ginseng over much of its range. State regulations require the licensing of collectors and buyers, but unlicensed collecting and poaching from public lands are relatively common, especially in large mountain parks. The population in the northern part of Fort A.P. Hill is not large enough to sustain any appreciable collecting activity (Fleming and Van Alstene 1994). Virginia regulations pertaining to ginseng only prohibit a landowner with the plant on his or her property from selling the plant or moving it across jurisdictional boundaries (Bradshaw, personal communication, 2006).

Regarding mammal species, no federal or state-listed threatened or endangered species or species of concern are known to occur on Fort A.P. Hill. Two state mammal species of special concern, the river otter (*Lontra* [= *Lutra*] *canadensis*) and the star-nosed mole (*Condylura cristata*), have been collected on the installation. River otter is considered uncommon only in the montane and upper Piedmont regions of Virginia and considered relatively abundant in the Coastal Plain. It continues to be legally trapped at Fort A.P. Hill.

VDCR-DNH undertook a comprehensive biological diversity inventory in 1993 that identified two animals and three plants on the installation (Fleming and Van Alstene 1994). Listed bird species identified include the federally-listed threatened bald eagle and state-listed threatened Bachman's sparrow (*Aimophila aestivalis*). Twelve active bald eagle nest sites and one occurrence of Bachman's sparrow have been documented. One of the nests, active as of spring 2006, is southeast of the Pender Camp area. This nest was also documented to be active in 1992, 1993, 1997, 1998, 2001, 2002, and 2005. Primary and secondary protection zones (250 and 440 yards, respectively) for the nest extend to the southeastern boundaries of the proposed LSA (Pender Camp area) (Figure 4.2-16).

No reptile or amphibian federal or state-listed threatened or endangered species or federal species of concern are known to occur at Fort A.P. Hill. The carpenter frog (*Rana virgatipes*), a state species of special concern, is known only from the Mattaponi drainage and thus is restricted to southern areas of the installation. The species is closely associated with sphagnum bogs in coastal plains from New Jersey through Florida. Fort A.P. Hill is within Virginia's Coastal Plain, but the relatively high relief of the Rappahannock River drainage excludes the species' preferred habitats.

According to mollusk distribution maps, two mollusk species with special status (i.e., federal or state threatened, endangered, or of concern) have been recorded in counties near Fort A.P. Hill—the Atlantic pigtoe (*Fusconaia masoni*) and the green floater (*Lasmigona subviridis*), the latter of which is listed as a state species of special concern and is historically known from Fort A.P. Hill. A review of available literature, however, indicated that there have been no recent records of



LEGEND

- Bald Eagle Nest Buffer (440 yd.)
- FOB Site
- Installation Property
- Surface Water

Bald Eagle Nest

Fort A.P. Hill, Virginia

Figure 4.2-16

Source: Fort A.P. Hill GIS, 2006.

these species occurring in Caroline County. The two species are not likely to occur on Fort A.P. Hill (Smock, personal communication, 2006).

4.2.7.1.4 Wetlands

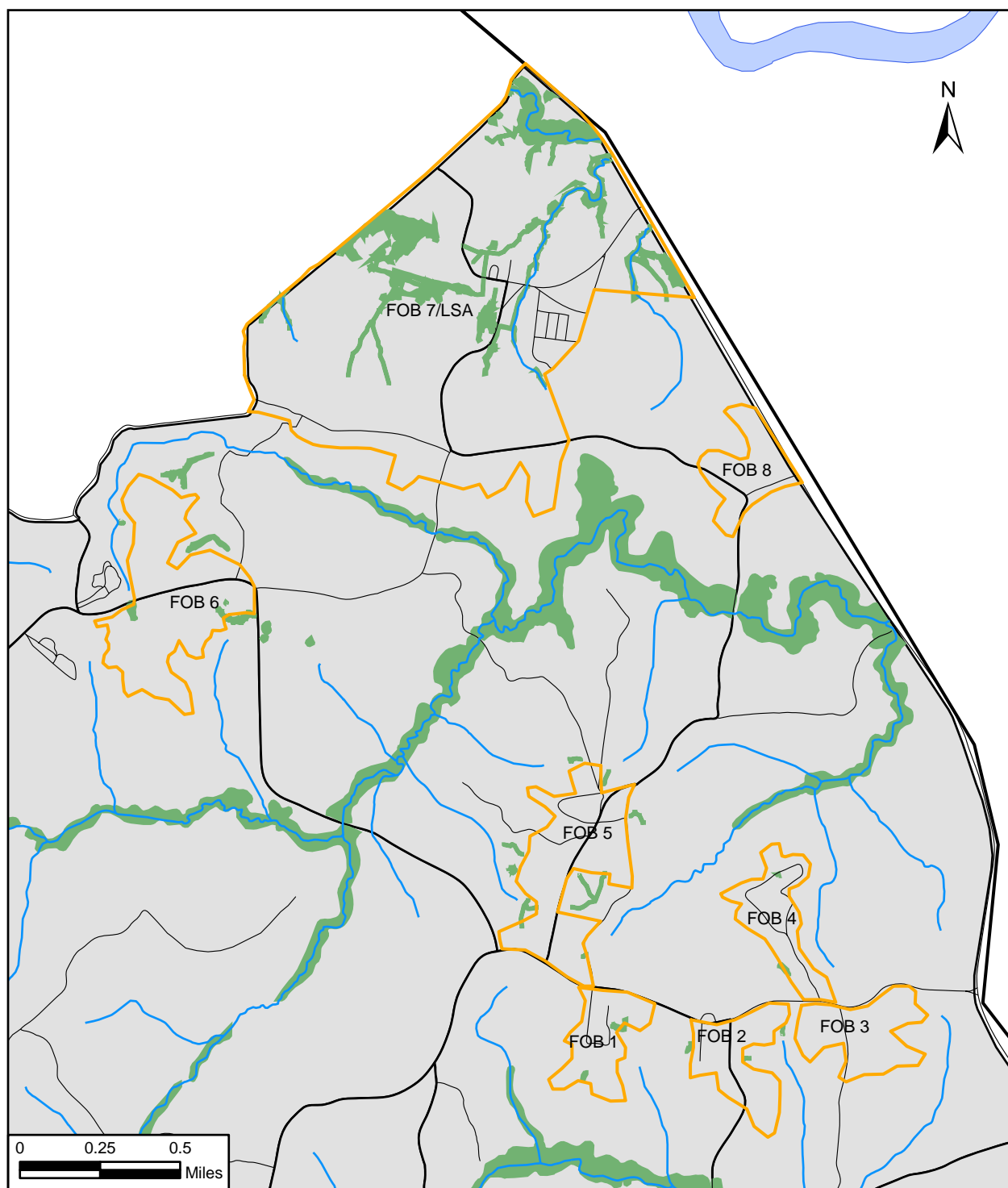
Most wetlands on the Pender Camp area, areas designated for FOBs, and Training Areas 26 and 27 (where the EOD facilities would be established) are associated with streams (riverine wetlands) that drain off the installation (Figures 4.2-17 and 4.2-18). Streams in the areas are both perennial and intermittent. A palustrine wetland at the western edge of the Pender Camp site is connected via small drainages to other wetlands on the site. The palustrine wetland extends beyond the site and off the installation.

A tributary of Portobago Creek runs near Mexico Trail, which forms much of the boundary between Training Areas 27A and 27B, from Igloo Road north, and then generally follows the boundary of Training Area 27B to the western edge of the proposed site. Wetlands and their associated buffers lie within 100 feet to either side of the creek. Other nearby wetlands are those along Mill Creek and its tributaries, northwest of the proposed site. The wetlands have some tidal influence because of their proximity to the Rappahannock River, and they support a mosaic of alder-willow swamps (palustrine scrub wetlands) and grass-dominated marshes. Open water is very limited in these wetlands and is primarily limited to the stream channel (Fleming and Van Alstene 1994).

4.2.7.1.5 Management Programs

The Army's commitment to natural resources management is reflected in *U.S. Army Environmental Strategy into the 21st Century* (U.S. Department of the Army 1992), a strategy built on four pillars that support environmental stewardship and the Army mission. The four pillars represent the four major activity areas, including conservation. The conservation pillar "focuses on managing Army lands responsibly to ensure long-term natural resource productivity so that the installation can achieve its military mission." Natural resources management at Fort A.P. Hill reflects a commitment to environmental stewardship, conservation, and ecosystem management. The Army also manages its natural resources in accordance with the Sikes Act (as amended in the Sikes Act Improvement Act of 1997) and DoD Instruction 4715.3 (*Environmental Conservation Program*), which require that Integrated Natural Resources Management Plans (INRMPs) be developed and maintained for all Army installations, as well as AR 200-3 (*Natural Resources—Land, Forest and Wildlife Management*). Active natural resources management programs at both installations include Integrated Training Area Management (ITAM), Range and Training Lands Assessments (RTLA), Land Rehabilitation and Maintenance (LRAM), Sustainable Range Awareness (SRA), and Training Requirement Integration (TRI) programs. Fort A.P. Hill, having areas within the Virginia Coastal Zone, ensures that environmental stewardship activities at the installation are consistent with and support the principles of the CZMA, as amended, and are implemented in a manner consistent with the Virginia CRMP.

The Army's ITAM program is a management and decision-making process geared toward integrating Army training and other mission requirements for land use with sound natural resource management of its lands (HQDA 2005). The Army's goal in establishing the ITAM program includes components for assessing land quality, monitoring land conditions, and recommending land rehabilitation options; integrating training and testing requirements with land carrying capacity; educating land users to minimize adverse impacts; and providing for training land rehabilitation and maintenance.



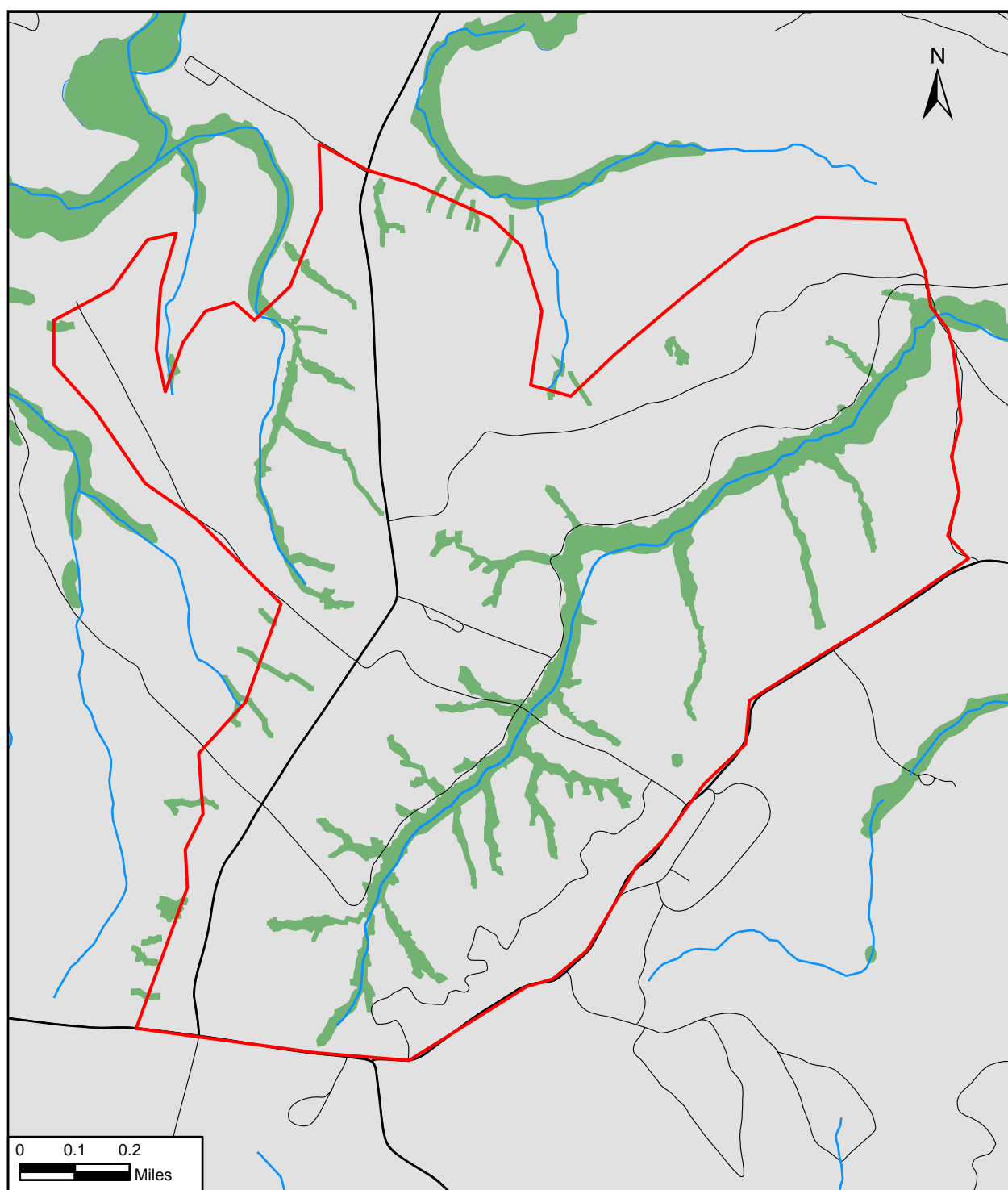
LEGEND
 Wetland
 FOB Site
 Installation Property
 Surface Water

Wetlands- FOB Sites

Fort A.P. Hill, Virginia

Figure 4.2-17

Source: Fort A.P. Hill GIS, 2006.



LEGEND
 Wetland
 EOD Site
 Installation Property
 Surface Water

Wetlands- EOD Site

Fort A.P. Hill, Virginia

Figure 4.2-18

Source: Fort A.P. Hill GIS, 2006.

ITAM's specific program objectives are to (1) establish a long-range natural resource and land inventory, monitoring, and trend analysis; (2) to interface land capability and rehabilitation actions with training requirements to promote long-term mission support; (3) to establish an environmental awareness program that encourages stewardship and wise tactical use of the installation's natural resources; and (4) to provide multipurpose land rehabilitation and maintenance techniques, and provide a realistic environment for training.

The waters and uplands of Fort A.P. Hill have been managed with an emphasis on the harvest of fish and wildlife game species by sport fishers, trappers, and hunters. The installation has been open to hunters since 1946, though the earliest available documentation of hunting by permit does not occur until 1954. Prior to 1966 the recreational use of the installation for all wildlife activities was under the direction of the Special Services officer. After 1966 the responsibility for the management of all fish and game, as well as public recreation uses, was under the Forestry and Wildlife Management section of the Facilities Engineers. Forestry and wildlife management sections are now the responsibility of the Environmental and Natural Resources Division, Directorate of Public Works. The Division performs all activities necessary for the successful management of all of the installation's lands and waters.

Concurrent with fish and wildlife responsibilities, the Environmental and Natural Resources Division has acquired additional wildlife management responsibilities under new Federal laws designed to ensure the maintenance and continued survival of rare, threatened, and endangered species, as well as other non-game species that reside within, or migrate through, Fort A.P. Hill. Fort A.P. Hill has an active management program that provides abundant timber, wildlife habitat, and recreation areas. Loblolly pine is the favored species for timber management because of its rapid growth rate, seed production, root system, and tendency to shed lower limbs. In deciduous forests, forest management favors yellow poplar, white oak, and northern red oak. Forest management activities include stand composition manipulation, timber harvesting, reforestation, prescribed burning, wildfire, insect and disease protection, and control of undesirable species and wildfires.

The management of natural resources has been shifting from a focus on commercially valuable species, game species, or endangered species to a more holistic approach in the management of these, and other, resources. This approach, termed *ecosystem management*, seeks to fully integrate management approaches so that a sustainable level of biological diversity based on ecological community structure can be ensured.

4.2.7.2 Environmental Consequences

4.2.7.2.1 Preferred Alternative

From an ecosystem perspective, in the context of the large land areas and existing natural communities that comprise the Pender Camp area, proposed FOBs, and EOD sites, and of the anticipated comparatively low impact of the Preferred Alternative, only negligible ecosystem-level impacts would be expected. Long-term minor adverse effects on vegetation and wildlife at Fort A.P. Hill, however, would be expected from the creation and use of an LSA at the Pender Camp area, a site for supporting facilities, and an EOD site. Military training activities at the proposed LSA would result in continual disturbances to existing vegetation and resident wildlife. Development of portions of the area would result in significant short- and long-term impacts, and additional training activities would increase disturbance to an area that has not been used frequently for military training for quite some time. However, areas of disturbed vegetation

should rejuvenate quickly (under the ITAM program), and wildlife should become accustomed to the additional military presence or move to other areas.

Development of the proposed EOD site would require site clearing and construction of facilities on previously disturbed and undisturbed land. Some vegetation would be cleared to develop ranges, and wildlife in the immediate vicinity would be temporarily displaced. Of the 1,200 acres of forested habitat designated for the EOD area, about 15 percent, or 180 acres, would be expected to be used for range development.¹³ Any clearing of areas necessary for development of EOD training sites, the LSA, and the FOBs would be done to avoid sensitive forested habitats (for example, the Mount Creek Slopes Conservation Site near FOBs 1-6 and 8) and the habitats of sensitive species. The environmental impact, therefore, would be minor. Wildlife in the area would become accustomed to the noise generated at the range, and wildlife on Fort A.P. Hill are in general tolerant of noise in general because of the continuous military training use at the installation.

Long-term minor adverse impacts on state-listed sensitive species at the proposed LSA would be expected from implementation of the Preferred Alternative. American ginseng found at the site would likely be disturbed by the military training activities. Takings of this species by this activity are unrestricted by state regulations. According to the Virginia Department of Conservation and Recreation, recent studies of reptiles and amphibians at Fort A.P. Hill indicated the presence three rare species, including rainbow snake (*Farancia erytrogramma erytrogramma*), carpenter frog, (*Rana virgitipes*), and lesser siren (*Siren intermedia intermedia*). Site-specific surveys for these species were not conducted for this analysis. Additional surveys would be dependent on the availability of funding. However, all three species are water and wetland dependent. It is anticipated that impacts to wetlands and streams, including adjacent 100-foot-wide upland buffers, would be avoided. Therefore, impacts to these species—even if present near proposed FOBs, LSA, or EOD training area—are not anticipated.

Surveys for small whorled pogonia were conducted on the parcels of land proposed for BRAC development in 2006 and no indication of the species' presence was found. If this species was encountered during implementation of BRAC activities, coordination with the USFWS and VDACS would be initiated to minimize potential impacts. Impacts on the eagle pair that uses the nest shown in Figure 4.2-14 would be avoided through avoidance of the primary (250 yards) and secondary (440 yards) protection zones around the nest. No impacts on known sensitive species and potential habitat at the proposed EOD site would be expected. If any new occurrence of state- and federally listed species is discovered, however, the appropriate state and/or federal agency would be immediately notified, baseline data would be collected, a monitoring effort would commence, and buffers would be established to protect the occurrence and surrounding habitat. For all construction occurring on the installation, Fort A.P. Hill would continue to consult with the DCR-DNH and the DGIF for state and federally listed endangered, threatened, and rare species prior to the activity in any un-surveyed portions of the installation. A coordination letter was sent to the USFWS in June 2005. The Service replied on July 26, 2006, stating that it had reviewed the project information and believes that the project would not affect federally listed or proposed species or designated critical habitat (see Appendix A).

¹³ The estimate of an impact on 15 percent of the area in the proposed EOD training area was derived from an examination of aerial photos and maps of the McKinley Range at Redstone Arsenal, after which the EOD range at Fort A.P. Hill would be designed.

No impacts on wetlands at the proposed LSA and EOD sites would be expected. Fort A.P. Hill has a policy to protect all wetlands and streams by maintaining 100-foot buffers. Development at the proposed EOD site would be limited and would not be expected to significantly contribute to sedimentation in downslope streams. Though wetlands are present at the proposed LSA site, military training would not be expected to affect wetland areas.

Disturbance on soil and vegetation in the southern part of the proposed LSA area would be repaired regularly, thereby minimizing erosion along the steep slopes that lead to Mount Creek and minimizing disturbance to the mature hardwood forests in the Mount Creek Slopes conservation site.

Cumulative Effects

No foreseeable cumulative effects on the species and habitats that would be disturbed by BRAC development would be expected. Other future projects on Fort A.P. Hill could affect similar habitats and species, and separate environmental documents would analyze the effects of those actions. No foreseeable cumulative effects on biological resources from development projects off the installation would be expected.

Mitigation

No mitigation to minimize, avoid, or compensate for adverse effects on biological resources due to implementing of the Preferred Alternative would be required. Fort A.P. Hill would, however, continue to implement Army and federal policies for environmental protection (see sections 1.6.2 and 4.2.7.1.5).

4.2.7.2.2 No Action Alternative

No mitigation to minimize, avoid, or compensate for adverse effects on biological resources due to implementing of the Preferred Alternative would be required. Fort A.P. Hill would, however, ensure to the maximum extent practicable the use of BMPs for limiting impacts on biological resources. Examples of BMPs that Fort A.P. Hill would implement are provided below.

Best Management Practices for Biological Resources

- Limit land disturbance on each land parcel to no more than what is necessary for the desired use or development.
- Revegetate disturbed areas with native, indigenous vegetation.
- Place contractor staging and mobilization areas inside construction footprints to avoid wetland and natural areas wherever practicable.
- Avoid and minimize impacts on wildlife corridors and create corridors where construction would fragment habitats.
- Place protective fencing or signage, as appropriate, around environmentally sensitive areas.
- Promote environmental awareness and conservation through installation communication (e.g., newsletters, newspaper articles, bulletins)

4.2.8 Cultural Resources

4.2.8.1 Affected Environment

4.2.8.1.1 Prehistoric and Historic Background of Fort A.P. Hill

Prehistoric and Contact Periods

The early cultural background of Fort A.P. Hill is the same as that described for Fort Lee. Native American groups began as small, mobile bands of hunters and gatherers, and eventually changed to large, settled communities using hunting, gathering, and horticulture for their subsistence. Contact with Europeans was at first cooperative but soon degenerated until the tribes were pushed west.

Historic Period

Records kept by Captain John Smith in 1610 suggest that although there were no Native American villages on the land that was to become Fort A.P. Hill, there were numerous villages nearby and four in very close proximity. As European settlements expanded through the 1600s and the frontier boundary was pushed inland, European settlers continued to clear land and establish homesteads. By 1676, 71 plantations were situated in the upper part of old Rappahannock County's Sittenborne Parish, which included the area that was to become Fort A.P. Hill (CRI 2000). It is believed that the plantations and farms within what became Fort A.P. Hill were modest in size. During the 1730s, four rolling roads were laid out in Caroline County, enabling planters to transport their tobacco to official inspection warehouses on the Rappahannock River. Two of these roads crossed the installation, the forerunners of Route 301 and Three Notch Road. The state's transportation networks became increasingly more complex, which Virginians perceived as a way to stimulate the local and state economies. Animal husbandry and wood products became increasingly important; however, by 1860 more than half of the county's total acreage was under the plow (CRI 2000).

In June 1861 the Confederate seat of government was moved to Richmond, Virginia. From then on, much of the focus of the Civil War in the east was the territory separating Richmond from Washington, D.C., the federal capital. As a result, much of Virginia's landscape was devastated by war. Caroline County's strategically important position midway between the Union and Confederate capitals resulted in its being mapped by cartographers of both sides. Preliminary research suggests that no pitched battles occurred within the installation boundaries. During the winter of 1862–63, however, winter camps were established within the northern boundaries of the installation for the troops led by A.P. Hill, D.H. Hill, Jackson, and Trimble. Though large bodies of Union troops moved through the countryside south of Fredericksburg, the armies of Union Generals Grant and Sheridan did not approach what became Fort A.P. Hill (CRI 2000).

After the Civil War, corn became the dominant crop raised in Caroline County, followed by wheat, then tobacco. The late 19th century also saw the rise of wood product industries in Caroline County; by 1893 nearly 50 sawmills were in operation, some in the Fort A.P. Hill area. Caroline County witnessed steady population growth during the early 20th century. The area that would become the installation was characterized by farmland interspersed with woodlots and dissected by large and small streams. Isolated hamlets, churches, schools, and farms were scattered across the landscape. Current roads on the installation reflect the ca. 1930s network of county roads (Gray and Pape 2004).

In May 1941 the U.S. military acquired the first acreage for a new range and maneuver ground in the vicinity of Washington, D.C. In June 25,000 Soldiers participated in the first training exercise conducted at the installation. Construction activity began in earnest. Most buildings at Fort A.P. Hill were constructed by the Civilian Conservation Corps, which had its own camps on the installation. When the Corps was terminated in 1942, it transferred its assets, including buildings, to the Army. The present layout of the installation was largely determined during World War II (Gray and Pape 2004). In 1952 the name was changed from A.P. Hill Military Reservation to Camp A.P. Hill, reflecting the relative permanence of the installation. The road system, firing ranges, camp sites, and airfield were improved. In 1974 the name of the installation was changed to Fort A.P. Hill (Gray and Pape 2004).

4.2.8.1.2 Cultural Resources Compliance at Fort A.P. Hill

Cultural resource compliance activities at Fort A.P. Hill to consider effects on historic properties and to consult with potentially interested Native American tribes are conducted in compliance with the same federal legislation described for Fort Lee. Fort A.P. Hill has an ICRMP that directs cultural resource management actions and decisions for the installation (CRI 2000). The ICRMP and the SOPs contained in it ensure compliance with the legislation discussed above (for Fort Lee). A Programmatic Agreement (PA) addressing BRAC activities and the protection of historic properties is being developed for signature by Fort A.P. Hill, the Virginia State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP). Fort A.P. Hill is consulting with other interested parties in preparation of this PA.

4.2.8.1.3 Cultural Resources at Fort A.P. Hill

Overview

Fort A.P. Hill's cultural resource management program operates under the guidance of the ICRMP prepared for the military reservation in 2000 (CRI 2000). The ICRMP contains a summary of the cultural resources identified on the installation, preservation and maintenance strategies for archaeological and architectural resources, cultural resource management strategies and planning, and standard operating procedures to ensure the protection of resources and consideration of effects on resources resulting from military use of the installation.

Fort A.P. Hill has undergone extensive studies to identify historic properties, including archaeological sites and architectural properties. All buildings and structures dating to 1959 and older have been recorded and evaluated for eligibility for listing on the NRHP. In total, 97 buildings and structures have been inventoried (CRI 2000; Gray and Pape 2004). Most of these resources relate to the World War II construction phase of the installation, but several resources pre-date establishment of the installation. Of the 97 recorded resources, two (Liberty Church and Travis Lake Historic District) are considered eligible for listing on the NRHP and one (a mid-19th to early 20th century dwelling) is considered potentially eligible.

Many inventories have been conducted on the installation to identify prehistoric and historic archaeological resources. Inventories of 16,455 acres (almost 22 percent of the installation) have been completed (Fort A.P. Hill geographic information system (GIS) database). These include mostly Phase I surveys to identify sites. However, they also include some Phase II testing of sites to determine areal extent and eligibility for NRHP listing and Phase III data recovery excavations to mitigate potential effects. These inventories have recorded 212 archaeological sites; of these, 38 are Native American sites, 155 are historic period sites, and 19 have both prehistoric and

historic components. Of these sites, 97 have been determined not eligible for listing on the NRHP and 93 have been determined potentially eligible (CRI 2000).

Fort A.P. Hill recently conducted numerous archaeological inventories in preparation for the BRAC realignment. One was a full Phase I inventory of the eight FOBs, with Phase II evaluation testing at five archaeological sites (Louis Berger Group 2006). The proposed EOD area underwent three separate inventories, resulting in full Phase I survey coverage (Roberts 2006, Versar 2006).

There are 21 known historic cemeteries on Fort A.P. Hill (CRI 1999). When the land for Fort A.P. Hill was acquired by the government in the mid-20th century, all known human remains were reinterred off the installation. At that time, only remains associated with marked graves, headstones, footstones, and fences were removed. It is probable that some of the cemeteries still contain graves with human remains. These areas are marked as *sensitive areas* on the installation GIS database.

Cultural Resources in the Areas of Potential Effect

None of the three architectural properties that are eligible or potentially eligible for listing on the NRHP are within the BRAC realignment project areas at Fort A.P. Hill.

Full Phase I and partial Phase II archaeological inventories have recently been completed at the eight proposed FOBs at Fort A.P. Hill, and a total of 31 archaeological sites were found (Louis Berger Group 2006). Table 4.2.8-1 lists the resources recommended as eligible for inclusion in the NRHP and those recommended as potentially eligible (further work is needed to determine whether they are eligible). These sites represent both prehistoric and historic use of the area. The

Table 4.2.8-1
Historic properties within the eight FOB project areas^a

Project area	Site Number	Description	Recommendation
FOB 2	TS3663-03	19 th to 20 th century house site	Further evaluation
FOB 3	TS3663-02	19 th to 20 th century house site	Further evaluation
FOB 4	44CE0402	Civil War camp 1862-1863	Further evaluation
FOB 5	TS3663-04	19 th to 20 th century house site	Further evaluation
FOB 5	TS3663-05	19 th to 20 th century house site	Further evaluation
FOB 6	TS3663-07	19 th to 20 th century house site	Further evaluation
FOB 6	TS3663-08	19 th to 20 th century house site	Further evaluation
FOB 6	TS3663-09	Prehistoric habitation site	Further evaluation
FOB 7/LSA	44CE0110	Woodford Plantation 18 th to 20 th century	Eligible
FOB 7/LSA	44CE0325	Civil War trench 1862-1863	Eligible
FOB 7/LSA	44CE0386	Civil War camp 1862-1863	Eligible
FOB 7/LSA	TS3663-20	18 th to 19 th century domestic site	Further evaluation
FOB 7/LSA	TS3663-22	Civil War camp 1862-1863	Eligible
FOB 7/LSA	TS3663-23	Civil War camp 1862-1863 20 th century house site	Eligible Not eligible
FOB 8	44CE0391	18 th to 19 th century historic road	Further evaluation
FOB 8	44CE0393	19 th to 20 th century house site	Further evaluation

^a The information in this table dates to June 26, 2006.

recommendations of NRHP eligibility and further work in the table for each site are recommendations by the surveyors; they have not been formally determined by Fort A.P. Hill. Fort A.P. Hill will provide the findings of the archaeological surveys, determinations of NRHP eligibility for all identified sites, and determinations of potential effects on eligible sites within the proposed FOBs to the Virginia SHPO for consultation under Section 106 of the NHPA. Compliance with Section 106 would be completed before any BRAC realignment activities took place in these areas.

Three Phase I inventories have been recently completed at the proposed EOD (Roberts 2006, Versar 2006). Sixteen archaeological sites and isolated artifacts were identified. These resources are listed in Table 4.2.8-2. Recommendations for NRHP-eligibility have not yet been made for these sites. Fort A.P. Hill will provide the findings of the complete Phase I archaeological inventory, determinations of NRHP eligibility for all identified sites, and determinations of potential effect on eligible sites within the EOD project area to the Virginia SHPO for consultation under Section 106 of the NHPA. Compliance with Section 106 would be completed before any BRAC realignment activities took place in this area.

There are five cemeteries within the proposed EOD boundaries. These areas are marked as *sensitive areas* on the installation's GIS database because of the possibility that some human remains might still be present.

During the Public Comment period for the Draft EIS, concerns were raised about the potential for impacts from vibrations (both airborne and ground-borne) to the Port Royal Historic District. The District is listed on the National Register and the Virginia Landmarks Register, and comprises several structures built during the 18th and early 19th centuries.

Table 4.2.8-2
Archaeological resources within the EOD project area^a

Temporary Site Number	Description
VR-1	Domestic; possible cellar depressions, concrete footers, artifact scatter
VR-2	Domestic; chimney fall, artifact scatter
VR-3	Earthworks, possibly Civil War-era; long trench-and-berm feature and deep pit
VR-4	Earthworks, possibly Civil War-era; trench and redoubt
VR-5	Domestic, possibly Miller's house built ca. 1800; brick-lined cellar hole, chimney falls
VR-6	Domestic; cellar hole, chimney fall, outlying features
VR-7	deep pit and possibly associated earthworks
VR-8	Domestic, possibly associated with 1930s-era school house; concrete block features
VR-9	Earthworks; intersecting trenches
VR-10	Earthworks; deep pits
VR-11	Military; large reinforced bunker
TS366304-01	4 historic artifacts
TS366304-02	100+ historic artifacts
TS366304-03	6 historic artifacts
TS366304-04	3 historic artifacts
TS366304-05	10 historic artifacts and 1 prehistoric artifact
Isolates	10 historic, 1 prehistoric

^a The information in this table dates to December 2006.

4.2.8.1.4 Native American Resources at Fort A.P. Hill

Fort A.P. Hill has initiated consultation under NEPA and NHPA with potentially interested tribes by sending a letter describing the Preferred Alternative and asking for comments or concerns that the tribes might have. The letters were sent on June 5, 2006, to the North Carolina Eastern Band of the Cherokee Nation, the United Keetoowah Band of the Cherokee Indians of Oklahoma, the Tuscarora Nation of New York, and the Virginia Council on Indians. No response has yet been received from any of the tribes. Though not representing any Federally recognized Indian tribes, the Virginia Council on Indians responded on June 23, 2006, with a letter stating their concerns regarding potential effects of ground-disturbing activities on Native American archaeological resources. They requested that the Council be consulted on any such projects. There are no known resources on Fort A.P. Hill that are considered of traditional importance to any tribe.

4.2.8.1.5 Pending Investigations and Compliance

Fort A.P. Hill conducts its cultural resource management in accordance with applicable federal legislation and with guidance from the ICRMP (CRI 2000). The installation has no existing PAs with the Virginia SHPO and ACHP; however, a PA is being developed specifically to address the proposed BRAC activities. The installation has conducted cultural resource inventories and evaluations in preparation for potential BRAC realignment activities. Further work is needed to complete site evaluations at the EOD project area and at the eight FOB project areas. The results of this work will be provided to the Virginia SHPO for consultation under Section 106 of the NHPA. Also, if any BRAC-related activities were to occur in an area that has not been inventoried for cultural resources, before any such activities began the installation would determine whether any resources would be adversely affected and would consult with the Virginia SHPO in compliance with Section 106 of the NHPA. Any adverse effects would be avoided, minimized, or mitigated, as determined in consultation with the SHPO and in accordance with the installation's ICRMP and the pending BRAC PA.

4.2.8.2 Environmental Consequences

The proposed BRAC activities would likely have no significant impacts on historic properties at Fort A.P. Hill. Although unanticipated adverse effects on historic properties from the BRAC activities are a possibility, compliance with applicable federal legislation, the installation's ICRMP, and the pending BRAC PA would ameliorate any unanticipated effects to less than significant.

4.2.8.2.1 Preferred Alternative

Long-term minor adverse impacts on important cultural resources could occur as a result of the Preferred Alternative at Fort A.P. Hill. The Preferred Alternative would include use of new ranges and construction of facilities at the installation.

All the architectural resources at Fort A.P. Hill have been evaluated for NRHP eligibility. None of the three properties that are eligible or potentially eligible for listing on the NRHP are within the BRAC realignment project areas at Fort A.P. Hill. Thus there would be no adverse impacts on architectural historic properties at Fort A.P. Hill from BRAC realignment activities.

Construction activities are proposed for LSA, potentially another FOB, and the EOD site. All eight FOBs and EOD project areas have been surveyed for archaeological sites. There are historic

properties present in FOBs 2 through 8. Archaeological sites have been identified in the EOD site, and it is likely that some of them would be evaluated as historic properties. In accordance with Section 106 of the NHPA, the installation's ICRMP, and the PA, all historic properties would be fenced during nearby construction activities to ensure avoidance and protection. Best management practices would also be implemented to protect the properties, including measures to prevent changes in erosion patterns, both during and after construction; training and instruction of construction workers on the importance of cultural resources and the need to avoid and protect those resources located near where they are working; and periodic monitoring of historic properties to ensure that avoidance and protection measures are effective. Thus, there would be no adverse impacts on historic properties from construction of facilities and associated infrastructure at any of the eight FOBs or the EOD site.

Fort A.P. Hill has an SOP in place (in the ICRMP) that directs personnel to plan all training exercises and activities in coordination with environmental management personnel to ensure that no training activities occur within 100 feet of known archaeological sites or cemeteries. Training activities associated with the BRAC realignment and conducted at Fort A.P. Hill would follow the SOPs in the ICRMP. Therefore, no impacts on historic properties or cemeteries would be expected to occur as a result of training activities at the eight FOBs or the EOD.

During the public comment period for the Draft EIS, concerns were raised about potential impacts from vibrations (both airborne and ground-borne) occurring to structures in the Port Royal Historic District. Analysis of this potential has been conducted (see detailed description in section 4.2.4, Noise). There is no potential for impacts to this historic district from vibrations resulting from BRAC-related activities at Fort A.P. Hill.

If avoidance and protection of historic properties as discussed above are not feasible, measures would be implemented in accordance with Section 106 of the NHPA, the installation's ICRMP, and the PA to mitigate the adverse effects on the properties. The PA would be developed in consultation with concerned Indian tribes and other interested parties. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding the cultural resources of the installation or region. Because of the mitigation measures, the adverse impacts on the properties would be minor.

When conducting ground-disturbing activities, there is always the possibility that buried archaeological resources will be discovered or unanticipated adverse effects will occur on historic properties that were to be avoided. In accordance with best management practices, construction workers would be trained to recognize when archaeological resources have been discovered or when unanticipated adverse effects have occurred, and instructed to halt construction activities and notify the installation. Although unanticipated adverse effects on historic properties from the BRAC activities are possible, compliance with Section 106 of the NHPA, the installation's ICRMP, and the BRAC PA would mitigate any unanticipated effects. Because of the mitigation measures, the adverse impacts in these cases would be minor.

Cumulative Effects

No cumulative effects on cultural resources would be expected. Adverse effects on NRHP-eligible cultural resources could result if such resources are physically disturbed during the development of BRAC facilities or training exercises. Federal legislation, the Fort A.P. Hill ICRMP, and the PA would be followed in all cases, including construction for BRAC, the AWG

range, and other projects on Fort A.P. Hill, to compensate for any impacts. Thus, any adverse cumulative impacts that would occur would be considered minor.

Mitigation

Mitigation measures that the Army is considering to avoid, minimize, and compensate for impacts on historic properties at Fort A.P. Hill are listed below.

- Fence all historic properties during nearby construction activities.
- Monitor historic properties periodically to ensure that avoidance and protection measures are effective.
- If avoidance and protection of historic properties are not feasible, measures would be implemented in accordance with Section 106 of the NHPA, the installation's ICRMP, and the BRAC PA to mitigate the adverse effects on the sites. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region.

4.2.8.2.2 No Action Alternative

Under the No Action Alternative there would be no impacts on important cultural resources at Fort A.P. Hill. There would be no construction activities and no use of new range areas. Therefore, no effects on historic properties at Fort A.P. Hill would occur as a result of this alternative.

4.2.9 Socioeconomics

4.2.9.1 Affected Environment

The ROI for the Fort A.P. Hill socioeconomic environment is defined as Caroline, Essex, King George, Spotsylvania, and Stafford Counties and Fredericksburg City, Virginia. The ROI covers an area of 1,653 square miles in northeastern Virginia. Fort A.P. Hill is within the boundaries of Caroline County along the I-95 corridor between two major metropolitan statistical areas (MSAs): the Baltimore-Washington MSA comprising a population in excess of 2.4 million and the Richmond-Petersburg MSA with a population of more than 1.1 million (Fort A.P. Hill 2005; U.S. Army; Fort A.P. Hill 2006). The towns of Bowling Green (just south of the installation) and Port Royal (just north of the installation) in Caroline County are the closest towns to Fort A.P. Hill and provide community support to the installation. Fredericksburg City is about 20 miles north of Fort A.P. Hill's main gate. These communities and the counties surrounding Fort A.P. Hill have a lengthy history of support for the installation (Fort A.P. Hill 2005).

The baseline year for socioeconomic data is 2005, the date of the BRAC Commission's announcement. Where 2005 data are not available, the most recent data available are presented. Projections beyond 2005 are also provided, as appropriate, to illustrate trends.

4.2.9.1.1 Economic Development

Employment and Industry

The ROI has a labor force of about 162,000 individuals (BLS 2006). The largest employment sector is the government and government enterprises sector, which accounts for 17 percent of

total ROI employment. Of that 17 percent, 11 percent are state and local government jobs, 3 percent are military, and 3 percent are federal civilian jobs. Other prominent employment sectors are retail trade, which accounts for 14 percent of total employment; construction (9 percent); health care and social assistance (8 percent); accommodation and food services (8 percent); and professional and technical services (7 percent) (BEA 2006). Farming accounts for 1 percent of ROI employment.

Fort A.P. Hill supports a working population of 390 civilian employees and nearly 700 military personnel. Seasonal, temporary employees number 100 or more during peak training periods (Fort A.P. Hill 2005).

The 2005 annual unemployment rate for the ROI was 2.7 percent—lower than the national unemployment rate of 5.1 percent. The ROI unemployment rate was up from the 2000 annual rate of 1.8 percent (Table 4.2.9-1).

Table 4.2.9-1
Fort A.P. Hill ROI labor force statistics

	Labor force	Employed	Unemployed	Unemployment rate
2005				
Caroline County	12,409	11,949	460	3.7
Essex County	5,444	5,201	243	4.5
Fredericksburg City	11,470	10,957	513	4.5
King George County	9,560	9,268	292	3.1
Spotsylvania County	61,246	59,818	1,428	2.3
Stafford County	61,803	60,331	1,472	2.4
ROI	161,932	157,524	4,408	2.7
2000				
Caroline County	10,933	10,696	237	2.2
Essex County	5,120	4,984	136	2.7
Fredericksburg City	10,262	10,027	235	2.3
King George County	8,356	8,195	161	1.9
Spotsylvania County	48,232	47,413	819	1.7
Stafford County	48,134	47,325	809	1.7
ROI	131,037	128,640	2,397	1.8

Source: BLS 2006

Income

The ROI's PCPI was about \$31,500 in 2004 (Table 4.2.9-2). This is an increase of 13 percent from 2000, compared to the national change of 11 percent. The ROI income is lower than the national and state income levels. Within the ROI, Caroline and Essex Counties had lower incomes than the other counties comprising the ROI, which most likely reflects the rural nature of the two counties compared to the more rapidly growing, urbanizing counties of King George, Spotsylvania, and Stafford (US Army, Fort A.P. Hill 2006).

Table 4.2.9-2
Fort A.P. Hill per capita personal income

Jurisdiction	Year 2000 PCPI	Year 2004 PCPI
Caroline County	\$23,819	\$26,974
Essex County	\$22,334	\$25,145
King George County	\$27,879	\$33,004
Spotsylvania County + Fredericksburg City	\$28,360	\$31,950
Stafford County	\$28,747	\$32,378
ROI	\$27,836	\$31,550
Virginia	\$31,087	\$36,160
United States	\$29,845	\$33,050

Source: BEA 2006

Note: BEA reports income data for Fredericksburg City in combination with Spotsylvania County.

Population

Population characteristics in the ROI are provided for the baseline year, 2005. To illustrate trends, historical data are presented for 1990 and 2000.

Table 4.2.9-3 presents population data for the ROI. In 2005, the ROI population was 311,847, an increase of 24 percent over the 2000 population of 251,033 (U.S. Census Bureau 2000). This rate of growth was much higher than the state of Virginia's and the United States, which had population increases of 7 percent and 5 percent, respectively. Caroline County's population increased by 16 percent, and King George, Spotsylvania, and Stafford counties all grew by more than 20 percent. Essex County and Fredericksburg City experienced more modest growth. Two counties in the ROI were among the fastest-growing counties in the nation. Between 2000 and 2004, Stafford County ranked number 20 in the list of 100 fastest growing counties. Spotsylvania County ranked 24th (U.S. Census Bureau 2006a). Urban sprawl contributes to the high population growth. As the Richmond and Northern Virginia metropolitan areas expand, more people are moving into the outer counties such as Spotsylvania and Stafford.

Table 4.2.9-3
Fort A.P. Hill ROI population trends

City or county	1990	2000	2005	Percent change, 1990–2000	Percent change, 2000–2005
Caroline County	19,217	22,121	25,563	15%	16%
Essex County	8,689	9,989	10,492	15%	5%
Fredericksburg City	19,027	19,279	20,732	1%	8%
King George County	13,527	16,803	20,637	24%	23%
Spotsylvania County	57,403	90,395	116,549	57%	29%
Stafford County	61,236	92,446	117,874	51%	28%
ROI	179,099	251,033	311,847	40%	24%
Virginia	6,187,358	7,078,515	7,567,465	14%	7%
United States	248,709,873	281,421,906	296,410,404	13%	5%

Sources: U.S. Census Bureau 1990, 2000

Note: 2005 data is estimated as of July 1, 2005.

4.2.9.1.2 Sociological Environment

Housing

On-Post Housing. Fort A.P. Hill has 25 on-post family housing units. The homes have two, three, or four bedrooms. The housing units are primarily occupied by key and essential permanent party civilian personnel. The homes are off of A.P. Hill Drive, near the installation's Main Gate (Fort A.P. Hill Housing Office 2006).

Fort A.P. Hill also has barracks and bachelor officers' quarters (BOQs) for unaccompanied Soldiers. The Wilcox Camp Site has 23 barracks and 8 BOQs with a total of 4,422 beds. The Longstreet Camp Site has five barracks with a total of 520 beds. The occupancy rate of these housing units is seasonal. During the peak season of March through mid-November, occupancy is about 75 percent. During the winter season, occupancy drops to 30–40 percent or less (Fort A.P. Hill Directorate of Logistics 2006).

Off-Post Housing. The ROI has experienced strong housing market growth since 2000. The ROI had 111,018 housing units as of 2004, an increase of 18 percent over the 2000 housing stock of 94,527 (Table 4.2.9-4) (U.S. Census Bureau 1990, 2000). The ROI housing market can be characterized as primarily single-family homes occupied by the home owner, with the exception of Fredericksburg City, where 50 percent of the housing units are in multiunit structures with a homeownership rate of 36 percent (Table 4.2.9-5). The ROI's median home ownership rate of 79 percent is high compared to the state and national averages of 68 percent and 66 percent, respectively. The median value of owner-occupied housing units ranged from \$88,900 in Caroline County to \$156,400 in Stafford County, with an ROI median value of \$125,850, about the same as the state value but about \$6,200 higher than the national median home value of \$119,600 (Table 4.2.9-5). Median gross rent ranged from \$539 in Essex County to \$842 in Stafford County, with a median gross rent for the ROI of \$637. In comparison, the state median gross rent was \$650, and the national median gross rent was \$602.

**Table 4.2.9-4
Fort A.P. Hill ROI housing units**

Jurisdiction	Housing units, 1990	Housing units, 2000	Housing units, 2004	Percent change, 1990–2000	Percent change, 2000–2004
Caroline County	7,292	8,889	9,815	22%	10%
Essex County	4,073	4,926	5,250	21%	7%
Fredericksburg City	8,063	8,888	9,084	10%	2%
King George County	5,280	6,820	7,859	29%	15%
Spotsylvania County	20,483	33,329	40,583	63%	22%
Stafford County	20,529	31,405	38,427	53%	22%
ROI (median)	65,720	94,257	111,018	43%	18%
Virginia	2,496,334	2,904,192	3,116,827	16%	7%
United States	102,263,678	115,904,641	122,671,734	13%	6%

Source: U.S. Census Bureau 1990, 2000, 2006b

**Table 4.2.9-5
Fort A.P. Hill ROI housing characteristics**

	Home ownership rate, 2000	Housing units in multiunit structures, 2000	Median value, owner occupied units, 2000
Jurisdiction	Percent	Percent	Dollars
Caroline County	82%	3%	\$88,900
Essex County	77%	7%	\$98,700
Fredericksburg City	36%	50%	\$135,800
King George County	72%	9%	\$123,200
Spotsylvania County	82%	6%	\$128,500
Stafford County	81%	8%	\$156,400
ROI (median)	79%	7%	\$125,850
Virginia	68%	22%	\$125,400
United States	66%	26%	\$119,600

Source: U.S. Census Bureau 2000

The median ROI homeowner vacancy rate was at 2.0 percent in 1990 and 2000 (Table 4.2.9-6). This rate is slightly above the state homeowner vacancy rate of 1.5 percent and the national rate of 1.7 percent. The median ROI rental vacancy rate decreased between 1990 and 2000 from 7.0 percent to 6.0 percent (Table 4.2.9-6). The ROI rental vacancy rate is slightly above the state rate of 5.2 percent but lower than the national rate of 6.8 percent. The ROI had 6,553 vacant housing units in 2000 (Table 4.2.9-6). Of those vacant units, 1,132 units were for sale, 1,113 were for rent, and the remainder were vacant for seasonal, recreational, or occasional use; for migrant workers; or other reasons (U.S. Census Bureau 2000).

**Table 4.2.9-6
Fort A.P. Hill ROI Housing Vacancy**

	Vacant housing units		Homeowner vacancy rate		Rental vacancy rate	
Jurisdiction	1990	2000	1990	2000	1990	2000
Caroline County	661	868	1.8	2.0	6.5	6.0
Essex County	815	931	1.5	1.6	5.4	3.4
Fredericksburg City	613	786	2.0	2.1	6.8	8.2
King George County	544	729	1.9	1.7	6.4	6.8
Spotsylvania County	1,538	2,021	2.9	1.7	6.8	6.1
Stafford County	1,114	1,218	2.5	1.5	7.6	5.4
ROI	5,285	6,553	2.0 ^a	2.0 ^a	7.0 ^b	6.0 ^b
Virginia			2.1	1.5	8.1	5.2
United States			2.1	1.7	8.5	6.8

Source: U.S. Census Bureau 1990, 2000

Notes:

^a ROI homeowner vacancy rate is a median.

^b ROI rental vacancy rate is a median.

Law Enforcement, Fire Protection, Medical Services

Fort A.P. Hill's Directorate of Emergency Services conducts law enforcement, physical security, fire prevention and protection, and force protection operations. The Provost Marshall's Office oversees law enforcement and physical security including vehicle and weapons registration, traffic accident and criminal investigations, crime prevention, general and absent without leave investigations, and training. The Fort A.P. Hill fire department provides fire prevention, fire protection, special fire operations, hazardous material response, aircraft rescue, and fire prevention education and training. The fire department has a mutual aid agreement with Caroline County (Fort A.P. Hill 2005). On the basis of DoD Fire and Emergency Services minimum staffing requirements and the square footage of the installation's structures, Fort A.P. Hill has the requirement for two engine companies. However, there is only one engine company, which is at Anderson Camp. Fort A.P. Hill has not received the authorization or funding for the second engine company. If or when it is approved, the second engine company would be sited at Heth and Mahone Camp sites, near the assault landing strip. Fort A.P. Hill has one medical crew, also stationed at Anderson Camp, to provide emergency medical response (Directorate of Emergency Services, personal communication, 2006).

City, county, and state police departments provide law enforcement in the ROI. There were more than 500 city and county law enforcement employees (officers and civilians) for the seven-county ROI as of 2004. The state of Virginia has about 1,800 state police officers (DOJ-FBI 2006). Caroline County is served by its sheriff's department, which has 32 full-time, sworn-in personnel and 17 state police officers (Fort A.P. Hill 2005). The ROI has 16 career or volunteer fire departments and 40 fire stations. Each county or city in the ROI has at least one fire department. The majority of the fire departments (13 departments or 80 percent) are volunteer and the remaining three departments are career (NFPA 2005; Caroline County 2006). Caroline County's Department of Fire, Rescue, and Emergency Management has six fire stations, three rescue squads, and is staffed by a full-time director and deputy director and more than 300 volunteers (Caroline County 2006).

Fort A.P. Hill's Lois E. Wells Clinic is part of Fort Belvoir's DeWitt Army Medical Center. The Lois E. Wells Clinic offers primary medical care and ambulance service for active duty, retirees, and family members (Fort A.P. Hill 2005). The closest hospital to Fort A.P. Hill is the Mary Washington Hospital in Fredericksburg, about 40 minutes northwest of the installation. The majority of Fort A.P. Hill emergency cases are transported to this hospital. However, if more intensive care is required, patients are taken to the Virginia Commonwealth University Medical Center in Richmond, which has a level one trauma center (Directorate of Emergency Services, personal communication, 2006). Virginia Commonwealth University Medical Center is about an hour south of the installation.

The Mary Washington Hospital is a short-term acute care facility with 412 patient beds. The hospital has an emergency room, inpatient surgery, cardiovascular services, offers treatment of neurological disorders, oncology services, rehabilitation therapy, orthopedic services, radiology, and imaging (AHD 2006; MediCorp 2006).

Besides Mary Washington, there is one other hospital in the ROI. The Riverside Tappahannock Hospital in Tappahannock, Essex County, is a short-term acute care facility with 67 patient beds. The hospital offers an emergency room, inpatient surgery, intensive care unit, hospice, radiology and imaging services, chemotherapy, and joint replacement (AHD 2006).

Schools

There are no primary or secondary schools on Fort A.P. Hill. Children living on-post can attend the public schools in the town of Bowling Green, part of the Caroline County School District. Children of Fort A.P. Hill military and civilian personnel living off-post attend the school district for the area in which they reside. The following public school districts serve the ROI: Caroline County Public Schools, Essex County Public Schools, Fredericksburg City Public Schools, King George County Public Schools, Spotsylvania County Public Schools, and Stafford County Public Schools. Together these school districts have 71 schools: 3 primary, 36 elementary, 17 middle, and 15 high schools. Total enrollment was about 58,000 students. The median student-to-teacher ratio was 13:1, lower than the U.S. average of 16:1 (NCES 2005).

The Caroline County Public School District has six schools: two primary (pre-kindergarten through second grade), two elementary (grades 3–5), one middle school (grades 6–8), and one high school (grades 9–12). Total student enrollment was about 1,700, and the student-to-teacher ratio was 12:1 (NCES 2005).

Family Support and Social Services

Fort A.P. Hill Directorate of Human Resources provides military and civilian personnel support. The Directorate of Morale, Welfare, and Recreation offers programs, activities, facilities, and services to enhance Soldiers' quality of life. There is no chaplain stationed at Fort A.P. Hill, but religious services are available upon request and are coordinated with Fort Belvoir's Chaplain's Office (Fort A.P. Hill 2005).

The Virginia Department of Social Services has a local office in each county of the ROI and Fredericksburg City. Social services departments administer, coordinate, and provide direct and indirect service delivery for state and federally mandated assistance programs (Spotsylvania County 2006). Assistance is provided to all citizens of Virginia, including active duty military personnel (and their families) stationed in the state (VDSS 2006). Services can include a food bank; food stamps; Medicaid; state-sponsored children's medical insurance program; supplemental hospital coverage; general relief providing assistance to pay for rent, utilities, prescriptions, or limited medical visits; temporary financial subsidies to assist with the financial needs of children; heating fuel assistance; child and adult day care; foster care and adoptions; counseling; and prevention of abuse and neglect.

Caroline County's Social Services Department is in Bowling Green and offers assistance in child and adult protective services, abuse, foster parenting, food stamps, and other services. The Fredericksburg Area Food Bank in Fredericksburg has partnerships with various Caroline County churches and nonprofit organizations for food distribution to those in need through various programs such as Emergency Food Boxes, Food for Life, Kids Café, and USDA Commodities (Caroline County 2006).

Shops, Services, and Recreation

The installation has a PX, a barber shop, a chapel and auto crafts center, an outdoor swimming pool (open seasonally), and a Community Activities Center (CAC). The CAC has a Nautilus room, Hammer Strength room, a recreation room, an indoor basketball gymnasium, an Internet café, and a guest services office that sells discount tickets to local area attractions and trip packages. Fort A.P. Hill catering service can provide breakfast, lunch, and dinner to troops at the installation's campsites and food service for special events (Fort A.P. Hill 2005).

Fort A.P. Hill has gymnasium and recreation center with weight- and cardio-training equipment, pool tables, air hockey, foosball, television, and video games. The gym is open 24 hours a day, 7 days a week. There are recreation fields designed for softball, volleyball, football, and other sports activities at each of the installation's camp sites (Fort A.P. Hill 2005).

Recreational opportunities on-post that are available to military personnel and also to the public (i.e., to licensed permit holders and registered guests) include hunting, fishing, and camping (in designated areas). Training areas are strictly off limits except for hunting and fishing, which is permitted only by special sign-in procedures. On-post recreational accommodations are available at the Lodge at Travis Lake, the Travis Lake cottages, the Dolly Hill guest house, the cabins at Bullocks Pond, and Champ's Camp recreational vehicle park (Fort A.P. Hill 2005).

The National Boy Scout Jamboree has been hosted by Fort A.P. Hill since 1981. The event is held every 4 years and lasts for 10 days. In 2005, the jamboree attracted more than 40,000 scouts (Fort A.P. Hill 2005).

Caroline County has an extensive parks and recreation program, with 10 softball fields, 4 tennis courts, a golf course, and numerous private swimming pools (Fort A.P. Hill 2005). There are many community activities throughout the year, including the Caroline County Fair in August, Discovery Days Festival in Stafford County, Bowling Green's Harvest Festival in October, July 4th festivals, Port Royal Day, home tours, fish fries, dances, and holiday parades. George Washington's boyhood home, Ferry Farm, is in Stafford County just east of the city of Fredericksburg. The region has many Revolutionary and Civil War sites, including four battlefields that are preserved as National Parks (Fort A.P. Hill 2005). Lake Anna State Park in Spotsylvania County, Aquia Landing in Stafford County, and the Rappahannock, Potomac, and Mattaponi Rivers provide scenic beauty and plenty of opportunity for water sports such as boating, fishing, swimming, canoeing, kayaking, and water skiing. The city of Fredericksburg has a historic downtown area with shops and restaurants as well as historic homes and Civil War sites. Fredericksburg also has a shopping mall and numerous shopping plazas with local and national chain retail, grocery, and big-box discount stores. Fort A.P. Hill is just off I-95 with easy access to Washington, D.C. and Richmond and the many cultural and recreational opportunities available in those cities.

4.2.9.1.3 Environmental Justice

Environmental justice addresses race, ethnicity, and the poverty status of populations within the ROI. On February 11, 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The order is designed to focus the attention of federal agencies on the human health and environmental conditions in minority and low-income communities. Environmental justice analyses are performed to identify potential disproportionately high and adverse impacts from proposed actions and to identify alternatives that might mitigate these impacts. 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 negative environmental consequences resulting from federal programs or policies. Consideration of environmental justice concerns typically includes race, ethnicity, and the poverty status of populations in the vicinity of where a proposed action would occur. Table 4.2.9-7 lists this data for the ROI, Caroline County, and for the towns of Bowling Green and Port

Royal, which border Fort A.P. Hill. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the Executive Order.

Table 4.2.9-7
Fort A.P. Hill ROI race, ethnicity, and poverty data

	Town of Bowling Green	Town of Port Royal	Caroline County	ROI
White	79%	59%	62%	77%
Black or African American	18%	38%	34%	16%
American Indian and Alaskan Native	0.5%	0%	1%	0.4%
Asian	0%	0%	0.4%	1%
Native Hawaiian and other Pacific Islander	0%	0%	0.01%	0.1%
Some other race	0.1%	0%	0.1%	0.2%
Two or more races	0.3%	2%	1%	2%
Hispanic or Latino origin	2%	0.6%	1%	3%
Total minority	21%	41%	38%	23%
Persons living in poverty	14%	7%	9%	6%

Source: U.S. Census Bureau, 2000

Note: Percent minority is the sum of Black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian and other Pacific Islander, some other race, two or more races, and Hispanic or Latino.

Minority populations should be identified where either the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). The population of the state of Virginia was 30 percent minority (U.S. Census Bureau 2000). As shown in Table 4.2.9-7, the proportion of the population of a minority race or ethnicity was 23 percent for the ROI, 38 percent for Caroline County, 41 percent for the town of Port Royal, and 21 percent for the town of Bowling Green.

Poverty thresholds as established by the Census Bureau are used to identify low-income populations (CEQ 1997). Poverty status is reported as the number of persons or families with income below a defined threshold level. The 2000 Census defines the poverty level as \$8,794 of annual income, or less, for an individual and \$17,603 of annual income, or less, for a family of four. As shown in Table 4.2.9-7, the proportion of the population living below poverty level was 6 percent for the ROI, lower than the state of Virginia's poverty rate of 10 percent (U.S. Census Bureau 2000). Looking at the communities in closest proximity to or surrounding Fort A.P. Hill,

Caroline County had a poverty rate of 9 percent, the town of Bowling Green was at 14 percent, and the town of Port Royal was at 7 percent.

4.2.9.1.4 Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), seeks to protect children from disproportionately incurring environmental health risks or safety risks. 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 might diminish protection from standard safety features; and their behavior patterns might make them more susceptible to accidents. Because 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.

The training lands and ranges of Fort A.P. Hill are restricted to authorized personnel only and access is limited, excluding the entry of unauthorized adults and children (U.S. Army, Fort A.P. Hill. 2006).

4.2.9.2 Environmental Consequences

4.2.9.2.1 Preferred Alternative

Economic Development

EIFS Model Results. Long-term minor beneficial effects would be expected. The economic effects of implementing the proposed action were estimated using the EIFS model (see Appendix E). Because no planning charettes have been held and no funding has been authorized for the proposed structures and facilities at Fort A.P. Hill (see section 2.2 and Appendix E), a total cost range of \$8 to \$35 million was estimated. These low- and high-end estimates were input into the EIFS model as the change in expenditures. Under both the low- and high-end estimates, long-term minor beneficial effects would be expected. If the proposed facility construction occurs and additional jobs are created, this would result in beneficial impacts for the Fort A.P. Hill ROI in terms of long-term job creation, income generation, and spending. Under the low-end estimate, about 60 direct jobs could be created (Table 4.2.9-8). This direct job creation could generate an increase in direct income of nearly \$1.8 million. In addition, direct sales volume could increase

Table 4.2.9-8
Fort A.P. Hill EIFS model output—low cost estimate

Indicator	Projected change	Percentage change	RTV range
Direct sales volume	\$2,866,300		
Induced sales volume	\$4,586,080		
Total sales volume	\$7,452,380	0.10%	-9.02% to 12.61%
Direct income	\$1,823,412		
Induced income	\$712,022		
Total income	\$2,535,433	0.05%	-7.47% to 11.46%
Direct employment	61		
Induced employment	18		
Total employment	79	0.08%	-6.18% to 4.21%
Local population	0		
Local off-post population	0	0.00%	-2.46% to 3.40%

by about \$2.9 million. This direct job creation, income generation, and spending would also result in secondary job creation, income generation, and spending. An estimated 80 jobs could be created (direct plus indirect) (Table 4.2.9-8). In addition, income generation could increase by a total of about \$2.5 million and total sales volume could increase by more than \$7.4 million. These increases in business volume, income, and employment would not exceed historical fluctuations and would therefore be considered minor. No increase in population is projected. The ROI has an available labor force of more than 160,000 people, and new jobs would most likely be filled by persons residing in the ROI.

Under the high-end estimate, about 83 direct jobs and 52 secondary jobs could be created, for a total of about 135 jobs (Table 4.2.9-9). This job creation could generate a total increase in income of nearly \$4.7 million. In addition, total sales volume could increase by almost \$21.5 million.

These increases in business volume, income, and employment would not exceed historical fluctuations (i.e., the RTV thresholds) and would therefore be considered minor. No increase in population is projected. The ROI has an available labor force of more than 160,000 people, and new jobs would most likely be filled by persons residing in the ROI.

Table 4.2.9-9
Fort A.P. Hill EIFS Model output—high cost estimate

Indicator	Projected change	Percentage change	RTV range
Direct sales volume	\$8,266,300		
Induced sales volume	\$13,226,080		
Total sales volume	\$21,492,380	0.28%	-9.02% to 12.61%
Direct income	\$2,661,800		
Induced income	\$2,053,444		
Total income	\$4,715,244	0.09%	-7.47% to 11.46%
Direct employment	83		
Induced employment	52		
Total employment	135	0.13%	-6.18% to 4.21%
Local population	0		
Local off-post population	0	0.00%	-2.46% to 3.40%

Sociological Environment

Housing. No adverse effects on housing would be expected. The Soldiers that would train at Fort A.P. Hill would stay on-post in barracks or camp in tents during their week of training. A new barracks might be constructed on Fort A.P. Hill. There is also some available capacity at the Wilcox and Longstreet Camp Site barracks. There would be no effect on on- or off-post family housing.

Law Enforcement, Fire Protection, Medical Services. Long-term minor adverse effects would be expected. The proposed action could have about 900 Soldiers arrive each Monday from Fort Lee to train on Fort A.P. Hill through Thursday, at which point the Soldiers would return to Fort Lee. The installation has only one medical crew. Travel time from Fort A.P. Hill's medical center to the Pender Camp area and to Training Areas 26 and 27 can take up to 20 minutes, with an

additional 40 minutes or more if the patient needs to be transported to a hospital. An additional medical crew would be needed. Ideally, the new medical center would be collocated with a second fire engine company (if or when the second engine company is authorized and funded) at the Heth and Mahone Camp Sites, near the assault landing strip (Directorate of Emergency Services, personal communication, 2006). Siting the medical crew at the Heth and Mahone Camp Sites would reduce travel time to the training sites. Long-term minor adverse effects on medical care and response time would be expected if a second medical crew is not acquired.

No adverse effects on police or fire services would be expected. Fort A.P. Hill Directorate of Emergency Services does not anticipate an increase in crime. The proposed action could result in an increase in security checks and operation of the gate at Pender Camp (to allow the buses from Fort Lee to enter and exit the installation), but these would not require an increase in law enforcement staff. The proposed action also would not change the fire department requirements. If the additional facilities proposed under the BRAC action were built, the additional building square footage would not increase Fort A.P. Hill's fire department requirement to three engine companies; it would remain at two (Directorate of Emergency Services, personal communication, 2006).

Schools. No effects would be expected. The proposed action would not impact local schools.

Family Support, Services, and Recreation. No adverse effects would be expected. Fort A.P. Hill's working population is 1,090 (700 military and 390 civilians). The proposed action would create an estimated 50 civilian jobs at the installation, or a 5 percent increase in the workforce. The additional personnel would create a negligible increase in demand for on-post services.

Environmental Justice

No effects would be expected. The proposed training and construction activities at Fort A.P. Hill are not actions that have the potential to substantially affect human health or the environment by excluding persons, denying persons benefits, or subjecting persons to discrimination because of their race, color, national origin, or income level. No low income or minority populations exist on the installation or immediately adjacent to the proposed training or construction sites.

Protection of Children

No effects would be expected. The proposed training and construction activities would be sited in Fort A.P. Hill's training lands and ranges. The training lands and ranges of Fort A.P. Hill are restricted to authorized personnel only and access is limited, excluding the entry of unauthorized adults and children.

Cumulative Effects

Long-term minor beneficial economic effects would be expected. The operation of Fort A.P. Hill continues to economically benefit the ROI by providing jobs, income, and the purchase of goods and services. The proposed action for the training of Fort Lee Soldiers at Fort A.P. Hill, along with the construction of facilities to support the training, would provide minor long-term beneficial economic impacts in the form of additional employment, income, and sales. A future action that could also add to the region's economy is the proposed AWG ranges at Fort A.P. Hill. Other ongoing or proposed future development projects in the ROI include the completion of the Bowling Green Bypass; the opening of two new manufacturing plants (FSI Manufacturing in Caroline County and a plant in King George County); the opening of a new complex for M.C. Dean, a systems integration and engineering firm in Caroline County; a planned expansion of King George County's Industrial Park; a proposed Wal-Mart Supercenter along Route 17 in

Stafford County; a planned hospital in Stafford County; and relocating the Virginia State Fair and the Renaissance Fair to Caroline County.

In addition to the proposed training and construction activities at Fort A.P. Hill, these other projects would generate employment, income, and sales volume in the ROI, resulting in long-term cumulative beneficial economic effects.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on socioeconomics.

4.2.9.2.2 No Action Alternative

No effects would be expected on the economic or sociological environment. The changes in population and economic activity that would occur under the proposed action would not be implemented under the No Action Alternative. The housing market and public services (e.g., schools, police, fire, medical, social services) would continue to respond as they have in the past to ROI population changes as needed.

4.2.10 Transportation

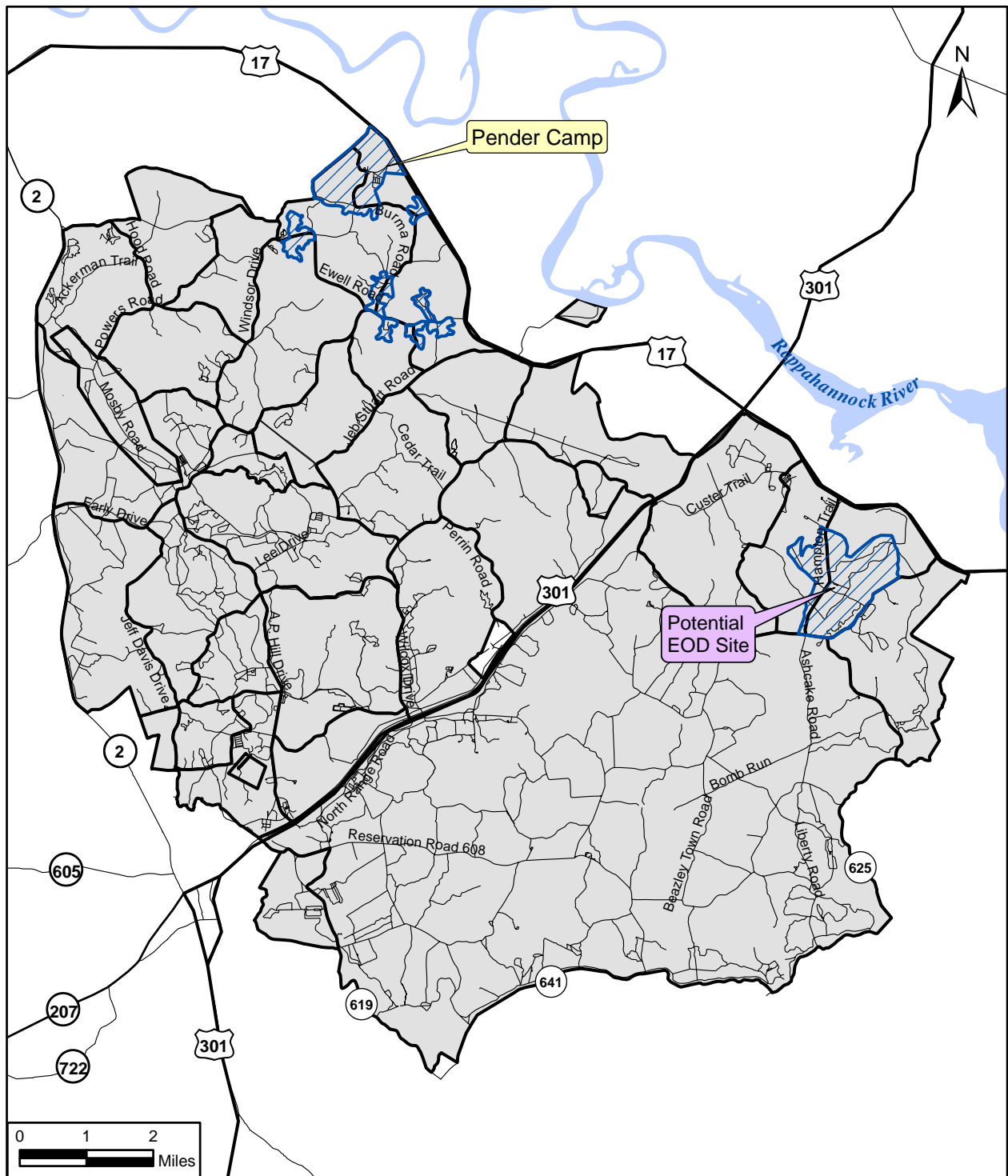
This section describes the existing highway and transit systems near Fort A.P. Hill, the effects associated with implementing the Preferred Alternative, and potential mitigation measures, if required.

4.2.10.1 Affected Environment

Highway access to Fort A.P. Hill is available regionally via I-95, Routes 1, 17, and 301, and Route 2. Route 301 provides access to the main entrance of the installation and is a four-lane, north-south route that bisects Fort A.P. Hill. The primary transportation network within Fort A.P. Hill consists of roads and streets that act as main distribution arteries and provide access to all functional areas. Secondary and tertiary light-duty roadways provide access between and within various functional areas. Wide, clear trails for the use of heavy tactical vehicles are adjacent to some roads (Figure 4.2-19).

No rail access or service is available at Fort A.P. Hill. The closest city to Fort A.P. Hill served by rail transportation, via Amtrak, is Fredericksburg, Virginia. Amtrak provides regular service to Fredericksburg via its Carolinian/Piedmont and regional routes (Amtrak 2006). Ground transportation between Fredericksburg and the installation (approximately 30 minutes' driving time) is available via POV, bus, limousine, taxi, or rental car. No public transit access or bus service is available at Fort A.P. Hill. The closest city to Fort A.P. Hill served by bus transportation, via Fredericksburg Regional Transit (FRED), is Bowling Green. FRED provides regular service to Bowling Green (approximately 5 minutes' driving time to Fort A.P. Hill) via the Tan Line (FRED 2006).

Fort A.P. Hill does not support private access to the installation via the air. Because there are no permanently assigned aircraft on the installation, military aviation support facilities are limited. Fort A.P. Hill has one Army Air Field (AAF), one drop zone, one assault airstrip, and many authorized landing or pick-up zones to support airborne and aviation training for both fixed-wing



LEGEND

- Installation Property
- Road
- Proposed Project Area

Transportation Network

Fort A.P. Hill, Virginia

Figure 4.2-19

Source: Fort A.P. Hill GIS, 2006.

and rotary aircraft. In 1994, an estimated 2,600 aircraft movements were reported at Fort A.P. Hill (USACHPPM 1999). The Army conducts fixed-wing aircraft operations primarily at the drop zone, which is in the northwest portion of the installation. The U.S. Army Night Vision Laboratory also uses the installation drop zone and assault airstrip for night-vision research. The 70-acre AAF is on the southeast side of the main gate on Route 301, and the Army uses the AAF only for rotary-wing operations. In addition, there are eight Flight Training Areas for helicopter training and several helicopter-landing pads throughout the installation.

4.2.10.2 Environmental Consequences

This section discusses the effects on transportation resources at Fort A.P. Hill due to the Preferred Alternative. Both vehicular traffic and nonroadway transportation at Fort A.P. Hill are assessed.

4.2.10.2.1 Preferred Alternative

Both short- and long-term minor adverse effects on vehicle-based transportation resources at Fort A.P. Hill would be expected with the implementation of the Preferred Alternative. These effects would be directly related to using on-road construction vehicles during the periods of construction, and bussing of Army personnel to and from Fort A.P. Hill for training activities. The effects on railway, air, or public transportation at Fort A.P. Hill would be negligible.

Construction Traffic

Traffic congestion would increase at both Fort A.P. Hill due to additional construction vehicles and traffic delays near construction sites. These effects would be temporary in nature and would end with the construction phase of the Preferred Alternative. The condition of the local on-post and off-post road infrastructure would be sufficient to support any increase in construction vehicle traffic. In addition, road closures or detours to accommodate utility system work would be expected, creating short-term traffic delays. Such effects would be minimized by directing all construction vehicles to access the installation via the gates closest to the project site, minimizing construction vehicle movement during peak traffic hours, and placing construction staging areas where they would least interfere with traffic. All construction traffic controls would be carefully planned. All construction vehicles would be equipped with backing alarms, two-way radios, and Slow Moving Vehicle signs when appropriate.

Cumulative Effects

Construction of BRAC facilities and the establishment of the AWG ranges would occur simultaneously, and other future projects could also occur concurrently. Traffic attributable to these actions would also occur concurrently. Other construction and development projects would produce some measurable amounts of traffic. The effects on transportation resources associated with the preferred action are minor and would not be expected to cause adverse cumulative effects.

Mitigation

No mitigation for adverse affects on transportation resources due to implementation of the Preferred Alternative would be necessary at Fort A.P. Hill.

4.2.10.2.2 No Action Alternative

Under the No Action Alternative, no effects on transportation resources would be expected at Fort A.P. Hill. Existing, short-term, and long-term traffic conditions would remain as described in section 4.2.11.1.

4.2.11 Utilities

4.2.11.1 Affected Environment

Utilities available at the Pender Camp area at Fort A.P. Hill include potable water; a series of latrines with holding tanks feeding a drain field, dry vault field latrines, and shower buildings; telephone; and electricity (see Figure 4.2-2). Rappahannock Camp, where FOB 1 is proposed, has some small buildings and is served by electric, telephone, water, and wastewater lines, and it has a septic drain field (Figure 4.2-3). The services (except wastewater, which is local to FOB 1) continue along A.P. Hill Drive to the proposed FOB 2, just east of FOB 1 where Patton Road intersects A.P. Hill Drive. FOB 2 also has local wastewater lines, an electric generator, and approximately 100 tent pads. Both of the proposed FOBs 1 and 2 have exterior lights. Other proposed FOBs are not served by utilities.

Utilities available at the proposed EOD site include electricity and telephone (Figure 4.2-4). The lines run along Hampton Trail, which separates TA 26 and TA 27, and North Range Road along the base of TA 26 and TA 27.

4.2.11.1.1 Potable Water Supply

Pender Camp at Fort A.P. Hill has a 182-foot-deep well with a yield capacity of 72 gallons per minute (gpm) and a pump capacity of 59 gpm. The existing system was constructed in 1957. The installation has a 42,500-gallon storage tank for holding potable water. The proposed FOB 1 has one water hydrant and the proposed FOB 2 (at Rappahannock Camp) has two hydrants. Proposed FOB 2 also has a water tank that serves the water lines of both of the proposed FOBs 1 and 2.

4.2.11.1.2 Sewer and Wastewater

Pender Camp at Fort A.P. Hill has a series of latrines with a 6,000-gallon holding tank feeding a 3,000-gallon-per-day drain field. The system was constructed in the mid-1990s. The septic system has a telemetry system for monitoring and operation. In addition, the camp has a 37,000-gallon holding tank for additional latrines, showers and gray water and ten units of 1,000-gallon dry-vault field latrines. The 37,000-gallon holding tank and the dry vaults are pumped by contract. All building structures of these latrines and showers are in poor condition and are in need of repairs to function and operate as required. Proposed FOB 1 has wastewater lines running from two buildings to a septic tank and an associated drain field. Wastewater lines on the proposed FOB 2 serve the tent pads and a small building. The proposed EOD site has no wastewater system.

4.2.11.1.3 Energy Sources

Electricity

The electric distribution system at Pender Camp, Fort A.P. Hill, is privately owned and operated by Rappahannock Electric Cooperative. All capital improvements and maintenance are done by the supplier. The system consists of overhead lines and secondary service conductors and poles.

Natural Gas

Natural gas is not available on Fort A.P. Hill.

4.2.11.1.4 Storm Water Collection System

Storm water on Pender Camp, the proposed FOBs, and at the proposed EOD site at Fort A.P. Hill infiltrates the soil or travels overground in natural drainageways.

4.2.11.1.5 Solid Waste

The average daily per capita solid waste generated at Fort A.P. Hill in 2004 was 5.78 pounds in comparison to the national average of 4.5 pounds per capita per day. This higher average of solid waste generated at Fort A.P. Hill in comparison to the national average is reflective of the high number of reservists attending training sessions at Fort A.P. Hill.

Solid waste collected at Fort A.P. Hill is transported to the King George Landfill in Virginia one to two times daily depending on the amount of troop training. Some special (nonhazardous) wastes, primarily wooden ammunition boxes and mattresses, are hauled to the Chambers Landfill, an industrial landfill in Charles City, Virginia (Fort A.P. Hill Army Garrison: Integrated Solid Waste Management Plan, July 2005). Three days per week, two full-time DPW custodial personnel collect solid waste in plastic bags from waste receptacles in various operations buildings at Fort A.P. Hill. However, solid waste from campsites are not collected by the DPW personnel. All units performing annual training are responsible for placing solid waste in one of the nearby collection containers. Units can also transport the solid waste and other items to the DPW Scrap Yard at the intersection of Cedar Trail and Wilcox Drive (Fort A.P. Hill Army Garrison: Integrated Solid Waste Management Plan, July 2005). Pender, Cooke, Rappahannock Camps have two solid waste collection containers of 6 cubic yard capacity and 16 solid waste collection containers of 8 cubic yard capacity among the above three camps for the collection of solid waste. Solid waste collection and disposal from the Pender Camp site is managed as a one-person operation. C&D debris generated at Fort A.P. Hill is considered as the property of individual contractors and is mostly disposed of in local landfills.

4.2.11.1.6 Communication Systems

Communication services at Fort A.P. Hill is owned and operated by the Post. Telephone service at the Pender Camp area consists of a 25 pair, 22 gauge copper cable installed in the 1970s with two existing lines for regular use and one line for emergency purposes. Lines serving the proposed FOB 1 and 2 and the proposed EOD site are similar to those at Pender Camp.

4.2.11.2 Environmental Consequences

4.2.11.2.1 Preferred Alternative

Short- and long-term minor beneficial and adverse effects on all existing utilities would result from implementation of the Preferred Alternative. Renovations and upgrades would be required for all existing utility systems at Pender Camp and the proposed EOD site. The pump control wiring for the supply of potable water would have to be replaced to maintain reliable service to Pender Camp. In addition, it would be necessary to dig an additional well and construct a 200,000-gallon, elevated water tower for fire suppression. It would also be necessary to replace existing potable water supply pipes with new PVC pipes. Though the area is currently not designated as a ground water management area and permits are not required for development of wells, changes to this designation may necessitate permits to develop ground water resources if demand for potable water increases significantly.

Existing latrines and shower buildings are aging and would need to be replaced. Additionally, the influx of personnel under the Preferred Alternative, would necessitate a pumping contract to empty sewage holding tanks regularly.

Fort A.P. Hill proposes to construct a sewer connection from Pender Camp to the wastewater collection system at the Wilcox Wastewater Treatment Plant via Engineer Road, approximately 1.7 miles from Pender Camp.

Wilcox Wastewater Treatment Plant facility is used for advanced treatment of domestic sewage produced at Fort A.P. Hill. It serves six permanent campsites, five tent campsites, buildings within the headquarters complex, and the VAANG 29th Infantry Division Training Detachment Building. The most recent connections to the Sewerage Plant have been the connection of the Central Vehicle Wash Facility and the Regional Jail Facility (a Caroline County facility that is off the installation). The design flow and permit limits is 530,000 gallons per day and a peak capability of 1,030,000 gallons per day. The Wilcox Treatment Plant consists of primary screening, flow equalization, activated sludge aeration basins, secondary clarifiers, chemical addition, continuous backwash filters, ultraviolet disinfection, and post aeration before discharge into the receiving stream identified as a tributary of Mill Creek.

The collection system consists of 23 remote, sewage-lift stations conveying flow to the treatment facility. Stabilized solids generated by the treatment process are transported to a contracted landfill for disposal every 3 to 6 months.

Under the Preferred Alternative, existing secondary overhead electric service conductors would be demolished and replaced with new ground fault service interpreter circuits in all new tent pads. A load survey would be performed to evaluate the anticipated load in coordination with the Rappahannock Electric Cooperative to ensure adequate service of electricity.

Solid waste generated under the Preferred Alternative at Pender Camp would have an adverse impact in terms of the logistics of collecting solid waste from the proposed LSA, FOBs and EOD site. The additional collection activity would exert an additional demand on available manpower.

Table 4.2.11-1 provides an estimate of the C&D debris that would be generated at Fort A.P. Hill by construction under the Preferred Alternative. As per requirements stipulated in memorandum ACSIM, DAIM-ZA, 06 Feb 06, SAB, a minimum of 50 percent of the estimated 421 tons of

construction and demolition debris would be diverted from Army-owned, non-installation-operated landfill sites. As a result of this sustainable management of waste in military construction, renovation and demolition activities, approximately 210 tons of construction and demolition debris would be disposed of in various landfill sites in the area.

Table 4.2.11-1
Estimates of construction and demolition debris generated
at Fort A.P. Hill as a result of implementing the Preferred Alternative

Construction Type	Admin Area (ft²)	C&D Factor (lb/ft²)	Estimated Waste (lb)	Estimated Waste (tons)
Construction	191,192	4.4	841,247	421
Renovation	0	20	0	0
Demolition	0	115	0	0
GROSS TOTAL			841,247	421
Amount Recycled (50%)	N/A	N/A	420,623	210
NET TOTAL C&D DEBRIS GENERATED	N/A	N/A	420,623	210

The overall quantity of 210 tons of C&D debris equates to a yearly average (based on 4 years of construction activity) of 53 tons, or a monthly average of approximately 4.4 tons. Most of the BRAC actions involve construction and renovation, which have a much lower solid waste generation rate (the *C&D Factor* in Table 4.2.11-1) than demolition. Area landfill lifespans would be minimally reduced from their current estimates because of solid waste generated under the Preferred Alternative, but capacities are sufficient to handle the short-term waste that would be generated from construction and the long-term operational waste from the increased population on post.

Cumulative Effects

A minor beneficial cumulative effect on utility systems at Fort A.P. Hill would result from system upgrades at the proposed EOD site, the proposed LSA, and other areas on the post where construction projects may occur. A minor adverse cumulative effect on utility systems would result from the additional demand placed on utility systems by the increased training load at the installation. Construction associated with implementation of regional projects (see section 4.2.9.2.1), BRAC projects, and other actions would result in a cumulative consumption of regional landfill capacity.

Mitigation

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on utilities. Best management practices required as part of DoD and Fort A.P. Hill policy and the Commonwealth of Virginia, examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on utilities.

Best Management Practices for Utilities

- **Potable Water.** Install water-efficient control devices, such as low-flow showerheads, faucets, and toilets, in all new facilities.
- **Energy.** Install energy-efficient interior and exterior lighting fixtures and controls in all new and renovated facilities. All new facilities would be built to comply with Energy Policy Act of 2005 with specified goals for increased use of renewable energy sources, advanced utility metering, and procurement of energy efficient equipment and building systems in all applicable contracts. In addition, all vertical building construction projects starting with the Fiscal Year 2008 would be expected to achieve the SILVER level of LEED of the U.S. Green Building Council.
- **Solid Waste.** To achieve the goal of recycling 50 percent of the construction and demolition debris as stipulated in memorandum ACSIM, DAIM-ZA, 06 Feb 06, SAB, provide required training for in-house staff on materials eligible for recycling and methods of achieving the goal. Incorporate these requirements in all contracts awarded to outside contractors.

4.2.11.2.2 No Action Alternative

No effects on utility systems would be expected under the No Action Alternative.

4.2.12 Hazardous and Toxic Materials

4.2.12.1 Affected Environment

Specific environmental statutes and regulations govern hazardous material and hazardous waste management activities at Fort A.P. Hill. For the purpose of this analysis, the terms *hazardous waste*, *hazardous materials*, and *toxic substances* include those substances defined as hazardous by the CERCLA, RCRA, and TSCA. In general, they include substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, might present substantial danger to public health or welfare or to the environment when released into the environment.

4.2.12.1.1 Storage and Handling Areas

There are two 10,000-gallon USTs for fuel at Pender Camp on Fort A.P. Hill. The tanks are in good condition and have active monitoring systems.

4.2.12.1.2 Hazardous Waste Disposal

Fort A.P. Hill is a RCRA Large Quantity Generator of hazardous wastes and a former Transportation, Storage and Disposal facility. In addition, the installation EPA CERCLIS identification number is VA2210020416. Hazardous wastes are managed by the Fort A.P. Hill Department of Public Works (DPW) in accordance with the *Installation Hazardous Waste Management/Waste Minimization Plan*.

4.2.12.1.3 Site Contamination and Cleanup

The FAPH IAP is used to track compliance clean-up sites and military munitions response sites. There are only five compliance clean-up sites and four military munitions response sites requiring additional investigation at Fort A.P. Hill.

4.2.12.1.4 Asbestos

Two categories are used to describe ACM. *Friable ACM* is defined as any material containing more than 1 percent asbestos (as determined by polarized light microscopy) that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. *Non-friable ACM* is material that contains more than 1 percent asbestos and does not meet the criteria for friable ACM.

Existing buildings at Pender Camp on Fort A.P. Hill are suspected of containing ACM. If implementation of the proposed action at Fort A.P. Hill involved demolition of existing buildings, ACM would be abated at the time of demolition.

4.2.12.1.5 Polychlorinated Biphenyls

PCBs are industrial compounds used in electrical equipment, primarily capacitors and transformers, because they are electrically nonconductive and remain stable at high temperatures. Because of their chemical stability, PCBs persist in the environment, bioaccumulate in organisms, and become concentrated in the food chain. The disposal of PCBs is regulated by TSCA, which regulates the removal and disposal of contaminated equipment containing PCBs at concentrations greater than 50 ppm.

There are no known PCB contaminated transformers on Fort A.P. Hill.

4.2.12.1.6 Lead-Based Paint

Existing buildings at Pender Camp on Fort A.P. Hill are suspected of containing LBP. If implementation of the proposed action at Fort A.P. Hill involved demolition of existing buildings, LBP would be abated at the time of demolition.

4.2.12.1.7 Pesticides

Pesticides used on Fort A.P. Hill include pre-emergents for weed control and insecticides for insect control. Pesticide application is performed by licensed contractors. There is no known chlordane use at the BRAC locations at Fort A.P. Hill.

4.2.12.1.8 Ordnance

There are no known UXO or MEC concerns at Pender Camp, other FOBs, or the proposed EOD site.

4.2.12.2 Environmental Consequences

4.2.12.2.1 Preferred Alternative

Long-term minor beneficial effects would be expected related to ACM and LBP present in existing buildings if such buildings were demolished or renovated to accommodate incoming BRAC activities. ACM and LBP would be handled in a manner consistent with applicable rules and regulations, and thus no environmental or health effects from the removal, handling, and disposal of these materials would be expected during demolition, renovation, or construction activities. Before initiating renovation activities, the potential for environmental impacts of special hazards such as ACM and LBP would be evaluated and addressed as specified in the

appropriate regulatory requirements. Demolition that involves LBP or ACM would be evaluated for compliance with the OSHA standard at 29 CFR 1926.62; EPA and HUD standards; and state, federal, and Army regulations. Measures to control airborne asbestos and lead dust would be implemented. Contractors certified in the management of ACM and LBP would be used to evaluate and remove these materials. All construction debris that contains ACM and LBP would be disposed of at licensed disposal facilities in accordance with applicable laws.

Long-term minor adverse effects could result from an increase in the use of hazardous materials. Additional potentially hazardous materials that could be found on-post during BRAC-related construction and operational activities include paints, thinners, asphalt, and fuel and motor oils for vehicles and equipment. An increase in the volume of these wastes generated and the amount of storage required would be anticipated.

Short-term negligible adverse effects could result from an increase in spills associated with the use of hazardous materials. Established controls such as spill containment, emergency response and clean-up procedures would limit the impact of spills.

No effects would be expected from hazardous waste disposal. The installation is a large-quantity generator of hazardous wastes and has established procedures for managing and disposing of hazardous wastes. The current hazardous waste disposal procedures would continue with implementation of the preferred alternative. All hazardous wastes would be managed in accordance with the installation's *Hazardous Waste Management Plan* and RCRA requirements.

Long-term minor adverse effects could result from an increase in storage capacity requirements for POL. Any construction of new storage facilities to handle storage requirements from BRAC actions would be done in accordance with applicable laws regarding construction materials, leak protection, monitoring, and spill containment.

No adverse health effects or environmental impacts would be expected from UXO or MEC at Fort A.P. Hill. Proposed training at Fort A.P. Hill would occur in existing ranges.

No effects from pesticides would be expected at Fort A.P. Hill BRAC training areas. Pesticides would be used in accordance with their intended use and the *Fort A.P. Hill Pesticides Management Plan*.

Cumulative Effects

No cumulative effects on hazardous or toxic materials would be expected.

Mitigation

Environmental and health risks, as detailed in section 4.2.12.2, are controlled by implementing existing programs, policies, regulations, and SOPs. Measures to reduce the risk of harm to humans and the environment from hazardous and toxic materials would be included in these requirements and, as such, no mitigation would be required.

No mitigation measures would be necessary to reduce the adverse impacts of the Preferred Alternative on hazardous and toxic materials. Environmental and health risks as detailed in section 4.2.12.2 would be controlled by implementing existing programs, policies, regulations, and SOPs. Best management practices required as part of DoD and Fort A.P. Hill policy and the

Commonwealth of Virginia, examples of which are provided below, would adequately limit the adverse impact of the Preferred Alternative on hazardous and toxic materials.

Best Management Practices for Hazardous and Toxic Materials

- *Contamination.* Any soil suspected of contamination, or wastes that are generated, would be tested and disposed of in accordance with applicable laws and regulations. These include, but are not limited to, the Virginia Waste Management Act (Virginia Code sections 10.1-1400 *et seq.*) and the Virginia Hazardous Waste Management Regulations (9 VAC 20-60).
- *Demolition or Renovation of Structures.* All structures to be demolished, renovated, or removed would be checked beforehand for asbestos-containing materials and lead-based paint. If asbestos-containing materials were found, the Army would follow the requirements of 9 VAC 20-80-640 and other requirements in the Virginia Solid Waste Management Regulations. If lead-based paints were found, the Army would follow the requirements of 9 VAC 20-60-261 and other requirements in the Virginia Hazardous Waste Management Regulations.
- *Pollution Prevention.* The Army would implement pollution prevention principles in all construction activities, including reduction of waste materials at the source, re-use of materials, and recycling of solid wastes. Hazardous waste generation would be minimized and all hazardous wastes would be handled appropriately.
- *Remediation.* The Army would honor all CERCLA obligations at active and closed ERP sites at the installation. The installation's remedial project manager would be contacted before any land, soil, or groundwater disturbance at or near ERP sites to ensure that all remedies in place would remain intact and that long-term monitoring wells would not be disturbed.
- *Petroleum Contamination.* In the event that petroleum contamination was discovered during project excavation, the incident would be reported to DEQ's Piedmont Regional Office. Disposal of any contaminated soils and groundwater would be accomplished in accordance with applicable DEQ guidelines. Petroleum spills would be reported to VDEQ as required.

4.2.12.2.2 No Action Alternative

No effects on hazardous and toxic substance, or from their use, storage, or disposal would be expected from implementation of the No Action Alternative.

4.2.13 Cumulative Effects Summary

Cumulative environmental effects would result from the concurrent implementation of the BRAC action, the creation of the AWG range in Training Area 25, and regional development activities. Minor adverse cumulative effects on land use, noise, and utilities would be expected from the concurrent activities, and minor beneficial cumulative effects on socioeconomics and utilities would be expected.

4.2.13.1 Land Use

A minor adverse cumulative effect on surrounding land use would result from operation of an AWG demolition range near the proposed EOD site. Both the AWG range and EOD training area would

be used for explosives detonation, and noise from the operations would exacerbate noise nuisance in nearby residential land use areas.

4.2.13.2 Aesthetic and Visual Resources

No cumulative effects on the aesthetics or visual resources of Fort A.P. Hill would be expected. Other future projects would be for military use and would maintain the field training nature of the installation.

4.2.13.3 Air Quality

The Commonwealth of Virginia takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the SIP. Estimated emissions generated by the preferred alternative are expected to be *de minimis* and would not be regionally significant. Below these thresholds, it is understood that a project of this limited size and scope would not interfere with the states timely attainment of the NAAQS or threaten the attainment status of the region. Therefore, it would not contribute to cumulative adverse effects on air quality.

4.2.13.4 Noise

A minor adverse cumulative effect on the noise environment outside of the boundaries of Fort A.P. Hill would be expected. The 130-dBP and 115-dBP large-caliber weapons peak noise contours for implementation of the Preferred Alternative and the establishment of the AWG ranges would be the same as those for the Preferred Alternative condition alone. Fort A.P. Hill would not, therefore, expect that operation of the two ranges would result in a cumulative (i.e., greater) effect with respect to concern and complaints from individual acoustical events than operation of the EOD range alone.

The metrics used in the noise analysis, particularly CDNL, naturally take into account all past, present, and reasonably foreseeable noise. The changes due to the Preferred Alternative, when combined with other future actions, would increase in noise levels and associated areas of incompatible land use surrounding Fort A.P. Hill. The noise environment of the installation would be adversely affected locally by mission-related construction projects, and noise from such projects would be addressed under separate environmental analysis documents.

4.2.13.5 Geology and Soils

No cumulative effects on geology or soils would be expected.

4.2.13.6 Water Resources

No cumulative effects on water resources would be expected. Other future projects on Fort A.P. Hill could result in erosion and sedimentation in streams, and separate environmental documents would analyze the effects of those actions. No cumulative effects on water quality in the Chesapeake Bay would be expected from BRAC development on Fort A.P. Hill and Fort Lee and other development in the region. Sediment and other pollutants from streams on Fort A.P. Hill and in the area would enter the bay from the Rappahannock River and York River, while those from development on and near Fort Lee would enter the bay from the James River. The distances separating these source inputs and mixing in the bay would render any potential for a cumulative water quality effect negligible and immeasurable.

4.2.13.7 Biological Resources

No foreseeable cumulative effects on the species and habitats that would be disturbed by BRAC development would be expected. Other future projects on Fort A.P. Hill could affect similar habitats and species, and separate environmental documents would analyze the effects of those actions. No foreseeable cumulative effects on biological resources from development projects off the installation would be expected.

4.2.13.8 Cultural Resources

No cumulative effects on cultural resources would be expected. Adverse effects on NRHP-eligible cultural resources could result if such resources are physically disturbed during the development of BRAC facilities or training exercises. Federal legislation, the Fort A.P. Hill ICRMP, and the PA would be followed in all cases, including construction for BRAC, the AWG range, and other projects on Fort A.P. Hill, to compensate for any impacts. Thus, any adverse cumulative impacts that would occur would be considered minor.

4.2.13.9 Socioeconomics

A long-term minor beneficial cumulative economic effect would be expected from proposed development projects in the Fort A.P. Hill region. Other construction and development projects occurring in the Fort A.P. Hill region—including the completion of the Bowling Green Bypass; the opening of two new manufacturing plants (FSI Manufacturing in Caroline County and a plant in King George County); the opening of a new complex for M.C. Dean, a systems integration and engineering firm, in Caroline County; a planned expansion of the King George County Industrial Park; a proposed new Wal-Mart Supercenter along Route 17 in Stafford County; a hospital planned to be built in Stafford County; and moving the Virginia State Fair and the Renaissance Fair to hold them in Caroline County—would also generate employment, income, and sales volume in the ROI.

4.2.13.10 Transportation

Construction of BRAC facilities and the establishment of the AWG ranges would occur simultaneously, and other future projects could also occur concurrently. Traffic attributable to these actions would also occur concurrently. Other construction and development projects would produce some measurable amounts of traffic. The effects on transportation resources associated with the preferred action are minor and would not be expected to cause cumulative effects.

4.2.13.11 Utilities

A minor beneficial cumulative effect on utility systems at Fort A.P. Hill would result from system upgrades at the proposed EOD site, the proposed LSA, and other areas on the post where construction projects may occur. A minor adverse cumulative effect on utility systems would result from the additional demand placed on utility systems by the increased training load at the installation. Construction associated with implementation of regional projects (see section 4.2.9.2.1), BRAC projects, and other actions would result in a cumulative consumption of regional landfill capacity.

4.2.13.12 Hazardous and Toxic Materials

No cumulative effects on hazardous or toxic materials would be expected.

4.2.14 Mitigation Summary

Table 4.2.14-1 provides a summary of mitigation measures that the Army would potentially employ to minimize, avoid, or compensate adverse environmental effects of implementing the Preferred Alternative. Mitigation does not include legal, regulatory, or policy-driven environmental protections required to comply with Federal and state laws, or Army and Fort A.P. Hill policies. Only those resource areas for which mitigation has been determined to be necessary are mentioned in Table 4.2.14-1.

Table 4.2.14-1
Recommended Mitigation Measures for BRAC Actions at Fort A.P. Hill

Noise
If necessary, Fort A.P. Hill would expand the perimeter noise monitoring system to add a noise monitor in the area of concern. The monitors would allow the installation to evaluate operations under varied weather conditions and assess how noise levels can impact neighbors off-post. Mission permitting, locations or scheduling of training activities could be adjusted to lower off-post noise levels.
Cultural Resources
Fence all historic properties during nearby construction activities.
Monitor historic properties periodically to ensure that avoidance and protection measures are effective
If avoidance and protection of historic properties are not feasible, then a PA would be developed between Fort A.P. Hill and the Virginia SHPO to determine measures to be implemented to mitigate the adverse effect. Mitigation measures could include data recovery excavation of prehistoric and historic deposits, archival research for historic components, or development of public interpretation materials regarding cultural resources of the installation or region.

4.2.15 Unavoidable Adverse Environmental Impacts

Implementation of the Preferred Alternative would result in a variety of adverse environmental effects, as detailed in sections 4.2.1 through 4.2.12. Some of the effects could be minimized, avoided, or compensated for through mitigation, but others would be unavoidable. The principal unavoidable adverse effects on the environment are the following.

- **Air Quality:** Unavoidable emissions of air pollutants associated with facility construction, Soldier transport, and training activities at the LSA and EOD training areas.
- **Noise:** Unavoidable generation of noise associated with military training activities.

4.3 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable commitments of resources are related to the use of nonrenewable resources and the effects that use of such resources will have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time. Irretrievable resource commitments involve a loss in the value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species).

Construction of facilities and subsequent operations at Fort Lee and Fort A.P. Hill would involve irreversible commitments of common resources to build structures (sand and stone). The Army would use energy during both construction and operations. Relative to societal demands for such resources, neither of these commitments would be significant. Implementation of the Preferred Alternative would not involve irretrievable commitments of resources.

4.4 SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term uses of the biophysical components of man's environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that would occur over a period of less than 5 years. Long-term uses of man's environment include impacts occurring over a period of more than 5 years, including permanent resource loss.

Several kinds of activities could result in short-term resource uses that would compromise long-term productivity. Examples of such actions that affect long-term productivity are filling of wetlands or loss of other especially important habitats, conversion of prime or unique farmlands to non-agricultural use, and consumption of high-quality water at nonrenewable rates.

Implementation of the Preferred Alternative would not be expected to materially affect maintenance and enhancement of long-term productivity. Construction and operation of facilities at Fort Lee and Fort A.P. Hill would affect several resources, including air quality, noise, traffic, storm water runoff, and energy. Training at Fort A.P. Hill would respect management measures in the post's Integrated Natural Resources Management Plan, Integrated Cultural Resources Management Plan, and other management plans designed for the protection and conservation of environmental resources. Environmental effects would occur at discrete locations, and they would be of a nature that generally would not affect long-term productivity.

SECTION 5.0

LIST OF PREPARERS

V. Regno Arulgnanendran, P.E.

Ph.D., Civil (Environmental) Engineering, New Mexico State University
M.S./D.I.C., Public Health Engineering, Imperial College of Science, Technology, and Medicine,
University of London
M.Eng., Construction Engineering and Management, Asian Institute of Technology
B.S., Civil Engineering Honors, University of Ceylon, Sri Lanka
Registered Professional Engineer, Virginia and New Mexico
Years of Experience: 24

Ken Bailey

B.A., Biology, Virginia Polytechnic Institute and State University
Years of Experience: 18

Mike Betteker

M.S., Environmental Science and Engineering, Virginia Polytechnic Institute and State
University
B.S., Biology, Florida Institute of Technology
Years of Experience: 25

Clint Boschen

M.S., Biological Sciences, Florida State University
B.S., Biology, Virginia Polytechnic Institute and State University
Years of Experience: 10

Michelle Cannella

Graduate Studies, Mineral Economics, Pennsylvania State University
B.S., Mineral Economics, Pennsylvania State University
Years of Experience: 10

Jim Collins

M.A., Geography and Marine Affairs, University of Rhode Island
B.A., Environmental Science, Boston University
Years of Experience: 26

Jeff Dorman

B.S., Biology and Environmental Studies, St. Lawrence University
Years of Experience: 3

Jennifer Jarvis

B.S., Environmental Resource Management, Virginia Polytechnic Institute and State University
Years of Experience: 6

Tim Lavallee, LPES, Inc.

M.S., Environmental Health, Tufts University, Medford, Massachusetts
B.S., Mechanical Engineering, Northeastern University, Boston, Massachusetts
Years of Experience: 15

Jessica Parker

B.A., Environmental Sciences, University of Virginia
Years of Experience: 4

Samuel Pett

M.S., Environmental Policy, University of Massachusetts/Boston
B.S., Wildlife Biology, Michigan State University
Years of Experience: 15

Catherine Price

B.S., Chemical Engineering, Georgia Institute of Technology
B.S., Chemistry, Albany State University
Years of Experience: 24

Kathy Roxlau

M.A., Anthropology, Northern Arizona University
B.A. Anthropology, Colorado College
Years of Experience: 16

Kristin Shields

B.A., Environmental Science, Sweet Briar College
Years of Experience: 12

Jeff Strong

M.S., Technical and Scientific Communication, James Madison University
B.A., Computer Information Systems, Eastern Mennonite University
Years of Experience: 17

Paul Wilbur, J.D.

J.D., Wayne State University Law School
B.A., English, University of Michigan
Years of Experience: 29

SECTION 6.0

DISTRIBUTION LIST

Ms. Vanessa Adams
Warden
Federal Correctional Institution
PO Box 90026
Petersburg, VA 23804-0026

Honorable George Allen
204 Russell Senate Office Building
Washington, DC 20510

Mr. William Arguto
NEPA-Federal Facilities
US Environmental Protection Agency
Region 3
Attn: 3EA30 – NEPA
1650 Arch Street
Philadelphia, PA 19103-2029

Mr. Donald Bagshaw
Chairman
James River Soil & Water Conservation
District
PO Box 129
Prince George, VA 23875-2527

Ms. Deanna Beacham
Program Specialist
Virginia Council on Indians
PO Box 1475
Richmond, VA 23218

Honorable Eric I. Cantor
Virginia's 7th Congressional District
329 Cannon House Office Building
Washington, DC 20515

Ms. Pamela J. Chandler
Chief
US Department of Justice
Federal Bureau of Prisons
Site Selection and Environmental Review
Branch
320 First St NW, Rm 5005
Washington, DC 20534

Ms. Rosalyn R. Dance
Delegate, 63rd
VA General Assembly
P.O. Box 2584
Petersburg, VA 23804

Mr. Eric Davis
NEPA Coordinator
US Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Honorable JoAnn Davis
Virginia's 1st Congressional District
1123 Longworth House Office Building
Washington, DC 20515

Ms. Denise Doetzer
State Conservationist
USDA, Natural Resources Conservation
Service
1606 Santa Rosa Rd
Suite 209
Richmond, VA 23229-5014

Mr. Scott Flanigan
Chesterfield County Env. Eng.
P.O. Box 40
Chesterfield, VA 23832

Ms. Holly Flores
Chesterfield Chamber
951 E. Byrd St.
Richmond, VA 23219

Honorable J. Randy Forbes
Virginia's 4th Congressional District
307 Cannon House Office Building
Washington, DC 20515

Mr. Nicholas Froelich
Environmental Manager
Virginia Department of Transportation
2430 Pine Forest Dr
Colonial Heights, VA 23834

Mr. William Gandel
Prince George County Dept. of Social
Services
P.O. Box 68
Prince George, VA 23875-0068

Ms. Brenda Garton
Prince George County
P.O. Box 68
Prince George, VA 23860

Ms. Jeanne Grandstaff
Hopewell Regional Wastewater Treatment
Facility
PO Box 969
Hopewell, VA 23860

Mr. Robert Hargrove
Division Director
US Environmental Protection Agency
Office of Federal Activities
1200 Pennsylvania Avenue, NW
Room 7241
Washington, DC 20044

Mr. Richard Hill
NAGPRA Representative
Tuscarora Nation of New York
2235 Mount Hope Rd.
Sanborn, NY 14123

Superintendent Hodge
Riverside Regional Jail
1000 River Rd
Hopewell, VA 23860

Dr. Amy Howard
University of Richmond
28 West Hampton Way
University of Richmond, VA 23227

Ms. Cindy Arrington
Virginia National Defense Industrial
Authority
901 E Byrd, West Tower, 19th Fl.
Richmond, VA 23218

Ms. Ellie Irons
Program Manager
Virginia Department of Environmental
Quality
PO Box 10009
Richmond, VA 23219

Mr. Vandy Jones
City of Petersburg
City Hall, Room 210
135 North Union Street
Petersburg VA 23803

Mr. Bob Kirby
Superintendent
Petersburg National Battlefield
1539 Hickory Hill Rd
Petersburg, VA 23803

Mr. Don Klima
Director
Advisory Council on Historic Preservation
Eastern Office of Project Review
1100 Pennsylvania Ave, NW, Suite 809
Washington, DC 20004

Mr. Joseph Leming
Prince George County BOS
P.O. Box 68
Prince George, VA 23875

Mr. Tom Lesniak
Virginia Employment Commission
5240 Oaklawn Blvd.
Hopewell, VA 23875

Dr. Charles Maranzano
Dinwiddie County Public Schools
P.O. Box 7
Dinwiddie, VA 23841

Mr. Allen McKeown
Petersburg HD
301 Halifax St.
Petersburg, VA 23803

Mr. R.B. Metcalf, Jr.
P.O. Box 1013
Chesterfield, VA 23832

Ms. Annie Mickens
City of Petersburg
City Hall 135 North Union Street
Petersburg, VA 23803

Mr. & Mrs. Ralston and Paula Mims
201 W. Sycamore St.
Petersburg, VA 23803

Mr. Dennis K. Morris
Executive Director
Crater Planning District Committee
PO Box 1808
Petersburg, VA 23805

Mr. Kenneth Myers
Planning and Environment Program
Manager
FHWA Virginia
400 North 8th Street
Richmond, VA 23240

Mr. Jay Paul
Commonwealth's Attorney
Prince George County
P.O. Box 730
Prince George, VA 23875

Mr. Mark Petersohn
City Engineer
City of Hopewell
300 N. Main St.
Hopewell, VA 23160

Ms. Marietta Salyer
VEC--Tri-Cities
5240 Oaklawn Blvd.
Hopewell, VA 23860

Honorable Robert C. Scott
Virginia's 3rd Congressional District
1201 Longworth House Office Building
Washington, DC 20515

Ms. Lisa Stopp
THPO/NAGPRA Representative
United Keetoowah Band of Cherokee
Indians in Oklahoma
PO Box 189
Park Hill, OK 74431

Mr. Willie R. Taylor
Director
US Department of the Interior
Office of Environmental Policy and
Compliance
1849 C Street, NW, Room 2342
Washington, DC 20240

Mr. Russell Townsend
Tribal Historic Preservation Officer
Eastern Band of the Cherokee Nation
PO Box 455
Cherokee, NC 28719

Ms. Adrienne Volenik
University of Richmond
School of Law
Richmond, VA 23173

Honorable John Warner
225 Russell Senate Office Building
Washington, DC 20510

Ms. Mina Wheatley
511 Riverview Rd.
Colonial Heights, VA 23834

Eld. Cornelius White
Refuge Church
930 Cool Spring Drive
Petersburg, VA 23803

Ms. Lena Whitt
Whitt R.E.
534 Grone Ave.
Petersburg, VA 23803

RADCO/Geo. Wash. Regional Commission
Bowman Industrial Complex
3304 Bourbon Street, 3rd Fl
Fredericksburg, VA 22404

Col. Sandra Thacker
Peumansend Creek Regional Jail
11093 SW Lewis Memorial Dr.
PO Box 1460
Bowling Green, VA 22427

Mr. Gary Allen
Middle Peninsula Planning District
PO Box 23149
Saluda, VA 23149

Mr. Marc Holma
Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221

Mr. Lamar Smith
Project Development Specialist
US Department of Transportation
400 Seventh St, SW
Washington, DC 20590-0001

Ms. Marlee Parker
ECS Mid-Atlantic, LLC
2199 D North Hamilton St.
Richmond, VA 23230

John Ward
Tri-City Cab
312 South Park Drive
Petersburg VA 23805-2623

Horace Webb
Petersburg City Council
1974 Ridgewood Drive
Petersburg VA 23805-1830

Brian Moore
Ward 4, City of Petersburg
328 Claremont Street
Petersburg VA 23805-1412

Patricia Ellis
Fort Lee - ACME
19405 Foxbrook Drive
Colonial Heights VA 23834-5692

Russell Moore
ATLAS Homes and Land
9720 Coleman Drive
Amelia VA 23002

Sally Dickens
14580 Makenzie Lee Road
Disputanta VA 23842

Jess Fowler
12905 Rivers Bend Road
Chester VA 23836

Judith Fulks
Belvedere Plantation, Nottingham Fairways
1601 Belvedere Drive
Fredericksburg VA 22408

Freddie Hughes
Woodlake Investment Company, Stars &
Stripes Realty
6500 Harbour View Court
Suite 202
Midlothian VA 23112

John Marling
9406 Beckham Drive
Richmond VA 23235

Dennis Mull
2123 Armistead Ave
Petersburg VA 23803

Annie Mickens
City of Petersburg
City Hall, Room 210
135 North Union Street
Petersburg VA 23803

Brian Reagan
K.W. Poore & Associates
2201 West Broad Street
Suite 204
Richmond VA 23220

Dawn & Lloyd Skinner
8084 Eva Drive
Port Royal VA 22535

Juanita Tayborn
103 Pinetree Court
Prince George VA 23875

Robert Vaughan
12701 Colby Cove Court
Chester VA 23801

Julian Walker
Times-Dispatch
300 East Franklin Street
Richmond VA 23219

Gary Wilson
Caroline Economic Development
104 South Main Street
Bowling Green VA 22427

Ellen Marie Hess
2316 Logan Street
Richmond VA 23235

Carolyn Barley
P.O. Box 231
Port Royal VA 22535

Cleopatra Coleman
P.O. Box 59
Port Royal VA 22535

Cynthia Devereaux
Petersburg Chamber of Commerce
P.O. Box 928
325 East Washington
Petersburg VA 23803

David Jenkins
P.O. Box 57
Port Royal VA 22535

Alexander Long
P.O. Box 270
Port Royal VA 22535

Roland Metcalf
R.B. Metcalf Real Estate Consulting
P.O. Box 1013
Chesterfield VA 23832

Kathleen Steele
Colonial Heights Presbyterian Church
P.O. Box 339
Colonial Heights VA 23834

Cornell Urquhart
Urban Real Estate Development
P.O. Box 6781
Richmond VA 23220

Terri Harrison
P.O. Box 45
Port Royal VA 22535

Calvin B. Taylor
Caroline County Board of Supervisors
Port Royal District
14023 Stonewall Jackson Rd
Woodford, VA 22580

Della Mills
Port Royal Town Council
Vice Mayor
621 Main St
Port Royal, VA 22535

Cedell Brooks, Jr.
King George Board of Supervisors
Shiloh District
10459 Courthouse Rd
King George, VA 22485

Stephen Manster
Town Manager
Town of Bowling Green
117 Butler St
Bowling Green, VA 22427

Percy Ashcraft
Caroline County Administrator
Caroline County
117 Ennis St
Bowling Green, VA 22427

Linda E. Lumpkin
Essex County Asst. County Admin
Essex County, Courthouse Sq
Tappahannock, VA 22560

Hamilton "Guy" Garnsey, Principal
Beardsley Design Associates, PC
64 South St
Auburn, NY 13021

Councilwoman Dama Rice
Petersburg City Council
1708 Hickory Hill Rd
Petersburg, VA 23803

Mr. John Altman, Jr.
Asst. City Manager
300 N. Main St.
Hopewell, VA 23860

Fred S. Hughes, President
Woodlake Inn, Corp.
6500 Harbour View Ct. Ste 202
Midlothian, VA 23112

Mr. Boroch
c/o Allen Corporation
7801 Redpine Rd.
Suite J
Richmond, VA 23238

Bhupendra Patel
13401 Whispering Wood Dr
Richmond, VA 23233

Brian Curtis
M. Baker Corp
1801 Bayberry Ct
Suite 101
Richmond, VA 23226

Libraries

Caroline Library, Inc.
Port Royal Branch
419 King Street
Port Royal, VA 22535

Chesterfield County
Central Library
9501 Lori Road
Chesterfield, VA 23832

Colonial Heights Public Library
1000 Yacht Basin Drive
Colonial Heights, VA 23834

Dinwiddie Branch Library
14103 Boydton Plank Road
Dinwiddie Court House, VA 23841

Caroline Library, Inc.
17202 Richmond Tpk
Bowling Green, VA 22427

Hopewell Regional Library
Appomattox Regional Library System
245 East Cawson Street
Hopewell, VA 23860

Petersburg Public Library
William R. McKenney Branch Central
Library
137 S. Sycamore St.
Petersburg, VA 23803

Prince George County
Appomattox Regional Library System
6102 County Drive
Disputanta, VA 23842

Richmond Public Library
Main Library
101 East Franklin Street
Richmond, VA 23219

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SECTION 9.0

ACRONYMS AND ABBREVIATIONS

AAF	Army Airfield
AAFES	Army and Air Force Exchange Service
ACHP	Advisory Council on Historic Preservation
ACM	asbestos containing materials
ACS	Army Community Service
ADL	average daily load
ADNL	A-weighted day night average sound level
ADT	Average Daily Traffic
AFB	Air Force Base
AIT	Advanced individual training
AQCR	Air Quality Control Region
AQCR 225	State Capital Intrastate Air-Quality Control Region
AQCR 224	Northeastern Virginia Intrastate Air-Quality Control Region
AR	Army Regulation
ASP	Ammunition Supply Point
AST	aboveground storage tank
AWG	Asymmetrical Warfare Group
BACT	best available control technology
BES	Baseline Environmental Survey
BMP	best management practice
BNA	Base-Neutral Acid Compounds
BOCA	Building Officials and Code Administrators
BOQ	Bachelor Officers' Quarters
BRAC	Base Realignment and Closure
C&D	construction and demolition
CAA	Clean Air Act
CAC	Community Activities Center
CASCOM	Combined Arms Support Command
CDNL	C-weighted day night average sound level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CO	carbon monoxide
COA	courses of action
CRMP	Coastal Resources Management Program
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DA	Department of the Army
dB	decibel
dBA	A-weighted decibel
dBc	C-weighted decibel
dBp	Peak Level decibel
DCMA	Defense Contract Management Agency
DCR	Virginia Department of Conservation and Recreation
DD	Department of Defense (acronym used for forms only)
DeCA	Defense Commissary Agency

DNH	Virginia Department of Natural Heritage
DNL	Day-night average sound level
DoD	Department of Defense
DODI	Department of Defense Instruction
DPW	Department of Public Works
DPWL	Directorate of Public Works and Logistics
DRMO	Defense Reutilization and Marketing Office
DZ	drop zone
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FDF	fuel dispensing facility
FICUN	Federal Interagency Committee on Urban Noise
FOB	Forward Operations Base
FPPA	Farmland Protection Policy Act
FRED	Fredericksburg Regional Transit
ft ²	square feet
FTX	field training exercise(s)
GETA	Government Equipment Testing Area
GIS	geographic information system
GOV	government-owned vehicle
gpm	gallons per minute
HCS	highway capacity software
HUC	Hydrologic Unit Code
HUD	Housing and Urban Development
Hz	Hertz
I-	Interstate
IAP	Installation Action Plan
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ITE	Institute of Transportation Engineering
KAHC	Kenner Army Health Clinic
kV	kilovolt
lb	pound
LBP	lead-based paint
LID	Low Impact Development
LOS	Level of Service
LRTP	Long Range Transportation Plan
LSA	Logistics Support Area
LZ	landing zone
MEC	munitions and explosives of concern
MICLIC	Mine Clearing Line Charge
MIF	Military in the Field
mgd	million gallons per day
µg/m ³	micrograms per cubic meter
mm	millimeter
MOUT	military operations on urban terrain
MPO	Metropolitan Planning Organization
MRAQC	Metropolitan Richmond Air Quality Committee
MSA	metropolitan statistical area
msl	mean sea level

NAAQS	National Ambient Air Quality Standards
NCO	Noncommissioned Officer
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFA	no further action
NHPA	National Historic Preservation Act
NI	no indicator
NOx	oxides of nitrogen
NOA	Notice of Availability
NOI	Notice of Intent
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
NSR	new source review
NWI	National Wetlands Inventory
O ₃	ozone
OBL	Obligate Hydrophyte
OP	off peak
OSHA	Occupational Safety and Health Administration
OTR	Ozone Transport Region
PA	Programmatic Agreement
PAT	Petersburg Area Transit
PCB	polychlorinated biphenyls
pCi/L	Picocurie per liter
PCPI	per capita personal income
PCS	permanent change of station
PL	Public Law
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 lubricants
POV	privately owned vehicle
ppm	parts per million
PSD	prevention of significant deterioration
PTF	Petroleum Training Facility
PUB	Palustrine, unconsolidated bottom
RCI	Residential Communities Initiative
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
RPA	Resource Protection Area
RTA	Range Training Area
RTV	Rational Threshold Value
SEAhut	Southeast Asia huts
SCOE	Sustainment Center of Excellence
sf	square feet
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO ₂	Sulfur Dioxide
SOP	Standard Operating Procedures
SPL	sound pressure level
SPiRiT	Sustainable Project Rating Tool
SWP3	Storm Water Pollution Prevention Plan
TA	training area

TAL	Target Analyte List
TBD	to be determined
TDY	Temporary Duty
TIP	Transportation Improvement Plan
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
tpy	tons per year
TRADOC	U.S. Army Training and Doctrine Command
TRB	Transportation Research Board
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
UPH	Unaccompanied Personnel Housing
UPL	Upland Plant
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USAF	United States Air Force
USC	United States Code
USGS	United States Geological Survey
USN	United States Navy
UST	underground storage tank
UXO	unexploded ordnance
VA	Virginia
V/C	volume to capacity
VDEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VOC	volatile organic compounds
VPDES	Virginia Pollutant Discharge Elimination System
VRA	vehicle recovery area