

# **Fort A.P. Hill, VA**

## **FY 2009-2013 Forest Management Activities**

### **Environmental Assessment**



**January 2009  
DRAFT FINAL**

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**Finding of No Significant Impact**  
**FY 2009-2013 Forest Management Activities**  
**US Army Garrison, Fort A.P. Hill, Virginia**  
**Directorate of Public Works – Environmental Division**

The US Army Garrison, Fort A.P. Hill in Caroline County, Virginia, proposes forest management activities, including timber harvesting, prescribed burning, and timber stand improvement actions to support the military mission by providing ecologically sustainable and viable training lands.

The proposed action is the Preferred Alternative and includes conducting timber harvests on approximately 12,915 acres (average of 2,583 acres each year), prescribed burns on approximately 53,820 acres (average of 33,430 acres each year with some areas receiving repeat burns), and timber stand improvement activities on approximately 3,364 acres. The timber stand improvement activities include 258 acres of crop tree release, 1,657 acres of pre-commercial thinning, and 1,449 acres of herbicide vegetation control treatments. These activities would be conducted by trained Fort A.P. Hill employees and staff contractors, temporary Fort A.P. Hill hires, and external contractors. These actions would require the creation of new forest access roads and firebreaks and the clearing and grading of existing forest access roads. The objectives for these actions are to reduce stem densities for improved growth and vigor of residual trees, increase accessibility of forests to mounted and dismounted maneuver training, increase forest structure diversity and the biologic diversity that these structures can support, reduce wildfire hazards, stimulate forest ecosystem processes, including regeneration establishment, and provide a usable, renewable resource to the local economy.

Three alternatives to the proposed action (Alternative 1) were considered by the Fort A.P. Hill Forestry Branch. Alternative 2 examines an accelerated forest management proposal to meet wildfire hazard management, forest health and accessibility objectives in a more aggressive manner on additional acres across the installation. Alternative 3 examined applying different harvest types to meet the same forest management objectives as the proposed action, such as single tree selection instead of shelterwood harvests, to reduce immediate site impacts. Though this approach has good intentions, it would require more frequent harvests to meet the same structure and species goals, effectively negating the reduced impact over time. Neither of these alternatives met the screening criteria established by the Forestry Branch and have been eliminated from further consideration within this Environmental Assessment. Reasons for eliminating the alternatives included concerns for sustainability, limited available resources, including personnel, to accomplish the objectives, and the inability to attain biological diversity goals.

Alternative 4, the No Action Alternative, was also examined. The No Action Alternative is defined as continuing the current use of the installation property with no application of the proposed action. No timber harvesting, prescribed burning, or timber stand improvement actions would take place. Army Regulation 200-1, Environmental Protection and Enhancement [Sec 4-3, d. (7) and (8)] mandates that Fort A.P. Hill will maintain an active forest management program and if the No Action Alternative is implemented then Fort A.P. Hill will not be in compliance; therefore, the No Action Alternative was eliminated. The No

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Action Alternative does serve as a baseline against which the Preferred Alternative can be evaluated in the Environmental Assessment.

The No Action Alternative and the Preferred Alternative are the only scenarios described in detail in the Environmental Assessment. Although other alternatives were considered, the Preferred Alternative, which is the proposed action, is the only one that meets the screening criteria established by the Forestry Branch on Fort A.P. Hill. The proposed action is needed to support the sustainability of the installation's military mission and to fulfill the Fort A.P. Hill natural resource management goals developed based on regulatory guidelines.

Army regulations, management plans, and environmental requirements implemented by Fort A.P. Hill would ensure activities are in compliance with applicable federal, state, and local laws and other regulations. The Forestry Branch applies current standards of Environmental Management System awareness and environmental compliance to its activities. Contractors and Fort A.P. Hill personnel performing the timber harvests, prescribed burning, and timber stand improvement would implement Best Management Practices, including erosion and sediment control measures and Streamside Management Zones, Smoke Management Plans, hazardous material containment measures, and internal natural resource site assessments. These practices would minimize or avoid impacts to air, streams, wetlands, wildlife, and threatened and endangered species. In addition, cultural resources eligible or potentially eligible for the National Register of Historic Places would be avoided during prescribed burning and forest management activities.

The EA concludes that the proposed action would have no significant impacts on the quality of the physical and human environment at Fort A.P. Hill or the surrounding region. In accordance with the requirements of the National Environmental Policy Act, Fort A.P. Hill therefore issues a Finding of No Significant Impact for this project, and an Environmental Impact Statement will not be prepared.

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MICHAEL S. GRAESE  
LTC (P), AD  
COMMANDING

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DATE

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**Environmental Assessment  
for the  
FY 2009-2013 Forest Management Activities**

**U.S. Army Garrison Fort A.P. Hill**

**Prepared by:  
Environmental Division – Forestry Branch  
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# **EXECUTIVE SUMMARY**

## **INTRODUCTION**

This Environmental Assessment (EA) is prepared in accordance with the National Environmental Policy Act (NEPA), its implementing regulations published by the Council on Environmental Quality (40 CFR 1500-1508), and Code of Federal Regulations (CFR) 32 Part 651 which implements NEPA for the Army. Under NEPA, federal agencies are required to consider the environmental consequences of proposed actions. The Army can consider environmental consequences of proposed actions through the use of a Record of Environmental Consideration, an EA, or an Environmental Impact Statement.

This EA provides NEPA analysis and documentation for the proposed action, which is to conduct forest management activities including commercial timber harvesting, prescribed burning and timber stand improvement activities to support sustainable training mission and ecosystem conditions.

## **PURPOSE AND NEED**

The purpose of conducting forest management activities in fiscal years (FY) 2009-2013 is to continue management of the forest ecosystem and on-going resource protection in direct support of the long term military mission and training land sustainability as directed by the Fort A.P. Hill Integrated Natural Resources Management Plan (2008), the Forest Management Plan (2005) and the Long-Term Forest Management Plan (2008 draft). The proposed action would be conducted within the boundaries of Fort A.P. Hill. The proposed action incorporates timber harvest activities appropriate for attaining long-term forest management goals, a comprehensive prescribed burning program to reduce wildfire hazards, and timber stand improvement activities to reduce stem densities and increase tree vigor. Additionally, these actions will benefit the installation by creating desired forest training settings for mounted and dismounted maneuvering and optimum forest health and by providing a natural fire disturbance regime to increase ecosystem, habitat and wildlife diversity opportunities.

## **PROPOSED ACTION**

The proposed action is a regime of land management activities designed to achieve established Forestry Branch goals and clearly defined management objectives. These objectives would be met using accepted and reviewed silvicultural applications, prescribed burning practices and timber stand improvement methods. The project area for the proposed action consists of 389 timber harvest blocks on 12,915 acres; prescribed burning sites on 53,820 acres; and 3,364 acres of timber stand improvements including 274 acres of crop tree release, 1,657 acres of pre-commercial thinning, and 1,449 acres of herbicidal vegetation control. These activities will be conducted over five years starting in FY 2009 and occurring through FY 2013.

## **ALTERNATIVES CONSIDERED**

The No Action Alternative and the Preferred Alternative are the only scenarios described in detail in the EA. Although other alternatives were considered, the Preferred Alternative, which is the proposed action, is the only one that meets the screening criteria established by the Forestry Branch on Fort A.P. Hill. The No Action Alternative serves as a baseline against which the Preferred Alternative can be evaluated. For this analysis, the No Action Alternative is defined as continuing the current use of the installation property with no application of the forest management activities described in the proposed action.

## **ALTERNATIVES CONSIDERED AND REJECTED**

Alternatives to the proposed action that were considered by the Forestry Branch include an accelerated forest management proposal to meet wildfire hazard management, forest health and accessibility objectives in a more aggressive manner on additional acres across the installation. The other alternative examined applying different harvest types to meet the same forest management

objectives as the proposed action, such as single tree selection instead of shelterwood harvests, to reduce immediate site impacts. Though this approach has good intentions, it would require more frequent harvests to meet the same structure and species goals, effectively negating the immediate reduced impact over time. Neither of these alternatives met the screening criteria established by the Forestry Branch and have been eliminated from further consideration within this EA.

## **ENVIRONMENTAL CONSEQUENCES**

The EA evaluates potential environmental consequences of implementing the proposed action and the No Action Alternative. Implementation of the proposed action, the installation's Preferred Alternative, would mean that forest management activities including timber harvesting, prescribed burning and timber stand improvements would begin. Overall, implementation of the proposed action would either have no impacts or no significant impact on the resources evaluated, including: land use; noise; soils; vegetation; water resources, including wetlands; biological resources, including threatened and endangered species; cultural resources; socioeconomic resources; environmental justice/protection of children; infrastructure; utilities; and hazardous wastes and materials.

Minor impacts may be incurred temporarily on air during timber harvesting, prescribed burning, and timber stand improvement activities due to expected smoke production and mechanized equipment operation. Smoke management plans and prescribed burning schedules would be implemented to reduce impacts of smoke production. Harvests, timber stand improvements, and firebreak construction are expected to have no or minor impacts on water quality, cultural resources, and threatened and endangered species. The proposed action would implement a 50-foot minimum, no-harvest Streamside Management Zones to protect water quality and known cultural resources would also be protected from management activities with a designated buffer and specialized prescribed burn ignitions. Known threatened and endangered species colonies would be protected with a buffer according to Fort A.P. Hill Integrated Natural Resources Management Plan. Each site in the proposed action would be surveyed for additional threatened and endangered species, desirable habitats, wetland boundary locations, or cultural resources prior to action implementation. Prescribed burning and forest management sites identified in the proposed action may be reduced in size or eliminated from management application as a result of on-going resource survey results. The proposed action would have a minor, but positive impact on regional socioeconomics. There would be no impacts concerning environmental justice or protection of children. Existing roads and trails would be utilized as firebreaks where reasonable and new, non-permanent firebreaks would be reshaped and seeded where needed following the completion of the prescribed burning activity. Above-ground utilities would be protected from prescribed burning and forest management activities. Handling or production of hazardous materials or wastes during prescribed burning or other forest management activities would be minimal and handled according to applicable federal and state law and regulations, Fort A.P. Hill policy, and existing waste management contracts.

Implementation of the No Action Alternative would mean existing conditions (as presented in Section 4.0) would continue as the *status quo*. Under the No Action Alternative, no new prescribed burning or forest management actions would be implemented and the sites would be altered only by natural processes, including wildfires, forest disease, and severe storms, or land clearing for construction.

## **CONCLUSIONS**

The proposed action is needed to support the installation's military mission and to fulfill the Fort A.P. Hill natural resource management goals based on regulatory guidelines. Army regulations, management plans, and environmental requirements implemented by Fort A.P. Hill would ensure activities are in compliance with applicable federal, state, and local laws and other regulations. Implementation of the proposed action would not result in significant impacts to the physical

environment of Fort A.P. Hill or to the socioeconomic region. Based upon the findings and conclusions within this EA, issuance of a Finding of No Significant Impact would be appropriate and an Environmental Impact Statement would not be prepared.

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## 1.0 INTRODUCTION

### 1.1 Introduction

This Environmental Assessment (EA) describes the proposed action of forest management activities, including timber harvesting, prescribed burning, and timber stand improvements to be carried out on Fort A.P. Hill in Fiscal Years (FY) 2009-2013 and evaluates the environmental impacts of the proposed action. Alternatives to the proposed action are included and evaluated in this EA. These forestry activities are to be managed by the Fort A.P Hill Directorate of Public Works' (DPW) Environmental Division's (ED) Forestry Branch.

This EA has been prepared pursuant to the Council on Environmental Quality (CEQ) regulations in 40 Code of Federal Regulations (CFR) Part 1500-1508 and 32 CFR Part 651 "Environmental Analysis of Army Actions," (Army Regulation (AR) 200-2). The EA addresses the environmental and socioeconomic impacts of the proposed action in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended. In this EA, the described forest management activities are the proposed action.

### 1.2 Purpose and Need for the Proposed Action

#### *1.2.1 Background*

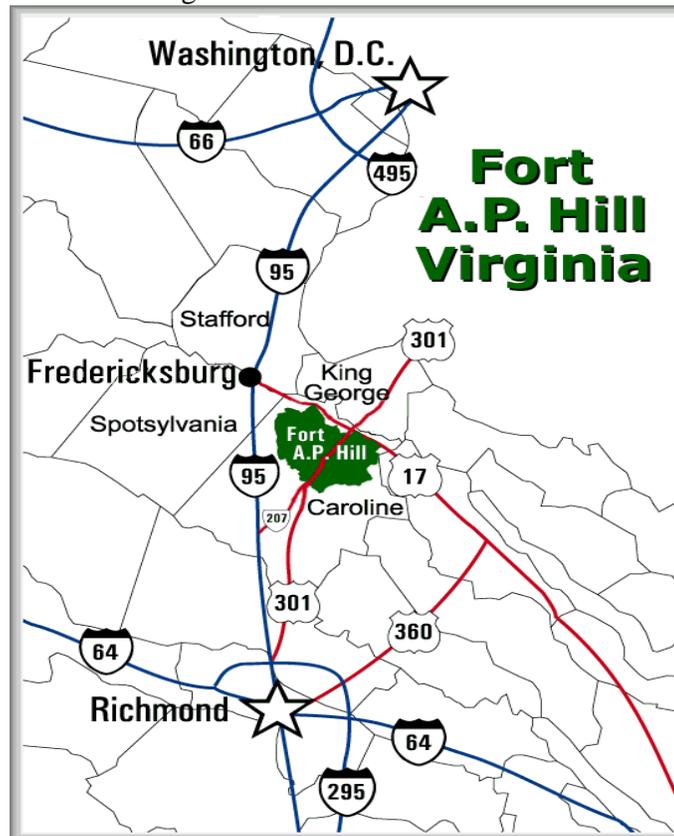
Fort A.P. Hill is a heavily forested, 75,794-acre U.S. Army training facility located in Caroline County, Virginia proximal to the I-95 corridor. The installation is situated roughly midway between Richmond, Virginia and the Washington, D.C. metropolitan areas. The installation, which is bisected by US-301, is comprised of a live-fire range complex to the south and maneuverable training areas to the north (Figure 1). The installation rests on the upper Atlantic Coastal Plain in the watersheds of the Rappahannock and Mattaponi Rivers. Fort A.P. Hill's terrain consists of rolling hills and some low areas and wetlands occur throughout the landscape. Forest cover contains hardwood, coniferous, and mixed cover types typical of the Southeastern Plains ecoregion (CEC 1997). Other portions of the installation are characterized by open grasslands, improved grounds, and a minor agricultural outlease component. The installation is bordered by privately owned forest and farms and by the towns of Bowling Green and Port Royal.

The mission of Fort A.P. Hill is to provide realistic joint and combined arms training, logistics and support, enabling America's Defense Forces to win in the 21<sup>st</sup> Century operational environment. In support of Fort A.P. Hill's mission and environmental policy, the goals of the Forestry Branch (Forest Management Plan (FMP) 2005) are to:

- Maintain, and where necessary, create sustainable forest conditions required to support or facilitate military training activities.
- Maintain ecosystem vitality and overall forest health by applying the concepts of timber stand improvement, forest health monitoring, and sustainable silvicultural treatments.
- Manage forest stands to provide structural diversity and to optimize natural plant and animal biological diversity.
- Integrate wildlife habitat requirements into the decision-making process at the forest stand and landscape levels.
- Manage forest and grassland areas for fuel loading and wildfire prevention.

- Apply current standards of Environmental Management System (EMS) awareness and environmental compliance to forestry activities to maintain compliance with federal, state, and local regulations.

Figure 1: Location of Fort A.P. Hill



### 1.2.2 Purpose

Army Forestry programs are required to be compatible with mission operations and support conservation, compliance, sustainability, and natural resources stewardship (AR 200-1).

The purpose of conducting forest management activities in the five years covering FY 2009-2013 is to continue management of the forest ecosystem and on-going resource protection in direct support of the long term military mission and training land sustainability (FMP 2005). The proposed action incorporates commercial timber harvesting to manage forest density levels and improve forest health, tree growth and vigor, to move the structure and species cover to these designated in the long-term goals, and to create accessible, maneuverable training areas. It incorporates a comprehensive prescribed burning program to reduce wildfire hazards and related risks resulting from munitions training. Prescribed burning also provides a natural fire disturbance regime to create a favorable training setting and to enhance and maintain current biodiversity and ecosystem function, such as the oak and pine covertypes occurring on the installation are fire-tolerant ecosystems that benefit from a regular fire regime to control competing vegetation. The proposed action also includes timber stand improvement activities, including pre-commercial pine thinning and crop tree release, in areas with small trees occurring in high densities. This action results in increased growth and resource availability to the residual trees and improves accessibility for training actions in these areas. Finally, a series of herbicidal treatments is planned for areas where pine or oak are the designated coertype. In regenerating pine stands where there are at least 400 desirable trees per acre of which less than 80

percent are free-to-grow, herbicides will be applied to control the hardwood competition and assist in successful establishment of the pine regeneration. Inventories will also be conducted in potential oak regeneration stands to determine the amount of oak stems present and viability before herbicides are applied. The sites for pine and oak herbicide treatments identified in this EA are those that are potential candidates, but will be surveyed for appropriateness of treatment before herbicides are applied. All of these actions are associated with long-term forest management goals for forest type and structure on the installation landscape.

### *1.2.3 Need*

The Long-Term Forest Management Plan (2008 draft), herein after referred to as Long-Term Plan, outlines a desired forest structure that will characterize the installation in 100 years time. The Long-Term Plan is in direct support of the Fort A.P. Hill Integrated Natural Resources Management Plan (INRMP) and AR 200-1. The goals set in the plan are based on set forest management units (MU) and are geared towards a mosaic of forest structural diversity to maximize available habitat and training settings across the Fort A.P. Hill landscape through time. This forest “mosaic” includes a pre-designated distribution and abundance of forest structure types across the landscape through time. The forest structure types include early, mid, and late-successional structure types to ensure that while there are adequate amounts of areas on the installation sufficient for current desired training regimes, including mounted and dismounted maneuvering, there will also be adequate levels of forest regeneration and habitat types for a variety of wildlife species. Some areas of the installation may look like a park or savannah with widely-spaced trees and groups of trees, while other areas will be characterized by a more “natural” forest condition with higher tree densities. This mosaic approach will also serve to support changes in future training regimes as a variety of forest settings will be available on the installation. Objectives of the Long-Term Plan also include landscape while also include reducing the amount of edge between forest types and creating larger core areas of each particular structure to increase the development of ecosystem functions and habitat structures. Forest covertypes (pine, hardwood, and mixed pine and hardwood) will also be maintained at pre-designated levels and distribution with a slight shift away from pine in favor of mixed and hardwood covertypes.

The management activities proposed in this EA were designed to begin shifting the current forest structure to allow it to meet the desired future condition (DFC) set for 100 years in the future. The stands were prioritized based on forest stocking (density) levels with the most overstocked stands receiving the highest priority. Overstocking that occurs in forest stands results in increased mortality and tree disease rates due to the competition for limited resources (Crow 1992). The proposed action includes a silvicultural regime that will be applied spatially based on watershed groupings (Figure 2) over the five-year period designated by this EA and will begin to shift the forest structure to the DFC while also reducing the density in the overstocked stands for increased training access and improved forest health, vigor, and sustainability. Many stands were also selected for harvest in order to meet specific training requirements, particularly mounted and dismounted maneuvers.

Munitions training that occur in the range complex on the southeastern portion of the installation often results in the ignition of wildfires. Installation personnel are equipped to respond to these fires and perform control, containment, or confinement as needed as per the Integrated Wildland Fire Management Plan (IWFMP 2007). However, wildfire hazard management practices reduce the volume of available forest fuels (e.g., leaf litter, twigs, and fallen logs) during wildfire events. Reduced forest fuel availability generally decreases the intensity of the wildfire and increases the ability to respond to and contain the fire safely and effectively. Prescribed fire also mimics a natural fire disturbance regime and works to maintain and enhance the current level of biodiversity found on the installation. Maintaining biodiversity over time is expected to contribute to the long term sustainability of the installation including the on-going military training mission. Wildland fire also plays a distinct role in the establishment of oak as a sustainable coertype as oak species have

adapted to sprout repeatedly following fire events, unlike other more competitive tree species. Creating large canopy openings (as with shelterwood harvests) and maintaining a regular fire regime is essential to ensuring that oak species remain a significant species on the installation. Prescribed burning reduces understory densities and enhances the growth of herbaceous species providing a food source for wildlife and a training site for the warriors.

Forest management practices can be applied to enhance or expedite natural processes for a desired result. The productive capacity of soils on the installation and the high growth rates of local vegetation often result in high-density forest stands. These stands are characterized by heavily vegetated understory conditions and numerous small tree stems. This setting is in direct conflict with the desired military training setting. The actual desired setting varies by training objective and type; however, it is generally accepted that increased visibility and maneuverability within the forested setting are desirable characteristics. Timber stand improvement activities would reduce stem densities before a stand is large enough for a commercial harvest and create more open understory conditions which would contribute additional acres available for the variety of training modules that may require this type of setting. The reduced stem density also provides increased access to available resources to the residual trees resulting in higher growth rates, increased vigor, and increased ability to withstand insect and disease outbreaks.

### **1.3 Scope of the Document**

The FY 2009-2013 Forest Management Activities EA describes the proposed action with its related objectives. A description of the affected environment is provided and an assessment of the effects of the actions on the following environmental resources and factors: land use, air quality, noise, soils and vegetation, water resources (including wetlands), biological resources (including threatened and endangered species), cultural resources, socioeconomic resources, environmental justice, infrastructure and utilities, and hazardous materials and wastes. The environmental effects of the No Action Alternative are also assessed to provide a baseline to determine the significance of impact of the proposed action. This EA also provides discussion on any cumulative or secondary impacts that may be associated with the proposed action and Best Management Practices (BMP's) that would be applied to the proposed action to minimize environmental impacts.

### **1.4 Interagency Review and Public Comment Period**

Federal, state, and public comment periods would be held following the completion of the draft EA. During this time, agency and public input on the proposed action and the EA document will be obtained. Comments submitted by agencies, organizations, and members of the public on the proposed action or EA will be considered. If the EA concludes that there are no significant impacts, the EA will be finalized and a Finding of No Significant Impact (FONSI) will be issued.

Additionally, in accordance with the Fort A.P. Hill Standard Operating Procedure "Conducting Cultural Resource Surveys in Association with Forestry Activities", NEPA review of the proposed action will be coordinated with the project review under Section 106 of the National Historic Preservation Act of 1966 (as amended) to allow for State Historic Preservation Officer review of individual undertakings at each proposed forestry block prior to forestry activities.

## **2.0 PROPOSED ACTION**

The proposed action is a regime of timber harvesting, prescribed burning, timber stand improvement, and herbicidal vegetation control activities designed to achieve established Forestry Branch goals and clearly defined management objectives. These objectives would be met using accepted and reviewed silvicultural, prescribed burning practices, and timber stand improvement methods. The project area for the proposed action consists of 389 timber harvest blocks on 12,915 acres; prescribed

burning sites on 53,820 acres; and 3,364 acres of timber stand improvements including 274 acres of crop tree release, 1,657 acres of pre-commercial thinning, and 1,449 acres of herbicidal vegetation control. The purpose of conducting timber harvests, prescribed burning, and timber stand improvements over the five years of FY 2009-2013 is to meet the goals set forth in plans put forth by Fort A.P. Hill directed to continue management of the forest ecosystem and on-going resource protection in direct support of the long-term military mission and training land sustainability. Refer to the glossary found in Appendix K for definitions and descriptions of terminology used in the following sections.

## 2.1 Timber Harvesting

The proposed action includes applying silvicultural treatments and resulting timber harvests on over 12,915 acres (Appendix A). The installation is characterized by 13 sub-watersheds that have been grouped into five compartments to facilitate logical, cyclical forest management applications and monitoring efforts (Figure 2 and Appendix D). Timber harvesting operations will be focused in one of the five watershed groups for each FY proposed in this plan. There are exceptions to this approach to address silvicultural timing requirements and accommodate facility and range development occurring on the installation. This approach will allow monitoring to occur at the sub-watershed level to determine any potential impacts of actions on the water quality.

Figure 2. Fort A.P. Hill Sub-watershed Management Groups

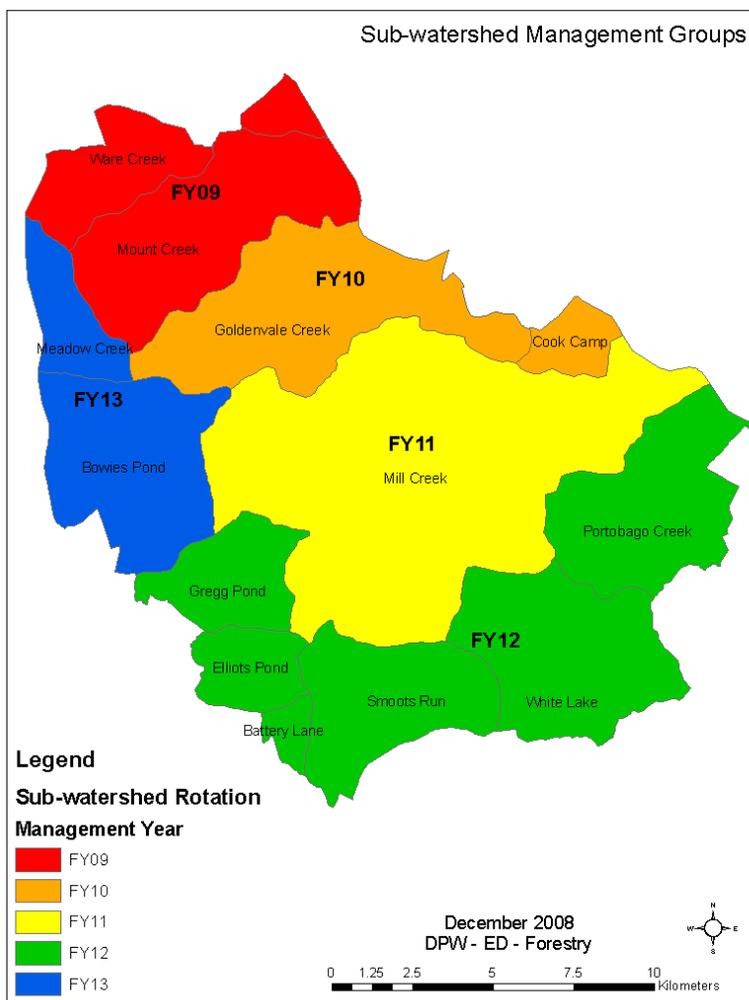


Table 1. Fort A.P Hill Sub-watershed Summary

<b>Fiscal Year</b>	<b>Sub-watershed Group</b>	<b>Forested Acres</b>	<b>Acres Proposed for Harvest</b>	<b>Percent of Forested Acres Proposed for Harvest</b>
2009	Mount Creek, Ware Creek	10,711	3,051	28%
2010	Cook Camp, Goldenvale Creek	8,789	2,719	31%
2011	Mill Creek	19,918	2,428	12%
2012	Battery Lane, Elliots Pond, Gregg Pond, Portobago Creek, Smoots Run, White Lake	19,678	2,995	15%
2013	Bowies Pond, Meadow Creek	7,676	1,722	22%
<b>TOTAL</b>		<b>66,772</b>	<b>12,915</b>	<b>19%</b>

The proposed action includes harvesting an estimated 50,927 thousand board feet (MBF) and 38,399 cords of pine and 47,684 MBF and 33,440 cords of hardwood timber. The timber would be removed from 389 harvest blocks, which may be comprised of one or more forest stands, totaling approximately 12,915 acres (Appendix A). For sustainability analysis, these volumes were converted to cubic foot (cuft) equivalents to compare to the annual net growth (16,896,422 cuft) and annual removal rates (15,207,935 cuft) for Caroline County (Table 2). This comparison to regional growth and harvest rates shows that an average of about 20 percent (one fifth) of the annual growth is proposed to be harvested indicating that tree growth will far exceed tree removal on Fort A.P. Hill. Additionally, the proposed action will be removing an average of about 23 percent (less than one quarter) of the volume removed through commercial timber management or development in the surrounding region. The reasons for these differences are related to the difference in management objectives. Ideally, commercial forestry practices remove timber at a rate that closely mirrors the growth rate to maximize the productivity of the land, as seen in the Caroline County volumes. Timber management on Fort A.P Hill is geared towards creating desired training settings and forest structure varieties, not commercial timber management. It should also be noted that though over 12,900 acres are proposed for harvesting over the next five years in this EA, over 18,000 forested acres are set aside as “forest reserve areas” that will not receive harvest treatments. The proposed harvest actions will be conducted by private contractors who will remove all of the purchased timber from the installation. Primary skid trails and log landings to be used at the timber harvest sites will be identified and marked by Forestry Branch staff. When possible, existing or previously established skid trails and log landings will be utilized and all forest access roads, primary skid trails and log landings will be shaped and seeded as needed. Seed mixes may include any or all of the following: wheat, clover, perennial and annual rye, orchard grass, and native warm season grasses. Proposed new primary skid trails, log landings, or forest access roads will be subject to a cultural and natural resources surveys prior to establishment.

Table 2. Annual Cubic Foot Volume Removal Under the Proposed Action Compared to Annual Removal and Annual Net Growth Rates for Caroline County, VA. (USFS FIA)

Fiscal Year	Fort A.P. Hill Volume Removal (MBF)	Fort A.P. Hill Volume Removal (Cords)	Fort A.P. Hill Total Volume Removal (MBF + Cords) in Cubic Feet	Percent of Caroline County Annual Growth	Percent of Caroline County Annual Removal
2009	19,343	16,825	3,765,452	22.3%	24.8%
2010	32,844	21,524	5,491,962	32.5%	36.1%
2011	17,493	11,571	2,938,778	17.4%	19.3%
2012	15,890	10,071	2,613,202	15.5%	17.2%
2013	13,041	11,848	2,603,250	15.4%	17.1%
TOTAL	98,611	71,839	17,412,647	20.6%	22.9%

### 2.1.1 Harvest Types and Objectives

The proposed harvest or management types include thinning, shelterwood, selection, seed tree with reserves, and clearcut/clearcut with reserves. The harvest type was selected to effectively shift the stand towards the DFC indicated in the Long-Term Plan with consideration of the desired regeneration's site requirements. The following sections describe the technique and management objectives for each type of harvest. The harvest types are then broken out by the general covertypes of the stands in tabular format. To determine which stands within a harvest block are to receive which treatment, refer to the harvest type map in Appendix A. Most silvicultural treatments will rely on natural regeneration from established seed source and stump sprouting, but artificial regeneration may be considered to meet specific management requirements to include planting of loblolly pine (*Pinus taeda*) and shortleaf pine (*Pinus echinata*). These plantings would be used to augment natural regeneration in areas where a pine covertype is the desired future condition and natural regeneration is not occurring as desired. Additionally, shortleaf pine plantations are successfully being used to assist in oak seedling establishment, can be managed on a longer rotation than loblolly pine and responds well to thinning operations even late in their life-expectancy. These characteristics make shortleaf pine a viable tool in shaping the landscape for training and biodiversity goals. Shortleaf pine planting will also be considered on a site-by-site as a potential covertype replacement in areas dominated by Virginia pine (*Pinus virginiana*) which is not well suited for management for training requirements.

- Thinning.** This practice selectively removes trees to a desired level in an immature stand. The objectives are to reduce stand density and maintain or accelerate diameter growth, to improve the average form of the remaining trees, and increase training accessibility without significantly opening the canopy. Full canopies encourage height growth and self-pruning, resulting in higher-quality wood products. This method favors suppressed and poor quality trees for removal from the stand. Any resulting canopy gaps allow sunlight to reach the ground and promote regeneration and an increase in herbaceous plants, potentially beneficial to many wildlife species. This method would be applied to stands with a DFC indicating a large average diameter and medium to low overstory density. Thinnings are traditionally applied in pine plantations and on Fort A.P. Hill they will be applied in pine stands and mixed covertypes and can assist in shifting species composition from pine to mixed pine and hardwood, or to a pure hardwood stand. These thinned stands also provide direct training benefits when the residual stand structures are suitable as maneuverable areas following the action. See Table 3 for proposed thinning information.

Table 3. FY 2009-2013 Forest Stand Thinnings

Cover	Number of Harvest Blocks	Total Acres
Pine	114	2,923
Mixed Pine/Hardwood	2	40
Total	116	2,963

- Shelterwood.** This even-aged silvicultural system is comprised of a series of cuts that gradually removes trees from mature stands that contain a large percentage of desirable species. Approximately 30 to 40 mature trees per acre (or about 20-50 square feet in basal area – a measure of forest stand density) are retained after the initial cuts to provide seed and/or protection for regeneration of the stand. This amount of residual trees allows adequate seed source, but also allows sufficient light to reach the forest floor for successful forest regeneration. The residual mature trees may be removed in a subsequent harvest or multiple harvests once the new trees are established. By harvesting the trees in this manner an abundance of herbaceous species will flourish for several years enhancing the habitat for wildlife dependent on this early successional stage. The residual structure following a shelterwood harvest is also adequate for mounted (vehicle) maneuver training. See Table 4 for proposed shelterwood information.

Table 4. FY 2009-2013 Shelterwood Harvests

Cover	Number of Harvest Blocks	Total Acres
Pine	38	1,368
Mixed Pine/Hardwood	29	832
Hardwood	27	1,003
Total	94	3,203

- Selection.** This is a method of regenerating new age classes in uneven-aged stands. The selection method can be applied by removing individual trees, preferably of poor quality and form or undesirable species. Stems are removed more or less uniformly across a stand or by cutting small groups or patches (ca. one-half acre in size) of trees. This method is applied on forest stands at Fort A.P. Hill designated to create or maintain uneven-aged stands of hardwoods such as oaks (*Quercus* spp.), hickory (*Carya* spp.) and yellow-poplar (*Liriodendron tulipifera*). This structure is typical of a “natural” forest setting with a wide distribution of tree sizes and spacing. This method is also being proposed to apply in pine stands to contribute to structural diversity. This method will provide timber marking flexibility to create a desired residual structure and species composition to shift the stand towards the DFC. See Table 5 for selection cut information.

Table 5. FY 2009-2013 Selection Harvests

Cover	Number of Harvest Blocks	Total Acres
Pine	20	483
Mixed Pine/Hardwood	43	1,463
Hardwood	57	2,690
Total	120	4,636

- Seed Tree with Reserves.** In a seed tree system, the entire block is managed for an even-aged structure, except that select trees are left to supply seed for the regenerating stand. Therefore, the best phenotypes are selected to try to encourage desirable genetic traits. These seed tree harvests will retain a minimum of five trees per acre spaced more or less uniformly across the harvest area. The residual seed trees may be retained to contribute to forest stand structural diversity, beneficial for wildlife habitat. See Table 6 for proposed seed tree information.

Table 6. FY 2009-2013 Seed Tree Harvests

Cover	Number of Harvest Blocks	Total Acres
Pine	13	535
Mixed Pine/Hardwood	1	21
Total	14	556

- Clearcut/Clearcut with Reserves.** In a clearcut system, all or most of the stand's overstory is removed in one harvest with a new even-aged stand regenerating following the harvest. The clearcut system incorporates all of the advantages associated with managing an entire stand uniformly through time, including ease in harvest operations as well as increased site preparation opportunities. Generally, this system is used to replace over-mature stands with a younger, vigorous stand as quickly as possible, establishing an even-aged structure. Clearcutting is applied in some salvage operations, land use conversions, and some over-mature stands characterized by high mortality rates which results in hazardous training conditions, particularly in stands dominated by Virginia pine. Additionally, stands characterized by Virginia pine do not respond well to thinning operations due to susceptibility to wind-throw, so some of the proposed clearcuts may be implemented where military access is essential and alternative silvicultural approaches cannot be successfully implemented. This will be determined on a site-by-site basis. Clearcuts with reserves will retain snags, den trees, potential den trees, mast-producing trees, and possibly additional live trees that are not contrary to the DFC for the MU. These blocks will regenerate naturally from the existing seed source, from tree seedlings remaining in the block following harvest and from root and stump sprouts, as well as potential tree planting to enhance natural regeneration or shift the covertime from Virginia pine to a more suitable species in areas highly utilized for training. See Table 7 for proposed clearcut information.

Table 7. FY 2009-2013 Clearcut Harvests

Cover	Number of Harvest Blocks	Total Acres
Pine	13	221
Mixed Pine/Hardwood	2	77
Total	15	298

- Overstory Removal.** Overstory removals occur in stands that have previously received a shelterwood harvest that have since established adequate regeneration. This operation removes the large, residual, merchantable stems in order to release the regeneration for complete stand establishment. This operation is also geared towards utilizing the mature timber before over-maturity and mortality become prevalent. The skid trails created in these stands characterized by high sapling densities also have the added benefit of increasing accessibility for training. See Table 8 for proposed overstory removal information

Table 8. FY 2009-2013 Overstory Removal Operations

Cover	Number of Harvest Blocks	Total Acres
Pine	30	1,258

## 2.2 Prescribed Burning

The proposed action includes the prescribed burning of approximately 53,820 acres during the five-year timeframe covered by this EA (Appendix B). Many areas will receive repeated prescribed burns during this period. Appendix B contains a series of maps representing the distribution of burn block, burn objectives, and burn block acreage. The burn objectives include wildfire hazard reduction, oak regeneration, vegetation control, site preparation for timber management, and open area burns for wildlife management. Sites were selected based on location in proximity to designated maneuver lane training sites, live-fire range areas, recently harvested sites, areas of known oak regeneration potential, MU's that have a DFC requiring a low understory density, and selected wildlife enhancement areas. Table 9 displays the desired fire intensity (i.e., Fire Spread Index), and preferred burning times to accomplish each burn objective.

Hand-held drip torches filled with a combination of diesel and gasoline would be used to ignite the prescribed burns. The ignition pattern would entail backfiring, strip firing, flank firing and head firing as trained Forestry and installation Fire Department personnel follow established firebreaks, trails and roads. When safety permits, strip fires may be ignited through the block away from the pre-established firebreaks to minimize fire intensity and provide more thorough burn results. Prescribed burning guidelines, stipulated by the Fort A.P. Hill's Integrated Wildland Fire Management Plan (2007), Virginia Department of Forestry (VDOF), Virginia Department of Environmental Quality (VDEQ) and Environmental Protection Agency (EPA), include the development of a prescribed burn plan for each burn block. The plan, utilized on Fort A.P. Hill, is modeled after that used by VDOF, see Appendix G. The Prescribed Burn Plan for each block outlines burn block location, objectives of the burn, weather limits including: air temperature, humidity, wind velocity, wind direction and fuel moisture, and a site-specific smoke management plan.

Table 9. Prescribed Burning Objectives and Specifications

Burn Objective	Preferred Spread Index	Fire	Preferred Burn Time
Fuel Reduction	Moderate – High		Oct- Mar
Oak Regeneration	Moderate – High		Mar-May
Vegetation Control	Moderate – High		Feb-May
Site Preparation	Moderate – Very High		Oct-Mar
Wildlife Management	Moderate – High		Sep-Mar

### 2.2.1 Prescribed Burn Types and Objectives

- Wildfire Hazard (Fuel) Reduction** - The proposed action wildfire hazard (fuel) reduction burns will be applied in areas across the installation with a particular focus on the live-fire range complex, an area subject to frequent fires due to munitions firing. Historically, these blocks are burned annually and would be burned between November 1 and March 31. Prescribed burning for wildfire hazard reduction is an effective and cost efficient way to manage the accumulation of combustible fuels resulting in reduced risk of destructive wildfires. These forest “fuels” are comprised of dried leaves, pine needles, small twigs and grasses, known as “fine fuels” and fallen logs and branches known as “heavy fuels”. Generally, only the fine fuels would be consumed as they burn easier and occur continuously through most forested areas. Fuel hazards accumulate based on factors such as past wildfire frequency, covertime, weather events, and improvements at risk. Reducing the amount of dried leaves, grasses and woody debris is of primary importance in reducing wildfire hazards, incidence, and intensity and is essential in protecting natural resources and real property where munitions training is a primary land use. Therefore, annual burns are applied to areas where munitions use is expected and at a lesser frequency where structures and other training facilities are to be protected. See Table 10 for the acreage of wildfire hazard reduction burns prescribed for each of the five years. See Appendix B for the location of these forest fuel reduction burns through time.

Table 10. Wildfire Hazard Reduction Burn Acreage per FY

Fiscal Year	Number of Blocks	Acres
2009	85	27,063
2010	92	25,557
2011	88	25,913
2012	91	26,755
2013	89	27.092

- Oak Regeneration** - Prescribed burning focused on encouraging oak regeneration would occur in the growing season between March 15 and April 30. See Appendix B for the location of these

burns. Oak species have biological adaptations, such as thick bark, the ability to re-sprout repeatedly following top-kill and resistance to rot which allows oaks to withstand a regime of frequent fire compared to competing species. Fire encourages successful oak regeneration by creating favorable growing conditions for cached acorns, reducing insect populations that prey on acorns and young seedlings, and reduction of understory and midstory competition from fire-intolerant species. The exclusion of fire from the regional landscape has had an unintended impact on the successful establishment of oak throughout its historic range. The reduced fire frequency favors the establishment of less fire-tolerant and more competitive tree species such as sweetgum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*) over the establishment of oak. Oak species have been identified as a favorable species component of the installation forest complex and is specified as a goal in the Long-Term Plan. Ensuring the continued presence of this tree species is significant owing to their longevity, resistance to rot, ability to tolerate soil compaction and other military-related impacts, use as a source of food for wildlife, and quality timber production. See Table 11 for the acreage of oak regeneration burns.

Table 11. Oak Regeneration Burn Acreage per FY

Fiscal Year	Number of Blocks	Acres
2009	3	409
2010	0	0
2011	1	116
2012	0	0
2013	2	312

- **Vegetation Control** – Prescribed burning for vegetation control would occur between February 1st and May 31<sup>st</sup>. See Appendix B for the location of the five-year vegetation control burns. Prescribed burning can be an inexpensive and effective way to remove the smaller woody undergrowth leaving a more open forest floor, encouraging herbaceous undergrowth while maintaining the larger trees to characterize the site. Prescribed burning is used in training areas to maintain training access by reducing or eliminating understory vegetation and supports the goals of the Long-Term Plan. See Table 12 for vegetation control burn acreage.

Table 12. Vegetation Control Burn Acreage per FY

Fiscal Year	Number of Blocks	Acres
2009	22	10,199
2010	16	4,218
2011	10	5,686
2012	24	9,695
2013	12	3,177

- **Site Preparation** - Prescribed burning for site preparation would occur between October 1st and March 31st (Appendix B). Site preparation for the regeneration of forests is carried out to produce a high-quality environment for the efficient establishment and growth of seeds and seedlings. This is accomplished through the nutrient release resulting from the combustion of organic materials as well as the resulting vegetation control. This type of burn also serves to break down harvest residues making these sites more accessible. See Table 13 for site preparation burn acreage.

Table 13. Site Preparation Burn Acreage per Fiscal Year

Fiscal Year	Number of Blocks	Acres
2009	1	45
2010	0	0
2011	0	0
2012	0	0
2013	0	0

- **Wildlife Management** – Prescribed burning specifically for wildlife management would occur between February 1st and March 31<sup>st</sup> (Appendix B). Prescribed burning restricts vegetative succession, promoting open spaces for wildlife and enhancing understory growth of favorable species for foraging wildlife found at Fort A.P. Hill. These burns can also be applied to maintain and enhance warm season grass fields. See Table 14 for wildlife management burn acreage.

Table 14. Wildlife Management Burn Acreage per Fiscal Year

Fiscal Year	Number of Blocks	Acres
2009	9	147
2010	9	147
2011	9	147
2012	9	147
2013	9	147

Preparation for prescribed burning activities includes identification, establishment, and/or clearing of existing firebreaks. Whenever possible, existing roads, trails, and waterways are used as firebreaks for prescribed burning activities. In some instances, resources such as cultural sites, protected plant colonies, specified forest stands, and structures may require the establishment of new firebreaks for protection. When new ground must be broken to protect these resources, the appropriate Fort A.P. Hill digging permit would be attained if needed, cultural resource survey performed, and appropriate

distance maintained from waterways (minimum of 50 ft). Firebreaks would be established with a tractor and disk attachment or fireplow. Alternative firebreak types such as handlines, leaf blowers, or surface-scraping tools, such as a tractor and rake, for short distances (<100 ft) may be utilized to anchor firebreaks to existing fuel breaks, such as perennial streams or to protect other sensitive resources like protected plant colonies. Approximately 62,624 linear feet (11.9 miles) of new, temporary firebreaks need to be installed to conduct the prescribed burns proposed in this EA (Appendix A). Additionally, 55,973 linear feet (10.6 miles) of new firebreaks have been identified to be maintained by the installation to complete a manageable firebreak along the entire perimeter of Fort A.P. Hill to protect neighboring resources from wildfires occurring on the installation and vice versa. These perimeter firebreaks will require tree removal to maintain an adequate firebreak width. Firebreaks will be constructed based on specifications indicated in Virginia’s Forestry Best Management Practices (BMP) for Water Quality (2002) and rehabilitated as needed following the completion of prescribed burning activities.

### 2.3 Timber Stand Improvement Activities

The proposed action also includes several timber stand improvement activities, including pre-commercial pine thinning, hardwood crop tree release, and herbicidal vegetation control to occur in young timber stands. These actions would occur on approximately 3,364 acres. Refer to Appendix C for timber stand improvement types and locations.

Pre-commercial thinning silvicultural treatment is used to reduce tree density in young stands, carried out before the stems reach merchantable size. Pre-commercial thinning would occur in 62 blocks totaling approximately 1,657 acres. The intent is to concentrate the site's growth potential on fewer trees, thus increasing average diameter, retaining a higher live crown ratio, creating opportunities for future commercial thinning activities, improving stand operability and accessibility, and enhancing wildlife habitat. The released trees would grow faster and reach a larger size at maturity (United States Forest Service (USFS) 1990). Vegetation and small trees would be removed using brushsaws and chainsaws or a severe-duty shredder in combination with these hand tools. Felled and shredded vegetation would remain distributed throughout the stand. See Table 15 for pre-commercial thinning information.

Table 15. FY 2009-2013 Pre-commercial Thinnings

Fiscal Year	Number of Blocks	Acres
2009	15	307
2010	6	143
2011	10	222
2012	21	590
2013	10	395

The crop tree release method would be applied to 16 forest blocks totaling approximately 274 acres of the timber stand improvement stands (Appendix C). This type of cut improves the health, vigor, and growth of the selected hardwood crop trees by removing the vegetation surrounding the selected tree to increase the availability of light, water, and nutrients. This would be accomplished by felling all stems required to allow full sunlight on at least three of four sides of the selected crop tree’s

crown. Felled material would remain scattered throughout the stand. Since this operation is intended to improve timber quality, the selection criteria for crop trees would include larger trees that have healthy crowns and sound stem origin. They would be high-quality trees with no apparent defects or compromised health status, of high potential commercial value, species well adapted to the site, and with expected longevity of no less than 20 years. See Table 16 for crop tree release information.

Table 16. FY 2009-2013 Crop Tree Releases

Fiscal Year	Number of Blocks	Acres
2009	6	132
2010	3	39
2011	5	36
2012	2	51
2013	0	0

Forestry herbicides are a cost-effective tool for the control of undesirable vegetation in forest stands and can be used in several ways to increase forest productivity (McNabb 1997). The proposed action incorporates herbicidal hardwood control on sites where pine or oak are the desired future covertype. Pine treatments would occur two years following a shelterwood or seed tree harvest once the regenerating trees are becoming established. In areas where pine is the desired species community and there are at least 400 desirable trees per acre, of which less than 80 percent are in a free-to-grow condition due to competing hardwoods, herbicides would be used to control the hardwood competition to increase the light, water, and nutrient resources available to the desired pine seedlings (Neary & Michael 1996). Prescribed burning is not a viable tool at this stage due to the susceptibility of the pine seedlings as they do not become resistant, even to low-intensity fires until age ten (FEIS). Oak treatments would occur immediately preceding or following an oak-shelterwood harvest, targeting control of competitive hardwood species likely to rapidly re-sprout following the harvest (Loftis 1985; 1990). This treatment would be applied where adequate oak seedlings and sprouts have been identified prior to harvest to justify this form of control. Once the established oak seedlings have reached a three-foot height and a one-inch basal diameter, prescribed burns can be used to control the remaining competition.

Ground treatment using back pack sprayers and applicators is used so the individual stems of species targeted for control are directly treated. Trees in larger size classes may be controlled by frilling or tree injection. All applications are made by a certified forest pest control applicator. Herbicides currently approved and considered for use on Fort A.P. Hill include Garlon® 3A/4 with triclopyr as the active ingredient, Arsenal® AC and Chopper® with imazapyr as the active ingredient and Escort® XP with metsulfuron methyl as the active ingredient. Appendix C contains additional information on application rates, timing, required surfactants, and toxicity ratings. The areas where these vegetation control measures are being proposed (Appendix C) will be evaluated to determine if they meet the qualifying conditions mentioned above prior to herbicide application. If they do not meet the established requirements, no herbicides will be used. See Table 17 for herbicidal vegetation control information.

Table 17. FY 2009-2013 Herbicidal Vegetation Control Treatments

<b>Fiscal Year</b>	<b>Number of Pine Blocks</b>	<b>Pine Acres</b>	<b>Number of Oak Blocks</b>	<b>Oak Acres</b>
2009	0	0	7	126
2010	0	0	4	280
2011	3	71	1	112
2012	15	441	6	152
2013	15	376	0	0

## 2.4 Schedule

The proposed activities would commence once all regulatory requirements have been met and a decision document has been signed. Due to unpredictable weather patterns and military training requirements, completion of proposed activities would vary. Though the goal would be to complete these activities by September of their respective FY, the proposed activities that comprise the proposed action may not be completed until the appropriate time within two to three years of the FY. With acceptable operating conditions, the actions in individual management blocks would require approximately two to four weeks per harvest block, one operational day per burn block, and two weeks per timber stand improvement block.

## **3.0 ALTERNATIVES CONSIDERED**

### **3.1 Alternative Development**

CEQ regulations, NEPA, and Army regulations require reasonable alternatives to the proposed action to be described and evaluated. The alternatives should meet the same underlying purpose of the proposed action and should be analyzed with established screening criteria to support a fully informed land management decision. The No Action Alternative provides a baseline reference for the comparison of potential environmental impacts associated with the proposed action. Screening criteria were established by the Forestry Branch to evaluate alternatives based on ability to meet goals and objectives, purpose and need, overall cost, and the impact to the human and natural environment. Alternatives that did not meet the screening criteria were not considered for further analysis in this EA. Reasons for eliminating an alternative from a detailed analysis are indicated.

### **3.2 Screening Criteria**

Screening criteria established by the Forestry Branch (FMP 2005) for the proposed action include:

- 1) Maintains, and where necessary, creates sustainable forest conditions required to support or facilitate military training activities.
- 2) Maintains ecosystem vitality and overall forest health by applying the concepts of timber stand improvement, forest health monitoring, and sustainable silvicultural treatments.
- 3) Manages forest stands to provide structural diversity and to optimize natural plant and animal biological diversity.
- 4) Integrates wildlife habitat requirements into the decision-making process at the forest stand and landscape levels.
- 5) Manages forest and grassland areas for fuel loading and wildfire prevention.
- 6) Applies current standards of EMS awareness and environmental compliance to forestry activities.
- 7) Efficient and appropriate use of installation resources and allocated funds.

### **3.3 Alternative 1, Silvicultural Treatments of 12,915 Acres, Prescribed Burn over 53,820 Acres and Timber Stand Improvements on 3,364 Acres.**

Alternative 1 is the proposed action described in the section titled 2.0 Proposed Action of this document. This is the Preferred Alternative of the Forestry Branch as it meets the established screening criteria. The timber harvest, prescribed burning and timber stand improvement actions described create and maintain sustainable forest conditions to support military training activities, maintain ecosystem vitality and health, would provide structural diversity, integrate habitat requirements, manage forest fuel loading, apply EMS awareness and compliance, and require full, though reasonable, use of installation resources and funds.

### **3.4 Alternative 2, Accelerated Management.**

Forest fuel loading is a concern across all of Fort A.P. Hill due to the heavily forested condition and military training land use. This presents a wildfire concern for potential damage to installation resources and adjoining private property. In addition, many forest stands on Fort A.P. Hill are considered to be “highly overstocked”, or greater than 110 percent stocked, due to high stem densities or over-due pine plantation thinning operations, commercial or pre-commercial. As a

result, there are high levels of competition occurring within these stands for available nutrients. This circumstance creates decreased growth rates, increased mortality, and increased susceptibility to insect and disease outbreaks. The high understory densities also inhibit the ability for training soldiers to maneuver through the woods on foot or in vehicle for desired training requirements. The Forestry Branch considered drastically increasing forest management activities to get these highly overstocked stands into a more acceptable condition. Alternative 2 proposes a more aggressive forest fuel and vegetation management regime with increased annual prescribed burning on as much as 15,900 additional acres per year to increase the prescribed burning frequency. Additionally, of the 42,160 acres of forest stands estimated to be in a highly overstocked status ( $> 110$  basal area), Alternative 2 proposes an additional 8,165 acres of thinnings and selection harvest, totaling 21,080 acres of harvests over the 5-yr timeframe. This would reduce the amount of overstocked stands by half and would attain desired conditions in an expedited manner. This would create the desired military setting to increase utilization opportunities while also improving the overall forest health status. However, due to the high number of acres that would be subject to management activities and current resource limitations, including personnel, this alternative does not meet the screening criterion related to sustainable land management and limited resource availability would prevent this alternative from being completed in a timely manner. Alternative 2 has been eliminated from further consideration in this EA.

### **3.5 Alternative 3, Variations on Silvicultural Prescription Decisions**

The Forestry Branch also considered alternative methods for achieving the same land management goals set forth in the proposed action. This alternative involves applying a different set of silvicultural prescriptions to create the same residual structure with a potentially less intensive methodology. Replacing shelterwood and seed tree treatments with single tree selections would comparatively reduce site soil impacts, but would require more frequent returns to the site to create the desired structure, would create repetitive soil impacts, and would require access road maintenance over time (Reisigner *et al.* 1988). This type of approach removes less forest product with each entry, but would similarly result in less successful timber sale contracts as low-volume contracts can be difficult to sell due to high logging equipment operation costs. Lastly, the multiple-entry, reduced-impact approach would favor the successful establishment of shade-tolerant regeneration and resulting species composition. While this result is desirable on portions of the installation to contribute to overall structure and cover diversity, the most highly desirable species include pine and oak, both of which require high amounts of sunlight for successful establishment. Though a combination of techniques could meet most of the screening criteria, this potentially lower-impact alternative will not appropriately shift the current species compositions to meet DFC's and does not meet screening criterion three concerning biological diversity and has been eliminated from further consideration in this EA.

### **3.6 No Action Alternative**

Under No Action Alternative, timber harvest, prescribed burning and timber stand improvement actions would not be performed. Army Regulation 200-1, Environmental Protection and Enhancement (7) and (8) mandates that Fort A.P. Hill will maintain an active forest management program and if the No Action Alternative is implemented then Fort A.P. Hill will not be in compliance and therefore, the No Action Alternative was eliminated. Though this alternative does not meet Army requirements, it is included in the assessment as a baseline for comparison of impacts on the resources.

## **4.0 AFFECTED ENVIRONMENT**

### **4.1 Location Description**

Fort A.P. Hill is a heavily forested, 75,794-acre U.S. Army training facility located primarily in Caroline County, Virginia along the I-95 corridor (Figure 1). The installation, which is bisected by US-301, is comprised of live-fire range complex and maneuverable training areas. The proposed action would be applied over a five-year timeframe beginning in FY09. The timber harvest activities would occur on 12,915 acres occurring within the training areas primarily north of US-301 and the range complex area primarily south of US-301 (Appendix A). The prescribed burns in the proposed action occupy 53,820 acres in blocks scattered through the training areas and a significant portion of the range complex (Appendix B). The pre-commercial thinnings, crop tree release and herbicidal vegetation control in the proposed action occupy 3,364 acres scattered in the training areas located north and south of US-301 (Appendix C).

### **4.2 Land Use**

The project area occupies land currently used for military training including specific training sites such as land navigation courses (mounted and dismounted), campsites, military training lanes, tactical concealment areas, a drop zone, airfields, and the range complex. Other land uses in the project area include natural resource inventory and management activities and recreational activities such as small and large game hunting.

### **4.3 Air Quality**

To monitor ambient air quality trends, the VDEQ divides the commonwealth into seven regions. Fort A.P. Hill is located within the jurisdiction of the VDEQ's Northern Regional Office. The VDEQ has classified Caroline County as an attainment area for criteria pollutants based on the air quality monitoring stations closest to Fort A.P. Hill and in the County. Caroline County is located between the Northern Virginia 8hr Ozone and Particulate Matter (PM) 2.5 Non-attainment Area and the Richmond 8hr Ozone Non-attainment Area.

### **4.4 Noise**

Fort A.P. Hill implements an installation Environmental Noise Management Plan (ENMP) (CHPPM, 1998). Noise Zones are designated as Land Use Planning Zone, I, II, or III based on number of decibels produced for both long term and impulsive events. Noise contours are established for the small and large caliber weapons systems used in training events on the installation. The ENMP, which applies to all tenants, provides information and recommendations for reducing noise impact during land and air training exercises. It also provides noise complaint investigation procedures should any complaints arise from the proposed action.

### **4.5 Soils and Vegetation**

#### **4.5.1 Soils**

The installation is located directly east of the fall line between the Piedmont and Atlantic Coastal Plain physiographic regions of Virginia. The general topography ranges from rolling countryside terrain to mostly level plains interrupted by numerous shallow valleys. The elevation varies from 10 feet above mean sea level (MSL) at the northern portion of the installation to 250 feet MSL on hilltops throughout the base. Most of the installation lies above 100 feet MSL. The soils of Fort A.P. Hill range from mostly well-drained sandy soil, to moderately well drained loamy sand, to

poorly drained sandy clay and silt. The proposed action would occur on a variety of soil types found on the installation due to the scattered locations of the harvest and thinning sites and the broad application on prescribed burns. (See the soil type maps in appendices A, B, and C.)

#### 4.5.2 Vegetation

Forests cover approximately 66,000 acres (87 percent) of the installation land area. Fort A.P. Hill encompasses three general covertypes; southern yellow pines, mixed hardwoods, and a mixed pine-hardwood. Generally, a mix of southern pine and hardwoods occurs on the uplands, whereas nearly pure stands of hardwoods occur in the creek bottoms. Pine-dominated sites occupy abandoned farmland and plantations throughout the installation.

Pine forests cover 29 percent of the installation land area (33 percent of forested acres) and include natural forests as well as plantations of various ages. Dominant pine species include loblolly pine and Virginia pine, with a small component of shortleaf pine. Deciduous broad-leaf forests cover approximately 35 percent of the land area (40 percent of forested acres). The primary species include yellow-poplar (*Liriodendron tulipifera*), red oaks (*Quercus falcata*, *Q. rubra*, *Q. coccinea*, and *Q. velutina*), and white oaks (*Q. alba* and *Q. stellata*) interspersed with hickory (*Carya* spp), sweetgum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), hackberry (*Celtis occidentalis*), red maple (*Acer rubrum*), and American beech (*Fagus grandifolia*). Approximately 24 percent of Fort A.P. Hill is covered by a mix of evergreen, needle-leaf trees and deciduous, broad-leaf trees (27 percent of forested acres).

The installation's forests are second growth and reflect a history of land use that predates Fort A.P. Hill. However, records indicate that approximately half of the forest stands on the installation have not undergone any forest management activities since reestablished.

Based on field surveys completed in 1994 and earlier, the Virginia Department of Conservation and Recreation (VADCR), Division of Natural Heritage (1994) designated 18 Conservation Sites on Fort A.P. Hill that they consider worthy of special protection and management measures (see the biological resources maps in appendices A, B, and C). VADCR has recommended management and protection measures for each of these Conservation Sites which would be addressed when planning application of the proposed action.

Open areas on the installation are characterized by maintained (mowed) areas, native grasslands, wildlife enhancement areas, and agricultural outlease areas.

The proposed action would occur predominantly in the forested regions on the installation and the pre-commercial thinnings would occur only in the southern yellow pine stands.

#### 4.6 Water Resources (Surface, Wetland, Groundwater)

Eight major confined aquifers, eight major confining units, and an uppermost water table aquifer describe the regional hydrogeologic framework of the Coastal Plain. Groundwater movement through the unconfined and confined aquifers is generally lateral with discharge into a variety of water bodies including local seepage swamps and streams.

The northeastern 75 percent of the installation drains to the Rappahannock River, which in turn drains to the Chesapeake Bay. The southwestern 25 percent of the facility drains to the Mattaponi River, which drains to the York River and then to the Chesapeake Bay. Approximately 20 lakes and ponds totaling 290 acres in water surface area, and numerous beaver ponds totaling an additional 327 acres in water surface area are also located at Fort A.P. Hill. The water quality of the streams within Fort A.P. Hill is generally within the expected ranges for Coastal Plain streams.

Wetlands have been identified and delineated throughout the installation in the National Wetlands Inventory survey. The current estimation of wetland areas indicates that there are approximately 5,856 acres of wetlands at Fort A.P. Hill, which represent approximately eight percent of the installation's total land area. Greater than 90 percent of the total wetlands are categorized as palustrine forested, palustrine emergent and palustrine scrub-shrub wetlands.

Wetlands and perennial and intermittent streams located and identified by the Forestry Branch and the Fisheries Biologist would be maintained in a forested setting by implementing, at minimum, a 50-foot, no-harvest streamside management zones (SMZs). In addition, a 100-ft no harvest SMZ would be maintained along waterways known to support anadromous fish populations. No Scenic Waterways occur within the project area.

#### 4.7 Biological Resources

The wildlife at Fort A.P. Hill includes species typical of both the Piedmont and Coastal Plain physiographic provinces. Common mammal species include whitetail deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), woodchuck (*Marmota monax*) and raccoon (*Procyon lotor*). Common bird species at the installation include red-tailed hawk (*Buteo jamaicensis*), downy woodpecker (*Picoides pubescens*), common crow (*Corvus branchyrhynchos*), red-eyed vireo (*Vireo olivaceus*), pine warbler (*Dendroica pinus*), bluebird (*Sialia sialis*), wild turkey (*Meleagris gallopavo*), mourning dove (*Zenaida macroura*) and Carolina chickadee (*Parus carolinensis*). Mallard duck (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), green-backed heron (*Butorides striatus*), and prothonotary warbler (*Protonotaria citrea*), also occur in wetlands.

A total of 37 species of fish have been identified by surveys at Fort A.P. Hill. Approximately 50 reptile and amphibian species are also known to occur at the installation (Mitchell and McNulty, 1999).

Five federally and/or state listed threatened or endangered species (TES) have been documented at Fort A.P. Hill. The TES species are managed under the more stringent of available federal or state guidelines or regulations. The animal species are bald eagle (*Haliaeetus leucocephalus*) and Bachman's sparrow (*Aimophila aestivalis*). Currently, 13 nesting bald eagle pairs are known to be present on the installation. Though the bald eagle is no longer a TES species within the meaning of the Endangered Species Act, it is still federally protected under the Bald Eagle Protection Act of 1940 (16 US Code 668-668d, 54 Stat 250) as amended. Therefore, these sites would continue to be managed with eagle protection zones. The plant species include swamp-pink (*Helonias bullata*), small whorled pogonia (*Isotria medeoloides*), and New Jersey rush (*Juncus caesariensis*). Each known plant colony of these species is protected from forest management activities with an established buffer as identified in the Fort A.P. Hill INRMP.

#### 4.8 Cultural Resources

At Fort A.P. Hill, identified historic properties that are eligible for inclusion in the National Register of Historic Places (National Register) include two architectural resources and over 50 archeological sites (Williams 2008). The National Register-eligible architectural resources include one individual structure and one historic district with contributing resources. Temporal periods for significant archeological sites include prehistoric sites occupied by Native Americans prior to the eighteenth-century and historic sites.

Although comprehensive architectural resource surveys have been completed for the entire installation (Winter and Pezzoni 1994; Clarke et al. 2004), archeological surveys have been conducted on approximately 18,000 acres or approximately 24 percent, of the installation, resulting in the identification of over 300 archeological sites. Archeological and architectural resources

identified in the project area are listed in the tables found in Appendix E. As the unsurveyed portions of the installation have the potential to contain a large number of unidentified archeological sites, there is the potential for a significant number of additional National Register-eligible historic properties within the installation.

#### **4.9 Socioeconomic Resources**

The project area occurs on a military training installation. The high number of acres of unimproved grounds provides the required setting to carry out this training mission. Approximately 50,000 soldiers trained on the available grounds and facilities on the installation in the last year. Fort A.P. Hill provides employment for approximately 300 individuals through permanent federal positions, part-time and wage-grade positions, and full-time contracted positions.

The surrounding area is predominately rural, characterized by small towns that are located throughout large tracts of mostly forested or agricultural land. The total population of Caroline County in 2005 was estimated to be 25,563. The county's two incorporated towns of Bowling Green and Port Royal have populations of 995 and 174 respectively based on census estimates for 2005 (US Census Bureau 2006). Caroline County's private industry has historically been natural resource based including agricultural crops, forest products, and mineral resources. Government agencies are also significant employers in the County. The County occupies 549 square miles with 51,600 acres of farmland and 261,700 acres of commercial forestland (Caroline 2006).

Executive Order 13045 seeks to protect children from disproportionately incurring environmental health or safety risks that might arise as a result of installation policies, procedures, programs, activities, and standards. The training lands and ranges of Fort A.P. Hill are restricted to authorized personnel only and access is limited and excludes the entry of unauthorized adults and children.

#### **4.10 Environmental Justice**

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, requires federal agencies to identify and address disproportionate adverse effects of their programs, policies, and activities on minority and low-income populations. Fort A.P. Hill has a small permanent housing area occupied by federal employees and all access to the installation is restricted to authorized personnel only. No other permanent housing areas or residential populations occur on the installation.

#### **4.11 Infrastructure and Utilities**

Existing infrastructure on the installation consists of paved roads, gravel roads and unimproved trails. There are also numerous, scattered training facilities, barracks, assembly areas and other various training structures. Utilities, including water, sewer, power, and communication lines, run along main roadways throughout the installation. Several closed landfills and monitoring wells also occur on the installation and require buffering from forest management actions.

#### **4.12 Hazardous Materials/Wastes**

Fort A.P. Hill has a current contract for collection and disposal of any regulated and hazardous wastes generated on the installation. Hazardous and regulated materials and wastes on Fort A.P. Hill are regulated by AR 200-1 (2007) and any other applicable state and local laws and other regulations. Fort A.P. Hill follows Department of the Army pollution prevention and recycling methods whenever applicable including an Integrated Discharge Prevention and Contingency Plan (IDPCP) that includes Spill Prevention, Control, and Countermeasure (SPCC) requirements.

## 5.0 ENVIRONMENTAL CONSEQUENCES

### 5.1 Land Use

#### 5.1.1 *Effects of the Preferred Alternative*

The current land use includes military operations and training and the land management activities that support this land use. Conflicts with scheduled military training activities would be avoided through coordination with Range Control personnel. Timber harvest contracts specify the handling of tops, limbs, and other logging slash to minimize the obstacles to troop training and improve the aesthetics of the post-harvest area. Timber harvesting, prescribed burning and pre-commercial thinning have been part of the land management historically used on this installation; therefore, the continuation of these practices at the recommended, sustainable levels would produce a minor beneficial impact to current land use on the installation as access to forested areas for training purposes will increase resulting in increased land-base utilization and decreased wildfire hazards.

#### 5.1.2 *Effects of the No Action Alternative*

The No Action Alternative would have no short-term impact on land use. However, long-term forest fuel build-up and increasing forest stand density may produce adverse effects on available trainable lands due to maneuverability issues, presents an increased wildfire risk, and decreased forest health and vigor.

### 5.2 Air Quality

#### 5.2.1 *Effects of the Preferred Alternative*

The timber harvesting activities would result in localized increases in fugitive dust emissions (PM 10), a type of nonpoint source air pollution originating in small quantities over large areas. Sources of fugitive dust include unpaved roads, as those found on a timber harvest site, agricultural cropland, and construction sites. The combustion of diesel fuel from the operation of heavy equipment used in the harvesting process will release small, localized amounts of fine particulate matter, volatile organic compounds, nitrogen oxides, sulfur dioxide, and carbon monoxide. These types of emissions are typical for activities occurring on the installation, are expected to have short-term, negligible impacts on local air quality, and no impact on local or regional air quality on a long-term basis.

In general, little information is available on a national level to identify the contribution of prescribed burning to PM10 or PM 2.5 within nonattainment areas (EPA 1992a). It appears, however, that there is no clear relation between total acres burned (or particulate emissions) and the nonattainment status of nearby airsheds. Prescribed fire air emissions are difficult to quantify due to the variability in fuels, arrangement, density, and composition. However, it is known that 80 to 90 percent of wildfire smoke (by mass) is within fine particle size class (PM2.5), making public exposure a concern (NWCG 2001).

Prescribed burning in the proposed action activities could result in local, temporary impacts due to the quantities of smoke produced by burning large tracts of land, sometimes in heavy fuel conditions, and the generation of small-unburned particles that cause restricted visibility and potential respiratory complications. To reduce impacts, Fort A.P. Hill complies with regulations promulgated by the State Air Pollution Control Board and, including Emission Standards for Open Burning (Rule 4-40) of 9 Virginia Code (VAC) 5. Smoke sensitive areas include the towns of Bowling Green and Port Royal, Peumansend Creek Regional Jail, cantonment areas, US-301 and other bordering roadways, the Fort A.P. Hill airstrip, drop zone, headquarters, and housing areas, and bald eagle nesting sites. Appropriate application of smoke management plans and related weather requirements,

including prevailing winds and mixing heights, for burn blocks occurring in proximity to these sites would minimize the occurrence of negative impacts. Additionally, EPA believes that the amount of prescribed burning, conducted under smoke management programs, can be increased without causing violations of the air quality standards for particulate matter (EPA 1998).

Timber stand improvement activity equipment use would produce emissions due to small and large engine combustion but would not have an impact on the regional air quality.

#### *5.2.2 Effects of the No Action Alternative*

The No Action Alternative would have no impact on air quality, except during wildfire events resulting from munitions use on the training ranges that would burn through heavier, unmanaged forest fuel loads with no way to apply smoke management techniques.

### **5.3 Noise**

#### *5.3.1 Effects of the Preferred Alternative*

Prescribed burning activities are not expected to generate significant levels of noise to the installation and surrounding communities. At times, prescribed fires can detonate unexploded ordnance located in the impact areas. This occurrence would temporarily and briefly increase noise levels experienced in neighboring areas. Any detonated ordnance would be of the type typically used in training exercises on Fort A.P. Hill and addressed in the installation's Noise Management Plan.

The operation of harvesters, skidders, brushsaws, chainsaws, and severe duty shredder in relation to timber harvesting and pre-commercial thinning activities would produce localized increases in noise. This equipment would be used in a forested condition during business hours. These activities would not have an impact on noise generated at the installation.

#### *5.3.2 Effects of the No Action Alternative*

The No Action Alternative would have no new impact on noise generated on the installation. Existing conditions would continue.

### **5.4 Soils and Vegetation**

#### *5.4.1 Effects of the Preferred Alternative*

The Forestry Branch recognizes that maintaining soil productivity is key to ensuring sustainable ecosystem mechanics and will work to preserve these features while implementing management actions.

The principal impact of timber harvesting activities is soil disturbance resulting from trail construction, equipment traffic, and dragging of material. Soil disturbance can include soil particle movement, loosening, compaction, or puddling. The areas receiving heaviest impacts will include the primary skid trails and log landing areas. Though this soil exposure and scarification offers a desirable seed bed for regenerating trees, including oaks, soil movement to adjacent water sources is undesired. To avoid impact on water resources, all tree removal, skid trails, haul roads, and log landings will be located outside of the 50-foot SMZ. Due to the intensity of operations, the clearcut and shelterwood methods will tend to impact larger portions of the stands, though studies note that 63 to 99 percent of stands remain undisturbed based on the system used (Rummer 2006). Areas of specific concern include steep slopes and harvesting activities that require repeated entry like shelterwood or selection cuts, because of increased soil erosion potential. Appropriate erosion and sediment control measures outlined by the VDOF (2002) will be applied, including layout of skid trails along terrain contours and shaping and seeding following the completion of the harvest. No harvesting will occur on slopes with greater

than 40 percent grade. The wide, inflated tires of the current logging equipment help to reduce compaction and rutting. The Forestry Branch will implement additional erosion and sediment control measures, outlined in the Virginia Erosion and Sediment Control, as required. The impact of the proposed action on soils will be minimized through the application and use of appropriate equipment, pre-harvest skid trail layouts that follow landscape contours, log landing designations near hardened surfaces, a network of hardened trails and roads, and post-harvest shaping and seeding of skid trails and log landings using native grass species. Consequently, potential impacts to the soil will not be significant.

The intention of timber harvests implemented on the installation is to alter the vegetative condition to meet a desired future condition of forest structure that is contrary to the present condition in order to meet maneuver training and/or forest health goals. The resulting reduced forest stocking levels improves growth and vigor in the residual stand and the increased sunlight reaching the forest floor promotes the development of herbaceous vegetation and successful forest regeneration establishment, in effect, mimicking a natural disturbance. The effect creates a beneficial shift in the vegetative cover as it promotes sustainable forest ecosystem components of health and regeneration, creates the desired training setting, and contributes to the forest structural diversity occurring across the installation and regional landscapes. The harvest activities would occur on less than 4.5 percent of the forested acres or 4.0 percent of the total installation acres per year, so annual vegetation changes, though beneficial, would not be significant.

Through heat transfer, fire can affect the physical, chemical, and biological characteristics of soil, especially with extremely high intensity fires. Fire can also affect soil indirectly by altering the vegetation and nutrient dynamics of a site. The intensity of prescribed burning is limited by determining the appropriate weather conditions for igniting a site. The burning condition limits applied to these sites in the prescribed burn plan would follow VDOF recommendation and would avoid the intensity and residence time that would adversely impact the soil characteristic. Fire is beneficial to soil through the release of nutrients contained in organic matter and increasing the rate at which these nutrients become available to plants and other soil flora and fauna, particularly with long-term applications of periodic burning (Van Lear and Waldrop 1989). Prescribed burns would primarily be ignited and monitored from existing firebreaks and roads, so vehicle traffic over undisturbed soil would be minimal. Some soils movement may occur with the use of a fireplow and/or scraping tools to establish or tie-in firebreaks. The scheduled prescribed burning activities would have beneficial impacts to the soil over time with prescribed burn intensities and any impacts within the project area would not be significant.

Historically, fire has been an integral part of many ecosystems and the systematic exclusion of fire has had unintentional ecological effects including specific habitat and ecosystem losses (EPA 1998). The periodic use of prescribed burning on the installation historically and over the next five years will serve to provide the fire disturbance required for establishment and maintenance of fire-dependent ecosystem components, providing a beneficial biodiversity component on the landscape. The oaks and southern yellow pines that are typical of the Fort A.P. Hill forest and the native grasslands for wildlife management are well adapted to a fire regime and benefit from its use in land management. The increased application of prescribed fire on the landscape will reduce vegetation densities across the installation, but only areas where prescribed fire is used repetitively to meet goals will the vegetation shift to a more fire-adapted ecosystem structure. The structure resulting from periodic burns also increases military access to forested areas and helps to maintain established maneuver corridors. The impacts of this prescribed fire is beneficial, but since this management regime has been used historically, there have been frequent wildfire incidents, and fire-adapted ecosystem characteristics are already present on the installation, the vegetation shift resulting from these actions will not be significant.

Timber stand improvement activities would be low-impact on the soil, as most would be accomplished on-foot with hand held equipment. Herbicides to be used were selected, in part due to their low soil persistence and low toxicity (Appendix C). Vegetative cover in these areas would not change significantly though the structure would change as stem density is reduced. These sites would remain in a forested condition. There would be no effect to the soil and vegetative qualities at the timber stand improvement sites. Vegetation densities would be reduced and herbicidal vegetation control will help shift to a more desired species composition these areas so there will be a beneficial, but minor impact on the installation vegetation from timber stand improvement activities.

#### *5.4.2 Effects of the No Action Alternative*

The No Action Alternative would have no impact on soil conditions currently found on the installation. Vegetation conditions would maintain or increase in density and would move away from fire-adapted ecosystem structures over time resulting in decreased growth rates and diversity. The resulting conditions would not meet established land management goals and therefore creates an adverse impact.

### **5.5 Water Resources**

#### *5.5.1 Effects of the Preferred Alternative*

As published, the Federal Clean Water Act, Section 404(f) affords an exemption for normal and established silvicultural activities in wetlands with the exception of road construction and maintenance BMP's. Additionally, Section 9 VAC 10-20-120.10 states that: "Silvicultural activities in Chesapeake Bay Preservation Areas are exempt from [the] regulations provided that [the] silvicultural operations adhere to water quality protection procedures prescribed by the Department of Forestry in its 'Forestry Best Management Practices Handbook for Water Quality in Virginia.'" (VDOF 2002).

Water quality occurring on the installation is within expected ranges for the region and maintaining this quality is of utmost importance. With applicable BMP's, harvesting operations that occur near water resources will have minimal or no adverse impacts to surface water and groundwater. Increased seasonal peakflow, total stormflow, and sedimentation may increase slightly during the first year following a harvest activity, but will recover quickly (Kochenderfer and Edwards 1997). Water temperatures are not expected to change as waterway vegetation will not be removed or impacted. The contractors conducting the timber harvesting activities will be required to implement the BMP's specified by Fort A.P. Hill (Appendix F). The likelihood of a hazardous material release that could impact surface or ground waters is considered negligible.

Several proposed timber harvest blocks are adjacent to the stream valleys and wetlands associated with facility drainage areas. These harvesting activities are subject to regulation by VDOF as well as the Chesapeake Bay Preservation Act (CBPA). No harvesting will occur within 50 feet of identified wetlands, intermittent streams or perennial streams and no harvesting will occur within 100 feet of streams known to support anadromous fish populations. Using this guideline and applying Virginia's Best Management Practices for Water Quality, timber harvesting impact on aquatic resources or hydrology will be minimal and any impacts will not be significant. Watershed level monitoring will be conducted following harvest activities in order to detect any unforeseen adverse impacts and alter future management practices.

The prescribed burning activities would be expected to have temporary, minimal to no adverse impacts to surface or groundwater. Some increase in runoff and nutrient loading may be present in the months immediately following the burn (Debano, Neary, and Ffolliot, 1998.). In the training areas, where a streambed is used as an existing firebreak, a backburn would be used from the stream

to minimize the intensity and organic matter consumption of the fire. Personnel conducting the burn activities are required to implement measures specified by the VDOF (2002), CBPA, and the Forestry Branch.

Isolated wetlands that are included within larger, fire-managed blocks tend to be burned during prescribed fires in those blocks; however, fire does play a role in maintenance of these wetlands (Kirby, Lewis, and Sexson, 1988.). Generally, the moisture of surrounding organic matter is often too high during the burn season to allow fire to enter a wetland. No adverse impacts have been identified related to burning through wetlands and the potential impacts of these prescribed burn actions within the project area would not be significant.

Any new firebreaks or other cleared trails in relation to the proposed action will be reported through quarterly Virginia Stormwater Management Program (VSMP) permitting requirements submitted by the ED at Fort A.P. Hill.

Timber stand improvement activities would occur at least 50 feet from any aquatic resource and would, therefore, not have an impact on water quality. Additionally, herbicidal vegetation control will be conducted by direct stem spray of the target species using backpack sprayer systems operated by a certified pesticide handler. Application rates will be minimal and will be applied a minimum of 50 feet from any aquatic resource and will not impact the water resources. Depending on the application rate and method, generally speaking, buffer strips of 45 feet or larger are effective in minimizing herbicide residue contamination of stream flow (Neary *et al.* 1993).

No identified Scenic Waterways occur within the project area.

#### *5.5.2 Effects of the No Action Alternative*

The No Action Alternative would have no impact to water resources since vegetation cover would remain intact and unchanged. Existing conditions would continue.

## **5.6 Biological Resources**

### *5.6.1 Effects of the Preferred Alternative*

Timber harvesting, prescribed burning and timber stand improvement activities would directly affect plant and animal populations through potential injury or mortality and indirectly through changes to vegetation and habitat characteristics. Due to location, activity level and scheduling, the direct impacts would not threaten the health or sustainability of wildlife or plant populations on the installation. The indirect impacts are temporary and eliminated when the vegetation regenerates. As reduced vegetation density and increased regeneration of herbaceous species result in increased mobility and food sources for wildlife, the post-fire and thinning habitat is generally more favorable than taking no action. The potential impact of timber harvesting, prescribed burning and timber stand improvement activities on plant and wildlife populations within the project area would be temporary and not significant. In addition, measures will be taken to enhance wildlife habitat structures including retention of snags, den trees and coarse woody debris, residual tree spacing, and an extended no-harvest buffer around streams supporting anadromous fish populations.

Areas supporting endangered plant populations and their respective buffers as identified in their related management plans would not be included in any forest management activity. The seasonal protection zones around known bald eagle nest locations would also be honored in timber management and timber stand improvement operations and smoke management techniques would be applied to limit any potential disturbance to these sites.

### *5.6.2 Effects of the No Action Alternative*

The No Action Alternative would have no short-term impact on biological resources as the existing habitat structures and conditions would continue. Lack of active forest management will likely result in a reduction of structural and cover diversity over time.

## **5.7 Cultural Resources**

### *5.7.1 Effects of the Preferred Alternative*

With proper identification and buffering, the forest management activities would not be expected to directly impact any protected sites. Control lines may be established around any structures that may be discovered during these activities and that require protection from fire. At minimum, cultural surveys will be conducted on primary skid trails, log landings, and newly established firebreaks where soil disturbance and rutting are most likely to occur. Coordination of all activities with the State Historic Preservation Office will occur through arrangements established in the Fort A.P Hill Standard Operating Procedure for Conducting Cultural Resource Surveys in Association with Forestry Activities.

Locations of known archeological and architectural resources occurring inside or near forest management activity areas are shown on the maps in Appendices A, B, and C and listed in the table found in Appendix E.

### *5.7.2 Effects of the No Action Alternative*

The No Action Alternative would have no impact to cultural resources. Existing conditions would continue.

## **5.8 Socioeconomic Resources**

### *5.8.1 Effects of the Preferred Alternative*

Implementation of the forest management activities requires a sufficient staff of government or contracted installation personnel in addition to outsourced contracts for various activities and inventory implementation. This creates employment opportunities as well as local and regional subsequent spending. Additionally, forty percent of timber harvest income that exceeds program expense requirements is awarded to the counties occupied by Fort A.P. Hill to support county schools and roads as per 10 US Code 2665. Though the harvests proposed in this five-year action plan were established based on ecological goals, forecasting current market trends to the proposed harvest levels, it is likely that Caroline and Essex Counties will receive timber profit shares during this five-year activity cycle. Additionally, the forest products removed from the installation contributes raw materials for local primary and secondary wood products industries. The majority of forest products removed from the installation would be suitable for housing, composite wood products, paper pulp, and cabinets and furniture and will contribute to these related, local markets. The proposed harvest rates are set at extremely sustainable levels with only 4.5 percent of the forested acres to be harvested any given year, or no more than 32.5 percent of the regional annual net growth rate (i.e., the forest will be growing nearly 66 percent faster than we are harvesting), so that there is no risk of over-harvesting at the expense of creating a lull in forest product production over time.

Efforts would be made to identify, protect or maintain specified settings, structures, and any other training resources from fire so that there are no real property losses.

### *5.8.2 Effects of the No Action Alternative*

Though the No Action Alternative would neither damage existing training resources or settings, nor enhance or create these settings, there would be no contribution to the local economy or wood products industry resulting in forfeiture of income on many levels. Forest products would not be provided to local industries and the counties would receive no revenues from timber sale profits. This would be an adverse impact.

## **5.9 Environmental Justice**

### *5.9.1 Effects of the Preferred Alternative*

Existing conditions at Fort A.P. Hill would continue under the proposed action. Timber harvesting, prescribed burning and timber stand improvement operations on the installation do not create any advantage or disadvantage for any group or individual. The proposed action would not create any disproportionate adverse human health or environmental effects on children, minorities, or low-income population or communities within or surrounding the installation.

### *5.9.2 Effects of the No Action Alternative*

The No Action Alternative would have no disproportionate or adverse impacts or environmental or social effects on minority and low-income populations. Existing conditions would continue.

## **5.10 Infrastructure and Utilities**

### *5.10.1 Effects of the Preferred Alternative*

Infrastructure to support the proposed action includes temporary skid trails, log landings, and firebreaks. Existing or former skid trails, log landings, and firebreaks will be used where available and temporary trails, landings, and firebreaks will be installed and restored as needed. Topography and soil erosion concerns will be considered and addressed during this process.

Minor increases in vehicular traffic would occur on the local roads (both inside and outside the installation) during the proposed action. However, the traffic from logging trucks would not create a significant impact on road transportation or condition.

Prescribed burning activities will not significantly increase vehicular traffic on or off the installation; however, smoke produced by prescribed burning activities may reduce visibility on roads (both inside and outside the installation) during burning activities or settle on roads during evening inversions. Appropriate burning conditions and smoke management plans will consider the lift and transport of smoke to reduce impact to visibility along roadways. In the case of reduced visibility, road guards and/or signs will be posted to caution vehicle drivers. Reduced visibility and driver hazards would be temporary and minimized with appropriate planning and implementation procedures and; therefore, prescribed burning will not have a significant impact on transportation.

No electrical, water, or sewage utilities would be required for this proposed action. Any above ground utility structures would be identified and protected from the proposed action, therefore there would be no impact to these resources.

### *5.10.2 Effects of the No Action Alternative*

The No Action Alternative would not require any additional infrastructure or utilities to be added or used on Fort A.P. Hill. Existing conditions would continue.

## 5.11 Hazardous Materials/Wastes

### 5.11.1 Effects of the Preferred Alternative

Hazardous materials that would be used in the proposed action include gasoline, diesel, hydraulic fluid, chain lubricants, and oil mixes required by vehicles, machinery, and prescribed burning ignitions as well as herbicides. The use of these materials on site would be temporary and all remaining materials would be removed from the site upon conclusion of the action. These materials and any wastes generated would be handled, stored, and disposed of in accordance with federal, state, and Army regulations and requirements. Fort A.P. Hill would provide disposal for all wastes generated in the proposed action through existing contracts and has a program for recycling and pollution prevention and the current IDPCP that includes SPCC measures. Contracted service personnel are provided with written and verbal instruction on spill response protocol. The proposed action would not have a significant impact due to generation, storage, or disposal of hazardous materials or wastes.

### 5.11.2 Effects of the No Action Alternative

The No Action Alternative would involve no additional hazardous materials or wastes. Existing conditions would continue.

## 5.12 Best Management Practices

The application of BMP's, voluntary or regulatory, in the proposed action will minimize or avoid impacts to water quality, wetlands, wildlife habitat, cultural resources, training settings and resources, and threatened and endangered species. The proposed action would be carried out in accordance with all applicable federal, state, and local laws and regulations. Specific BMP's are incorporated into the proposed action to limit potential negative impacts to the human and natural environment. The planned BMP's include: use of Virginia's Erosion and Sediment Control Best Management Practices, Virginia's Forestry Best Management Practices for Water Quality, implementation of the installation IDPCP plan for hazardous and toxic materials, TES and known cultural resource buffers, standard operating procedure BMP's self-imposed by the Forestry Branch, and specific site evaluations and feedback on resources that may be impacted by the proposed action if BMP's are not applied.

ED personnel or contractors conducting the timber harvest, prescribed burning, and timber stand improvement activities would be required to implement BMP's. Appendix F describes principles derived from Best Management Practices for Water Quality (VDOF 2002) and additional BMP's formed by the Forestry Branch.

Additional measures that would be implemented by ED include:

- No action would take place in timber harvest, prescribed burning or pre-commercial thinning blocks until the installation TES Coordinator or appropriate state or federal agency concurs that impacts to threatened, endangered and rare species would not occur.
- Burning activities would not occur in any U.S. Fish and Wildlife Service (USFWS)/Virginia Department of Game and Inland Fisheries –designated portions of bald eagle nest zones during the critical nesting period of November 15 through July 15.
- A smoke management plan would be completed and implemented with each prescribed burn to mitigate smoke impacts to sensitive areas.
- Prescribed burning efforts will be reported to the DEQ, VDOF, regional emergency dispatchers, and the Public Affairs Office to inform them of potential nuisance smoke, public safety hazards, and visibility issues.

- Smoke-sensitive regions will be identified and incorporated into smoke management planning efforts.
- Scheduling with the Range Control office and contract specifications for residual logging debris will mitigate potential land use conflicts.
- Though noise-production would be minimal, noise-producing activities would take place in a forested setting and would occur during business hours only to minimize any noise disturbance to surrounding communities.
- Each Natural Resource program manager within the ED will review the proposed action through the Fort. A.P. Hill Natural Resource Site Assessment process. This process requires site visits of the project area, allowing managers to provide comments and suggestions relative to the proposed action and to delineate environmentally sensitive portions of the project area prior to action implementation. Coordination with VADCR, Virginia Department of Historic Resources, or other agencies would occur as needs are identified. Natural Resource program observations related to the proposed action would be addressed during the planning process prior to commencement of any management activity.
- Should a site assessment reveal a unique habitat feature or species present in the project area, that portion, stand, or block will be removed from the proposed action.

### **5.13 Secondary and Cumulative Effects**

Cumulative impacts are defined as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes these actions. Cumulative effects can result from individually minor but collectively significant actions taking place locally or regionally over a period of time.

Timber harvests, prescribed burns and timber stand improvements are planned and scheduled to provide a sustainable training setting and forest health condition while maintaining ecological diversity and to incrementally enhance and protect ecological integrity. Most impacts resulting from these actions are temporary as the management areas regenerate and recuperate to former dynamics within a short period of time, about 1-3 years depending on the activity and acreage. Past and foreseeable future actions are assumed to be similar in scope, nature, and impact to the activities described in this EA. Cumulative impacts within the project area from the proposed action are expected to be small to negligible by applying identified guidelines and BMP's. Future proposed activities at Fort A.P. Hill, including construction of ranges and training facilities, are being addressed in separate NEPA analyses as appropriate. Other impacts beyond the realm of what can be envisioned by trained and experienced personnel or any advisory committee cannot be determined at this point. Any scenario resulting from unexpected and unlikely impacts would be mitigated when, and as soon as, possible. Such impacts would be documented and subject to further NEPA analysis as appropriate.

## 6.0 CONCLUSIONS

This EA considers the potential environmental impacts of the proposed action, as the Preferred Alternative for proposed timber harvests, prescribed burning, and timber stand improvement activities for FY2009-2013 at Fort A.P. Hill in Caroline County, Virginia. The proposed action is needed to support the installation's military mission and to fulfill the Fort A.P. Hill natural resource management goals. Army regulations, management plans, and environmental requirements implemented by Fort A.P. Hill would ensure activities are in compliance with applicable federal, state, and local laws and regulations. The proposed action would include the use of outlined BMP's to avoid, minimize, or prevent significant impacts to environmental resources. Local air quality requirements would be applied and smoke management plans prepared and implemented. Noise complaints would be investigated and handled as necessary under Fort A.P. Hill policy. Local socioeconomics would benefit. Impact to soil resources would be minimal. Wetlands and streams would be identified and buffered in timber harvest and timber stand improvement activities or appropriately used as potential control lines in prescribed burning activities. Cultural resources, and threatened and endangered species areas would be identified, buffered, and avoided; therefore, there would be no impact to these resources. Hazardous materials and wastes utilized in the proposed action would be handled and disposed of according to Fort A.P. Hill protocol and existing contracts.

The proposed action delineated in this EA is the Preferred Alternative among those considered. Alternative 2 would have the potential to increase additional forest land viability and health and Alternative 3 would accomplish the objectives outlined in the proposed action utilizing alternative methods; however, these alternatives did not meet the screening criteria set forth by the Forestry Branch. The No Action Alternative inhibits beneficial management for military training by limiting the forested area that can be utilized for maneuvering to objectives on foot or in a vehicle and also inhibits the beneficial management of the health and vigor of the forest resource, increases the risk of uncontrolled wildfire, and would, therefore, not appropriately meet management directives for the installation. Additionally, the No Action Alternative would not allow Fort A.P. Hill to be in compliance with AR 200-1.

As a result of the analyses performed by this EA, it has been determined that the known and potential impacts of the Preferred Alternative on the physical and socioeconomic environment would not be significant and is the recommended alternative. Based on the findings and conclusions in this EA, issuance of a FONSI would be appropriate and preparation of an EIS would not be required.

## 7.0 ENVIRONMENTAL ASSESSMENT PREPARER

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## 9.0 REFERENCES

- Army Environmental Manager's Handbook: Compliance with the National Environmental Policy Act, May 1993.
- Army Regulation 200-1 (AR 200-1), *Environmental Protection and Enhancement*. 28 August 2007.
- Brady, Nyle C., 1990. *The Nature and Properties of Soils*. 10<sup>th</sup> ed. Macmillan Publishing Company, New York.
- Caroline County, 2006. <http://www.co.caroline.va.us/demographics.html>
- Clarke, Sarah, Robert Clarke, and Bradley Bowden, 2004. *A Reconnaissance Architectural Survey of Fort A.P. Hill in Caroline County, Virginia*. Prepared by Gray & Pape, Inc., Richmond, for Paciulli, Simmons and Associates, Ltd., Fairfax.
- Commission for Environmental Cooperation (CEC). 1997. *Ecological Regions of North America: Toward a Common Perspective*. Prepared by the Secretariat of the Commission for Environmental Cooperation.
- Council on Environmental Quality. *Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508)*. 2005.
- Crow, Thomas R. 1992. Stocking Level, Stand Structure, Cutting Cycle, and Growth Rates. In: Hutchinson, J.D., ed. *Nothern Hardwood Notes*. St. Paul, MN: US Department of Agriculture, Forest Service, North Central Research Station: Note 4.06.
- Davis, Lawrence S. and K. Norman Johnson., 1987. *Forest Management*. McGraw-Hill, Inc., New York.
- Debano, L.F., D.G. Neary, and P.F. Ffolliot. 1998. *Fire's effects on ecosystems*. New York: John Wiley and Sons, Inc. 333 pp.
- Environmental Protection Agency. 1992. *Prescribed burning background document and technical information document for prescribed burning best available control measures*. EPA-450/2- 92-003. Office of Air Quality Planning and Standards.
- Environmental Protection Agency. May 1998. *Fact Sheet – The Environmental Protection Agency's (EPA's) Interim Air Quality Policy*. Air Quality Strategies and Standards Division (OAQPS).
- Fire Effects Information System (FEIS). *Fire Ecology or Adaptations for Pinus taeda*. [www.fs.fed.us/database/feis/plants/tree/pintaec/all.html#FIRE%20ECOLOGY](http://www.fs.fed.us/database/feis/plants/tree/pintaec/all.html#FIRE%20ECOLOGY)
- Fort A.P. Hill Forest Management Plan (FMP). 6 April 2005. Environmental Division, Directorate of Public Works.
- Fort A.P. Hill Integrated Natural Resources Management Plan (INRMP). 2008. Prepared by the Environmental Division, Directorate of Public Works.
- Fort A.P Hill Integrated Wildland Fire Management Plan (IWFMP). 2007. Prepared by Anne J. Ulrey, Forestry Branch, Environmental Division, Directorate of Public Works.
- Fleming, G.P. and N.E. Van Alstine, 1994. *Fort A.P. Hill, Virginia Natural Heritage Inventory, Final Report, Natural Heritage Technical Report #94-1*, Virginia Department of Conservation and Recreation, Division of Natural Heritage. Unpublished report prepared for the U.S. Army Corps of Engineers, Mobile District, May 1994.
- Kirby, R.E., S.L. Lewis, and T.N. Sexson. 1988. *Fire in North American wetland ecosystems and fire-wildlife relations: An annotated bibliography*. U.S. Fish and Wildlife Service. Biol. Rep. 88(1).
- Kochenderfer, N. and Wood J. Edwards. 1997. *Hydrologic Impacts of Logging on an Appalachian Watershed Using West Virginia's Best Management Practices*. *Northern Journal of Applied Forestry*. Volume 14, Number 4, December 1997. pp. 207-218(12)

- Loftis, David L. 1985. Pre-harvest Herbicide treatment Improves Regeneration in Southern Appalachian Hardwoods. *Southern Journal of Applied Forestry*. Volume 9, Number 3, August 1985. pp. 177-180(4)
- Loftis, David L. 1990. A Shelterwood Method for Regenerating Red Oak in the Southern Appalachians. *Forest Science*. Volume 36, Number 4, December 1990. pp. 917-929
- McNabb, Ken. 1997. Environmental Safety of Forestry Herbicides. Alabama Cooperative Extension System. Publication ID ANR-0846. March 1997.
- Miller, Gary W. 2002. RWU 4557, Disturbance Ecology and Management of Oak-Dominated Forests. Northeastern Research Station. USDA Forest Service.
- Mitchell, J.C. and S. McNulty, 1999. Distribution and Habitat Affinities of Amphibians and Reptiles on Fort A.P. Hill, Virginia: A Gap Analysis Study. Prepared by Virginia Polytechnic Institute and State University, September 1999.
- National Environmental Policy Act (NEPA), 1969, as amended.
- National Wildfire Coordinating Group (NWCG), 2001. Smoke Management Guide for Prescribed and Wildland Fire 2001 Edition. National Wildfire Coordinating Group Fire Use Working Team, 2001. PMS 420-2.
- Neary, Daniel G. and Jerry L. Michael. 1996. Herbicides – Protecting Long-Term Sustainability and Water Quality in Forest Ecosystems. *New Zealand Journal of Forest Science*. Volume 26(1/2). Pp. 241-264. 1996.
- Neary, Daniel G., P.B. Bush, and Jerry L. Michael. 1993. Fate, Dissipation, and Environmental Effects of Pesticides in Southern Forests: a Review of a Decade of Progress. *Environmental Toxicology and Chemistry* 12: 411-28.
- Office of the Assistant Chief of Staff for Installation Management. Draft Natural Resource Implementation Guidance for Army Installations. March 2006.
- Perry, David A., 1994. *Forest Ecosystems*. Johns Hopkins University Press, Baltimore, Maryland.
- Phillips, J.R., 1992. Environmental Assessment, Natural Resources Management Plan Part III. Fort A.P. Hill, Bowling Green, VA: Department of the Army Headquarters, U.S. Army Garrison, Fort A.P. Hill.
- Reisinger, T.W., G.L. Simmons, and P.E. Pope. 1988. The Impact of Timber Harvesting on Soil Properties and Seedling Growth in the South. *Southern Journal of Applied Forestry*. Volume 12, Number 1, pp. 58-67
- Rummer, Bob., 2006. Environmental Impacts. Forest Encyclopedia Network. Southern Appalachian Forest Ecosystems.
- United States Department of the Interior (USDI), 1981. Department of Interior's Regulations, 36 CFR Part 60: National Register of Historic Places. U.S. Department of the Interior, Washington, D.C.
- United States Army Center for Health Promotion and Preventive Medicine (CHPPM), 1998. Environmental Noise Management Plan (Draft), Fort A.P. Hill, Prepared by Environmental Noise Program Directorate of Environmental Health Engineering October 1998.
- United States Census Bureau, 2006. <http://quickfacts.census.gov/qfd/states/51/51033.html>
- United States Fish and Wildlife Service (USFWS), 2006. Draft National Bald Eagle Management Guidelines.
- United States Fish and Wildlife Service (USFWS), 1991. Fishery Inventory and Baseline Water Quality Collected at Thirty-Two Streams Sites at Fort A.P. Hill, MIPR Agreement Number 180430007, White Marsh Virginia.

- United States Forest Service (USFS), 1990. How to Release Crop Trees in Pre-Commercial Hardwood Stands.
- United States Forest Service (USFS). Forest Inventory and Analysis (FIA) Network. Forest Inventory Data Online (FIDO) query referencing standard reports for annual net growth and annual removal for Caroline County, Virginia. 2007 FIA inventory data.  
<http://199.128.173.26/fido/mastf/index.html>
- Van Lear, David H., and Thomas A. Waldrop. April 1989. History, Uses, and Effects of Fire in the Appalachians. United States Forest Service, Southeastern Forest Experiment Station. General Technical Report SE-54.
- Virginia Code 10.1-2100 (VAC), 1988. Chesapeake Bay Preservation Act.
- Virginia Department of Conservation and Recreation. 1994. Fort A.P. Hill, Virginia Natural Heritage Inventory. Natural Heritage Technical Reports #94-1, #94-10.
- Virginia Department of Forestry (VDOF), 2002. Best Management Practices for Water Quality in Virginia, Fourth Edition, July 2002.
- Virginia Department of Games and Inland Fisheries, 1993. Bald Eagle Nest Management at Fort A.P. Hill. Prepared by Keith Cline.
- Williams, Eileen, 2008. *Integrated Cultural Resources Management Plan, U.S. Army, Fort A.P. Hill, Caroline County, Virginia*. Prepared by Natural Alternatives, LLC, Richmond, for Fort A.P. Hill Environmental Division, Directorate of Public Works with updates and revisions by Cultural Resource Manager John Mullin.
- Winter, Len, and J. Daniel Pezzoni, 1994. *A Phase I Cultural Resources Inventory of Fort A.P. Hill, Caroline County, Virginia*. Prepared by Gray & Pape, Inc., Richmond, for J.M. Waller Associates, Lorton.

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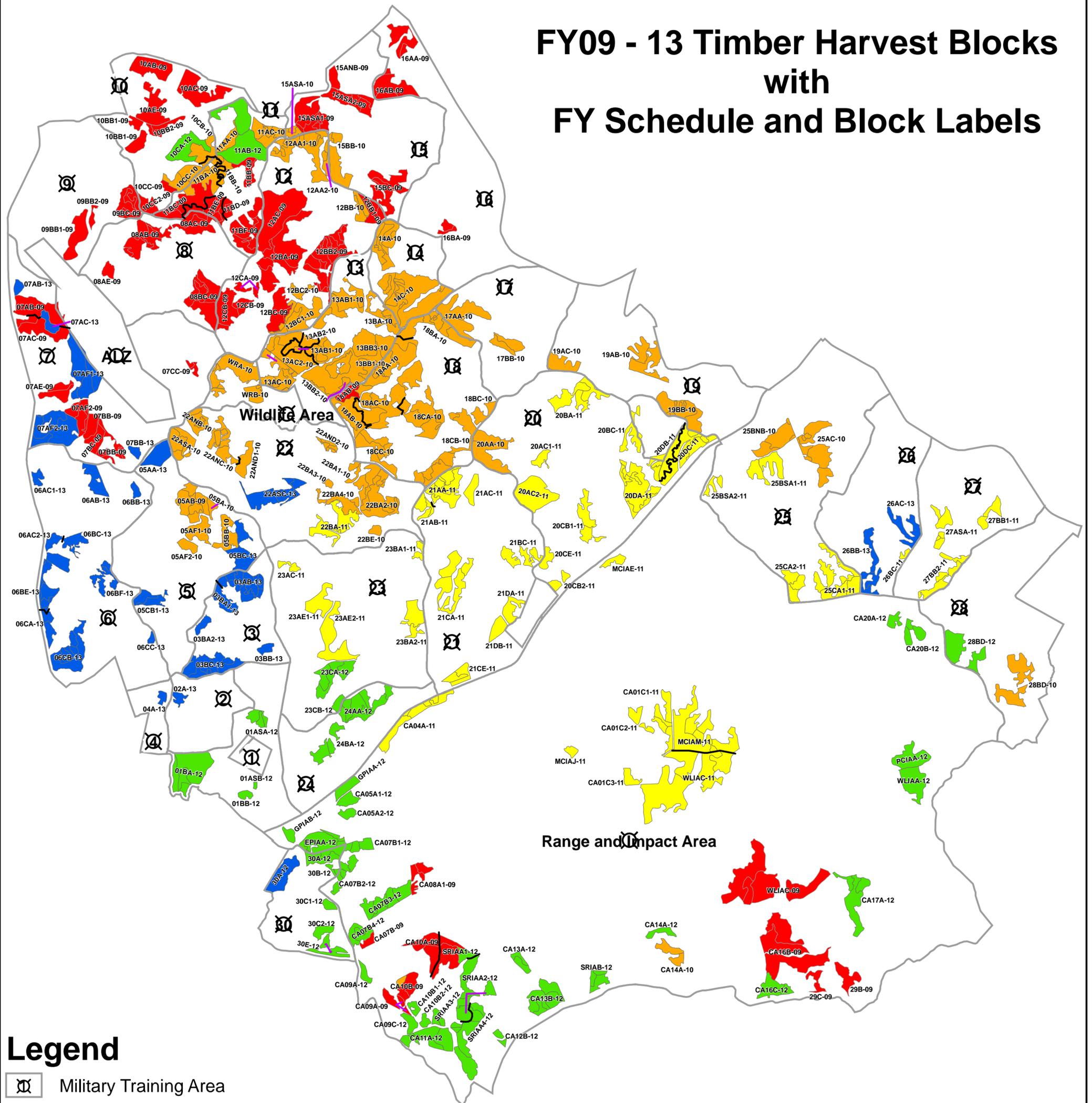
## Appendix A

### FY 2009-2013 TIMBER HARVEST LOCATION, OBJECTIVE, AND AFFECTED ENVIRONMENTAL RESOURCES MAPS

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# Environmental Assessment Appendix A - Figure 1

## FY09 - 13 Timber Harvest Blocks with FY Schedule and Block Labels



### Legend

Military Training Area

### FY09 - 13 Timber Harvest Blocks

FY: (total = 12,914.6 ac)

- 2009 (3,325.3 ac)
- 2010 (3,967.9 ac)
- 2011 (2,329.1 ac)
- 2012 (1,948.7 ac)
- 2013 (1,343.7 ac)

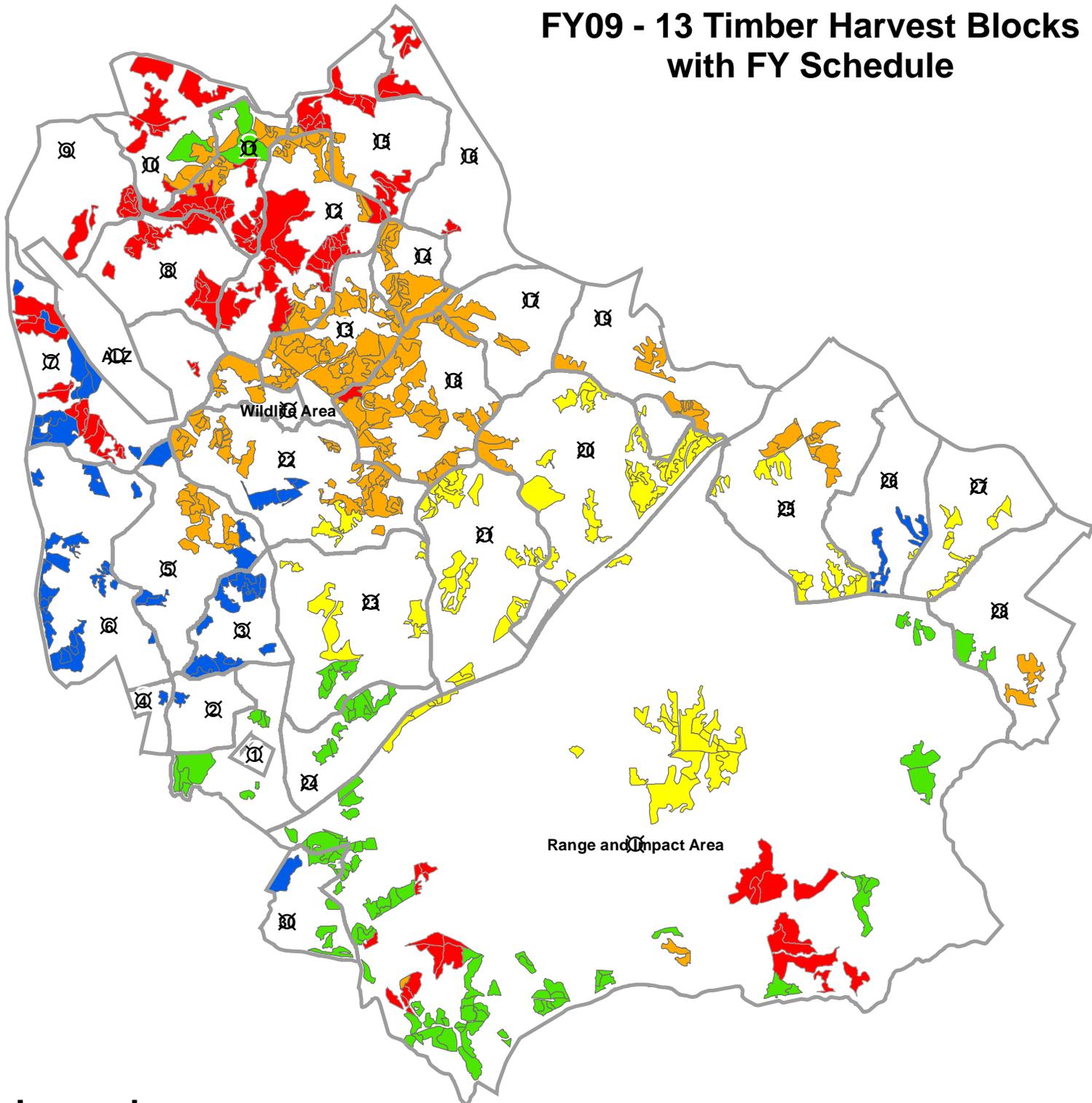
November 2008  
DPW - ED - Forestry

2



# Environmental Assessment Appendix A - Figure 2

## FY09 - 13 Timber Harvest Blocks with FY Schedule



### Legend

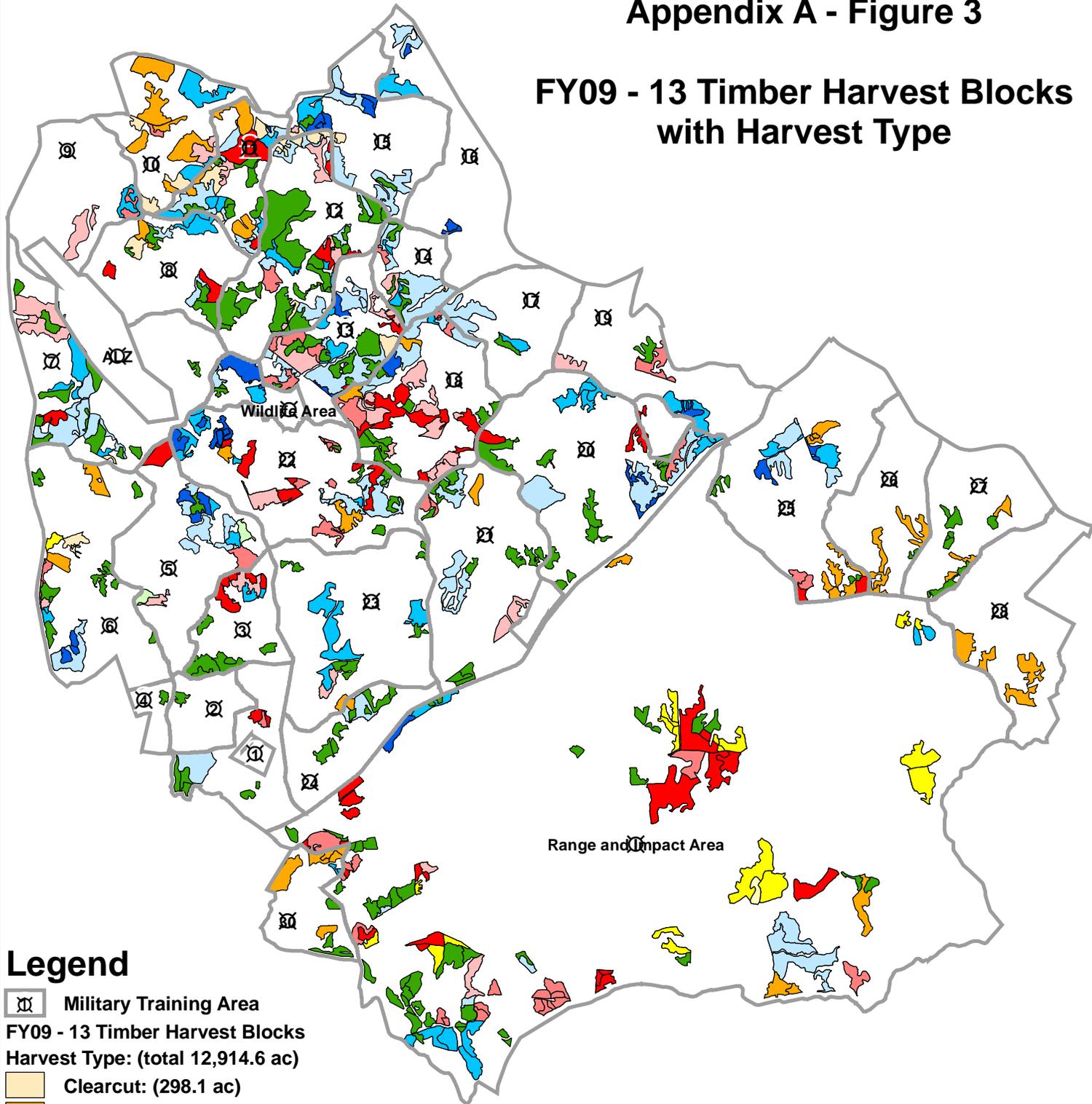
-  Military Training Area
- FY09 - 13 Timber Harvest Blocks  
FY: (total = 12,914.6 ac)
-  2009 (3,325.3 ac)
-  2010 (3,967.9 ac)
-  2011 (2,329.1 ac)
-  2012 (1,948.7 ac)
-  2013 (1,343.7 ac)

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# Environmental Assessment Appendix A - Figure 3

## FY09 - 13 Timber Harvest Blocks with Harvest Type



### Legend

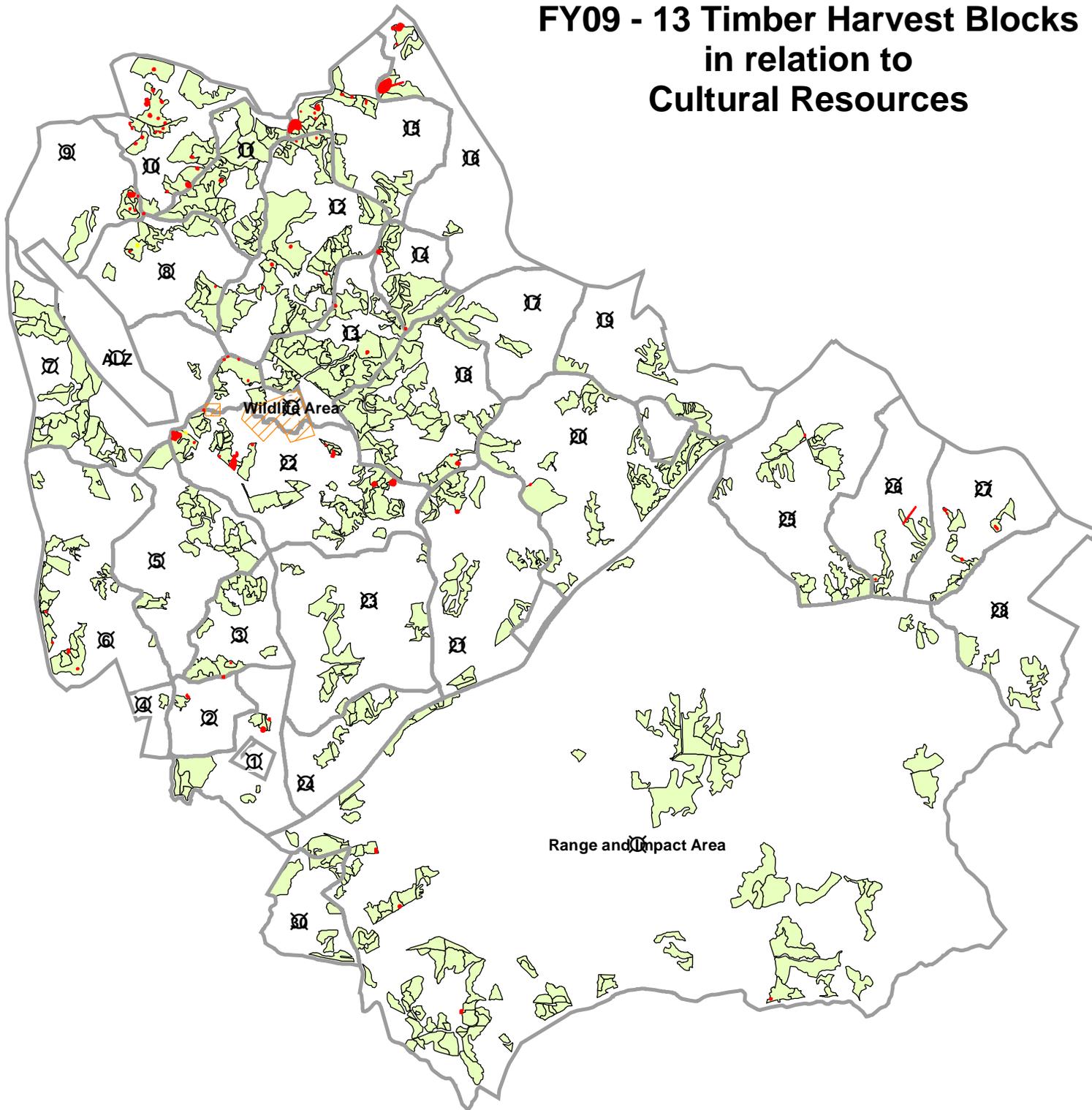
-  Military Training Area
- FY09 - 13 Timber Harvest Blocks**  
Harvest Type: (total 12,914.6 ac)
-  Clearcut: (298.1 ac)
-  Overstory Removal: (1,258.3 ac)
-  Mixed Thinning: (40.1 ac)
-  Pine Thinning: (2,922.9 ac)
-  Seed Tree - Mixed Hardwood & Pine: (21.1 ac)
-  Seed Tree - Pine: (535.0 ac)
-  Selection - Hardwood: (2,690.2 ac)
-  Selection - Mixed Hardwood & Pine: (1,462.7 ac)
-  Selection - Pine: (483.2 ac)
-  Shelterwood - Hardwood: (1,003.1 ac)
-  Shelterwood - Mixed Hardwood & Pine: (831.8 ac)
-  Shelterwood - Pine: (1,368.3 ac)

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0 1 2 4 6 8 10 Kilometers

# Environmental Assessment Appendix A - Figure 4

## FY09 - 13 Timber Harvest Blocks in relation to Cultural Resources



### Legend

-  Historic District
-  Archaeological Site
-  Architectural Resource
-  Military Training Area
-  FY09 - 13 Timber Harvest Blocks

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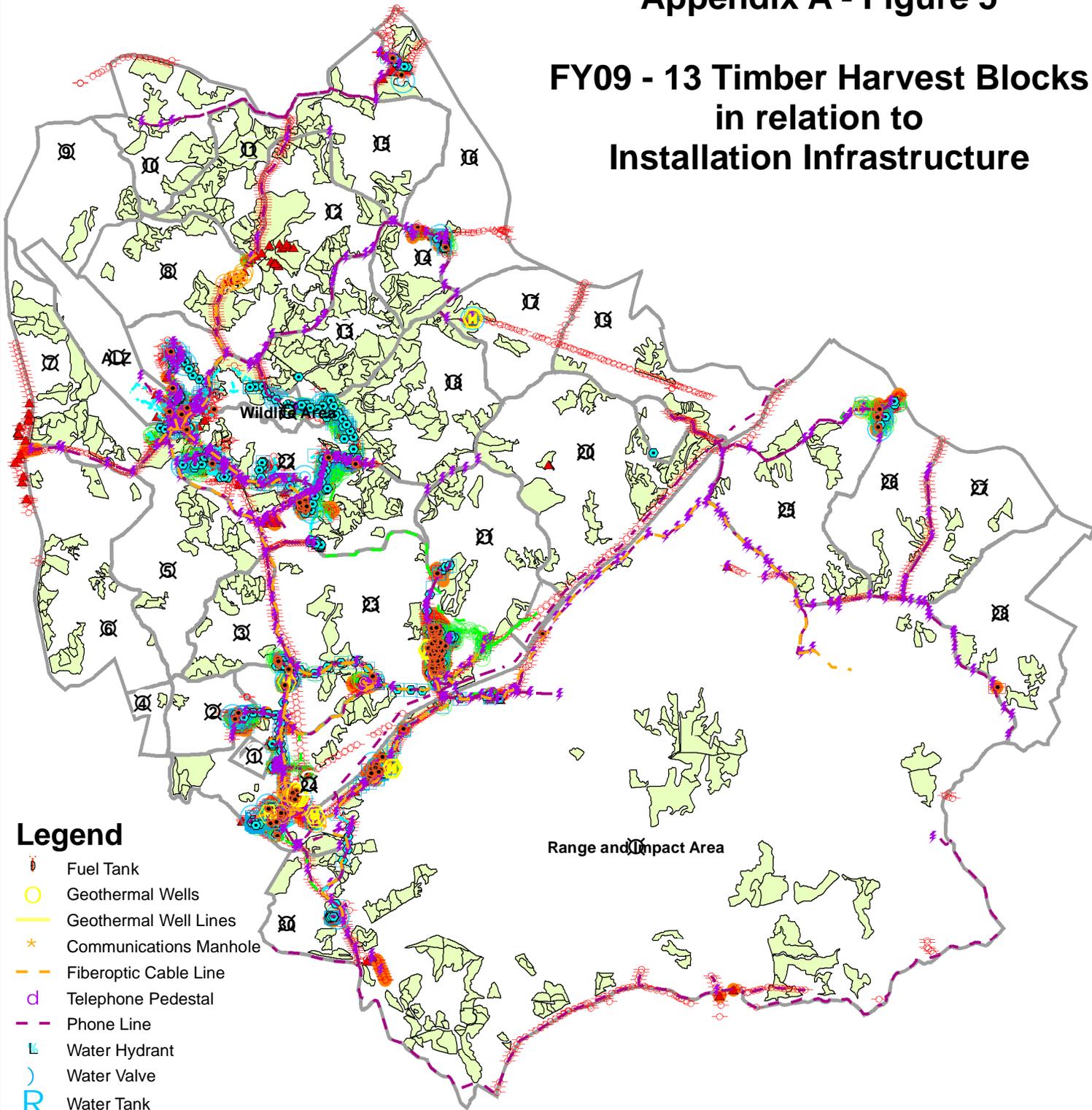
2

0 1 2 4 6 8 10 Kilometers



# Environmental Assessment Appendix A - Figure 5

## FY09 - 13 Timber Harvest Blocks in relation to Installation Infrastructure



### Legend

- Fuel Tank
- Geothermal Wells
- Geothermal Well Lines
- Communications Manhole
- Fiberoptic Cable Line
- Telephone Pedestal
- Phone Line
- Water Hydrant
- Water Valve
- Water Tank
- Water Line
- Wastewater Manhole
- Septic Tank
- Waste Water Line
- Drain Field
- Utility Pole
- Electric Transformer
- Electric Generator
- Electric
- Exterior Lighting
- Military Training Area
- FY09 - 13 Timber Harvest Blocks

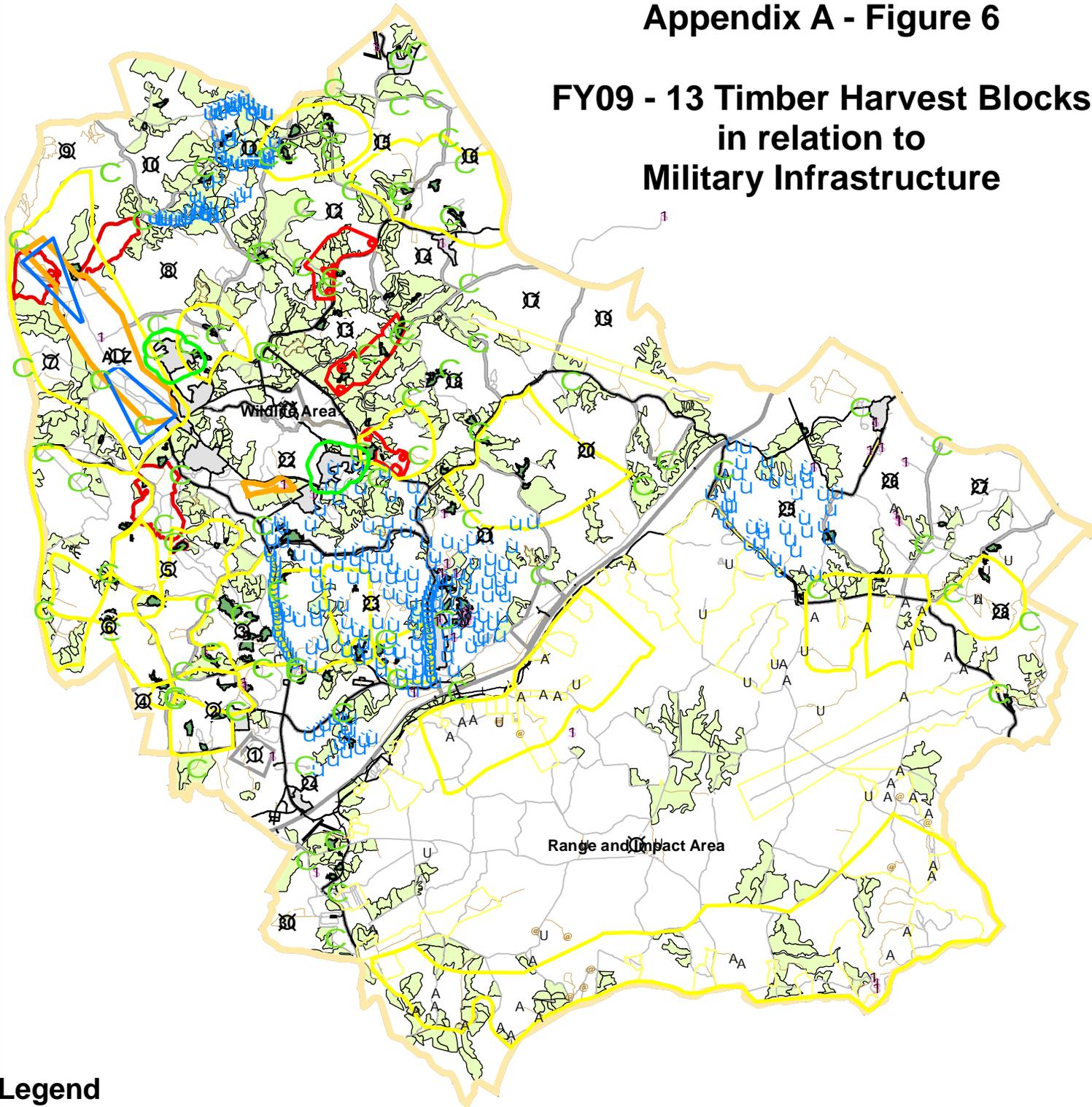
Range and Impact Area

November 2008  
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# Environmental Assessment Appendix A - Figure 6

## FY09 - 13 Timber Harvest Blocks in relation to Military Infrastructure



### Legend

- |                                 |                           |
|---------------------------------|---------------------------|
| FY09 - 13 Timber Harvest Blocks | Live-Fire Range Area      |
| Military Training Area          | Tactical Concealment Area |
| Camp Buffer                     | Landing Zone              |
| MOUT Site Bunkers               | Maneuver Corridor         |
| Specialized Training Facility   | Force Protection Buffer   |
| Observation Point               | Asphalt Road              |
| Demolition Sites                | Gravel Road               |
| Land Navigation Vehicle Course  | Dirt Road                 |
| Land Navigation Course          | Firebreak                 |
| Indirect Firing Points          | Tank Trail                |
| Military Lanes Training Site    |                           |
| ALZ Clear Zones                 |                           |
| Cantonment Area                 |                           |
| Drop Zone                       |                           |

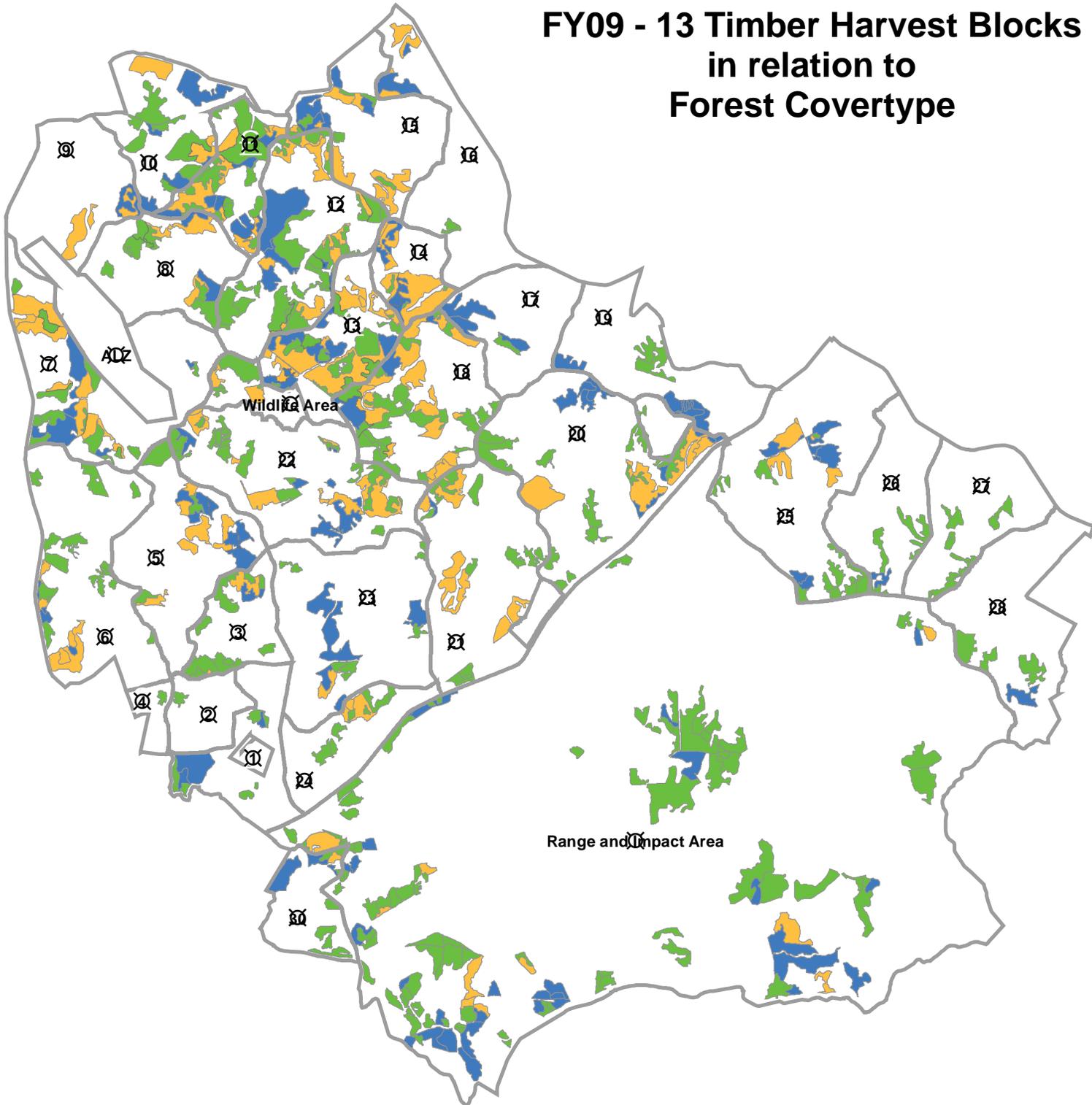
December 2008  
DPW - ED - Forestry

2

0 1 2 4 6 8 10 Kilometers

# Environmental Assessment Appendix A - Figure 7

## FY09 - 13 Timber Harvest Blocks in relation to Forest Coverture



### Legend

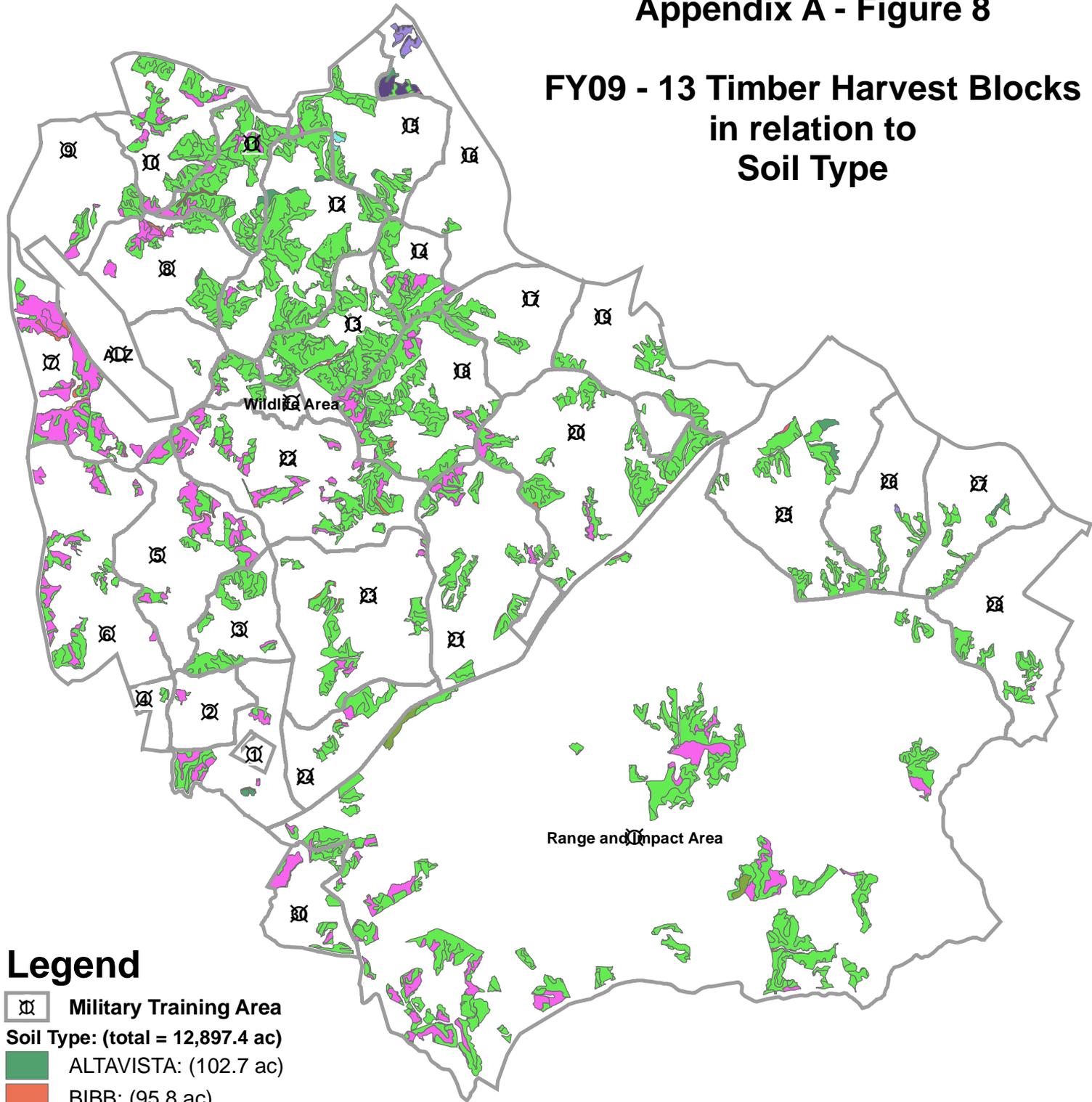
- Military Training Area
- Forest Coverture: (total = 12,914.6 ac)
  - Hardwood: (3,587.3 ac)
  - Pine/Hardwood Mixed: (3,272.7 ac)
  - Pine: (6,054.7 ac)

November 2008  
DPW - ED - Forestry



# Environmental Assessment Appendix A - Figure 8

## FY09 - 13 Timber Harvest Blocks in relation to Soil Type



### Legend

Military Training Area

Soil Type: (total = 12,897.4 ac)

ALTAVISTA: (102.7 ac)

BIBB: (95.8 ac)

CHASTAIN: (10.7 ac)

KEMPSVILLE: (10,470.2 ac)

MYATT: (17.3 ac)

NEVARC: (58.3 ac)

PITS, GRAVEL: (9.8 ac)

SLAGLE: (2,030.7 ac)

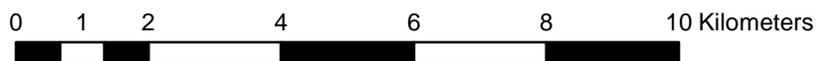
SUFFOLK: (51.7 ac)

TOMOTLEY: (4.9 ac)

WEHADKEE: (0.2 ac)

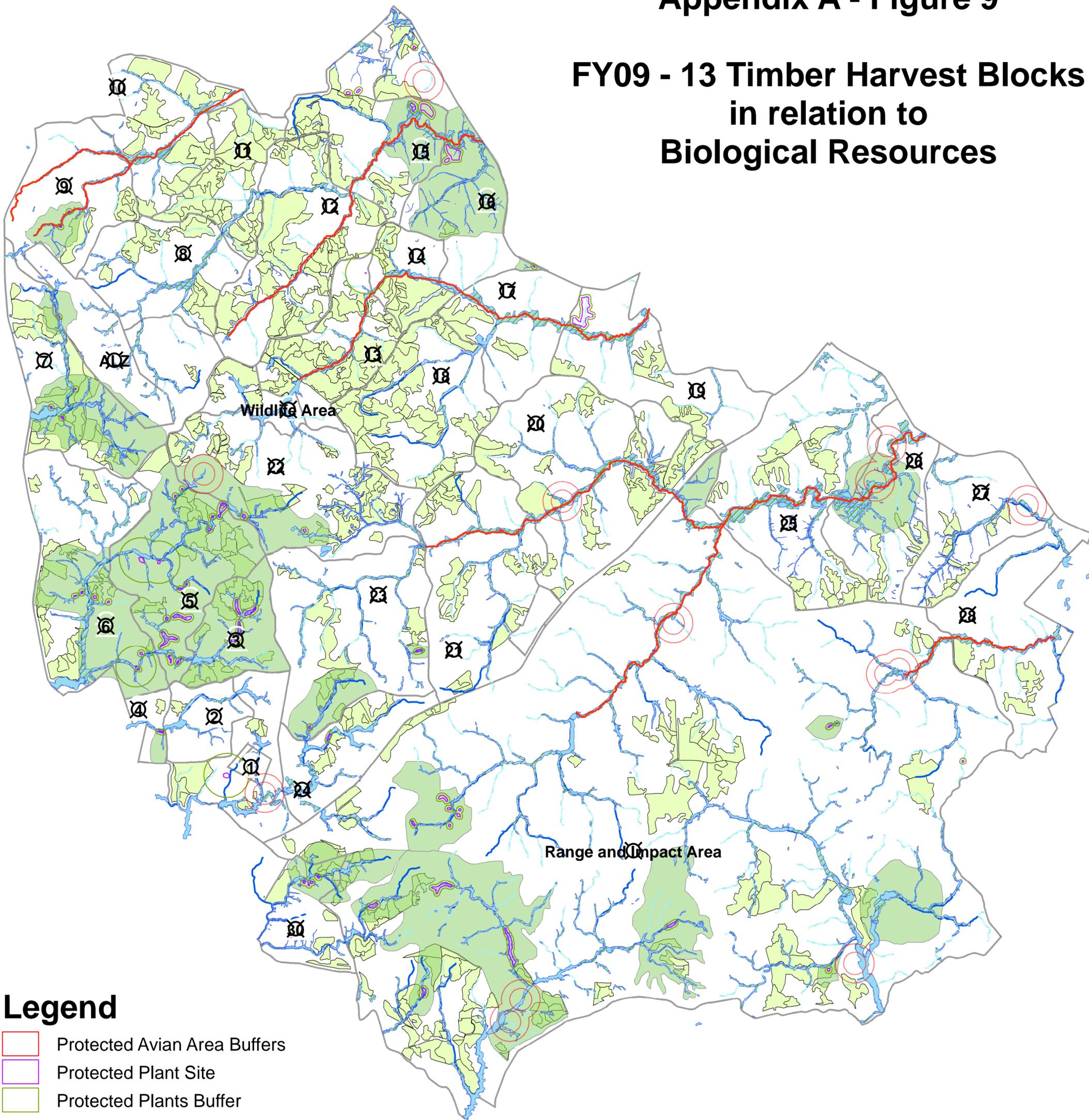
WICKHAM: (45.5 ac)

November 2008  
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# Environmental Assessment Appendix A - Figure 9

## FY09 - 13 Timber Harvest Blocks in relation to Biological Resources



### Legend

- Protected Avian Area Buffers
- Protected Plant Site
- Protected Plants Buffer
- Anadromous Fish Stream
- Pond
- Wetland
- Intermittent Stream
- Perennial Stream
- Military Training Area
- Conservation Areas
- FY09 - 13 Timber Harvest Blocks

November 2008  
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2

0 1 2 4 6 8 10 Kilometers

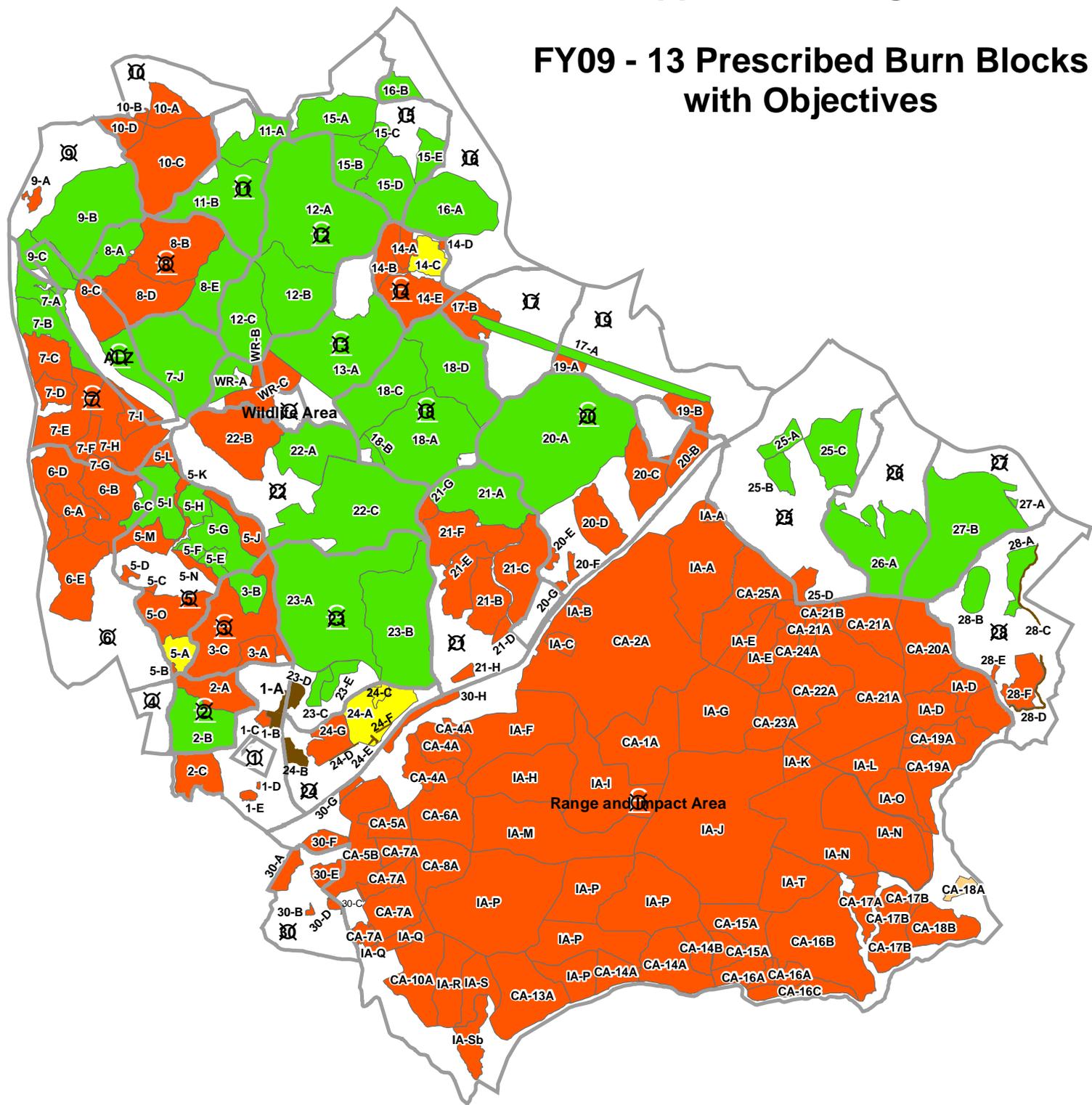
## Appendix B

### FY 2009-2013 PRESCRIBED BURNING LOCATION, OBJECTIVE, AND AFFECTED ENVIRONMENTAL RESOURCES MAPS

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# Environmental Assessment Appendix B - Figure 1

## FY09 - 13 Prescribed Burn Blocks with Objectives



### Legend

- Military Training Area
- Proposed 5 Year Prescribed Burn Blocks**
- Burn Type: (total 53,820.1 ac)**
- Fuel Reduction: (34,008.9 ac)
- Site Preparation: (44.5 ac)
- Oak Regeneration: (525.0 ac)
- Vegetation Control: (19,094.5 ac)
- Wildlife: (147.2 ac)

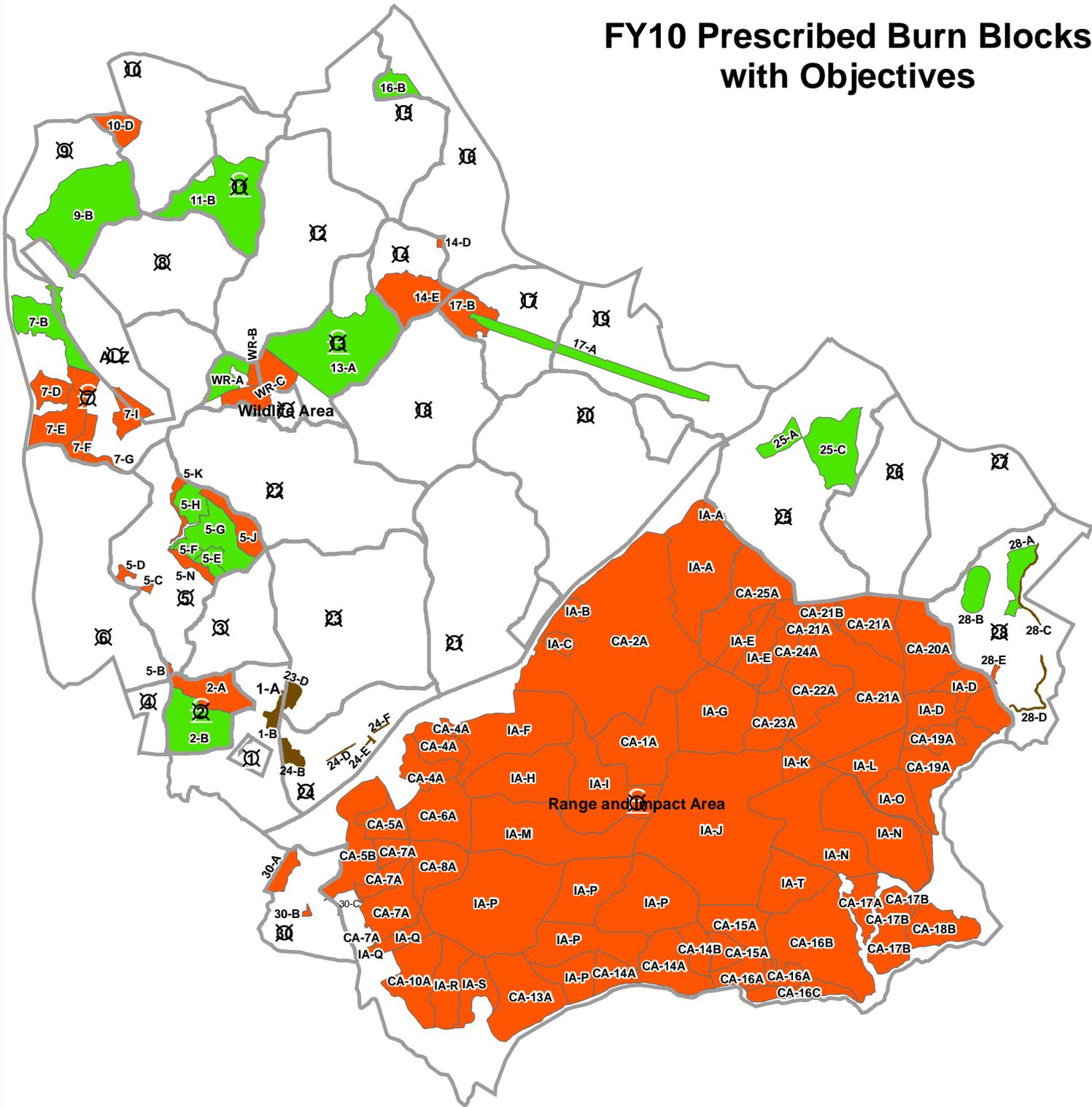
November 2008  
DPW - ED - Forestry





# Environmental Assessment Appendix B - Figure 3

## FY10 Prescribed Burn Blocks with Objectives



### Legend

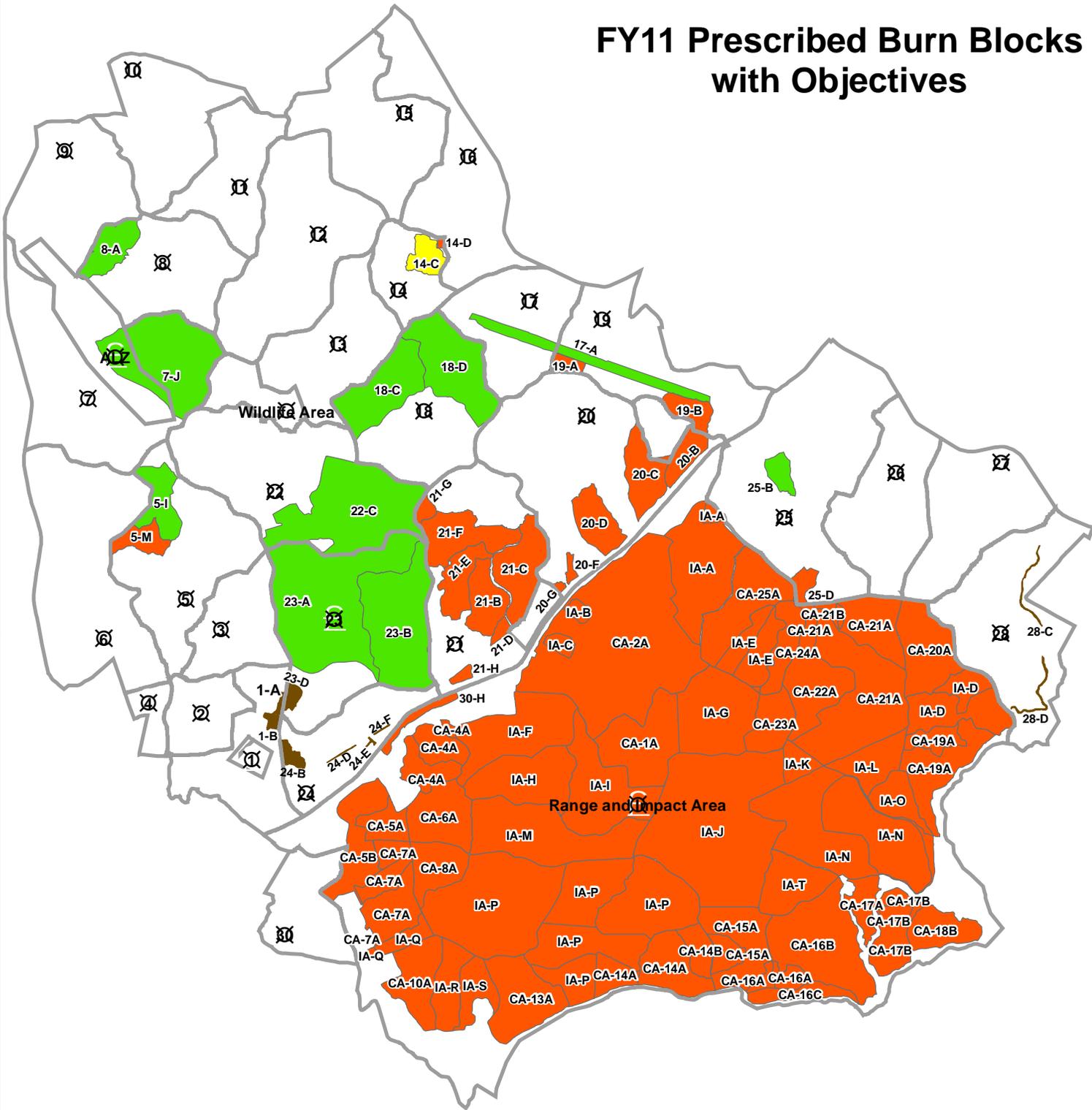
-  Military Training Area
- Proposed 5 Year Prescribed Burn Blocks**
- Burn Type: (total 29,922.15 ac)
  -  Fuel Reduction: (25,557.3 ac)
  -  Vegetation Control: (4,217.7 ac)
  -  Wildlife: (147.2 ac)

November 2008  
DPW - ED - Forestry



# Environmental Assessment Appendix B - Figure 4

## FY11 Prescribed Burn Blocks with Objectives



### Legend

-  Military Training Area
- Proposed 5 Year Prescribed Burn Blocks**
- Burn Type: (total 31,861.5 ac)
  -  Fuel Reduction: (25,912.6 ac)
  -  Oak Regeneration: (116.2 ac)
  -  Vegetation Control: (5,685.5 ac)
  -  Wildlife: (147.2 ac)

November 2008  
DPW - ED - Forestry







# Environmental Assessment Appendix B - Figure 7

## FY09 - 13 Prescribed Burn Blocks in relation to Cultural Resources



### Legend

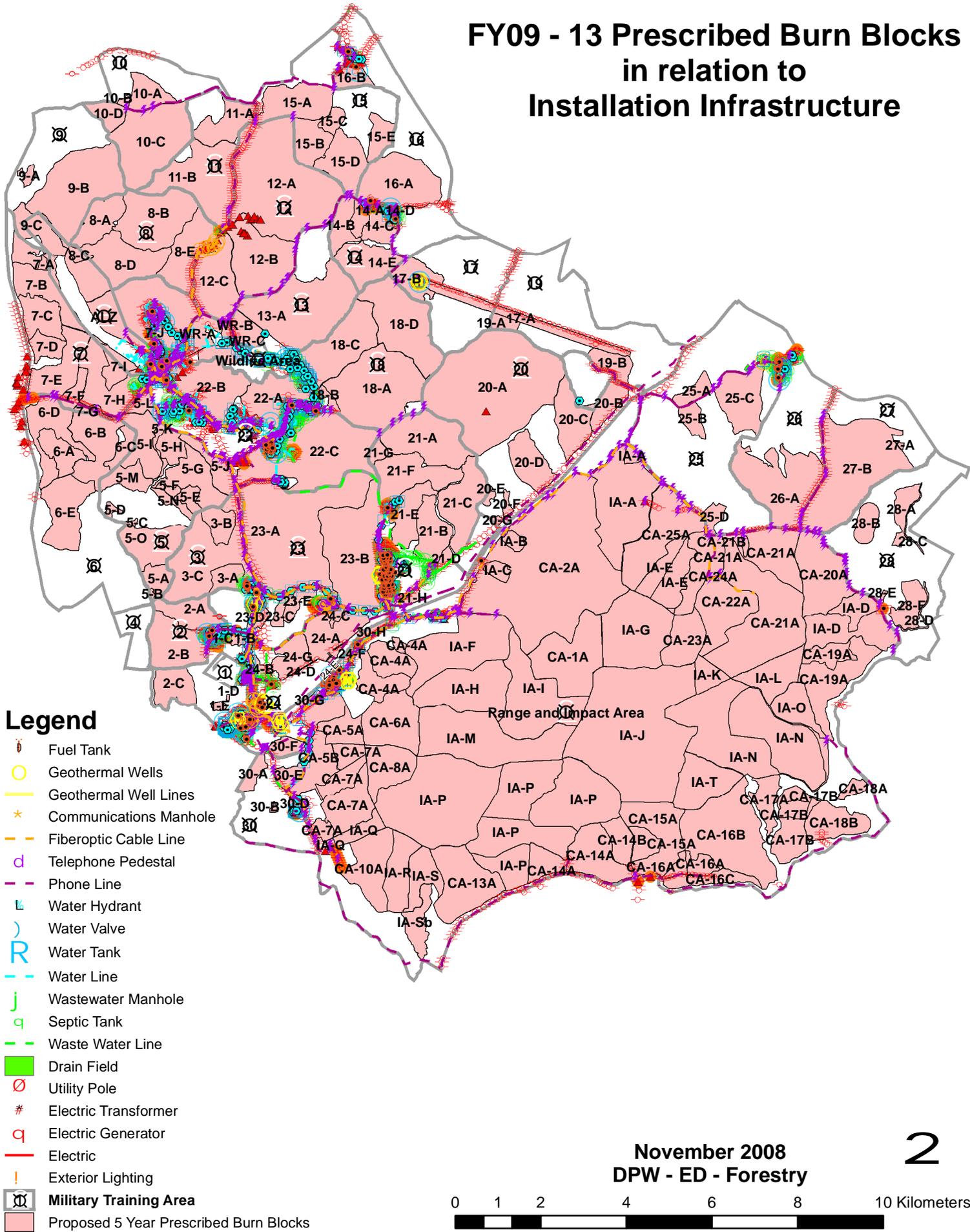
-  Historic District
-  Archaeological Site
-  Architectural Resource
-  Military Training Area
-  Proposed 5 Year Prescribed Burn Blocks

November 2008  
DPW - ED - Forestry



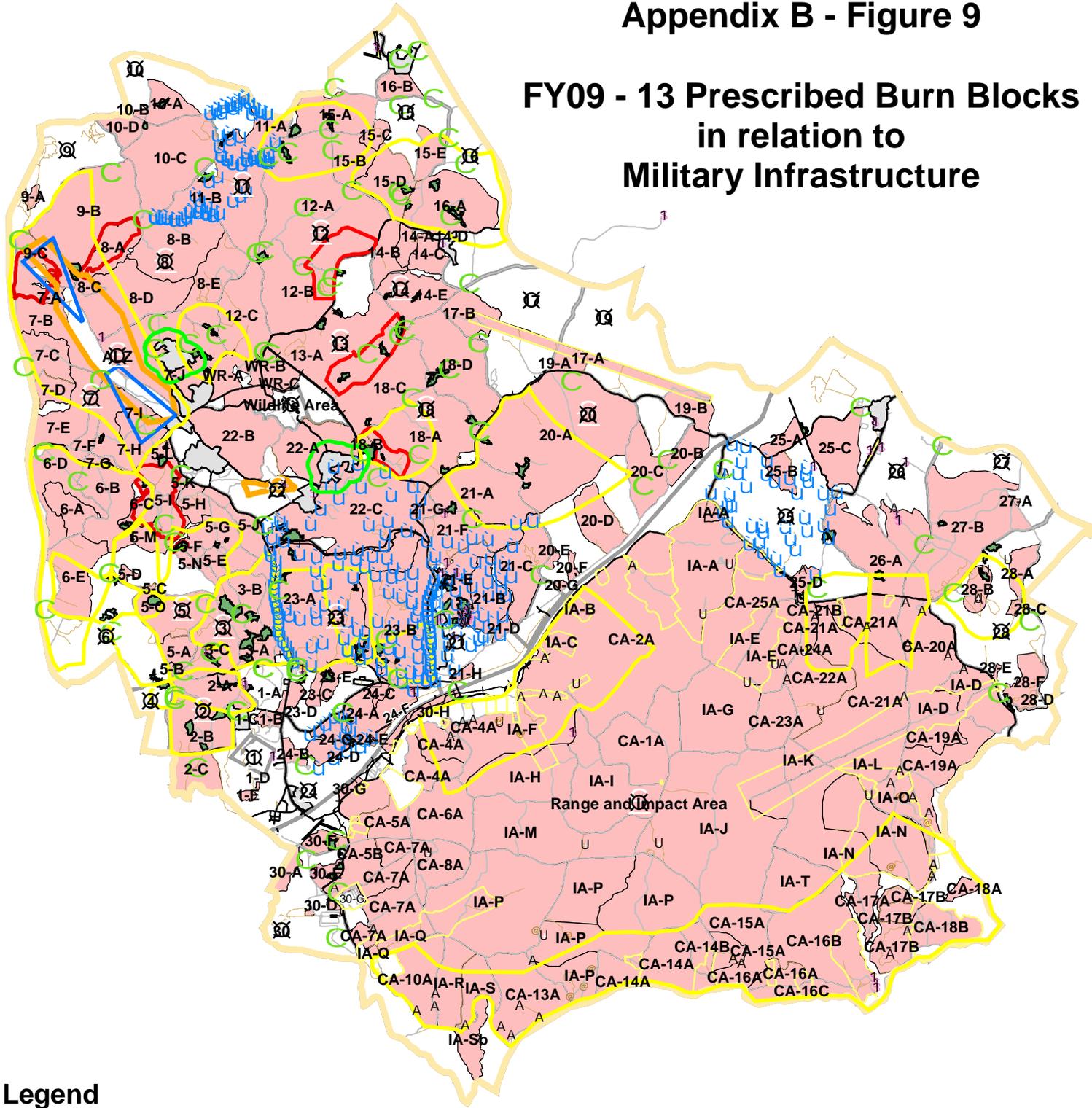
# Environmental Assessment Appendix B - Figure 8

## FY09 - 13 Prescribed Burn Blocks in relation to Installation Infrastructure



# Environmental Assessment Appendix B - Figure 9

## FY09 - 13 Prescribed Burn Blocks in relation to Military Infrastructure



### Legend

- |  |                           |
|--|---------------------------|
| Proposed 5 Year Prescribed Burn Blocks | Live-Fire Range Area      |
| Military Training Area                 | Tactical Concealment Area |
| Camp Buffer                            | Landing Zone              |
| MOUT Site Bunkers                      | Maneuver Corridor         |
| Specialized Training Facility          | Force Protection Buffer   |
| Observation Point                      | Asphalt Road              |
| Demolition Sites                       | Gravel Road               |
| Land Navigation Vehicle Course         | Dirt Road                 |
| Land Navigation Course                 | Firebreak                 |
| Indirect Firing Points                 | Tank Trail                |
| Military Lanes Training Site           |                           |
| ALZ Clear Zones                        |                           |
| Cantonment Area                        |                           |
| Drop Zone                              |                           |

December 2008  
DPW - ED - Forestry

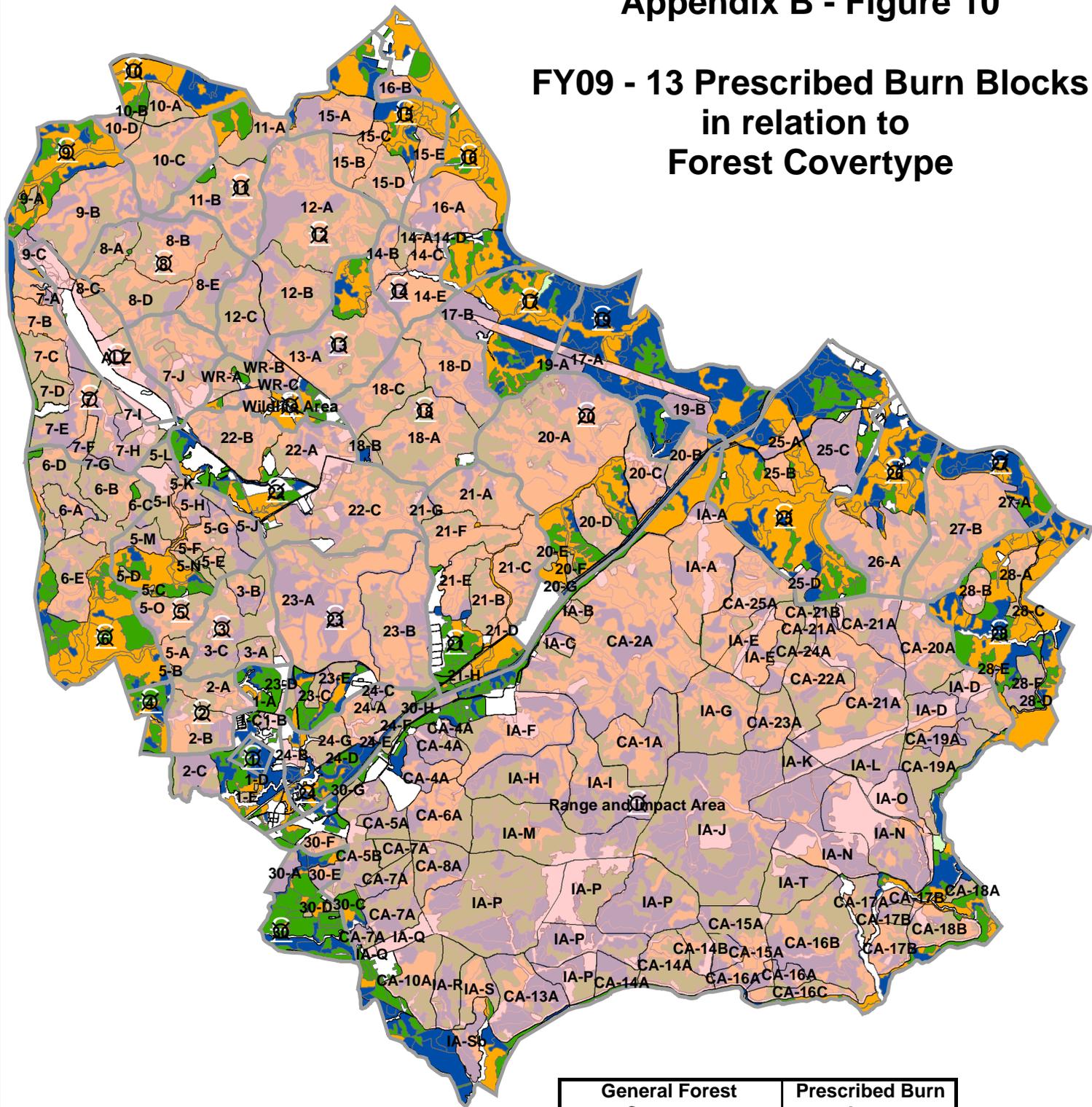
2

0 1 2 4 6 8 10 Kilometers



# Environmental Assessment Appendix B - Figure 10

## FY09 - 13 Prescribed Burn Blocks in relation to Forest Coverture



### Legend

- Military Training Area
- Proposed 5 Year Prescribed Burn Blocks
- Forest Coverture**
- Hardwood
- Pine/Hardwood Mixed
- Pine
- Young Forest
- Non-Forest

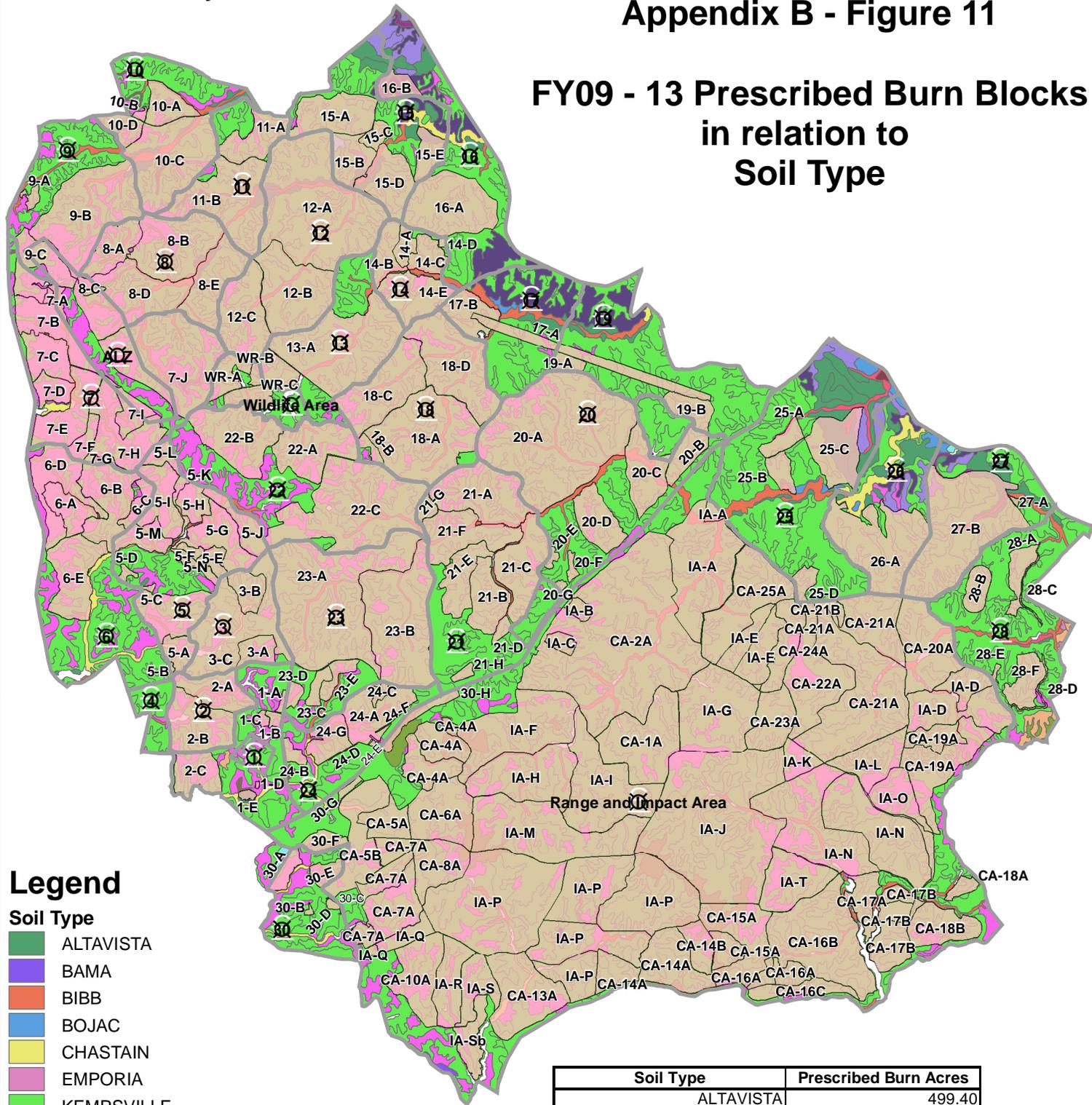
General Forest Coverture	Prescribed Burn Acres
Hardwood	18,456.08
Pine/Hardwood Mixed	13,094.75
Pine	16,955.81
Young Forest	134.47
Non-Forest	5,167.14
<b>Total</b>	<b>53,808.24</b>

November 2008  
DPW - ED - Forestry



# Environmental Assessment Appendix B - Figure 11

## FY09 - 13 Prescribed Burn Blocks in relation to Soil Type



### Legend

#### Soil Type

- ALTAVISTA
- BAMA
- BIBB
- BOJAC
- CHASTAIN
- EMPORIA
- KEMPSVILLE
- MYATT
- NEVARC
- PITS, GRAVEL
- RUMFORD
- SLAGLE
- STATE
- SUFFOLK
- TOMOTLEY
- WEHADKEE
- WICKHAM

Military Training Area

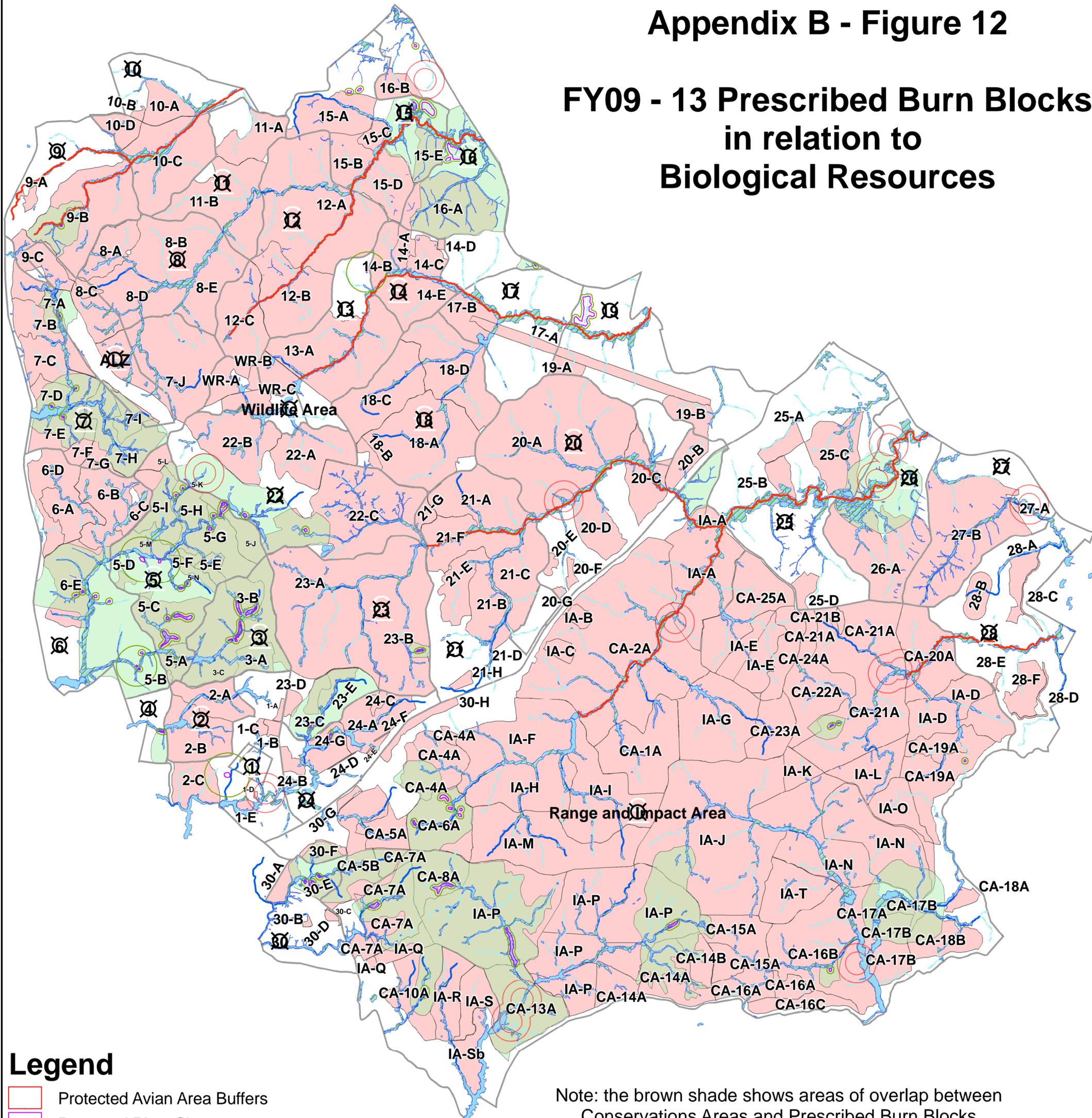
Proposed 5 Year Prescribed Burn Blocks

Soil Type	Prescribed Burn Acres
ALTAVISTA	499.40
BIBB	1,698.85
BOJAC	4.31
CHASTAIN	113.32
KEMPSVILLE	43,487.24
MYATT	54.25
NEVARC	69.95
PITS, GRAVEL	16.03
SLAGLE	6,965.36
SUFFOLK	621.97
TOMOTLEY	17.21
WATER	205.69
WEHADKEE	7.56
WICKHAM	47.13
<b>Total</b>	<b>53,808.27</b>

0 1 2 4 6 8 10 Kilometers

# Environmental Assessment Appendix B - Figure 12

## FY09 - 13 Prescribed Burn Blocks in relation to Biological Resources

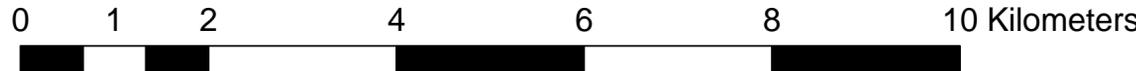


### Legend

- Protected Avian Area Buffers
- Protected Plant Site
- Protected Plants Buffer
- Anadromous Fish Stream
- Pond
- Wetland
- Intermittent Stream
- Perennial Stream
- ⊗ Military Training Area
- Conservation Areas
- Proposed 5 Year Prescribed Burn Blocks

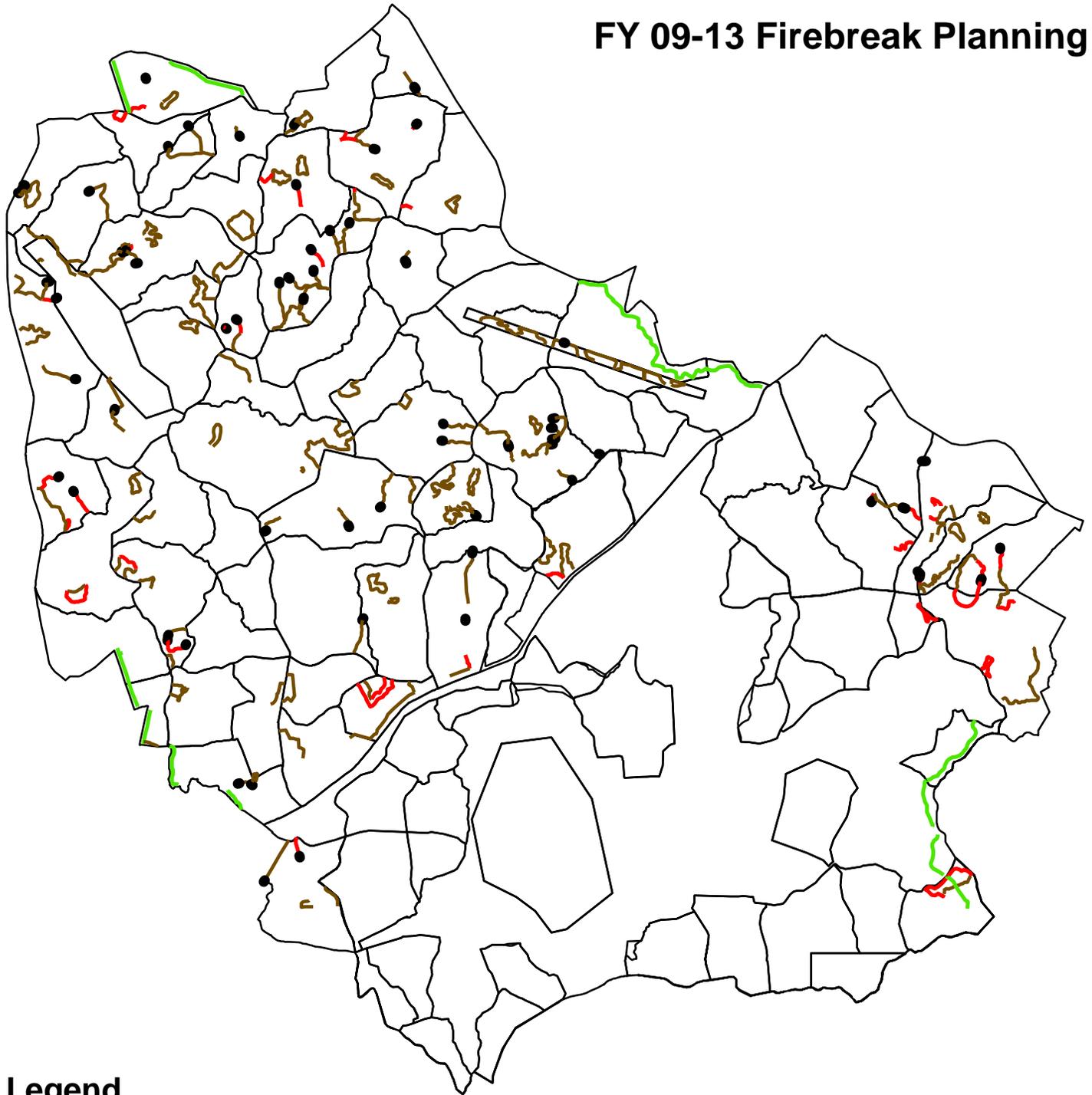
Note: the brown shade shows areas of overlap between  
Conservations Areas and Prescribed Burn Blocks.

November 2008  
DPW - ED - Forestry



# Environmental Assessment Appendix B - Figure 13

## FY 09-13 Firebreak Planning



### Legend

#### 5-yr Firebreak Planning

#### Firebreak Type

- Re-Opened or Existing Trail (61.7 miles)
- New Temporary Firebreaks (11.9 miles)
- New Maintained Firebreaks (10.6 miles)

● Tie In

□ Military Ranges

December 2008  
DPW - ED - Forestry

# 2



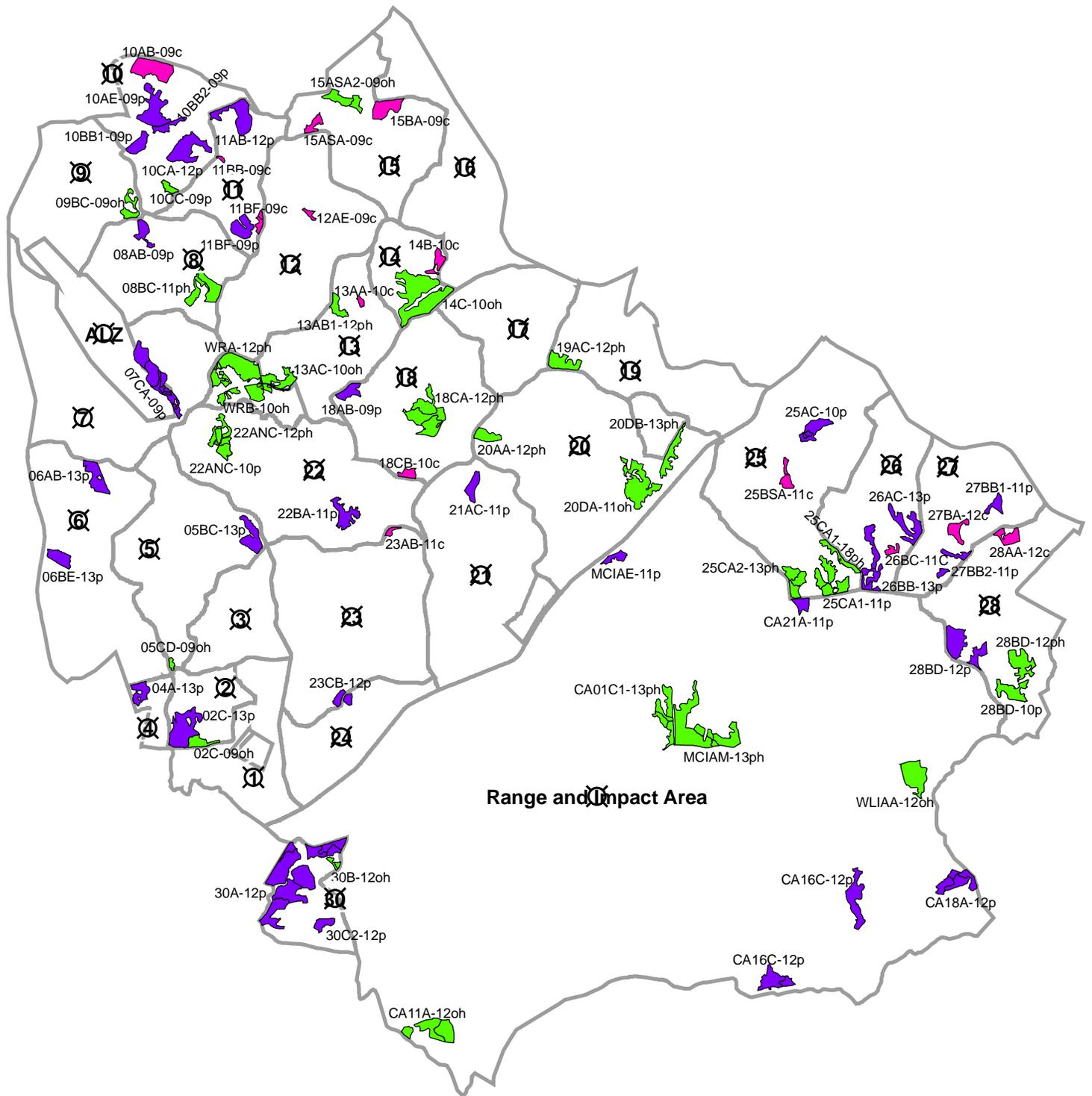
## Appendix C

### FY 2009-2013 TIMBER STAND IMPROVEMENT LOCATION, OBJECTIVE AND AFFECTED ENVIRONMENTAL RESOURCES MAPS

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# Environmental Assessment Appendix C - Figure 1

## FY09 - 13 Timber Stand Improvement Blocks

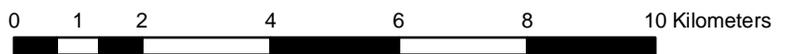


### Legend

-  Herbicide (1,448.6 ac)
-  Crop Tree Release (274.1 ac)
-  Pre-Commercial Thinning (1,656.6 ac)
-  Military Training Area

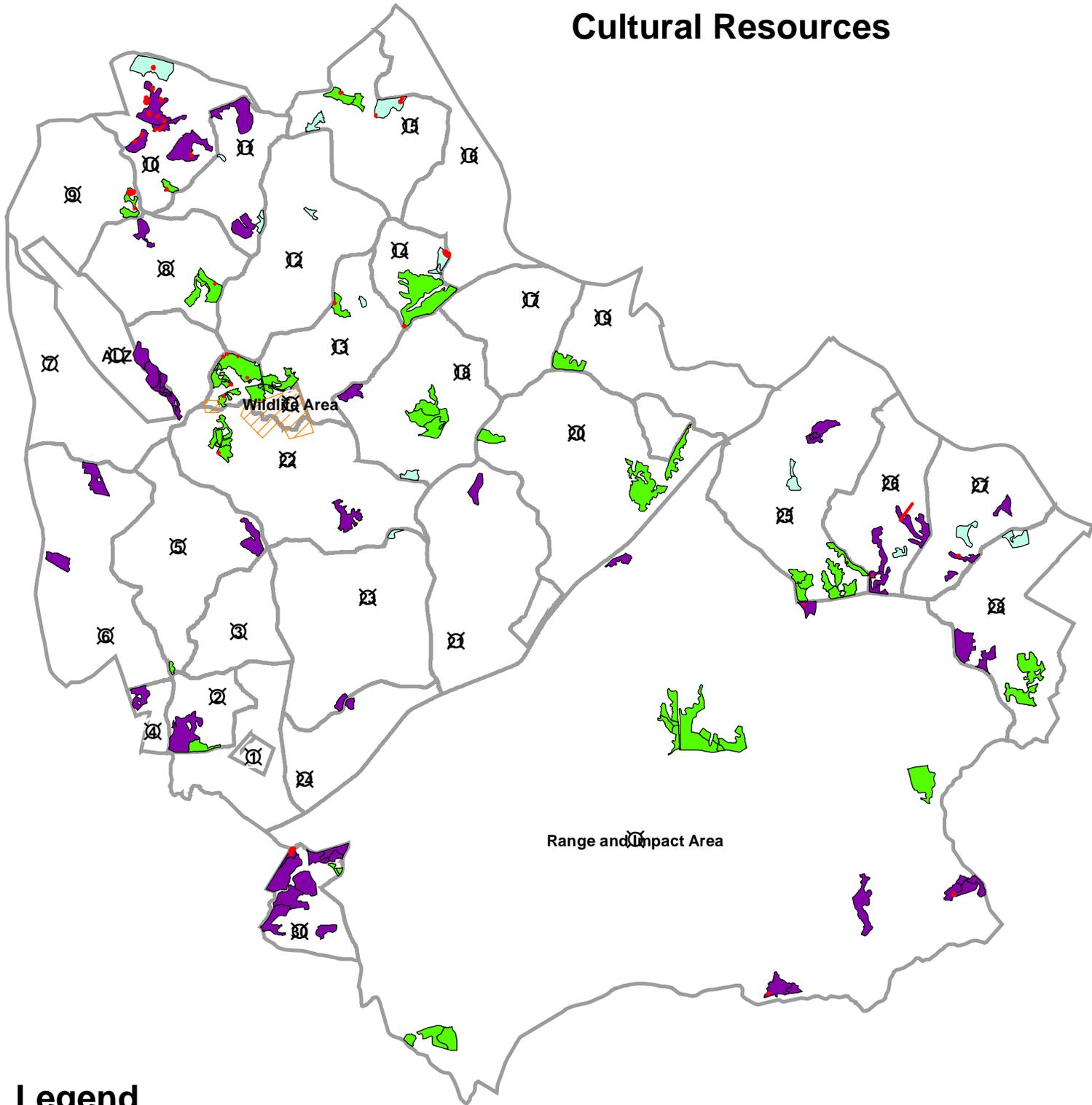
November 2008  
DPW - ED - Forestry

2



# Environmental Assessment Appendix C - Figure 2

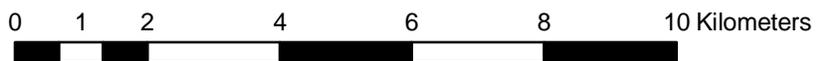
## FY09 - 13 Timber Stand Improvement Blocks in relation to Cultural Resources



### Legend

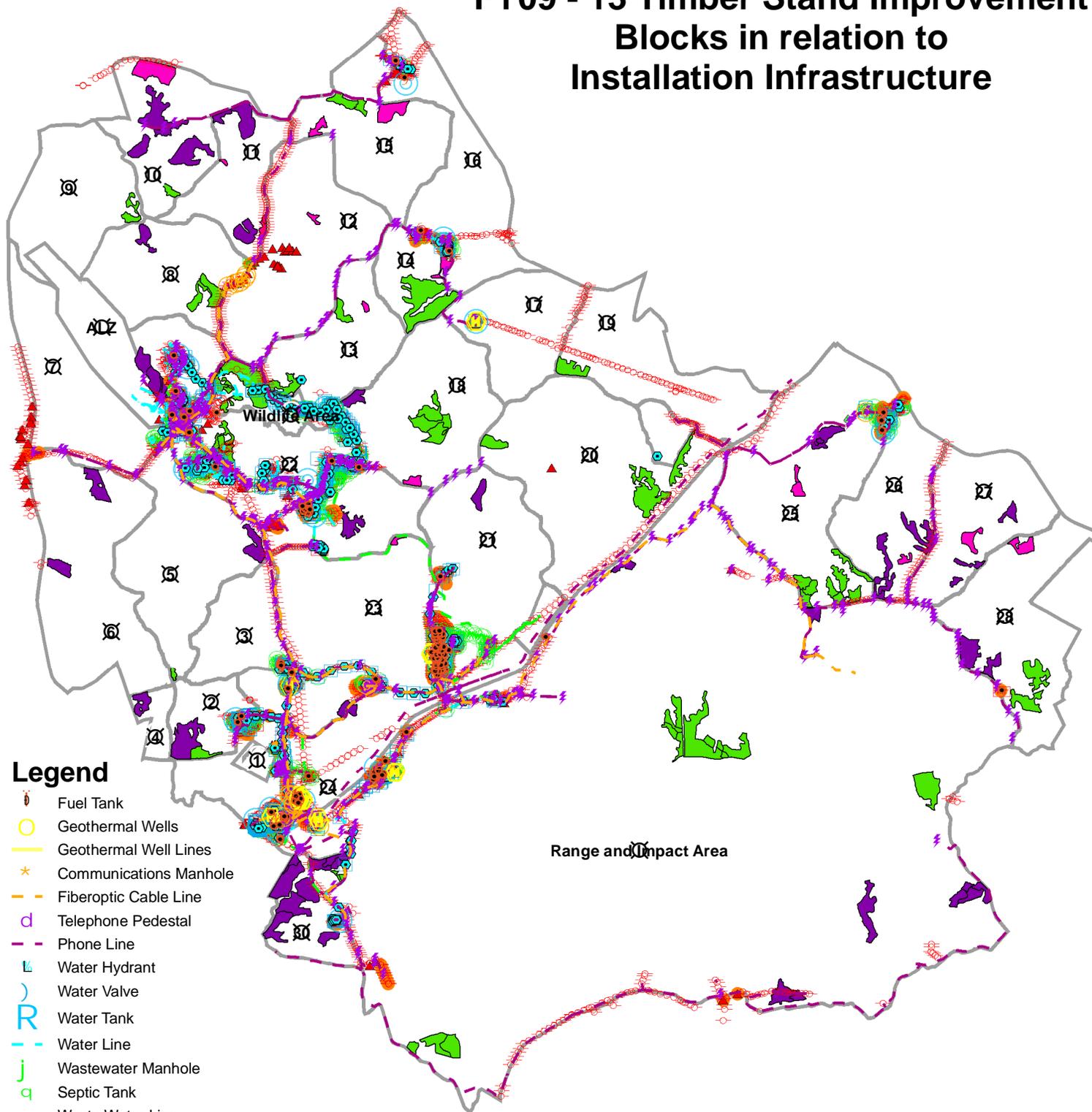
-  Historic District
-  Archaeological Site
-  Herbicide
-  Crop Tree Release
-  Pre-Commercial Thinning
-  Military Training Area

November 2008  
DPW - ED - Forestry



# Environmental Assessment Appendix C - Figure 3

## FY09 - 13 Timber Stand Improvement Blocks in relation to Installation Infrastructure



### Legend

- Fuel Tank
- Geothermal Wells
- Geothermal Well Lines
- Communications Manhole
- Fiberoptic Cable Line
- Telephone Pedestal
- Phone Line
- Water Hydrant
- Water Valve
- Water Tank
- Water Line
- Wastewater Manhole
- Septic Tank
- Waste Water Line
- Drain Field
- Utility Pole
- Electric Transformer
- Electric Generator
- Electric
- Exterior Lighting
- Herbicide
- Crop Tree Release
- Pre-Commercial Thinning
- Military Training Area

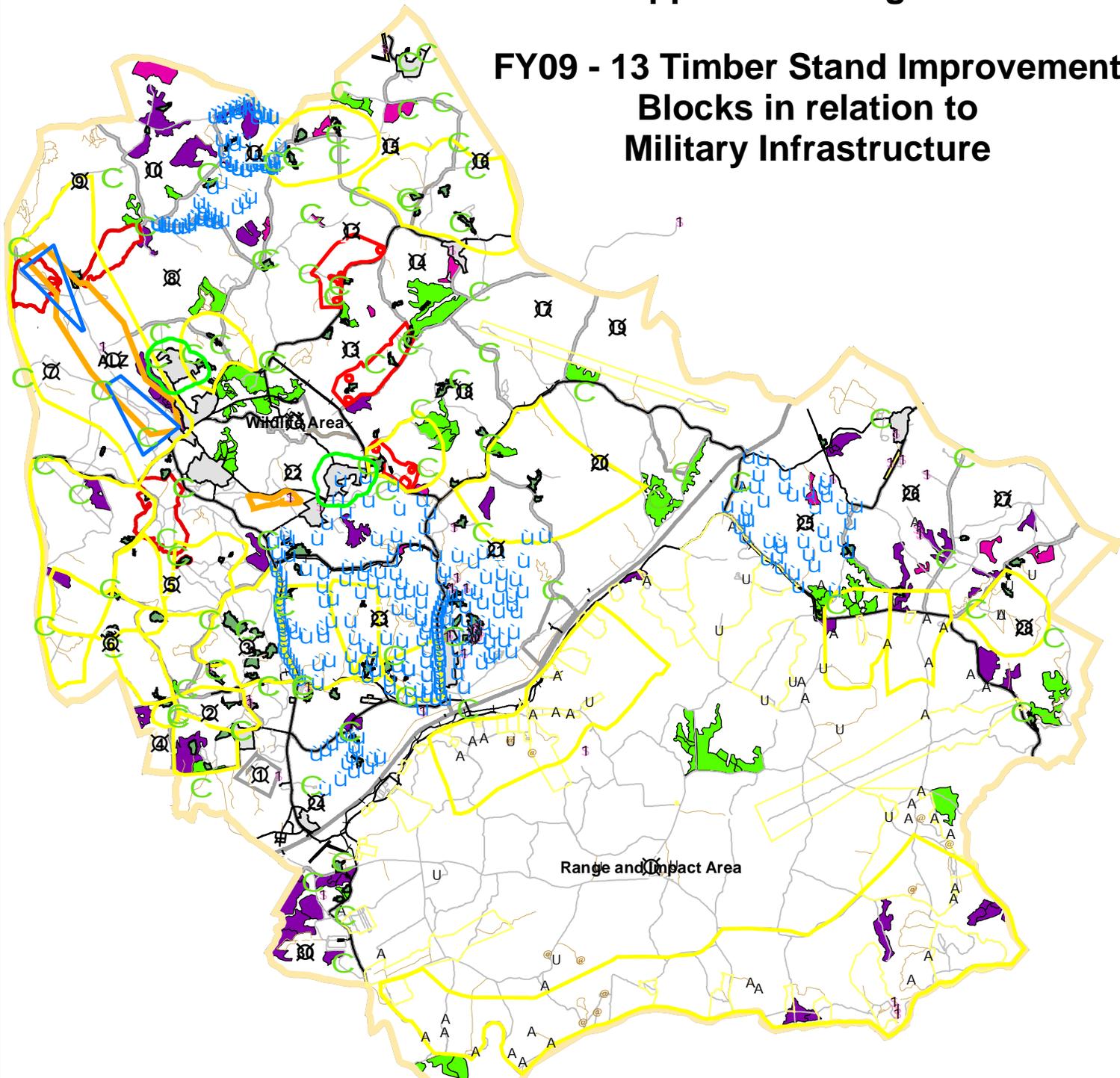
Range and Impact Area

November 2008  
DPW - ED - Forestry



# Environmental Assessment Appendix C - Figure 4

## FY09 - 13 Timber Stand Improvement Blocks in relation to Military Infrastructure



### Legend

- |   |                                |   |                           |
|---|--------------------------------|---|---------------------------|
|  | Crop Tree Release              |  | Live-Fire Range Area      |
|  | Herbicide                      |  | Tactical Concealment Area |
|  | Pre-Commercial Thinning        |  | Landing Zone              |
|  | Camp Buffer                    |  | Maneuver Corridor         |
|  | MOUT Site Bunkers              |  | Force Protection Buffer   |
|  | Specialized Training Facility  |  | Asphalt Road              |
|  | Observation Point              |  | Gravel Road               |
|  | Demolition Sites               |  | Dirt Road                 |
|  | Land Navigation Vehicle Course |  | Firebreak                 |
|  | Land Navigation Course         |  | Tank Trail                |
|  | Indirect Firing Points         |  | Military Training Area    |
|  | Military Lanes Training Site   |   |                           |
|  | ALZ Clear Zones                |   |                           |
|  | Cantonment Area                |   |                           |
|  | Drop Zone                      |   |                           |

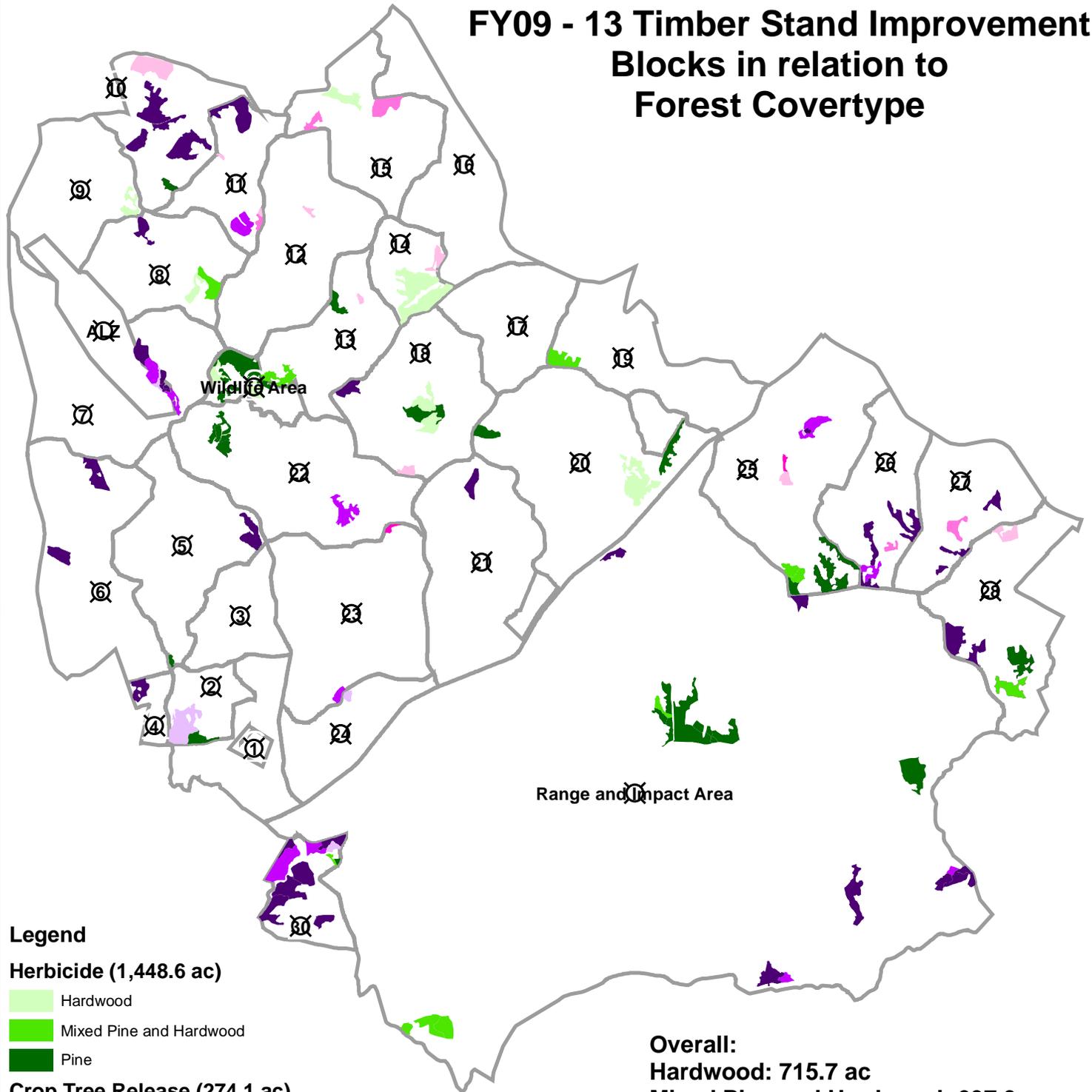
December 2008  
DPW - ED - Forestry

2



# Environmental Assessment Appendix C - Figure 5

## FY09 - 13 Timber Stand Improvement Blocks in relation to Forest Covertypes



**Legend**

**Herbicide (1,448.6 ac)**

- Hardwood
- Mixed Pine and Hardwood
- Pine

**Crop Tree Release (274.1 ac)**

- Hardwood
- Mixed Pine and Hardwood
- Pine

**Pre-Commerical Thinning (1,656.6 ac)**

- Hardwood
- Mixed Pine and Hardwood
- Pine

- Military Training Area

**Overall:**

**Hardwood: 715.7 ac**  
**Mixed Pine and Hardwood: 697.3 ac**  
**Pine: 1,966.3 ac**

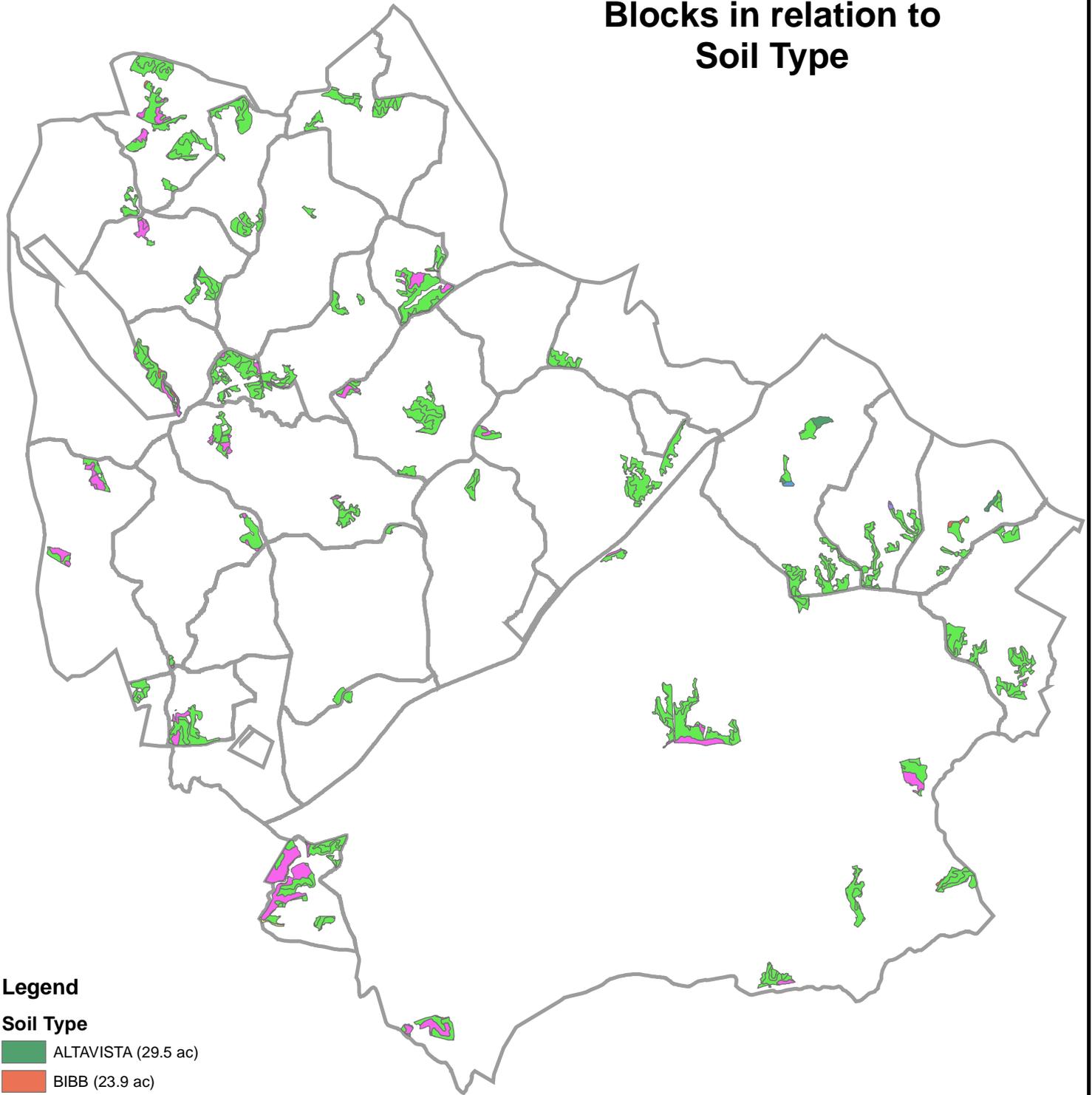
2

**November 2008**  
**DPW - ED - Forestry**



# Environmental Assessment Appendix C - Figure 6

## FY09 - 13 Timber Stand Improvement Blocks in relation to Soil Type



### Legend

#### Soil Type

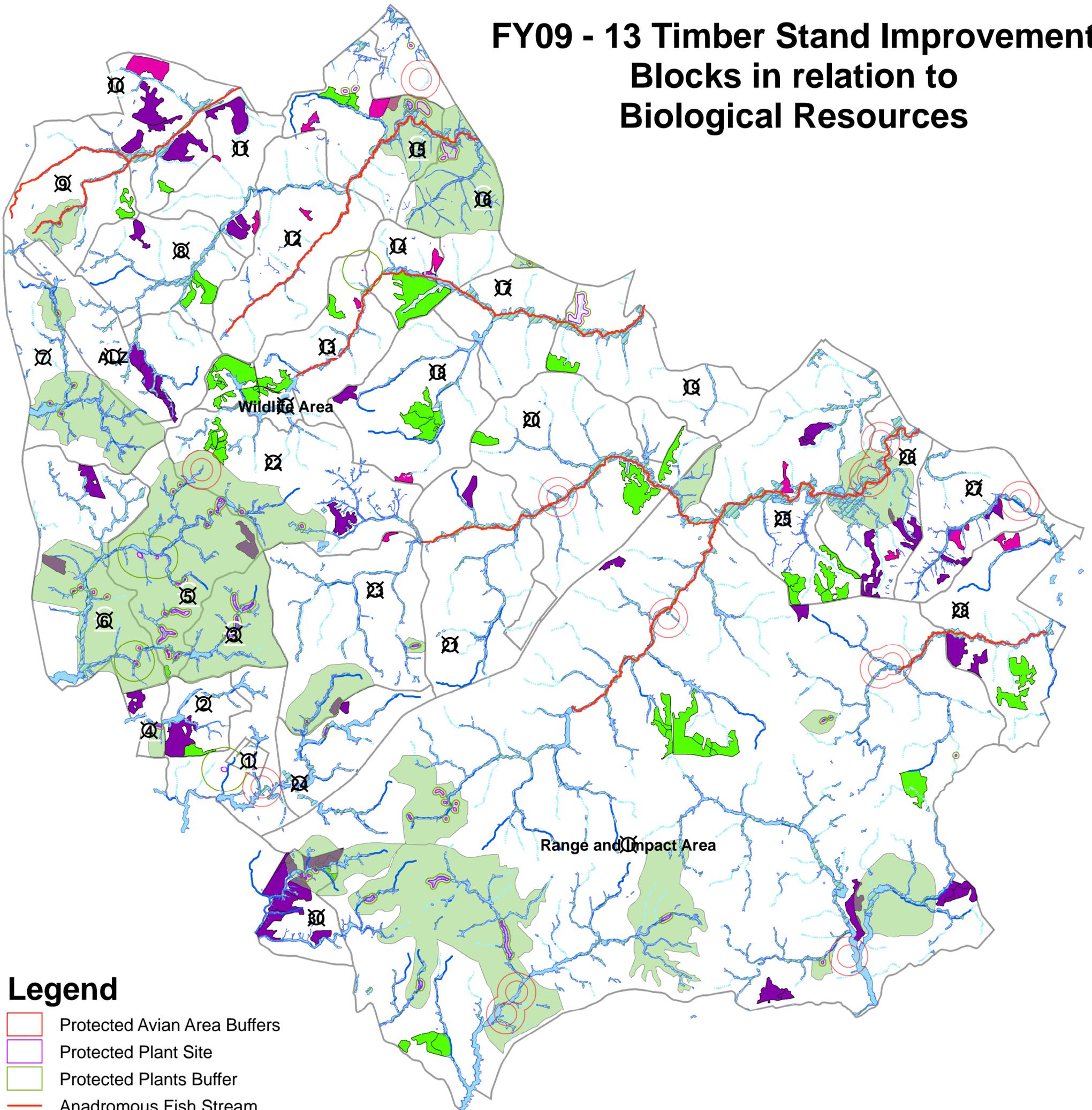
- ALTAVISTA (29.5 ac)
- BIBB (23.9 ac)
- BOJAC (4.5 ac)
- CHASTAIN (9.2 ac)
- KEMPSVILLE (2,692.7 ac)
- PITS, GRAVEL (0.2 ac)
- SLAGLE (412.1 ac)
- WICKHAM (2.6 ac)
- Military Training Area

November 2008  
DPW - ED - Forestry

0 1 2 4 6 8 10 Kilometers

# Environmental Assessment Appendix C - Figure 7

## FY09 - 13 Timber Stand Improvement Blocks in relation to Biological Resources



### Legend

- Protected Avian Area Buffers
- Protected Plant Site
- Protected Plants Buffer
- Anadromous Fish Stream
- Pond
- Wetland
- Intermittent Stream
- Perennial Stream
- Conservation Areas
- Herbicide
- Crop Tree Release
- Pre-Commercial Thinning
- Military Training Area

November 2008  
DPW - ED - Forestry

2

0 1 2 4 6 8 10 Kilometers

Appendix D

FORT A.P. HILL SUB-WATERSHED ACTIVITY  
SUMMARY TABLES FOR FY 2009-2013

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Table 1. Forest Management Activity Acres per Activity Type Occurring in each Sub-watershed on Fort A.P Hill

Sub-watershed		Activity Acres:		Timber Stand Improvements		
		Timber Harvest	Prescribed Burning	Crop Tree Release	Pre-commercial Thinning	Herbicide
Battery Lane (615.9 ac)	2009	124.3	338.9	\	\	\
	2010	7.4	338.9	\	\	\
	2011	\	338.9	\	\	\
	2012	53.0	338.9	\	\	\
	2013	\	338.9	\	\	\
Bowies Pond (6,466.3 ac)	2009	\	322.7	\	\	26.9
	2010	205.8	1,250.9	\	\	\
	2011	\	344.3	\	\	\
	2012	\	0.0	\	\	\
	2013	880.3	2,964.2	\	229.9	\
Cook Camp (1,234.8 ac)	2009	\	0.0	\	\	\
	2010	183.5	409.1	\	38.5	\
	2011	\	0.0	\	\	\
	2012	\	0.0	\	\	\
	2013	\	0.0	\	\	\
Elliot's Pond (1,915.0 ac)	2009	11.8	937.6	\	\	\
	2010	\	1,015.1	\	\	\
	2011	\	937.6	\	\	\
	2012	364.8	1,139.9	\	206.4	11.8
	2013	60.1	937.6	\	60.0	\
Goldenvale Creek (8,490.5 ac)	2009	24.4	2,023.6	\	24.4	21.6
	2010	2,511.2	1,847.4	38.7	16.3	279.6
	2011	\	1,579.8	\	\	\
	2012	\	1,576.3	\	\	327.1
	2013	\	1,319.5	\	\	\
Gregg Pond (2,991.4 ac)	2009	\	578.7	\	\	\
	2010	\	266.8	\	\	\
	2011	\	266.8	\	\	\
	2012	465.6	628.0	\	19.4	\
	2013	\	732.0	\	\	\
Meadow Creek (2,074.6 ac)	2009	337.7	827.8	\	\	\
	2010	\	855.9	\	\	\
	2011	\	0.0	\	\	\
	2012	\	1,190.1	\	\	\
	2013	298.1	561.6	\	\	\

Sub-watershed	Activity Acres:		Timber Stand Improvements		
	Timber Harvest	Prescribed Burning	Crop Tree Release	Pre-commercial Thinning	Herbicide
Mill Creek (21,697.1 ac)					
2009	\	12,141.7	\	\	\
2010	322.1	8,519.8	\	\	\
2011	2,000.4	13,653.2	35.7	166.1	\
2012	\	11,172.9	\	\	25.6
2013	105.2	8,519.9	\	105.2	376.4
Mount Creek (7,492.9 ac)					
2009	1,577.8	4,952.2	76.7	154.8	54.6
2010	432.7	580.9	\	\	\
2011	\	1,044.9	\	\	59.9
2012	\	4,893.9	\	\	\
2013	\	580.9	\	\	\
Portobago Creek (6,090.0 ac)					
2009	\	4,377.7	\	\	\
2010	88.5	3,639.4	\	88.5	\
2011	36.9	3,420.6	\	55.4	\
2012	178.2	4,382.9	50.8	72.9	88.5
2013	\	3,782.2	\	\	\
Smoots Run (5,067.3 ac)					
2009	96.4	4,374.5	\	\	\
2010	32.7	4,374.5	\	\	\
2011	\	4,374.5	\	\	\
2012	464.0	4,521.2	\	\	74.8
2013	\	4,374.5	\	\	\
Ware Creek (3,854.9 ac)					
2009	625.6	1,041.6	72.2	127.2	23.3
2010	184.1	922.6	\	\	\
2011	\	0.0	\	\	10.8
2012	230.6	852.2	\	131.6	\
2013	\	716.1	\	\	\
White Lake (6,759.3 ac)					
2009	527.2	5,945.1	\	\	\
2010	\	5,945.1	\	\	\
2011	291.8	5,945.1	\	\	\
2012	192.5	5,945.1	\	159.8	64.9
2013	\	5,945.1	\	\	\
<b>Totals:</b>	12,914.7	***	274.1	1,656.4	1,445.8

\*\*\* Many sites receive repetitive burns, total acres would not reflect this.

Table 2. Percent of Sub-watershed Acres for each Forest Management Activity Type Occurring in each Sub-watershed on Fort A.P. Hill

Sub-watershed		Activity % Acres:		Timber Stand Improvements		
		Timber Harvest	Prescribed Burning	Crop Tree Release	Pre-commercial Thinning	Herbicide
Battery Lane (615.9 ac)	2009	20.2%	54.9%	\	\	\
	2010	1.2%	54.9%	\	\	\
	2011	\	54.9%	\	\	\
	2012	8.6%	54.9%	\	\	\
	2013	\	54.9%	\	\	\
Bowies Pond (6,466.3 ac)	2009	\	5.0%	\	\	0.4%
	2010	3.2%	19.3%	\	\	\
	2011	\	5.3%	\	\	\
	2012	\	\	\	\	\
	2013	13.6%	45.8%	\	3.6%	\
Cook Camp (1,234.8 ac)	2009	\	\	\	\	\
	2010	14.9%	33.1%	\	3.1%	\
	2011	\	\	\	\	\
	2012	\	\	\	\	\
	2013	\	\	\	\	\
Elliot's Pond (1,915.0 ac)	2009	0.6%	49.0%	\	\	\
	2010	0.0%	53.0%	\	\	\
	2011	0.0%	49.0%	\	\	\
	2012	19.0%	59.5%	\	10.8%	0.6%
	2013	3.1%	49.0%	\	3.1%	\
Goldenvale Creek (8,490.5 ac)	2009	0.3%	23.8%	\	0.3%	0.3%
	2010	29.6%	21.8%	0.5%	0.2%	3.3%
	2011	\	18.6%	\	\	\
	2012	\	18.6%	\	\	3.9%
	2013	\	15.5%	\	\	\
Gregg Pond (2,991.4 ac)	2009	\	19.3%	\	\	\
	2010	\	8.9%	\	\	\
	2011	\	8.9%	\	\	\
	2012	15.6%	21.0%	\	0.6%	\
	2013	\	24.5%	\	\	\
Meadows Creek (2,074.6 ac)	2009	16.3%	39.9%	\	\	\
	2010	\	41.3%	\	\	\
	2011	\	\	\	\	\
	2012	\	57.4%	\	\	\
	2013	14.4%	27.1%	\	\	\

Sub-watershed	Activity % Acres:		Timber Stand Improvements		
	Timber Harvest	Prescribed Burning	Crop Tree Release	Pre-commercial Thinning	Herbicide
Mill Creek (21,697.1 ac)					
2009	\	56.0%	\	\	\
2010	1.5%	39.3%	\	\	\
2011	9.2%	62.9%	0.2%	0.8%	\
2012	\	51.5%	\	\	0.1%
2013	0.5%	39.3%	\	0.5%	1.7%
Mount Creek (7,492.9 ac)					
2009	21.1%	66.1%	1.0%	2.1%	0.7%
2010	5.8%	7.8%	\	\	\
2011	\	13.9%	\	\	0.8%
2012	\	65.3%	\	\	\
2013	\	7.8%	\	\	\
Portobago Creek (6,090.0 ac)					
2009	\	71.9%	\	\	\
2010	1.5%	59.8%	\	1.5%	\
2011	0.6%	56.2%	\	0.9%	\
2012	2.9%	72.0%	0.8%	1.2%	1.5%
2013	\	62.1%	\	\	\
Smoots Run (5,067.3 ac)					
2009	1.9%	86.3%	\	\	\
2010	0.6%	86.3%	\	\	\
2011	0.0%	86.3%	\	\	\
2012	9.2%	89.2%	\	\	1.5%
2013	0.0%	86.3%	\	\	\
Ware Creek (3,854.9 ac)					
2009	16.2%	27.0%	1.9%	3.3%	0.6%
2010	4.8%	23.9%	\	\	\
2011	\	\	\	\	0.3%
2012	6.0%	22.1%	\	3.4%	\
2013	\	18.6%	\	\	\
White Lake (6,759.3 ac)					
2009	7.8%	88.0%	\	\	\
2010	\	88.0%	\	\	\
2011	4.3%	88.0%	\	\	\
2012	2.8%	88.0%	\	2.4%	1.0%
2013	\	88.0%	\	\	\
<b>Totals:</b>	17.3%	***	0.4%	2.2%	1.9%

\*\*\* Many sites receive repetitive burns, total acres would not reflect this.

Appendix E

DESCRIPTIONS OF CULTURAL RESOURCES  
OCCURRING WITHIN THE PROJECT AREA

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Table 1. Fort A.P. Hill Cultural Resource Sites Occurring within the Timber Harvest Project Area

TIMBER BLOCK	VDHR NUMBER	SITE TYPE / DESCRIPTION	TEMPORAL PERIOD / DATE OF CONSTRUCTION	NATIONAL REGISTER RECOMMENDATION
<b>Architectural Resources</b>				
08AB-10	016-0349-0033	House ruin	Ca. 1920	Collapsed
22ASA-10	016-0349-0002	Building TT0211	Ca. 1940	Not Eligible (VDHR)
	016-0349-0053	Storage facility / P00220	1951	Not Eligible (VDHR)
<b>Archaeological Resources</b>				
01ASA-12	44CE0073	Indeterminate	Woodland	Not Eligible (VDHR)
02A-13	44CE0553	Industry/Processing/Extraction, Domestic, Funerary – Brick kiln, Farmstead, Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Potentially Eligible
		Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
03BC-13	44CE0121	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
	44CE0131	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
06CA-13	44CE0420	Settlement Patterns – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century 1 <sup>st</sup> quarter	Recommended Potentially Eligible
	44CE0421	Settlement Patterns – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century 1 <sup>st</sup> quarter	Recommended Potentially Eligible
06CB-13	44CE0077	Domestic – Other	Unknown historic	Recommended Potentially Eligible
	44CE0294	Domestic – Farmstead	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
08AB-09	44CE0425	Settlement Patterns – Farmstead	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century 1 <sup>st</sup> quarter	Not Eligible (VDHR)
08BC-09	44CE0543	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
09BC-09	44CE0394	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0395	Indeterminate	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0398	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
10AB-09	44CE0374	Domestic, Military/Defense – Single dwelling, Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter; 20 <sup>th</sup> Century	Recommended Potentially Eligible
		Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
10AE-09	44CE0367	Domestic – Other	Unknown historic	Recommended Not Eligible
	44CE0368	Domestic – Single dwelling	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0369	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0370	Other	Unknown historic	Recommended Not Eligible
	44CE0371	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible

<b>TIMBER BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0372	Domestic – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
10BB1-09	44CE0347	Indeterminate	19 <sup>th</sup> Century; Unknown prehistoric	Recommended Potentially Eligible
	44CE0348	Domestic – Single dwelling	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0350	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half;	Recommended Not Eligible
	44CE0351	Military/Defense – Military camp	Unknown prehistoric	Recommended Potentially Eligible
10BB2-09	44CE0352	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0353	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0354	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
10CB-10	44CE0360	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
10CC-09	44CE0363	Domestic, Military/Defense	19 <sup>th</sup> Century	Recommended Potentially Eligible
10CC-10	44CE0361	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0362	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
11AC-10	44CE0387	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Potentially Eligible (VDHR)
11BA-10	44CE0384	Domestic – Single dwelling	20 <sup>th</sup> Century	Recommended Not Eligible
12AA1-10	44CE0481	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0482	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Eligible (VDHR)
12BA-09	44CE0429	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter	Recommended Potentially Eligible
	44CE0430	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter	Not Eligible (VDHR)
12BB2-09	44CE0052	Domestic	19 <sup>th</sup> Century	Not Eligible (VDHR)
12CA-09	44CE0058	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Not Eligible
13AB1-10	44CE0083	Religion – Church	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
13BB3-10	44CE0525	Domestic – Farmstead	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
14A-10	44CE0062	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Potentially Eligible (VDHR)
14C-10	44CE0056	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
15ASA-10	44CE0387	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
15ASA1-09	44CE0387	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Potentially Eligible (VDHR)
	44CE0388	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0484	Settlement Patterns – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0485	Settlement Patterns – Lithic scatter	Unknown prehistoric	Not Eligible (VDHR)

		Settlement Patterns – Lithic scatter		
	44CE0486		Unknown prehistoric	Not Eligible (VDHR)
<b>TIMBER BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
15ASA2-09	44CE0306	Domestic – Camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0488	Domestic – Single dwelling	18 <sup>th</sup> Century; 19 <sup>th</sup> Century	Eligible (VDHR)
	44CE0500	Settlement Patterns – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
16AA-09	44CE0490	Domestic, Military/Defense – Single dwelling, Camp	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Eligible (VDHR)
	44CE0491	Settlement Patterns – Temporary camp	Woodland	Not Eligible (VDHR)
16AB-09	44CE0489	Military/Defense – Military camp	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Eligible (VDHR)
	44CE0492	Transportation/Communication – Road bed	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
18CB-10	44CE0066	Domestic – Camp	Middle Archaic; Woodland	Not Eligible (VDHR)
	44CE0081	Domestic – Other	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
20AC2-11	44CE0296	Indeterminate	Unknown prehistoric	Not Eligible (VDHR)
21AA-11	44CE0326	Funerary – Cemetery	18 <sup>th</sup> Century, 2 <sup>nd</sup> half; 19 <sup>th</sup> Century, 1 <sup>st</sup> half	Eligible (VDHR)
22ANB-10	44CE0327	Domestic	19 <sup>th</sup> Century, 1 <sup>st</sup> quarter	Potentially Eligible (VDHR)
22ANC-10	44CE0338	Domestic – Other	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0339	Domestic – Farmstead	18 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
22AND1-10	44CE0330	Domestic – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0339	Domestic – Farmstead	18 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
22AND2-10	44CE0549	Military/Defense – Military facility	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0550	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
22ASA-10	44CE0337	Domestic – Farmstead	19 <sup>th</sup> Century, 1 <sup>st</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Potentially Eligible
	44CE0342	Settlement Pattern – Camp	Unknown prehistoric	Recommended Not Eligible
22BA2-10	44CE0466	Domestic – Farmstead	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0468	Domestic – Farmstead	19 <sup>th</sup> Century	Not Eligible (VDHR)
26AC-13	44CE0505	Military/Defense – Earthworks	19 <sup>th</sup> Century	Eligible for the Purposes of a Program Alternative (ELPA) (VDHR)
26BB-13	44CE0556	Domestic – Artifact scatter	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
27ASA-11	44CE0511	Military/Defense – Earthworks	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Not Eligible (VDHR)
27BB1-11	44CE0497	Indeterminate – Trash scatter	Unknown historic; Unknown prehistoric	Not Eligible (VDHR)

<b>TIMBER BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
27BB2-11	44CE0509	Military/Defense – Earthworks	20 <sup>th</sup> Century	Not Eligible (VDHR)
CA07B1-12	44CE0471	Domestic – Single dwelling	19 <sup>th</sup> Century, 5 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA07B3-12	44CE0464	Domestic – Multiple dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
CA16C-12	44CE0474	Funerary – Family cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
WRA-10	44CE0127	Indeterminate	Unknown prehistoric	Recommended Not Eligible
	44CE0128	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0129	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
	44CE0130	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Recommended Not Eligible

Table 2. Fort A.P. Hill Cultural Resources Occurring within the Prescribed Burning Project Area

<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
<b>Architectural Resources</b>				
06-A	016-0349-0057	Shed	Post-1870	Not Eligible (VDHR)
07-J	016-0349-0012	Building TT0224	Ca. 1940	Not Eligible (VDHR)
	016-0349-0013	Building TT0226	Ca. 1940	Not Eligible (VDHR)
	016-0349-0014	Building TT0222	Ca. 1930	Not Eligible (VDHR)
08-A/08-B	016-0349-0033	Domestic – House ruin	Ca. 1920	Collapsed
16-A	016-0349-0015	Building TT0707 Water Treatment Building – PWAT 11 & PWAT	1958	Not Eligible (VDHR)
	016-0349-0055	11A/P00705	Ca. 1940	Not Eligible (VDHR)
16-B	016-0349-0035	Military/Defense – Pender Camp	Ca. 1940-1970	Not Eligible (VDHR)
22-B	016-0069	Liberty Baptist Church	1850	Eligible (VDHR)
	016-5009	Travis Lake Historic District	1864	Eligible (VDHR)
23-A	016-0145	Domestic – Earhfast house		Demolished
<b>Archaeological Resources</b>				
01-B	44CE0049	Domestic	18 <sup>th</sup> Century	Potentially Eligible (VDHR)
01-C	44CE0073	Indeterminate	Woodland	Not Eligible (VDHR)
02-A	44CE0121	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
	44CE0553	Industry/Processing/Extraction, Domestic, Funerary – Brick kiln, Farmstead, Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Potentially Eligible
	44CE0566	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
02-B	44CE0043	Domestic- Single dwelling	20 <sup>th</sup> Century 19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0044	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0521	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Potentially Eligible
	44CE0567	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Eligible
03-C	44CE0121	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
	44CE0131	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
	44CE0298	Domestic – Farmstead	18 <sup>th</sup> Century; 19 <sup>th</sup> Century	Recommended Potentially Eligible

44CE0307		Domestic – Farmstead	19 <sup>th</sup> Century	Recommended Potentially Eligible
<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0565	Military/Defense – Earthworks	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Potentially Eligible (VDHR)
05-I	44CE0428	Settlement Patterns – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> /3 <sup>rd</sup> quarter	Not Eligible (VDHR)
	44CE0530	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0541	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
05-K	44CE0427	Settlement Patterns – Camp	Woodland	Potentially Eligible (VDHR)
05-O	44CE0565	Military/Defense – Earthworks	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Potentially Eligible (VDHR)
06-A	44CE0544	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0545	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0546	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0547	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
06-E	44CE0295	Domestic – Camp	Woodland	Not Eligible (VDHR)
07-H	44CE0526	Domestic – Farmstead	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0527	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
07-I	44CE0431	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
07-J	44CE0042	Domestic – Trash scatter	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0534	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0535	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0538	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0539	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)

<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0542	Funerary – Cemetery	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
08-B	44CE0528	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
08-E	44CE0053	Domestic	19 <sup>th</sup> Century	Not Eligible (VDHR) Recommended Not Eligible
	44CE0335	Domestic – Single dwelling	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
	44CE0536	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0537	Domestic, Funerary – Farmstead, Cemetery	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0543	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
09-B	44CE0076	Domestic – Single dwelling	18 <sup>th</sup> Century; 19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0394	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0395	Indeterminate	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0396	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0397	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0398	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0399	Domestic, Military/Defense – Single dwelling, Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter; 20 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0531	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0532	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
09-C	44CE0048	Domestic, Government/Law/Political – Tavern/Inn, Post office	18 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0075	Domestic – Camp	19 <sup>th</sup> Century; 20 <sup>th</sup> Century; Unknown prehistoric	Not Eligible (VDHR)
	44CE0426	Military/Defense – Earthworks	Civil War 1862-1863	Potentially Eligible (VDHR)
10-A	44CE0367	Domestic – Other	Unknown historic	Recommended Not Eligible
	44CE0368	Domestic – Single dwelling	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0369	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible

	44CE0370	Other	Unknown historic	Recommended Not Eligible
<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0371	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
10-C	44CE0350	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half; Unknown prehistoric	Recommended Not Eligible
	44CE0351	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0352	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0353	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0354	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0355	Military/Defense – Military camp	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0356	Military/Defense – Military camp	19 Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0357	Military/Defense – Military camp	19 Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible (VDHR)
	44CE0358	Domestic, Funerary	Unknown historic	Recommended Not Eligible
	44CE0359	Domestic – Other	20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0360	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0361	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0362	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0363	Domestic, Military/Defense	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0364	Settlement Patterns – Temporary camp	Early Woodland	Recommended Potentially Eligible
	44CE0365	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
10-D	44CE0344	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0345	Settlement Patterns – Other	Unknown historic	Recommended Potentially Eligible
	44CE0346	Military/Defense – Privy	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0347	Indeterminate	19 <sup>th</sup> Century; Unknown prehistoric	Recommended Potentially Eligible
	44CE0348	Domestic – Single dwelling	19 <sup>th</sup> Century	Recommended Potentially Eligible

BURN BLOCK	VDHR NUMBER	SITE TYPE / DESCRIPTION	TEMPORAL PERIOD / DATE OF CONSTRUCTION	NATIONAL REGISTER RECOMMENDATION
	44CE0349	Military/Defense – Camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter; Unknown prehistoric	Recommended Potentially Eligible
11-A	44CE0382	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0383	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
11-B	44CE0384	Domestic – Single dwelling	20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0385	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
12-A	44CE0299	Indeterminate	Unknown historic; Unknown prehistoric	Recommended Not Eligible
	44CE0430	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter	Not Eligible (VDHR)
	44CE0481	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0482	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Eligible (VDHR)
	44CE0483	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Eligible (VDHR)
12-B	44CE0052	Domestic	19 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0058	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0429	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter	Recommended Potentially Eligible
12-C	44CE0058	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Not Eligible
13-A	44CE0525	Domestic – Farmstead	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
14-B	44CE0062	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Potentially Eligible (VDHR)
14-C	44CE0478	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
14-E	44CE0056	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
15-A	44CE0061	Domestic, Indeterminate – Single dwelling	18 <sup>th</sup> Century; 19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0306	Domestic – Camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0387	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Potentially Eligible (VDHR)
	44CE0388	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0389	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0390	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible

<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0484	Settlement Patterns – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0485	Settlement Patterns – Lithic scatter	Unknown prehistoric	Not Eligible (VDHR)
	44CE0486	Settlement Patterns – Lithic scatter	Unknown prehistoric	Not Eligible (VDHR)
	44CE0488	Domestic – Single dwelling	18 <sup>th</sup> Century; 19 <sup>th</sup> Century	Eligible (VDHR)
	44CE0500	Settlement Patterns – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
15-D	44CE0492	Transportation/Communication – Road bed	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0529	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
15-E	44CE0300	Indeterminate	19 <sup>th</sup> Century; Unknown prehistoric	Recommended Potentially Eligible
	44CE0301	Domestic – Camp, Farmstead	19 <sup>th</sup> Century; 20 <sup>th</sup> Century; Unknown prehistoric	Recommended Potentially Eligible
	44CE0302	Domestic – Camp	Unknown prehistoric	Not Eligible (VDHR)
16-A	44CE0400	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0401	Domestic – Single dwelling	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0402	Military/Defense – Military camp	18 <sup>th</sup> Century, 3 <sup>rd</sup> quarter; 19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century	Eligible (VDHR)
	44CE0403	Indeterminate	Civil War 1862-1863	Recommended Potentially Eligible
	44CE0404	Domestic – Ice house	Unknown historic	Recommended Potentially Eligible
	44CE0409	Domestic – Ice house	19 <sup>th</sup> Century	Recommended Not Eligible
	44CE0479	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible/ELPA (VDHR)
	44CE0480	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0487	Domestic – Trash scatter	19 <sup>th</sup> Century	Not Eligible (VDHR)
16-B	44CE0489	Military/Defense – Camp	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Eligible (VDHR)
17-A	44CE0065	Indeterminate	19 <sup>th</sup> Century; Unknown prehistoric	Potentially Eligible (VDHR)
	44CE0115	Indeterminate	Archaic	Potentially Eligible (VDHR)

<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
17-B	44CE0059	Domestic – Camp	Woodland	Recommended Potentially Eligible Potentially Eligible (VDHR)
	44CE0115	Indeterminate	Archaic	
18-A	44CE0066	Domestic – Camp	Middle Archaic; Woodland	Not Eligible (VDHR)
	44CE0069	Domestic – Camp	Middle Archaic	Not Eligible (VDHR)
	44CE0081	Domestic – Other	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0132	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Not Eligible
18-B	44CE0067	Domestic – Camp	20 <sup>th</sup> Century	Not Eligible (VDHR)
18-D	44CE0057	Domestic	20 <sup>th</sup> Century Unknown historic;	Recommended Not Eligible
	44CE0297	Indeterminate	Unknown prehistoric	Recommended Not Eligible
20-A	44CE0055	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century; Middle Archaic; Woodland	Recommended Not Eligible
	44CE0063	Indeterminate	Late Archaic; Late Woodland; Middle Woodland	Not Eligible (VDHR)
	44CE0064	Indeterminate	Early Archaic; Woodland	Not Eligible (VDHR)
	44CE0080	Domestic – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0296	Indeterminate	Unknown prehistoric	Not Eligible (VDHR)
	44CE0554	Domestic, Funerary – Farmstead, Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Potentially Eligible
	44CE0563	Military/Defense – Military facility	20 <sup>th</sup> Century	Recommended Not Eligible
21-A	44CE0326	Funerary – Cemetery	18 <sup>th</sup> Century, 2 <sup>nd</sup> half; 19 <sup>th</sup> Century, 1 <sup>st</sup> half	Eligible (VDHR)
22-A	44CE0548	Domestic – Farmstead	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0549	Military/Defense – Military facility	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0550	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
22-B	44CE0323	Military/Defense – Camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0324	Technology/Engineering – Brick kiln	Unknown historic	Potentially Eligible (VDHR)
	44CE0327	Domestic	19 <sup>th</sup> Century, 1 <sup>st</sup> quarter	Potentially Eligible (VDHR)

<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0328	Domestic	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0329	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0330	Domestic – Temporary camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0338	Domestic – Other	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0339	Domestic – Farmstead	18 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0540	Domestic – Farmstead	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
22-C	44CE0051	Domestic – Artifact scatter	20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0466	Domestic – Farmstead	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0467	Settlement Patterns – Lithic scatter	Unknown prehistoric	Not Eligible (VDHR)
	44CE0468	Domestic – Farmstead	19 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0533	Military/Defense – Military facility	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
23-A	44CE0123	Domestic – Farmstead	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
24-B	44CE0045	Domestic – Trash scatter	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0050	Domestic, Industry/Processing/Extraction – Iron furnace, associated structure	19 <sup>th</sup> Century; Unknown prehistoric	Potentially Eligible (VDHR)
25-A	44CE0290	Domestic, Indeterminate – Farmstead	19 <sup>th</sup> Century; Unknown prehistoric	Recommended Potentially Eligible
26-A	44CE0504	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0505	Military/Defense – Earthworks	19 <sup>th</sup> Century	ELPA (VDHR)
	44CE0510	Education – School	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0551	Domestic – Farmstead	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0552	Domestic – Farmstead	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Potentially Eligible
	44CE0556	Domestic – Artifact scatter	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
27-B	44CE0493	Domestic – Trash scatter	18 <sup>th</sup> Century; 19 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0494	Indeterminate – Trash scatter	Unknown historic	Not Eligible (VDHR)
	44CE0495	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)

<b>BURN BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
	44CE0496	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0497	Indeterminate – Trash scatter	Unknown historic; Unknown prehistoric	Not Eligible (VDHR)
	44CE0506	Military/Defense – Earthworks	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0507	Domestic – Farmstead	19 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0508	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0509	Military/Defense – Earthworks	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0511	Military/Defense – Earthworks	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0512	Military/Defense – Earthworks, rifle pit	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0513	Military/Defense – Quonset hut	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0514	Military/Defense – Earthworks berm	20 <sup>th</sup> Century	Not Eligible (VDHR)
	44CE0515	Military/Defense – Earthworks berm	21 <sup>st</sup> Century	Not Eligible (VDHR)
	44CE0516	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> quarter	Not Eligible (VDHR)
	44CE0517	Military/Defense – Quonset hut	20 <sup>th</sup> Century, 2 <sup>nd</sup> half	Not Eligible (VDHR)
	44CE0518	Domestic – Trash scatter	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
28-B	44CE0557	Domestic – Farmstead	18 <sup>th</sup> Century; 19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0562	Domestic – Farmstead	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
30-A	44CE0476	Domestic – Farmstead	18 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 19 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0477	Domestic – Trash scatter	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
CA-16B	44CE0472	Domestic – Farmstead	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA-16C	44CE0474	Funerary – Family cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA-18A	44CE0470	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0473	Funerary – Family cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)

BURN BLOCK	VDHR NUMBER	SITE TYPE / DESCRIPTION	TEMPORAL PERIOD / DATE OF CONSTRUCTION	NATIONAL REGISTER RECOMMENDATION
CA-21A	44CE0469	Domestic – Farmstead	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0475	Funerary – Family cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0570	Domestic – Farmstead	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0571	Funerary – Cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0572	Industry/Processing/Extraction, Military/Defense – Military facility, warehouse	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
CA-2A	44CE0084	Domestic – Tavern/Inn	19 <sup>th</sup> Century	Potentially Eligible (VDHR)
CA-5B	44CE0471	Domestic – Single dwelling	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA-7A	44CE0464	Domestic – Multiple dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0465	Settlement Patterns – Camp	Early/Middle Woodland	Not Eligible (VDHR)
IA-A	44CE0060	Domestic	18 <sup>th</sup> Century; 19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
IA-F	44CE0573	Domestic – Farmstead	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0575	Domestic – Farmstead	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0576	Military/Defense, Domestic – Military facility, Farmstead	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
	44CE0577	Military/Defense – Military facility	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
IA-R	44CE0564	Domestic – Farmstead	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
WR-A	44CE0117	Indeterminate	Early Archaic	Not Eligible (VDHR)
	44CE0125	Indeterminate	19 <sup>th</sup> Century	Recommended Not Eligible
	44CE0126	Indeterminate	Unknown prehistoric	Recommended Not Eligible
	44CE0128	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0129	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half	Recommended Not Eligible
	44CE0130	Domestic – Other	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century	Recommended Not Eligible
	44CE0569	Domestic – Trash scatter	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
WR-B	44CE0116	Indeterminate	Archaic	Potentially Eligible (VDHR)

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WR-C	44CE0568	Domestic – Farmstead	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
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Table 3. TIMBER STAND IMPROVEMENT PROJECT AREA

TSI BLOCK	VDHR NUMBER	SITE TYPE / DESCRIPTION	TEMPORAL PERIOD / DATE OF CONSTRUCTION	NATIONAL REGISTER RECOMMENDATION
<b>Archaeological Resources</b>				
10AB-09c	44CE0374	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
10AE-09p	44CE0367	Domestic – Other	Unknown historic	Recommended Not Eligible
	44CE0368	Domestic – Single dwelling	19 <sup>th</sup> Century	Recommended Potentially Eligible
	44CE0369	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0370	Other	Unknown historic	Recommended Not Eligible
	44CE0371	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
	44CE0372	Domestic – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
10BB1-09p	44CE0350	Domestic – Single dwelling	19 <sup>th</sup> Century, 2 <sup>nd</sup> half; 20 <sup>th</sup> Century, 1 <sup>st</sup> half; Unknown prehistoric	Recommended Not Eligible
	44CE0351	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
10BB2-09p	44CE0352	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0353	Military/Defense – Military camp	19 <sup>th</sup> Century, 3 <sup>rd</sup> quarter	Recommended Potentially Eligible
	44CE0354	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
10CA-12p	44CE0360	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Recommended Not Eligible
10CC-09p	44CE0363	Domestic, Military/Defense	19 <sup>th</sup> Century	Recommended Potentially Eligible
14B-10c	44CE0478	Domestic – Single dwelling	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Not Eligible (VDHR)
15ASA2-09oh	44CE0306	Domestic – Camp	Unknown prehistoric	Not Eligible (VDHR)
15BA-09c	44CE0303	Domestic – Camp	Unknown prehistoric	Potentially Eligible (VDHR)
	44CE0304	Domestic – Camp	Unknown prehistoric	Not Eligible (VDHR)
	44CE0392	Indeterminate	19 <sup>th</sup> Century	Recommended Potentially Eligible
22ANC-10p	44CE0338	Domestic – Other	19 <sup>th</sup> Century; 20 <sup>th</sup> Century	Recommended Potentially Eligible
26AC-13p	44CE0505	Military/Defense – Earthworks	19 <sup>th</sup> Century	ELPA (VDHR)
26BB-13p	44CE0556	Domestic – Artifact scatter	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Not Eligible (VDHR)
27BB2-11p	44CE0509	Military/Defense – Earthworks	20 <sup>th</sup> Century	Not Eligible (VDHR)

<b>TSI BLOCK</b>	<b>VDHR NUMBER</b>	<b>SITE TYPE / DESCRIPTION</b>	<b>TEMPORAL PERIOD / DATE OF CONSTRUCTION</b>	<b>NATIONAL REGISTER RECOMMENDATION</b>
30A-12p	44CE0476	Domestic – Farmstead	18 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 19 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA16C-12p	44CE0474	Funerary – Family cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA18A-12p	44CE0470	Domestic – Single dwelling	20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
	44CE0473	Funerary – Family cemetery	19 <sup>th</sup> Century; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)
CA21A-11p	44CE0469	Domestic – Farmstead	19 <sup>th</sup> Century, 4 <sup>th</sup> quarter; 20 <sup>th</sup> Century, 1 <sup>st</sup> half	Potentially Eligible (VDHR)

## Appendix F

### FORT A.P. HILL BEST MANAGEMENT PRACTICES

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## Fort A.P. Hill Forestry Best Management Practices

- Logging equipment is not allowed outside the cutting site and care is to be taken to avoid damaging trees in areas adjacent to the cutting site.
- At minimum, a 50-foot, no-harvest, riparian buffer will be established along any wetlands and perennial or intermittent streams. No harvesting activity will be allowed within the SMZ unless it is necessary for suppression of a forest insect or disease outbreak.
- At minimum, a 100-foot, no-harvest, riparian buffer will be established along any streams identified as anadromous fish habitat.
- All skid trails, haul roads, and logging decks will be located outside of delineated streamside management zones and riparian buffer areas.
- In case of hazardous materials spill, the Fort A.P. Hill Fire Department and personnel within the ED are to be contacted for immediate cleanup.
- Mud deposited on any hard surface as a result of logging activity will be removed. When deemed necessary, gravel or mats are required at the entrance to hard surface roads.
- No new logging roads and trails are to be constructed for the movement of trucks and other equipment to or from the harvest blocks.
- The impacts of logging operations will be monitored and the Installation Forester or appropriate COR may temporarily cease operations at any time if excessive rutting or damage is observed or other adverse conditions warrant cessation of operations.
- Logging roads and decks are to be repaired to near pre-harvest conditions including the removal and smoothing of ruts and piles of soil.
- Once harvest is complete, erosion control measures will be implemented including the installation of water bars, and seeding and mulching of disturbed sites.
- Snags (standing dead trees), and/or active den trees will be marked to be retained for wildlife habitat.
- Placement of logging debris in streams is to be avoided. Any debris in streams will be removed to prevent water pollution.
- No harvesting or cutting will occur in wetlands, known cultural sites, threatened or endangered species sites, or their defined buffers.
- No timber harvest activity will take place inside the 440-meter bald eagle nest protection zone unless insect infestation or storm damage has occurred or an approved bald eagle nest tree management plan is being implemented. Any approved management activity to occur within the bald eagle nest protection zone may only be implemented between July 16<sup>th</sup> and November 14<sup>th</sup>.
- If the contractor discovers suspected archeological or historical materials, work will cease in the vicinity of the material and the appropriate ED cultural resource personnel will be notified immediately.
- Any prescribed burns that implement a wetland, perennial, or intermittent stream as a control line will conduct a backburn from this control line to minimize the exposure of soil.
- Any prescribed burn control lines that anchor into a wetland, intermittent or perennial stream will implement low soil disturbing control line installation measures such as raking, handlines, or leaf blowers within the 50-foot streamside management zone.
- No new firebreaks will be created within the 50-foot streamside management zone and existing firebreaks and trails that occur within the SMZ will be examined for re-routing.
- Prescribed burning will not occur in stands containing bald eagle nest between November 15<sup>th</sup> and July 15<sup>th</sup>. Prescribed burns to occur in stands in the vicinity of bald eagle nest will incorporate wind direction, mixing height and transport wind requirement into the prescribed burn plan to avoid smoke impacts.
- Harvest operations will comply with Virginia's Forestry Best Management Practices for Water Quality (VDOF, 2002) and additional guidelines listed as Fort A.P. Hill Best Management Practices.

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## Appendix G

### PRESCRIBED BURN PLAN SAMPLE DOCUMENT

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**Fort A.P. Hill Forestry**  
**Prescribed Burn Management Plan**

Date \_\_\_\_\_

**1. Location and Identification**

**BLOCK INFORMATION**

**BLOCK NUMBER:** \_\_\_\_\_ **TRAINING AREA:** \_\_\_\_\_ **COORDINATES:** \_\_\_\_\_

**LOCATION:** \_\_\_\_\_

**ACRES:** \_\_\_\_\_ **STAND #:** \_\_\_\_\_ **MAP ATTACHED:**  YES  NO

**REASON FOR THE BURN:**  SITE PREP  FUEL REDUCTION  WILDLIFE  
 VEGETATION CONTROL  Other \_\_\_\_\_

**2. Objectives of the Burn**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**3. Weather**

**PRESCRIPTION CONDITIONS**

**Surface Wind** \_\_\_\_\_ **Relative Humidity (%)** \_\_\_\_\_  
Direction MPH

**Transport Wind** \_\_\_\_\_ **Temperature** \_\_\_\_\_  
Direction

**Fire Spread Index (Preferred)** \_\_\_\_\_

**Fire Intensity (Preferred):**  High  Medium  Low

**Time Of Day To Burn (Preferred):**  Normal Working Hours  Evening

**Time Of Year To Burn (Preferred):**  Spring  Summer  Fall  Winter

# Fort A.P. Hill Forestry

## Prescribed Burn Management Plan

### Weather for Day of Burn

	Forecast				On Site			
	Day		Night		Prior		At Conclusion	
<b>Surface Wind</b>								
	Direction	MPH	Direction	MPH	Direction	MPH	Direction	MPH
<b>Transport Wind</b>								
	Direction	MPH	Direction	MPH				
<b>Mixing Height</b>								
<b>Relative Humidity %</b>								
<b>Temperature</b>								
<b>Cumulative Severity Index</b>					<b>Fire Spread Index</b>			

## 4. Other Considerations

### Notification Prior to Start of Burn

**Virginia Department of Forestry**  
**Provost Marshal**  
**Fort A.P. Hill Fire Department**  
**Directorate of Plans, Training, Mobilization, and Security (DPTMS)**  
**Range Control and/or Training**  
**Directorate of Public Works (DPW)**  
**Public Affairs Office (PAO)**  
**Post Headquarters (Commander)**  
**Safety Officer**  
**Virginia Department of Environmental Quality**

**Fort A.P. Hill Forestry  
Prescribed Burn Management Plan**

What are the fuel conditions and characteristics?

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**5. Burning Plan / Strategy**

<b>Equipment on Site</b>	<b>Recommended</b>	<b>Actual</b>
Number of tractor/ fire plow units	_____	_____
Number of pickups	_____	_____
Additional water supply	_____	_____
Brush trucks	_____	_____
Number of hand radios	_____	_____
Other, specify:	_____	
	_____	
	_____	

<b>Personnel on Site</b>	<b>Recommended</b>	<b>Actual</b>
Number of personnel	_____	_____
Other, specify:	_____	
	_____	
	_____	





**Fort A.P. Hill Forestry  
Prescribed Burn Management Plan**

**Future Evaluation**

Date \_\_\_\_\_

1. **Block Number and Location** \_\_\_\_\_

2. **Insect / Disease Damage** \_\_\_\_\_

3. **Tree Mortality** \_\_\_\_\_

4. **% Understory Kill**                       <25%     26-50%     51-75%     >75%

5. **Soil Movement** \_\_\_\_\_

6. **Other Remarks** \_\_\_\_\_

**Evaluated by** \_\_\_\_\_

Print Name

Signature

## Appendix H

### COSTAL RESOURCES CONSISTENCY DETERMINATION

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## **Determination of Consistency of the FY2009-2013 Forest Management Activities with Virginia's Coastal Resources Management Program**

Pursuant to Section 307 of the Coastal Zone Management Act of 1972, as amended, this is a Federal Consistency Determination for Fort A.P. Hill forest management activities, including timber harvesting, prescribed burning and timber stand improvements. The Army is required to determine the consistency of its activities affecting Virginia's coastal resources or coastal resources or coastal uses with the Virginia Coastal Resources Management Program (VCRMP).

This document represents an analysis of project activities in light of established VCRMP Enforceable Programs. Furthermore, submission of this consistency determination reflects the commitment of the Army to act consistently with those Enforceable Programs. The proposed project will be implemented in a manner that is consistent with the VCRMP. Fort A.P. Hill has determined that the proposed timber harvests, prescribed burning and timber stand improvements for the 2009-2013 fiscal years would not affect the land and water uses or natural resources of the Commonwealth of Virginia's coastal zone.

### **1. Description of the Proposed Action**

The proposed action is a regime of forest management activities designed to achieve established Forestry Branch goals and clearly defined management objectives. These objectives will be met using time-honored silvicultural, prescribed burning and timber stand improvement practices. The area of effect for the proposed action consists of 389 timber harvest blocks on 12,915 acres, prescribed burning on 53,820 acres of the installation, and 3,364 acres of timber stand improvement activities including crop tree release, pre-commercial thinning, and herbicidal vegetation control. The purpose of conducting these management activities is to continue management of the forest ecosystem and on-going resource protection in direct support of the long term military mission and training land sustainability. These actions reduce the threat of declining forest health, uncontrolled wildfire and improve the training condition in managed sites.

### **3. Assessment of Probable Effects**

The planning and design phase of the proposed action would have no coastal zone effects to relevant VCRMP elements. Fort A.P. Hill staff evaluated the implementation of the forest management activities outlined in the proposed action based on the foreseeable effect on the following enforceable policies:

*Fisheries* – The FY 2009-2013 forest management activities have no foreseeable impacts on finfish or shellfish resources and would not affect the promotion of commercial or recreational fisheries at the proposed action sites. The proposed action will be implemented no less than one mile and no more than ten miles from the Rappahannock River. The proposed action implements Best Management Practices (BMP's) recommended by the Virginia Department of Forestry and Fort A.P. Hill's Environmental Division. A 50-foot no-harvest SMZ is established for all waterways and a 100-foot no-harvest buffer is established on streams known to support anadromous fish populations.

*Subaqueous Lands Management* – The FY 2009-2013 forest management activities have no foreseeable impacts on subaqueous resources. The proposed action implements BMP's recommended by the Virginia Department of Forestry and Fort A.P. Hill's Environmental Division.

*Wetlands Management* – Wetland resources are identified in each timber harvest, prescribed burning and timber stand improvement block and before creation of new firebreaks and, at minimum, a 50-foot, no-disturbance buffer is delineated around wetland resources. These wetlands will be avoided during proposed action implementation; therefore, there will be no impacts on wetlands from the proposed action. Wetlands included within prescribed burn block boundaries cannot be avoided, but are not expected to be adversely impacted by the fire.

*Dunes Management* – The FY 2008 prescribed burns and pre-commercial thinnings have no foreseeable impacts on coastal primary sand dunes. The proposed action would not destroy or alter coastal primary sand dunes.

*Non-point Source Pollution Control* – During proposed action implementation, vegetated buffers would be maintained around wetlands and perennial and intermittent streams for natural infiltration of any storm water runoff. Back burning ignition methods will be used on all accessible waterways to maintain duff layer and avoid exposing mineral soil during prescribed burns. All erosion controls will be designed in accordance with the Virginia Erosion and Sediment Control Handbook. Erosion and sediment controls will be implemented in accordance with the Virginia Stormwater Management Program; Virginia Department of Forestry's Forestry BMP's for Water Quality; Chesapeake Bay Preservation Area Designation and Management guidelines. The timber harvest, prescribed burning and timber stand improvements areas would be monitored for non-point source pollution.

*Point Source Pollution Control* – The FY 2009-2013 forest management activities would not utilize water or sewer connections. The proposed action would not generate any new point source discharges.

*Shoreline Sanitation* – The FY 2009-2013 forest management activities would have no impact on shoreline sanitation.

*Air Pollution Control* – Fort A.P Hill is in an attainment area for air pollutants. Smoke management plans will be prepared and implemented during prescribed burning activities and will prescribe the wind direction, mixing height, and transport wind speeds required for successful smoke movement. Prescribed burn schedules will also be applied to avoid smoke production during summer months. Dust and particulate matter resulting from the use of a skidder, harvester, severe duty shredder, chainsaws, and brushsaws during harvest and timber stand improvement activities would be local, temporary and minor.

*Coastal Lands Management* – The FY 2009-2013 forest management activities would have no impact on any coastal lands.

*Chesapeake Bay Preservation Areas* – The FY 2009-2013 forest management activities would not involve either development or redevelopment activities on any designated Chesapeake Preservation Area as defined by the Chesapeake Bay Preservation Act, Virginia Code 10.1-2100 *et seq.* and its implementing Chesapeake Bay Preservation Area Designation and Management Regulation, 9 VAC 10-20-10 *et seq.*

### **3. Summary of Findings**

Based on the above analysis and as elaborated in the Environmental Assessment, Fort A.P. Hill finds the proposed action involving timber harvests, prescribed burns and timber stand improvement activities fully consistent, or consistent to the maximum extent practicable, with the federally approved enforceable provisions of VCRMP, pursuant to the Coastal Zone Management Act of 1972, as amended and in accordance with 15 CFR Part 930.30I.

By certification that the proposed action is consistent with VCRMP Enforceable Programs, the Commonwealth of Virginia will be notified that it has 60 days from receipt of this letter in which to concur with or object to this Consistency Determination. However, pursuant to 15 CFR Part 903.63(b), if the Commonwealth of Virginia has not issued a decision by the 60<sup>th</sup> day from receipt of this determination, it shall notify Fort A.P. Hill of the status of the matter and the basis for further delay. The State's concurrence, objection, or notification of review status shall be sent to:

**Commander, US Army Garrison Fort A.P. Hill  
ATTN: DPW-Environmental Division  
19952 North Range Road  
Fort A.P. Hill, VA 22427-3123**

## Appendix I

### AGENCY CORRESPONDENCE

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## Appendix J

### PUBLIC NOTICES / PUBLIC COMMENTS AND RESPONSES

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## Appendix K

### ACRONYM INDEX AND GLOSSARY OF TERMS

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<b><u>ACRONYM INDEX:</u></b>	
<b>AR</b>	Army Regulation
<b>BA</b>	Basal Area
<b>BMP</b>	Best Management Practices
<b>CBPA</b>	Chesapeake Bay Preservation Act
<b>CEO</b>	Council on Environmental Quality
<b>CFR</b>	Code of Federal Regulations
<b>CHPPM</b>	Center for Health Promotion and Preventative Medicine
<b>DBH</b>	Diameter Breast Height
<b>DFC</b>	Desired Future Condition
<b>DHR</b>	Directorate of Human Resources
<b>DOIM</b>	Directorate of Information Management
<b>DPTMS</b>	Directorate of Plans, Training, Mobilization and Security
<b>DPW</b>	Directorate of Public Works
<b>EA</b>	Environmental Assessment
<b>EIS</b>	Environmental Impact Statement
<b>ED</b>	Environmental Division
<b>ELPA</b>	Eligible for the Purposes of a Program Alternative
<b>EMS</b>	Environmental Management System
<b>ENMP</b>	Environmental Noise Management Plan
<b>EO</b>	Executive Order
<b>EPA</b>	Environmental Protection Agency
<b>FONSI</b>	Finding of No Significant Impact
<b>FMP</b>	Forest Management Plan
<b>FY</b>	Fiscal Year
<b>GIS</b>	Geographic Information System
<b>IDPCP</b>	Integrated Discharge Prevention and Contingency Plan
<b>INRMP</b>	Integrated Natural Resources Management Plan
<b>MBF</b>	Thousand Board Feet
<b>MSL</b>	Mean Sea Level
<b>MSO</b>	Military Support Office
<b>MU</b>	Management Unit
<b>NEPA</b>	National Environmental Policy Act
<b>PM</b>	Particulate Matter
<b>PAIO</b>	Plans Analysis and Integration Office
<b>RMO</b>	Resource Management Office
<b>SMZ</b>	Streamside Management Zone
<b>SPCC</b>	Spill Prevention, Control and Countermeasure
<b>TES</b>	Threatened and Endangered Species
<b>USFWS</b>	United States Fish and Wildlife Service
<b>USFS</b>	United States Forest Service
<b>VAC</b>	Virginia Code
<b>VADCR</b>	Virginia Department of Conservation and Recreation
<b>VCRMP</b>	Virginia Coastal Resources Management Plan
<b>VDEQ</b>	Virginia Department of Environmental Quality
<b>VDOF</b>	Virginia Department of Forestry
<b>VSMP</b>	Virginia Stormwater Management Program

<b><u>GLOSSARY OF TERMS:</u></b>	(Definitions of the terms have been adapted from literature to specifically apply to forest program management at Fort A.P. Hill)
<b>Advance Regeneration (Reproduction)</b>	Well-established, thriving seedlings or saplings that are capable of surviving after a forest management treatment
<b>Air Quality</b>	The relative concentration of airborne particles and gases that may affect the health and well-being of organisms or disrupt the functioning of the environment
<b>Aspect</b>	The direction towards which a slope faces, usually expressed as a compass direction
<b>Backfire</b>	A fire set along the inner edge of a fire control line to stop a spreading wildfire by reducing available fuel or a prescribed fire set to burn against the wind, resulting in a slow burn
<b>Basal Area</b>	A measure of stand density. It is determined by estimating the total cross-sectional area of all trees measured at breast height (4.5 feet) and expressed in square feet per acre. Calculated from diameter (D) by: $BA = .005454 * D^2$
<b>Best Management Practices</b>	Environmental resource management practices that are designed to prevent or reduce undesirable side-effects of management actions
<b>Biodiversity, Community (Ecosystem)</b>	Refers to the variety of communities or ecosystems in an area; it has three components: (a) number of parts or elements; (b) the variety of patterns or organizations; and (c) the number of ecological processes (e.g., disturbance regimes and roles played by species, etc.)
<b>Biodiversity, Landscape</b>	The number of ecosystems, or combinations of ecosystems, and types of interactions and disturbances present within a given landscape
<b>Block</b>	A forested area designated to receive a forest management treatment including commercial or pre-commercial harvests, prescribed burning, or timber stand improvements. A block may contain one or more distinct forest stands.
<b>Board Foot</b>	A measure of wood produced which is expressed as the number of boards 1 foot wide by 1 foot long and 1 inch thick that can be sawn from logs
<b>Bucking</b>	Sawing felled trees into shorter lengths for utilization
<b>Buffer</b>	A vegetated zone or strip of land along the border of one area to protect another area. Buffer strips of standing trees may be used to shield an area from view, to filter sediment from surface water runoff before it enters a stream, or to protect threatened and endangered species habitats
<b>Canopy</b>	The overhead branches and leaves in a forest stand consisting of one or several layers
<b>Canopy Gap</b>	Opening in canopy due to natural or artificial felling of

	trees; this process allows sunlight to reach forest floor which contributes to regeneration
<b>Clearcutting</b>	A harvest method that removes essentially all trees in one cutting for the purpose of creating a new, even-aged stand or to allow the area to be used for other land management purposes
<b>Codominant</b>	Trees that have crowns forming the general level of the canopy and receive full light from above but comparatively little from the sides
<b>Commercial Species</b>	Conifer or hardwood tree species suitable for industrial wood products
<b>Community</b>	A group of plants and animals living in a specific region under relatively similar conditions
<b>Concealment</b>	For military training purposes, vegetation that provides shading, protection, and visual obstruction for troops and established Tactical Operation Control (TOC) sites
<b>Conifer</b>	Any of an order (Coniferales) with mostly evergreen trees and shrubs including forms with true cones (pines) and those with arillate fruit (yews)
<b>Conservation</b>	The protection, improvement, and wise use of natural resources to provide the greatest social and economic value for the present and future
<b>Contour</b>	A line connecting points of equal elevation
<b>Control Line</b>	An inclusive term for all constructed or natural fire barriers; a treated (fire) edge used to control a prescribed fire or wildfire
<b>Conversion Operation</b>	A planned sequence of treatments designed to change an even-aged community into an uneven-aged community and/or change the species composition within the community
<b>Cover Type</b>	See Forest Cover Type
<b>Cover Type Conversion</b>	A silvicultural operation which is specifically designed to change the species composition within a management unit
<b>Critical Habitat</b>	Specialized habitat containing the physical and biological features required for the conservation of a threatened/endangered species
<b>Crop Tree</b>	A tree that is retained for maximum longevity in a stand due to desired characteristics such as commercial quality e.g., veneer, pulpwood, or sawtimber or biotic contribution, e.g., mast, seed source, or dens
<b>Crop Tree Release</b>	Keep only the minimum number of trees for full site utilization at rotation age. Favor only elite trees, allowing a high degree of selectivity for crown condition and main stem qualities
<b>Crown</b>	Part of a tree or woody plant bearing living branches and foliage
<b>Crown Closure</b>	The point when, in a young stand, the crowns of the trees begin to touch each other

<b>Cultural Resources</b>	Historic properties as defined in the National Historic Preservation Act (NHPA); cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA); archeological resources as defined in the Archeological Resources Protection Act (ARPA); and sacred sites as defined in Executive Order (EO) 13007 to which access is provided under the American Indian Religious Freedom Act (AIRFA)
<b>Cutting Cycle</b>	The planned interval between partial harvests, usually pertains to uneven-aged stands
<b>DBH Size Class</b>	Any of the intervals into which a range of diameters of tree stems or logs may be divided for classification and use
<b>Density</b>	The quantity of trees, basal area, volume, or some other measure, per unit of area. Some common measures are basal area per acre or stems per acre at a given age
<b>Desired Future Condition (DFC)</b>	A description of the conditions and changes that are expected to occur as the Forest Management Plan is implemented. It is a description of desired resource conditions, land capabilities, ecosystem functions, and human interaction
<b>Diameter at Breast Height (DBH)</b>	Measurement of the tree stem diameter taken at 4.5 feet above the average ground level from the base of the tree
<b>Dominant</b>	Trees that have crowns extending above the general level of a canopy and receive full light from above and partly from the sides
<b>Downed Woody Material</b>	Any piece(s) of dead wood, e.g., dead boles, limbs, and large root masses, on the ground in forest stands or in streams
<b>Drip Torch</b>	A firing device consisting of a fuel tank and wick designed to allow flaming fuel droplets to ignite vegetative fuel for use in a prescribed fire or back-burn
<b>Ecological Association</b>	An idealized vegetation class referring to a major subdivision of formation that is defined by, and restricted to, (the presumed) climax community
<b>Ecological Integrity</b>	Encompasses the soundness of the structure, function, and composition of a spatially defined unit or ecosystem
<b>Ecosystem</b>	A spatially explicit, relatively homogenous unit that includes all interacting organisms and components of the abiotic environment within its boundaries
<b>Ecosystem Function</b>	The major processes of ecosystems that regulate or influence structure, composition, and pattern. These include nutrient cycles, energy flows, food chains, soil-building processes, and hydrologic cycles
<b>Ecosystem Management</b>	An ecological approach to forest resource management; it attempts to maintain the complex processes, pathways, and interdependencies of forest ecosystems [e.g., sub-watersheds] and keep them functioning in a sound state over long periods of time in order to provide resilience to

	short-term stress and adaptation to long-term change.
<b>Ecosystem Structure</b>	The living and nonliving elements of an ecosystem and their horizontal and vertical arrangement and distribution
<b>Ecosystem Sustainability</b>	The ability to maintain diversity, productivity, resilience to stress, health, renewability, and/or yield of desired values, resource uses, products, or services from an ecosystem, while maintaining the integrity of the ecosystem over time
<b>Endangered Species</b>	Plant or animal species vulnerable to extinction throughout all or a significant portion of its range within the foreseeable future; identified in the federal register in accordance with the Endangered Species Act of 1976
<b>Environmental Assessment (EA)</b>	A concise, public document containing a federal agency's analysis of the significance of potential environmental consequences; used to determine whether an environmental impact statement is needed or a "finding of no significant impact" is warranted
<b>Erosion</b>	The wearing away of land surface by rain, running water, wind, ice, gravity, or other natural or anthropogenic agents, e.g., road construction
<b>Even-Aged Stand</b>	A stand of trees that are about the same age (usually within 5-10 years). An even-aged forest may be a natural or artificially regenerated stand with trees aged usually within +/- 20% of the rotation age
<b>Even-Aged Management Operations</b>	A planned sequence of treatments designed to maintain and regenerate a stand with one age class
<b>Fire Behavior</b>	The manner in which a fire reacts to the variables of fuel, weather, and topography as in the shape, direction, and intensity of a fire
<b>Fire Burn Index</b>	A numerical classification that integrates the effects of selected fire danger factors such as fuel moisture, relative humidity, wind, and temperature into one numerical index of current fire protection needs. Burn index is from 1 to 100; 1 = low and 100 = high
<b>Fire Prevention</b>	Activities directed at reducing the number of fires that start, including public and military education and reduction in fuel hazards, i.e., prescribed burning
<b>Fire Season</b>	The period(s) of the year during which fires are likely to occur, spread, and do sufficient damage to warrant organized fire control. On Fort A.P. Hill, this is approximately 1 October through 30 April, depending on the year's average temperature and precipitation
<b>Firebreaks</b>	Constructed roads, trails, handlines, or existing streams or other natural features used to impede or stop forest fires by creating a discontinuity in potential fuels
<b>Fireline</b>	The part of a wildfire control line that is scraped to mineral soil
<b>Firing Technique</b>	Any of the multiple ignition patterns that may be used in a prescribed burn to attain desired fire characteristics to

	reach a specified resource management objective
<b>Forest Access Road</b>	Permanent, hardened roads through a forest that also serve as a fire control line and haul roads
<b>Forest Cover Type</b>	A natural group or association of different species of trees, which commonly occur together over a large area. Cover types are defined and named after one or more dominant species of trees in the type, such as the white oak-black oak-northern red oak type
<b>Forest Health</b>	The perceived condition of a forest derived from such factors as its age, structure, composition, vigor, and the resilience to disturbances including insects, disease, animals, various abiotic factors, and other environmental stress (i.e., lightning, wind, fire)
<b>Forest Management</b>	The practical application of biological, physical, quantitative, economic, social, and policy principles to the administration and working of a forest for specific objectives including maintaining forest health, vigor, production, and other values such as soil condition, water quality, wildlife preservation, and, specifically, to support the military training mission on Fort A.P. Hill
<b>Forest Management Plan</b>	A written document which includes overall guidelines and recommended practices for current and future management to meet specific objectives
<b>Forest Stocking</b>	An indication of the number of trees in a management unit, or stand, as compared to the optimum number of trees to achieve some management objective; typically, to maximize timber production through full site utilization
<b>Forest Structure</b>	See Structure, Forest
<b>Forestry</b>	The science, art, and practice of growing, managing and using trees, forests, and their associated resources for the continuing use and conservation of their resources
<b>Free Thinning</b>	The removal of trees to control stand spacing and favor desired trees, using a combination of thinning criteria without regard to crown position
<b>Frilling (Frill Girdling)</b>	Making a series of downward, more or less overlapping incisions, as for the introduction of an herbicide, with the intent of killing the tree and root system
<b>Fuel Accumulation</b>	A condition characterized by the buildup of woody or other vegetation that increases the risk of destructive wildfire
<b>Fuel Loading</b>	The oven dry weight of fuels in a given area, usually expressed in tons per acre
<b>Fuel Moisture</b>	The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212°F
<b>Fuel Type</b>	An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions

<b>Fuels</b>	Plants and woody vegetation, both living and dead, that are capable of burning
<b>Fully Stocked</b>	Management unit having sufficient growing stock for sawtimber production; trees effectively occupy all growing space, but have ample room for development
<b>Geographic Information System (GIS)</b>	GIS is both a mapping database designed to organize, store, and display geographic data, as well as a set of computer operations that can be used to analyze the data
<b>Goal</b>	The end toward which effort is directed
<b>Grading (firebreaks)</b>	The mechanical shaping and/or leveling of dirt firebreaks
<b>Groundwater</b>	Water found in unblocked pores and fractures in bedrock and other geologic material
<b>Group Selection</b>	An uneven-aged regeneration method used to remove small groups of trees in order to favor the reproduction and establishment of late-successional species. Larger group selections, or “patch cuts” (up to 2 acres) can be used to regenerate early-successional species
<b>Guidelines</b>	Parameters which direct forest management decisions and conduct
<b>Habitat</b>	The place or natural environment of a specific plant, animal, or fungus. An area containing all the necessary resources for the plant, animal, or fungus to live, grow, and reproduce. For wildlife, habitat is the combination of food, water, cover, and space
<b>Habitat Features</b>	The climate, food, cover, water, and soil that determines where a species normally lives and develops
<b>Hardwood</b>	A term describing broadleaf, usually deciduous, trees occurring in the botanical group Angiospermae
<b>Harvest</b>	Removing trees on an area to obtain a product or yield – <i>note: the objectives are (1) achieve some special objectives such as the development of wildlife habitats or military training conditions; (2) develop the environment necessary to regenerate the forest; and/or (3) to generate revenue</i>
<b>Headfire</b>	A fire spreading or set to spread with the wind
<b>Hybrid / Patch Selection</b>	A method of regenerating uneven-aged stands that uses a combination of the group and single tree selection silvicultural techniques
<b>Impact Area</b>	Areas designated for military training involving live ordinance; the boundaries of these areas are designated with frequent signs and no forest management activities occur within the boundaries
<b>Intensity (Fire)</b>	The rate of heat release per unit time and per unit of fire travel distance at the fire front. Numerically, the product of the quantity of fuel consumed at the fire front, the heat yield per unit of fuel consumed, and the rate of fire spread
<b>Intermediate Cuttings</b>	Any treatment used to improve the growth rate and vigor

	of residual trees
<b>Intermittent Stream</b>	A stream, or portion of a stream, that does not flow year-round but only when it a) receives base flow solely during wet periods, or b) receives groundwater discharge or protracted contributions from snow melt or other erratic surface and shallow subsurface sources (depicted on USGS maps as a broken blue line)
<b>Inventory, Forest</b>	A set of objective sampling methods designed to quantify the spatial distribution, composition, and rates of change of forest parameters within specified levels of precision
<b>Land Navigation</b>	Military training, either on foot or mounted on vehicle, requiring troops to interpret land features as depicted on a topographic map or traverse a set course using a compass and pacing to determine a position, course, and distance traveled
<b>Landing</b>	A place where logs are collected and prepared for further transportation
<b>Landscape</b>	A spatial mosaic of several ecosystems, landforms, and plant communities across a defined area, irrespective of ownership or other artificial boundaries
<b>Landscape Diversity (Biodiversity)</b>	The number of ecosystems, or combinations of ecosystems, and types of interactions and disturbances present within a given landscape
<b>Live-Fire Exercise</b>	Military training involving live ammunition and occurring on ranges and around impact areas
<b>Management Prescription</b>	A set of management practices and intensities scheduled for application on a specific area to satisfy multiple uses or other goals and objectives
<b>Mast</b>	The fruit of trees considered as food for certain kinds of wildlife – <i>note: hard mast includes the fruits or nuts of trees such as oaks, walnut, and hickories; soft mast includes the fruits and berries from plants such as dogwood, grape, and blackberry</i>
<b>MBF</b>	One thousand board feet, also written mbf – <i>see board foot</i>
<b>Mechanical Clearing</b>	Using machinery to remove unwanted vegetation and/or debris from a designated area; in some cases, it may involve the loosening of topsoil in preparation for regeneration by planting, direct seeding, or natural seed source
<b>Mesophytic</b>	A plant community that grows in an environment having a moderate amount of moisture
<b>Midstory</b>	The portion of trees and other vegetation suppressed by the overstory, usually occurring from 10-30 feet above the ground
<b>Military Operations</b>	Any mission, function, or activity related to military training
<b>Monitoring</b>	The periodic evaluation of management activities to measure how well objectives were met and how

	management practices should be adjusted; captures the outcomes and effects of management practices
<b>Multiple Use</b>	Any practice of forestry fulfilling two or more objectives of management and takes into account the long-term needs of the military
<b>Natural Area</b>	An area that allows physical and biological processes to operate and exemplifies an ecological community and its associated vegetation and other biotic, soil, geologic, and aquatic features
<b>Natural Regeneration</b>	The establishment of a plant or a group of plants from natural seeding, sprouting, suckering, or layering
<b>NEPA (National Environmental Policy Act)</b>	A federal policy enacted in 1969 that established a national Council on Environmental Quality to oversee government activities that could affect the environment, and also required federal agencies to file environmental impact statements before taking any major action.
<b>Noise Abatement</b>	The ability of vegetation to muffle or baffle sound along its path between source and receiver, i.e., between Fort A.P. Hill and the surrounding privately owned land
<b>Objective(s)</b>	A clear and specific statement of planned results to be achieved within a stated time period; it is measurable and implies precise time-phased steps to be taken and resources to be used in order to reach a preestablished goal
<b>One-Cut Shelterwood System</b>	An even-aged management technique applied when there is adequate density and suitable advance regeneration to skip the seed cutting, i.e., most of the new age class already grows at a site prior to overstory removal so the shelter trees remain on the site
<b>Overstocked</b>	Trees occupying the growing space completely, so that growth is slowed, i.e., trees in these stands compete with each other to an extreme degree, and are often suppressed as a result
<b>Overstory</b>	The portion of the trees, in a forest of more than one story, forming the upper-most canopy layer
<b>Perennial Stream</b>	A stream that has running water on a year-round basis under normal climatic conditions (depicted on USGS maps as solid blue lines)
<b>Plantation</b>	A stand composed primarily of trees, either pure or mixed species, that were established by planting or artificial seeding
<b>Pre-commercial Thinning</b>	An intermediate treatment in a young stand that does not yield any saleable products
<b>Prescribed / Controlled Burn</b>	The application of fire in a predetermined field, forest, or other area, usually under specific conditions of weather and fuel moisture, to control vegetation for military training, silvicultural purposes, or to reduce wildfire potential
<b>Proponent</b>	The organization or individual planning and

	implementing a proposed action, such as a prescribed burn or timber harvest
<b>Pulpwood</b>	The volume of wood generated by pole-size trees or any other wood intended primarily for wood pulp or chips used for secondary manufacturing
<b>Reforestation</b>	The natural or artificial reestablishment of forest cover
<b>Regeneration / Reproduction</b>	The natural or artificial renewal of trees in a forest stand or management unit
<b>Relative Humidity</b>	The ratio of the amount of moisture in a given volume of space to the amount that volume would contain if it were saturated
<b>Residual Trees</b>	Trees that are left to grow in the stand following a silvicultural treatment
<b>Restoration</b>	The process of returning or protecting ecosystem patterns or processes to a historical range of variability or other defined reference condition
<b>Riparian Area</b>	Area related to or located in conjunction with a wetland, on the bank of a river or stream, or also at the edge of a lake or tidewater; area influencing, and influenced by, the neighboring body of water
<b>Rotation</b>	In even-aged systems, the period between regeneration establishment and final cutting based on mean size, age, growth rate, and biological condition
<b>Salvage Cut</b>	The removal of dead trees, or trees being damaged or killed because they have been materially damaged by fire, wind, insects, fungi or other injurious agents other than competition; typically to obtain product yield that would otherwise be lost
<b>Savanna, Tree (Pine)</b>	An area dominated by irregularly scattered, large diameter, open grown trees, with grass understory and no midstory
<b>Sawtimber</b>	Class of trees that are greater than or equal to 12 inches in diameter at breast height in hardwood, greater than or equal to 10 inches in pine, and large enough to be cut into a sawlog
<b>Sedimentation</b>	The settling of organic, mineral soil particles, and rock in streams and water bodies (due to erosion)
<b>Sensitive Species</b>	Plant or animal species which are susceptible to habitat changes or impacts from various kinds of disturbance
<b>Shelterwood System</b>	Even-aged silvicultural system that leaves selected trees standing in order to provide a source of seed and/or protection for regeneration. The residual crop (shelterwood) is removed in a subsequent harvest or multiple harvests depending on whether it is a two or three-cut system
<b>Silvicultural Prescription</b>	A planned series of treatments designed to change current forest stand structure to one that meets management goals
<b>Silvicultural System</b>	A planned series of treatments for tending, harvesting,

	and reestablishing a forest stand
<b>Silviculture</b>	The art of producing and tending forest stands by applying scientifically acquired knowledge to control or influence stand establishment, composition, and growth by applying different treatments to make forests more productive and useful, and integrating biologic and economic concepts to devise and carry out treatments to meet set objectives
<b>Single Tree Selection</b>	A method of regenerating new age classes in uneven-aged stands by removing individual trees more or less uniformly across a management unit, or stand, at relatively short intervals; it is repeated indefinitely, by encouraging the continuous establishment of reproduction and maintaining an uneven-aged stand
<b>Site Preparation</b>	An activity intended to make conditions favorable for planting, direct seeding, or for the establishment of natural regeneration by clearing, chemical vegetation control, burning, disking, chopping, bedding, windrowing, raking, or some combination thereof
<b>Skid Trail</b>	A trail over which equipment drag logs from the stump to the landing
<b>Slash</b>	Tree tops, branches, bark, uprooted stumps or other residue left on the ground after logging, pruning, or other forest operations
<b>Slope</b>	The incline of the terrain usually expressed as a percent; the amount of rise over a hundred feet of horizontal distance
<b>Smoke Management</b>	Conducting a prescribed fire under suitable conditions with firing techniques that keep smoke impact within designated areas and below violations of air quality standards or within visibility protection guidelines
<b>Snag</b>	A standing, generally unmerchantable, dead tree from which the leaves and most of the branches have fallen
<b>Soil Types</b>	The most basic unit in the natural system of soil classification; a subdivision of a soil series and consisting of or describing soils that are alike in all characteristics including the texture of the A horizon or plow layer
<b>Species (of Trees)</b>	A group of related trees with common characteristics that are very similar genetically and are capable of interbreeding and classified into the same genus
<b>Species Composition (Tree)</b>	The mixture of tree species which comprises a defined area, typically a forest stand, or the representation of tree species in a defined area expressed quantitatively as percent by volume or basal area of each species, or as percent by trees per acre in sapling and seedling stands
<b>Species Diversity</b>	The number of species present and the relative abundance of each; variety of species in an area
<b>Stand</b>	A continuous group of trees sufficiently uniform in age-

	class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit; a management unit
<b>Stand Density</b>	A quantitative measure of tree stocking that can be expressed in terms of trees, total basal area, or volume per unit area; more precisely, a measure of the degree of tree crowding within stocked areas
<b>Structural Diversity</b>	Refers to the variety of horizontal and vertical features of an area
<b>Structure (Forest)</b>	The horizontal and vertical distribution of components of a forest stand including the height, diameter, age classes, crown layers, and stems of trees, shrubs, herbaceous understory, snags, and downed woody debris
<b>Succession</b>	The gradual supplanting of one community of plants by another as the available competing organisms respond to and modify the environment
<b>Sustainability</b>	Incorporates the means to maintain biological diversity, resilience to stress, and ecosystem health and integrity, and economic yield to meet present as well as future needs
<b>Sustained Yield</b>	An annual or periodic output of products and/or revenue from the forest without impairment of the productivity of the land
<b>Thinning</b>	A felling made in an immature stand primarily to reduce stand density and maintain or accelerate diameter increment and also to improve the average form of the remaining trees without permanently breaking the canopy
<b>Timber</b>	Trees capable of being used for wood products
<b>Timber Marking</b>	The process of designating trees to be cut or not to be cut. This is usually done by spraying a spot with brightly colored paint at the base of the tree and one or two spots at eye level
<b>Timber Sale</b>	Activities dealing with the exchange of forest products for economic gain
<b>Timber Stand Improvement</b>	A term comprising all intermediate treatments made to improve the composition, structure, condition, and increment of either an even- or uneven-aged stand
<b>Topography</b>	The physical and natural features of an area of land. It usually refers to the elevation, slope, and shape of the surface of the area
<b>Training Area</b>	A designation of area within Fort A.P. Hill for military training purposes
<b>Understocked</b>	A management unit having insufficient growing stock for sawtimber production; trees do not effectively occupy all growing space and therefore the competition is of the lowest degree
<b>Understory</b>	The lower vegetation layers in a forest, found beneath the forest canopy (overstory), including shrubs, grasses and

	grass-like plants, and forbs
<b>Uneven-aged Forest</b>	A forest with many ages of trees present (technically more than two age classes) and considerable differences between the ages
<b>Uneven-aged Management</b>	A silvicultural system defined by creating and managing a stand of trees of three or more distinct age classes, either mixed or in small groups
<b>Unexploded Ordinance (UXO)</b>	Explosive devices that have been fired, projected, dropped, or placed in such a way that they could become armed or detonate and pose the risk of injury or death to personnel in the vicinity
<b>Wetlands</b>	A transitional area between aquatic and terrestrial ecosystems that is inundated or saturated for periods long enough to produce hydric soils and support hydrophytic vegetation – <i>note: other agencies may have more specific definitions</i>
<b>Wildfire</b>	Any uncontrolled, non-structure fire, other than prescribed fire, occurring on lands covered wholly or in part by timber, brush, grass, or other flammable vegetation
<b>Wildfire Suppression</b>	The act of aggressively restricting the growth or spread of a fire occurring on wildlands, as with fireline construction
<b>Wildlife</b>	All undomesticated animal life including mammals, birds, fish, and some higher invertebrates
<b>Wildlife Habitat</b>	The place, natural or otherwise, (including climate, food, cover, and water) where an animal or population naturally or normally lives and develops