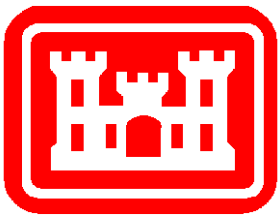
PUBLIC WORKS TECHNICAL BULLETIN 200-1-148
31 AUGUST 2015

CREATIVE STRATEGIES AND OPPORTUNITIES FOR MANAGING CULTURAL RESOURCES ON ARMY TRAINING LANDS



Public Works Technical Bulletins are published by the U.S. Army Corps of Engineers, Washington, DC. They are intended to provide information on specific topics in areas of Facilities Engineering and Public Works. They are not intended to establish new Department of Army policy.

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
441 G Street NW
Washington, DC 20314-1000

CECW-CE

Public Works Technical Bulletin 31 August 2015

No. 200-1-148

Facilities Engineering
Environmental

CREATIVE STRATEGIES AND OPPORTUNITIES FOR MANAGING CULTURAL RESOURCES ON ARMY TRAINING LANDS

1. Purpose

a. This Public Works Technical Bulletin (PWTB) identifies creative and innovative technologies and best management practices (BMPs) for cultural resources and site management on Army training lands. To facilitate sharing of BMPs, this publication details known examples from actual projects. In addition to the benefit of information sharing, money savings and increased land availability also will result from efficient integration of cultural resource management with site and training area land management BMPs described in this PWTB.

b. All PWTBs are available electronically at the National Institute of Building Sciences' Whole Building Design Guide webpage, which is accessible through this link:

http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215

2. Applicability

This PWTB applies to Cultural Resource Managers (CRMs) and Installation Training Area Management (ITAM) Coordinators at all Army facilities, with particular focus on Continental United States (CONUS) facilities.

3. References

a. Army Regulation (AR) 200-1, “Environmental Protection and Enhancement,” revised 13 December 2007.

b. National Historic Preservation Act (NHPA) of 1966, Public Law (P.L.) 89-665, codified at 16 United States Code (U.S.C.) 470 et seq. (as amended).

c. 36 Code of Federal Regulations (CFR) 800, “Protection of Historic Properties,” 1986 (as revised September 2004), Advisory Council on Historic Preservation.

d. Executive Order (EO) 13007, “Indian Sacred Sites,” President William J. Clinton, 24 May 1996.

e. Archaeological Resources Protection Act (ARPA) of 1979, P.L. 96–95 as amended in 1988, 93 Stat. 721, codified at 16 U.S.C. §§ 470aa–470mm.

f. Department of Defense Instruction (DoDI) 4715.16, “Cultural Resources Management,” 18 September 2008.

4. Discussion

a. AR 200-1 contains policy that regulates the environmental protection and enhancement within the Active Army, Army National Guard, and Army Reserve. Tenants, contractors and lessees performing functions under jurisdiction of the Department of the Army are also included, as are Army activities performed off-installation, formerly used defense sites (FUDS), and other excess properties managed by the Army. Installations and facilities in foreign countries must comply with AR 200-1 where overseas requirements are not specifically prescribed. AR 200-1 provides the framework for the Army’s Environmental Management System (EMS).

b. The NHPA establishes preservation as the national policy for historic and cultural properties, and it directs the federal government to preserve, restore, and maintain these properties. The NHPA also authorizes the Secretary of the Interior to maintain and expand the “National Register” as a listing of districts, sites, buildings, structures, and objects deemed significant in American history, architecture, archaeology, and culture. The National Register defines (a) significant historic and cultural properties; and (b) prehistoric and/or historic districts, sites, buildings, monuments, deposits, structures, or objects. Section 110 of the NHPA establishes the process by

which properties or sites are considered for eligibility to the National Register. The Advisory Council on Historic Preservation (ACHP) was also established by the NHPA. The ACHP is composed of 29 members one of which is the Secretary of Defense. Amendments to the NHPA establish guidelines for nationally significant properties and the preservation of federally owned historic sites, as well as artifact curation and historic property data documentation. Federal agencies, including the Army, are required to maintain historic properties without adverse effect to the preservation of pertinent historic, archaeological, architectural, and cultural values. The amendments also require the designation of a Preservation Officer within each federal agency. Section 106 of the NHPA makes federal agencies accountable to the public for any consequences of their undertakings on historic properties. Furthermore, Section 106 requires that costs of historic preservation must be fully considered and taken into account when planning projects and activities, for any undertaking (of a federally funded or assisted project) that is on or involving any historic properties. Such a project must be planned in accordance with regulations issued by the ACHP, and in consultation with the ACHP and the state historic preservation officer (SHPO). It should be noted that tribal values are taken into account to the extent feasible, and Native American and Native Hawaiian groups are authorized to establish their own culturally-specific criteria of significance. (These groups may develop their own Section 106 compliance process for resources on lands under their jurisdiction.)

c. 36 CFR 800 is the regulation behind the NHPA’s Section 106 process as outlined in 4c. This regulation specifies exactly what federal agencies must do to meet their legal obligations such as considering the effects of projects they undertake (carry out, approve, or fund) on historic properties, and allowing the ACHP opportunity to comment prior to a final decision.

d. EO 13007 addresses the accommodation of sacred sites. It says that each executive branch agency with statutory or administrative responsibility for the management of federal lands is required to allow access to and ceremonial use of Indian sacred sites by Indian religious practitioners to the extent practicable. Adverse effects to the physical integrity of the sacred sites must also be avoided. In addition, agencies must maintain the confidentiality of sacred sites where appropriate.

e. ARPA establishes standards that govern the excavation of archaeological sites and resources on federal and Indian Lands, as well as the removal and disposition of archaeological collections from those sites. The ARPA permit replaces any permits required by the Antiquities Act of 1906 because it requires permits to excavate and remove cultural remains. The ARPA ensures that any activities conducted comply with federal standards and guidelines (SHPO review and comment is included in the permitting process). It also requires agencies to identify archaeological sites and prescribes civil and criminal penalties should they be incurred. ARPA was designed to protect archaeological deposits and sites, as well as to encourage cooperation between federal agencies and private individuals.

f. DoDI 4715.16 establishes the Department of Defense (DoD) policy and assigns responsibilities under DoD Directive 5134.01 for the DoD to comply with federal statutory and regulatory requirements related to the integrated management of cultural resources on military lands. It also provides instructions to DoD components for the efficient management of cultural resources on military lands.

g. Creative resource mitigation (to compensate cultural, archaeological, and historic sites for potential adverse impacts) has been done at certain Army installations; however, project information is not always well disseminated across installations. In this PWTB, Army personnel will gain insight into how their counterparts on other installations have dealt with similar conflicts between protecting land resources and meeting installation training needs.

h. Appendix A contains background on cultural resource management and stewardship within the Army on CONUS installations. Initial discussion includes proactive strategies for maintaining a sustainable cultural resource management program while retaining and achieving the Army’s training mission. Appendix A also explains how the content of this publication was obtained, along with summaries of collected data.

i. Appendix B contains discussion and analysis of successful cultural resource management strategies or mitigation efforts. Three examples are given: (1) site hardening at Fort Drum, New York, which has allowed land previously withdrawn from training access to be put back into available land for active Army training; (2) public education used as mitigation for archaeological site disturbance at Fort Leonard Wood, Missouri, allowing access to historical records and knowledge while

documenting the site prior to adverse effects from installation activities; and (3) alternative site mitigation done via Army Compatible Use Buffer (ACUB) land exchanges at Fort A.P. Hill, Virginia, where some cultural resources are permitted to be destroyed as long as specific criteria are met for protecting other, more important sites.

j. Appendix C summarizes this study as lessons learned for cultural resource management and mitigation on Army installations, as well as summarizing opportunities for added value from utilizing some of the identified strategies.

k. Appendix D contains the list of other publications cited in this work.

l. Appendix E contains a list of acronyms and abbreviations together with their definitions.

5. Points of Contact.

a. Headquarters, U.S. Army Corps of Engineers (HQUSACE) is the proponent for this document. The point of contact (POC) at HQUSACE is Mr. Malcolm E. McLeod, CEMP-CEP, 202-761-5696, or e-mail: Malcolm.E.Mcleod@usace.army.mil.

b. Questions and/or comments regarding this subject should be directed to the technical POC:

U.S. Army Engineer Research and Development Center (ERDC)
Construction Engineering Research Laboratory (CERL)
ATTN: CEERD-CN-N, Anne Koster
PO Box 9005
Champaign, IL 61826-9005
Tel. (217) 352-6511 x6381
Tel. (217) 419-8379
FAX: (217) 373-7266
e-mail: Anne.P.Koster@usace.army.mil

FOR THE COMMANDER:

JAMES C. DALTON, P.E., SES
Chief, Engineering and Construction
U.S. Army Corps of Engineers

(This page intentionally left blank.)

Appendix A:

MANAGING CULTURAL RESOURCES ON MILITARY LANDS

Background

Installations of the Department of Defense (DoD) and more specifically for this publication, the Army, have a responsibility to maintain stewardship of the cultural resources on lands they own or manage. Of all the military service branches, the U.S. Army holds the largest inventory in major categories of land and cultural/historic resources. According to the Army Environmental Command website, “The Army is a leader in federal cultural resources management. It administers more than 100,000 cultural resources on some 15 million acres of land.”[1] The site lists the Army’s cultural resources to include: 14,000 historic buildings that have been listed or deemed eligible for listing on the National Register of Historic Places (NRHP); 54,000 archaeological sites; 17 National Historic Landmarks containing over 2,500 buildings; multiple Native American Sacred Sites on 31 installations; and 22,400 cubic feet of archeological artifact collections.[2]

These historic and cultural resources are assets to the nation’s heritage but can also be considered assets to the training mission of Army installations within the continental United States (CONUS). Because of the high national and military asset value of cultural resources to the Army, installation management strategies for cultural resources are important to the management approach taken within installation cantonment areas as well as on training ranges. This publication primarily addresses cultural resource management within training areas, with a focus on archaeological sites.

Installation management strategies for cultural resources respond to multiple drivers, and compliance requirements exist at various levels of government (as cited in the front pages of this document). The overarching regulations are at the federal level and include the National Historic Preservation Act (NHPA) of 1966 (as amended), which is the regulation behind the Section 106 process; 36 CFR 800 “Protection of Historic Properties”;

---

[1] http://www.aec.army.mil/Services/Preserve/CulturalResourcesManagement.aspx

[2] ibid.

Executive Order (EO) 13007 “Indian Sacred Sites”; and the Archaeological Resources Protection Act (ARPA) of 1979 (as amended in 1988). Policy at the DoD level includes DoD Instruction (DoDI) 4715.16, “Cultural Resources Management.” At the Army level, the management driver is Army Regulation (AR) 200-1, which contains guidance for the environmental protection and enhancement of cultural resources within the Active Army, Army National Guard, and Army Reserve.

Together these laws and regulations ensure a mentality of preservation and stewardship toward historic and cultural resources on Army installations. Implementation occurs at the installation level through a Cultural Resource Manager (CRM) and assisting staff, all of whom are trained in cultural resources, archaeology, and historic preservation. In response to the regulatory drivers, the CRM staff develops and maintains an Integrated Cultural Resources Management Plan (ICRMP). An ICRMP lays out the prevailing management strategy and approach that the installation plans to take to:

a) **consult** (consider how installation actions or activities might affect cultural and natural resources and surrounding communities);
b) **avoid** (protect the resources whenever possible) or, if necessary,
c) **mitigate** (compensate for potential adverse impacts).

Internal implementation of ICRMPs can include staff members beyond the CRM area such as the natural resources and environmental areas that are within the Directorate of Public Works (DPW) and Directorate of Plans, Training, Mobilization and Security (DPTMS) including the Integrated Training Area Management (ITAM) program. The execution of this integrated approach ensures that training, land maintenance, and preservation efforts are all coordinated relative to compliance goals and training mission targets.

External stakeholders involved with this integrated process may include Indian tribes and their representatives or a designated Tribal Historic Preservation Officer (THPO); State Historic Preservation Offices (SHPOs); and the Advisory Council on Historic Preservation (ACHP).

Typically, one of the primary targets of regulatory drivers was to ensure the identification of resources on the land, resulting in the requirement to survey 100% of Army training lands prior to use. This requirement enables Army installations to gain knowledge about any potential cultural resources that might

exist on designated training lands prior to training, thus preventing a situation where damage could result at previously unknown sites. The resulting site inventories are useful to CRMs in developing avoidance strategies to minimize negative impacts to known sites. However, cost is one of the largest barriers to completing this 100% survey requirement because archaeology surveys are expensive. Technically, if the land has not yet been surveyed, the Army is not supposed to train on it. The path to compliance for the land surveys is one of the more expensive tasks the Army is required to complete, especially if further surveying and cataloging is required. This could be the case if historic or archaeological sites of greater significance are found in the initial inventory survey.

However, there are other strategies that CRMs on Army installations are using to manage, preserve, and protect archaeological resources on their training lands. These best management practices (BMPs) and innovative protection strategies showcase the expertise of the CRM staff because to develop and implement such approaches, there must be an understanding of how sites change over time. The changing nature of cultural and archaeological sites is due to multiple dynamic environmental conditions (e.g., erosion from wind or water, damage from animals or vegetation, site weathering or other natural degradation processes) or anthropogenic forces (e.g., impacts occurring during training). If the site is not properly protected and negative impacts occur (no matter the cause), the physical integrity of the site may be affected, and loss of critical information can occur. This loss, in turn, can lead to a loss of the site value, and in some cases can undermine the site’s eligibility for listing on the NRHP. The CRM and other members of the cultural resources installation staff must understand all the existing and potential pressures on the historic or cultural resource and then, prepare strategies to avoid or mitigate such potential negative and sometimes unpredictable events.

Faced with the unpredictable nature of potentially adverse impacts, the general trend in cultural resource management is for proactive actions that ensure an integrated approach to protection. CRMs who take such a proactive stance generally develop creative solutions, technologies, or strategies to mitigate or overcome some of the shortcomings of avoidance-based protection plans. This publication will explore some of these key creative solutions, so that others can gain insight into a future of continued proactive cultural resource management.

Summary of Three Army Installations Studied

CRMs who take an active role in preserving an installation's cultural resources must be highly engaged in most areas of the installation operations. To effectively go beyond avoidance-based protection plans, CRMs should understand how an installation fits into the history of the surrounding areas and how the military's history affects the context of the region. In addition to understanding the local history, CRMs must have a basic understanding of the environmental context in which the installation operates. Installation operations such as training type, schedule, and location are also important for a CRM to know and to understand how those issues could potentially impact a culturally sensitive area.

The following sections illustrate the complexities that CRMs at the sites studied for this work (Fort Drum, Fort Leonard Wood, and Fort A.P. Hill) addressed when deciding the most effective management technique to pursue under the specific conditions of a culturally significant site. Further details of the three sites' creative strategies are given in Appendix B.

Fort Drum, New York

Fort Drum is located in Jefferson and Lewis Counties in New York. The fort is over 107,000 acres in size. About 30,000 of those acres are made up of firing ranges and impact areas, and 66,000 acres are for troop maneuvers and training activities (Quates 2013, 20).

Fort Drum is located adjacent to Sackets Harbor, a settlement founded by Augustus Sackett in 1801, originally known as Sacketts Harbor.[3] The location was strategically advantageous, which Sackett recognized as a perfect hub for a lumber business. The location also provided a protected natural harbor, and thus Sackets Harbor became central to military operations and shipbuilding for the northern theater of the War of 1812. During the War of 1812, the harbor became flooded with troops and shipbuilders as the "headquarters for the U.S. Military in the northern frontier" (Fort Drum 2013). After the war, the U.S. Army was interested in maintaining the capability to train soldiers, and created Madison Barracks (named after President

[3] The village of Sackets Harbor was originally named Sacketts Harbor, reflecting the name of Augustus Sackett, the founder. Over time the spelling was altered becoming Sackets Harbor.

James Madison). The barracks remained open and were run by the U.S. Army until after World War II (WWII; Fort Drum 2013). In 1907, the military's presence was increased as Camp Hughes was established in the area of Felt Mills, New York, to expand the Army's training capabilities with modern firearms and associated training exercises. The camp was named after Charles Hughes, who was then New York Governor.

Soon after, the Army expanded its training activities in 1908 into the area adjacent to Camp Hughes and north of the Black River, known as Pine Plains. The Army named the area Pine Camp, and significantly expanded it in 1941 due to the outbreak of WWII. This expansion had a large impact on the local civilians, displacing five villages. However, it was not until 1951 that the military training lands and the Pine Camp Cantonment were drawn together and Fort Drum was officially established. Fort Drum was named after WWII LTG Hugh A. Drum.

Currently, Fort Drum consists of 107,265 acres, and is home to the 10th Mountain Infantry Division, one of the Army's most deployed units (Fort Drum 2013). Fort Drum also trains other Active Army, Army Reserve, and Army National Guard units, along with other military services and government agencies (Quates 2013, 46). In all, approximately 80,000 troops train annually at the fort (Fort Drum 2013).

Due to the strong historic and prehistoric human presence on the landscape of Fort Drum, compliance with Section 106 of the NHPA requires that Fort Drum create and maintain a cultural management plan. Under such a management plan, an inventory base of archeological sites was created by Fort Drum's CRM team. In 1988, there were about 400 sites in that inventory; by 2013 there were about 1,000 sites (Quates 2013, 21). These sites fall into eight different categories of historical context: (1) Frontier, ca. 1540-1800; (2) LeRay Mansion, ca. 1806-present; (3) Farmstead, ca. 1800-1920; (4) Dispersed Agricultural Processing Industries, ca. 1800-1920; (5) Rural Village, ca. 1800-1920; (6) Dispersed Social Centers, ca. 1800-1920; (7) Iron Industry, ca. 1830-1885; and (8) Military Historic Context, ca. 1907-present (Quates 2013, 22-24).

In order to assist in surveying and documenting cultural properties and archaeological sites for compliance efforts, Fort Drum originally created four different predictive models to help determine where archeological sites might be located. The four different models were: (1) Glacial Landscape, (2) Adirondack Uplands, (3) Paleo-Maritime, and (4) Prehistoric-Pathways (Quates, 24–25). In 2010, the Glacial and Adirondack models were

combined to create a new model. This model is now referred to as the Revised Predictive model. With this new combined model, there are now three models that are utilized, although they all continue to be tested and revised to ensure the best possible analysis methods (Quates 2013, 25).

To date, the installation has surveyed about 87% of the land; the installation now tracks and cares for 962 archeological sites (Quates 2013, 47). Within the management plan, different sensitivity zones (low, medium, and high) were created to help determine where archeological sites might or might not be. The installation's site model seems to have predicted site sensitivity accurately. Of site-positive samples, 75% were found in areas that were thought to be high-sensitivity according to the models. Only 5% of site-positive samples were found in low-sensitivity areas. Most site-negative samples were found within the low-sensitivity areas (ibid.[4]).

Fort Drum continuously monitors and maintains the different archeological sites found on the installation. Archeological monitoring is based on avoidance and is a key element to the protection and maintenance strategy. For example, the archaeologist tries to keep people off the site by flagging or fencing off the area or by adding signage to divert activity from the site (Quates 2013, 28). Avoidance techniques are typical of installation archaeological site management. However, Fort Drum utilizes an additional tool that is, to date, unique to the installation and has become one of their best management practices (BMPs): site hardening.

Site hardening at Fort Drum has been promoted as a way to protect the site while allowing training to continue on-site. Site-hardening techniques involve altering some aspect of the site or modifying the site's groundcover (vegetative or manmade). At Fort Drum, site hardening is used both in situations where people will need to be kept off the site or where the site can be incorporated into training activities. Site hardening also helps to manage site deterioration, as revegetation of site areas will prevent erosion (Quates 2013, 52). When site hardening is used to aid training, it helps soldiers know what to do when addressing protection of cultural sites during war.

[4] Per standard author-date reference style, "ibid." is used when two or more references to the same work follow one another without a reference to a different source between them.

Fort Leonard Wood, Missouri

Fort Leonard Wood is located in the heart of the Ozarks in Pulaski County, Missouri, and is comprised of 62,000 acres. The installation is off Interstate 44, about 130 miles west of Saint Louis and 90 miles east of Springfield, Missouri (Fort Leonard Wood 2013).

Fort Leonard Wood was created on 1 October 1940, when the U.S. Army purchased 65,000 acres in Pulaski County. The fort is named after MG Leonard Wood, who was awarded the Medal of Honor (Fort Leonard Wood 2013). During World War II, the fort became home to the Engineer Training Replacement Center to train engineer replacement soldiers and to provide basic infantry, advanced engineering, and engineering specialist training. On 31 March 1946, Fort Leonard Wood was closed and leased to an Oklahoma rancher to allow his cattle to graze on the grounds (ibid.).

On 1 August 1950, the grounds were reopened for engineering training in response to the Korean conflict. Then, on 21 March 1956, the Secretary of the Army determined that Fort Leonard Wood would become a permanent installation (Fort Leonard Wood 2013). Subsequently, in 1975 the fort began construction equipment operator training courses for the U.S. Air Force and Marine Corps, followed by courses in combat engineer training in 1976 (ibid.).

The U.S. Army Engineer Center was transferred in 1985 to Fort Leonard Wood from Fort Belvoir, Virginia. The U.S. Army Chemical School and Military Police School were added at Fort Leonard Wood in 1999. These three centers are now known at Fort Leonard Wood as the U.S. Army Maneuver Support Center of Excellence, the U.S. Army Engineer Center, and the U.S. Army Chemical and Military Police Schools (Fort Leonard Wood 2013).

A total of 80,000-90,000 military and civilians train at Fort Leonard Wood each year. Specifically, Fort Leonard Wood instructors train and educate military personal for: Training and Doctrine Command’s U.S. Army Chemical, Biological, Radiological and Nuclear School; U.S. Army Engineering School; U.S. Army Military Police School; and the Army’s largest Non-Commissioned Officers Academy. Two non-Army, colonel-commanded detachments from the Marine Corps and Air Force, are the largest to reside on any Army installation and also receive support. Fort Leonard Wood also hosts part of the U.S. Coast Guard and the Navy Seabee Detachment for training (Fort Leonard Wood 2013).

Fort Leonard Wood has a rich cultural history, in part because it encompasses several former communities and contains buildings from former towns, farmsteads, schools, and churches. Cemeteries have also been found. About 207 historic archaeological sites have been found to date. In order to remain in compliance with Section 106, Fort Leonard Wood has focused on surveying the installation for cultural sites, successfully surveying about 90% of the installation to date (Carlson-Drexler et al. 2012, 1).

A recent study was completed to investigate existing sites at Fort Leonard Wood. The cultural management team at Fort Leonard Wood created a methodology to help preserve the cultural artifacts of the area. The team implemented a landscape approach to show human activities on the installation grounds before the creation of Fort Leonard Wood. The methodology allows installation staff to compare where known current archeological sites are to existing historical data, such as aerial photographs. This work was aimed at identifying areas of historical significance and allowing the team to determine which sites will need a full evaluation in order to determine eligibility for the National Register (Carlson-Drexler et al. 2012, 1). The study was broken down into two different phases. The first phase compiled and analyzed data on historical archaeology at Fort Leonard Wood and was meant as a prescreening stage (ibid., 3). The second phase utilized the landscape approach to locate sites with a historical significance. From this methodology, Fort Leonard Wood was able to identify three different sites for further investigation. Out of these three sites, one became eligible for listing on the National Register (Enscore 2005, 11). The study demonstrated this methodology as a strategic approach for cultural resource management and preservation, and it thus can be considered a BMP for cultural resource management.

Fort A.P. Hill, Virginia

Fort A.P. Hill is located in Caroline County, Virginia, which is about 60 mi south of Washington D.C. The installation consists of about 76,000 acres, mostly forested. The installation sits on the upper Atlantic Coastal Plain and the watersheds of the Rappahannock and Mattaponi Rivers (Fort A.P. Hill 2013a). There are hills and wetlands located across from the fort, and its location also borders forests, farmland, housing subdivisions, and the towns of Bowling Green and Port Royal (ibid.).

On June 11, 1941, A.P. Hill was created as an Army training facility. The fort is named after Lieutenant General Ambrose

Powell Hill, who was from Virginia and a Confederate commander under General Lee during the Civil War (Fort A.P. Hill 2013a). General Hill was wounded and died during the Third Battle of Petersburg, in Petersburg, Virginia. General Lee surrendered at Appomattox Court House only seven days after A.P. Hill lost his life (ibid.).

During the first year that Fort A.P. Hill was operational (1941), the II Army Corps and three activated National Guard divisions used the fort as a maneuver area. In 1942, Fort A.P. Hill became home to the headquarters of Major General Patton's Task Force A which invaded French Morocco in North Africa (Fort A.P. Hill 2013a). In the early 1950s during the Korean War, the installation was a major hub for sending troops to Europe; following that, it was a center for Engineering Officer Candidate School Training during the Vietnam War (ibid.).

Currently, Fort A.P. Hill is used year-round for military training, providing realistic joint and combined arms training for both active and reserve troops. About 28,000 acres make up a live-fire range complex which is utilized for certain training exercises. Fort A.P. Hill not only hosts the Army, but also the Marines, Navy, Air Force and other governmental agencies. These other agencies include but are not limited to: the Department of the State and Interior, the U.S. Customs Service, and various federal, state, and local security and law enforcement agencies. The fort has also hosted training for foreign allies (Fort A.P. Hill 2013a).

To comply with Section 106 of the NHPA, Fort A.P. Hill created an ICRMP. The installation also created and utilizes a predictive model with a historic context for the installation. The historical context includes: documents, maps, photographs and previous archaeological research (Fort A.P. Hill 2013b). This provision of historic context helps to understand the effect of past human activities on the landscape (ibid.). This new predictive model was put into action in 2013.

One unique approach that Fort A.P. Hill has taken within their cultural resource management is to consider options for alternate mitigation to help achieve a better preservation outcome other than data recovery. This has been done via the Army Compatible Use Buffer (ACUB) Program (Fort A.P. Hill 2013b, Appendix D, page 3). The ACUB creates buffer areas next to installations. This buffer helps to limit the effects of encroachment and maximize the land inside the buffer areas.

Thus far, Fort A.P. Hill is unique in their aim to implement an ACUB Program that has cultural resource mitigation elements. About 500 acres located on the Camden Farm, a National Historic Landmark, will be gained in a conservation easement that will assist in allowing unfragmented military training while simultaneously protecting the most important cultural properties within the area in and around the installation (Fort A.P. Hill 2013b, Appendix D, page 4). For Fort A.P. Hill, this approach can be considered a BMP-type strategy. It allows both cultural resource preservation, and it maintains and enhances military training that relates to the installation's mission. This example could be useful for other installations where a compatible-use buffer could provide a similar solution.

Approach and Data Collection for Installations Studied

Research was done on three individual forts, and the bulk of the information was gained from their associated ICRMPs. The ICRMPs provided information regarding the specific guidelines an installation must follow when dealing with archeological resources and sites. BMPs for cultural resources were also taken into consideration when gathering information on unique cases of archaeological resource management.

Interviews were conducted with cultural resource management personnel at the selected installations. These interviews provided background information about the cultural resource management practices at the installations. A questionnaire was also utilized to solicit information where possible and included the following questions:

1. What types of cultural resources (e.g., archaeology, historic buildings) are predominantly on your installation? What is the general environmental context, and in your opinion, does this help or hinder the preservation of the cultural integrity of sites?

2. What are the compliance issues that have in the past, are currently, or may be foreseen to become challenging in managing these sites, be it on training lands, on cantonment, or over the entire installation?

3. What are some specific best management practices that you've been able to employ to manage sites in-situ in order to allow training to continue? Or, if sites had to be removed and mitigation utilized to document and counter development / other site work, what techniques or technologies did you employ? Were any ACUB agreements

created? What best management practices have you had very good success with? Have you tried any that may have worked well on other installations only to find that they were not appropriate for yours?

4. What surveying techniques have been useful for you onsite? Are they considered quite time consuming? Have you been experimenting with new technologies? Which ones, how, and are you pleased with results? Are you thinking that any of these might be good for future BMPs and management regimes at your installation? Do you know other CRMs who have employed them previously to yourself?

5. With regard to the focus of this study (provided earlier) do you have any other general comments you'd like to share? (I'm interested in both site-management practices as well as mitigation efforts, so an all-in approach to see what is being done where, who is excited about what, and how I might help communicate the great ideas that are forthcoming.)

The information gained from interviews and data collection efforts helped to show what the cultural resource management teams wanted to accomplish in the future. It also helped to point out what areas they felt they were being successful and unique in their practices. The BMP and ICRMPs did not really show what issues teams ran into while implementing their management practices but added information was given in the surveys about issues they might be facing. Overall, the surveys helped to gain insight and more in-depth information that might not have been covered in specific plans.

A site visit was also conducted to Fort Drum. This visit allowed for viewing examples of site hardening and how successful it has been for them. The one-on-one conversations with the cultural resources management team were helpful in providing details about specific techniques and approaches. The conversations covered some survey questions, and additional survey questions were added based on team members' initial answers.

Fort Irwin, California

In addition to the three detailed examples of proactive and creative cultural resource management strategies presented above, other examples exist across the Army. Although not one of the sites detailed for this work, a general overview of the environmental and training conditions at Fort Irwin is given

below as another example of an installation proactively addressing cultural resource management.

Unique environmental and training conditions present challenges for archaeological site protection at Fort Irwin, California. The approximately 640,000 acres of Fort Irwin National Training Center (NTC) are located in the Mojave Desert near Barstow, California.

The first military facilities in the area were established in the early 1940s when the U.S. government activated a 1,000 sq. mi. military reservation to test antiaircraft techniques in the vicinity of present-day Fort Irwin. By 1942, the antiaircraft range was named Camp Irwin and was added to the Desert Training Center as another cantonment and range area. By the end of WWII when the need for an antiaircraft range dwindled, the Army put Camp Irwin on surplus status. However, the Camp was reopened in 1951 as the Armored Combat Training Area which served as a training center for units deploying during the Korean War. In 1961, eight years after the Korean War ended, the facility was designated a permanent installation and renamed Fort Irwin. During the Vietnam buildup of the 1960s, many units trained and deployed from Fort Irwin. However, by 1971, the post was placed in maintenance status. In 1979, the Department of the Army designated the fort as the site for the NTC. The NTC was officially activated in 1980, and Fort Irwin was again returned to active status in 1981 (Fort Irwin 2013).

As the Army’s premier training center, the NTC provides intense training that requires units to be mobile and self-sustaining in the desert for two weeks of hyper-realistic tank maneuvers. Mock village and urban terrain training has been added to the area’s training capabilities. (Fort Irwin 2013). These types of multiple, realistic training exercises create potential impacts to all parts of Fort Irwin rangelands.

Specifically, the unstructured type of training conducted in the rangeland impacts the strategies that Fort Irwin’s cultural resources manager can use to delineate important archaeological sites. The large size of the installation provides additional challenges for surveying and documenting sites. To meet federal regulations, Fort Irwin plans to survey 10,000 acres a year for archeological sites until the entire installation has been surveyed. This survey work is currently about 40% done. The archaeological sites at Fort Irwin are mostly lithic resource procurement sites and desert pavement quarry sites that feature rock art, cave sites, and rock-chipping areas. There are a few civilization sites around the lakes and washes. In addition to

prehistoric sites, Fort Irwin contains a few historic sites including old mining and prospecting attempts, town sites, and homesteads. The old town sites are restricted areas. Nevertheless, the tank training maneuvers in the ranges have created problems for preserving these archaeologically sensitive areas (Fort Irwin 2012).

Fort Irwin managers have tried several techniques to deter movement across archaeological sites. The standard deterrent is to surround the site with a chain link fence. However, the fencing stands out in the desert and serves as an attractor for curious soldiers who previously have cut the fence or driven through it to gain access to the sites. To reduce the visibility of the protected sites, resource managers have concluded that using Seibert stakes to mark areas that are off-limits is more effective at keeping training away from archaeological sites (Fort Irwin 2012).

The managers at Fort Irwin are interested in developing different strategies to further reduce training activity near archaeological sites. Fort Irwin’s CRM is interested in finding hostile plants that would serve as site deterrents (e.g., poison ivy, blackberry brambles). However, finding native desert plants that are hostile, hardy, and relatively fast-growing is challenging. Site hardening is also being considered at Fort Irwin; however, no examples are known to exist for desert archaeological sites (Fort Irwin 2012).

Appendix B:

CREATIVE STRATEGIES FOR CULTURAL RESOURCE MITIGATION

Fort Drum: Site Hardening

Because of the type of training conducted along with the particular environmental constraints of the area, Fort Drum has decided to cap or bury several of its archaeological sites to preserve them as well as to increase the safety of troops training in those areas. Burying an archaeological site is known as site hardening, a process which gives the site a more permanent type of protection from external sources that could damage or destroy it. Site hardening or stabilization also benefits soldier safety and assists in environmental protection. For example, potential hazards such as wells, open foundations, machinery, and industrial waste can be associated with protected historic archaeological sites, but they can also create falling hazards (Wagner 2007, 15). Site hardening at Fort Drum was introduced because other deterrents were unsuccessful at protecting both the sites and soldiers. Signage, fencing, and Seibert stakes were all observed to have been taken down or ignored in various instances. Nevertheless, all sites should not be hardened; environmental context and specific site properties promote the recommendation of a case-by-case management system for use of site hardening (Wagner 2007, 22).

There is a multistep process for determining if site hardening should be used; those multiple steps include evaluating the site for potential uses, training activities, and environmental conditions. The results of these considerations determine which level of site hardening to use on a particular location. Sites can be hardened to low, medium, or high levels depending on whether the site might be prone to more disturbances. Site hardening can be done with a variety of materials, depending on the type of cultural resource and the desired result. Explanations of the three levels of site hardening are given below.

- A *low* level of site hardening could be when erosion is present around the site location and causing exposure to the site. In such a case, nonintrusive revegetation can be implemented to reduce erosion and protect the site. In certain circumstances, using plants that are noxious (such as poison ivy and oak) will deter human activities and thus help to reduce traffic though sites.

- A *medium* level of hardening could consist of adding more top soil to allow for foot traffic or very light vehicular traffic (e.g., lawn mowers or light utility vehicles).
- A *high* level of hardening would be required if major changes such as excavation, refill, and any instance of utilizing built protective structures were needed to protect the site.

Additionally, materials used in site hardening should be considered carefully. Geotextiles such as a “woven polypropylene textile” can be used to help decrease erosion around archeological sites (Wagner 2007, 24). Polypropylene is used because it provides ultraviolet (UV) resistance and is black in color. A non-UV-resistant material (often white) can become brittle and fail over time (ibid., 25). A woven material will also be stronger and better able to withstand wear and tear. A nonwoven geotextile can also be used. Geotextiles are normally layered with rock, gravel, soil, or other foundation material to help increase site stability. They are appropriate for: separation of materials, a filter for water infiltration, and a deterrent for soil erosion (ibid., 24).

Geogrids are also effective in reinforcing slopes and walls, and as a base-layer construction material. In archeological aspects, the grids are used to reinforce and stabilize soils, especially if the area will later be used for military training (Figure B-1) (Wagner 2007, 26).

Figure B-1. Plastic geogrid netting is providing soil stabilization in an archaeologically sensitive training area at Fort Drum (ERDC-CERL, 2013).

Some above-ground historical structural sites can be hardened by building structures around the historical one. This reinforcing structure around the historical structure helps keep it upright and intact (Figure B-2) (Wagner 2007, 47). After a site has been hardened, signage should be placed at the site to inform soldiers on the historical importance of the area as well as what types of activities can occur on the hardened site. When site hardening is used in training, it helps heighten soldier awareness of cultural resources that are discretely located in a landscape (Quates 2013, 52).

Figure B-2. A stone foundation has been stabilized for use during training at Fort Drum (ERDC-CERL, 2013).

Fort Drum has executed varying levels of site hardening at a variety of sites. For example, a historic concrete cistern was covered with a geotextile and then surrounded with sandbags to protect the site as well as provide a protected fighting position during training exercises (Wagner 2007, 18). At a larger scale, the historic village of Sterlingville was located in an area of Fort Drum that was considered important for military training activities. The village had been a small community at the crossroads of the area’s iron works industry. In 1941, the military had taken the dozen homes and few business of the village by eminent domain. Contrary to what the Fort Drum CRM assumed about the site, the displaced residents living nearby had fond memories of the village, but they also wanted the military to put the landscape to good use. Working with the

training lands manager, the CRM developed a site-hardening plan that would protect the remaining foundations in the village and that also would stabilize the surrounding landscape to make the area available for training operations (Figure B-3) (Wagner 2007, 10).

Figure B-3. Geotexttile and gravel system used to cover a hardened historic village site at Fort Drum (ERDC-CERL, 2013).

Archaeological sites that have been hardened will have certain restrictions on their use. At Sterlingville, training over the hardened site must not involve digging or explosions, and heavy vehicles can never be driven over the hardened structures. Other requirements needed to maintain a hardened site include controlling the vegetation in the area (Figure B-4 and Figure B-5).

Figure B-4. An example of a historic site that has been stabilized and is now available for certain types of training (ERDC-CERL, 2013).

Figure B-5. Site of a former village at Fort Drum hardened for training use. Signs delineate the area as a site of cultural importance, (ERDC-CERL, 2013).

Fort Leonard Wood: Prescreening Model

To remain in compliance with federal regulations, Fort Leonard Wood maintains an ICRMP to guide and advise installation personnel and trainers on how to manage and interact with cultural sites. Active cultural resource management has been ongoing since 1922, but most of the site projects have been undertaken since 1992 (Edging, 3-1).

Part of Fort Leonard Wood's approach to active management was to create a model to assist in determining historical significance and National Register eligibility for historic farmstead archeological sites (Carlson-Drexler 2012, 80). Creating the model was done via studying existing sites and then using the findings to create a historical significance framework. The goal of the project was to create a viable tool that efficiently identified which archeological sites required further investigation to make a final determination of eligibility.

Developing Fort Leonard Wood's model consisted of two phases of evaluation. Phase I consisted of compiling and analyzing existing historical data on farmstead landscapes existing before establishment of the installation (Enscore 2005, 3). Phase II involved analyzing data on the potentially eligible historic farmstead archeological sites to determine if more intensive survey efforts would yield information related to the significance of the sites. This was a more labor-intensive phase for the CRM team because it required the further investigation of sites for their potential to be nominated to the NRHP.

The landscape approach was initially made with an effort to understand the installation's historic archaeological sites by using Steven D. Smith's 1993 study, *Made It in the Timber: A Historical Overview of the Fort Leonard Wood Region, 1800-1940*. The Smith study used a landscape approach to understand the physical, commercial, and social development of the area before Fort Leonard Wood was built. The landscape approach looks at the area as a whole to assess any environmental and human trends visible on the site. These trends are then compared to historical findings to identify the highest-probable areas where archeological sites might be found. The methodology also looked at existing sites, historical photos, and other information to assist in determining likely locations of unidentified sites and also allowing for a comparison of known sites to potential new sites (Carlson-Drexler 2012, 86).

Phase II of the methodology utilized a questionnaire known as the "Eligibility Prescreening Form," to help determine which

sites would be eligible for the National Register (Carlson-Drexler 2012, 80). From this prescreening form, historic themes and periods were identified and used to create a Site Inventory Form as a supplement to the *Archaeological Survey of Missouri* (Enscore 2005, 3). Both of these forms help to guide the cultural resource management team throughout the investigation.

Within the proposed methodology from the study, the Eligibility Prescreening and Site Inventory forms are intended to be used as part of a two-step eligibility process, meaning eligibility is determined in two different stages. The first stage is to be used as a prescreening process to examine the pre-existing data in the context of historical archaeological sites on Fort Leonard Wood. The second stage consists of a more in-depth investigation, for use on sites having several signs of historical significance based on answers collected by the prescreening form. This second stage of the eligibility process prescribes an on-site investigation to assess if the site's resources are relevant to the local historical context. The purpose and goal of the two-stage methodology was to find potential sites with as much background information as possible before committing to fieldwork (Enscore 2005, 8).

At Fort Leonard Wood, a preliminary field test of this methodology was completed during 2004–2005. Phase I work helped to narrow down which areas might have archeological sites before proceeding to a field investigation. Using the Eligibility Prescreening Form and Phase II investigations, three sites were selected and archaeological investigations of those sites were completed in the field (Enscore 2005, 10). The three areas were determined as potentially eligible for the National Register. The sites consisted of two farmsteads and a farmstead with a mill (ibid., 11). After field investigation of the three sites, only one was determined eligible for the National Register. The other sites had a lack of artifacts or had severe damage due to military training (ibid.). The model was considered to be successful because it significantly helped to narrow the focus on archaeological sites while saving time and money (ibid.).

Key elements of the prescreening model's success were attributed to the compilation and modification of the different materials such as the current land ownership database, grid maps, historical maps, and acquisition maps into a pictorial representation of the land tracts (Enscore 2005, 13). For example, the ability to highlight several land tracts owned by a single owner helped show the location of resource clusters that overlap resource types such as rural and village sites, and periods of significance (Enscore 2005, 13).

This study produced a usable model that allows Fort Leonard Wood to more effectively prioritize site evaluations through prescreening and identifying in-field cultural resource properties. The basic structure of the Fort Leonard Wood model has the potential to be translated to other installations by providing a validated tool that assists CRMs in prioritizing survey areas as well as in predicting the historic importance and value of a site. Fort Leonard Wood has thus created a valuable asset for compliance and cost savings. With the current budgetary constraints within the DoD, this approach will be essential in addressing CRM issues, while providing good techniques for site detection, selection, and resource prioritization. At the time of publication, the methodology is only applicable to Fort Leonard Wood. A project is ongoing to adapt the methodology for nationwide utility.

Fort A.P. Hill: Cultural Landscape Model and ACUB agreement

The Fort A.P. Hill cultural resource management program utilizes two innovative methods for addressing specific issues in resource preservation and maintenance. Fort A.P. Hill CRMs developed an overarching cultural landscape model that situates the human involvement of the area into a management framework. As part of the model, a historic context was created which contributed to the ability of the CRMs to predict the significance of cultural resources. Because the Fort A.P. Hill CRMs had the cultural landscape model, they were able to adapt the ACUB program to successfully address a major cultural resource preservation and management problem.

Cultural Landscape Model

Fort A.P. Hill’s cultural resource management approach utilizes a “cultural landscape” concept; this concept assumes that natural resource components are the main drivers in the establishment of human occupation and culture (Fort A.P. Hill 2013b, 2). To develop a predictive model, Fort A.P. Hill combined the natural history of the area with the historic context that was written as part of their cultural resources management plan. The historic context includes: documents, maps, photographs, and previous archaeological research (ibid.). The historic context outlines eight different historic periods that have distinct cultural development patterns for the area: (1) Settlement to Society, ca. 1607-1750; (2) Colony to Nation, ca. 1750-1789; (3) Early National Period, ca. 1789-1830; (4) Antebellum Period, ca. 1830-1861; (5) Civil War, ca. 1861-1865; (6) Reconstruction and Growth, ca. 1865-1917; (7) World War I to World War II, ca. 1917-1945; and (8) The New Dominion, ca. 1945-

present (Fort A.P. Hill 2013b, Appendix R). These historic periods are incorporated into the installation's predictive model.

As part of this cultural landscape model approach, the installation completed a comprehensive cultural resource inventory in 1994 (Fort A.P. Hill 2013b, 15). For the inventory, the installation used a sampling strategy to determine where the greatest likelihood of archeological sites would be. The data collected in this sampling was not entirely successful in site identification, but the effort proved helpful for future work (Fort A.P. Hill 2013n, 15).

Although the earlier predictive model had limitations, Fort A.P. Hill revisited and refined the model in 2013. In the 2013 iteration, the installation focused on historic context and utilized aerial photos of the entire installation to identify potential areas of human occupation. Then, documents such as historical maps, photographs, and oral accounts were cross-referenced to identify potentially occupied areas (Fort A.P. Hill 2013b, Appendix S, 2). This version of the predictive model also met with a series of limitations; these limitations involved difficulties in finding historical data prior to the Civil War since many records were burned during the war. Because of the missing information, the model is still being refined (Fort A.P. Hill 2013b, Appendix S, 3).

Even with some successful preliminary results from the predictive model, Fort A.P. Hill continues to consider options for alternative mitigation approaches. The installation's goal is to more efficiently preserve historically important and significant sites versus relying on expensive data recovery options such as an archaeological excavation.

Using Army Compatible Use Buffer for cultural resource management

Fort A.P. Hill leveraged their cultural landscape model to solve a complex and potentially negative cultural resource problem by using a novel approach to the ACUB program (Fort A.P. Hill 2013b, 3). The ACUB program allows installation managers to develop outside partnerships to preserve lands adjacent to the installation. The program benefits installations by creating areas where development is restricted. Restricting encroaching development allows the Army to train with fewer limitations on noise and smoke disturbances, thus maximizing the use of its training lands.

Buffer areas around installations were not needed until recent development grew to be adjacent to military facilities. The areas around Fort A.P. Hill previously were rural and undeveloped, but recently these areas have experienced growth and development (Figure B-6). Because encroaching development potentially limits the installation's use of training lands, the Army's solution is to create zones of open space that preserve and set aside areas for natural resources while reducing neighboring developments and the associated annoyance issues between military operations and the civilian population (U.S. Army Environmental Command n.d.).

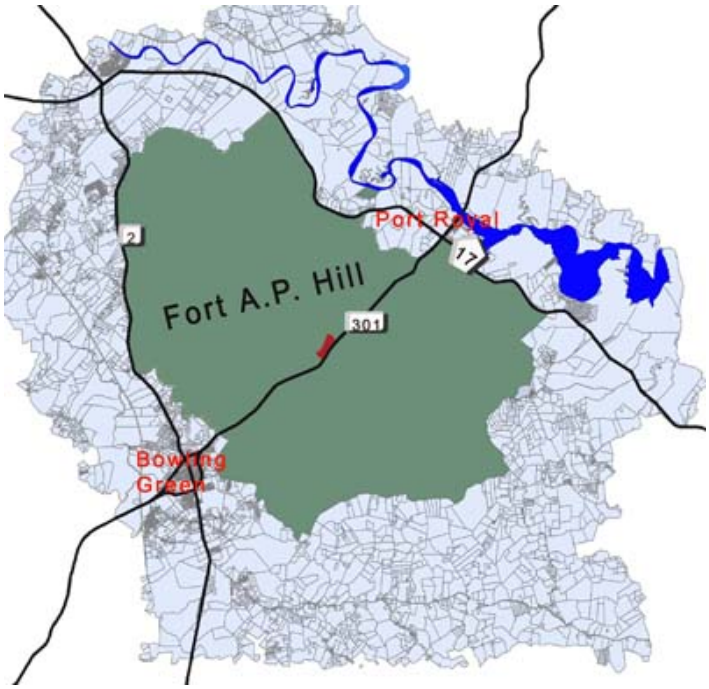


Figure B-6. Fort A.P. Hill reservation is surrounded by civilian development (http://www.aphill.army.mil/newcomerswelcome.asp).

Traditional parameters of ACUB assume that installations will trade restrictions on training lands for Army-sponsored preservation of habitat and other natural resources beyond the fence line. For natural resource mitigation, Fort A.P. Hill began using the ACUB program in 2005. A few years later, Fort A.P. Hill managers encountered a problem when a proposed expansion to the installation threatened several unexcavated Civil War-era sites. The expansion was critical to accommodate the increased training load that occurred when field exercises for the Army Combined Arms Support Command School were moved from Fort Lee to Fort A.P. Hill (Dennen 2009, 2011) (Figure B-7).

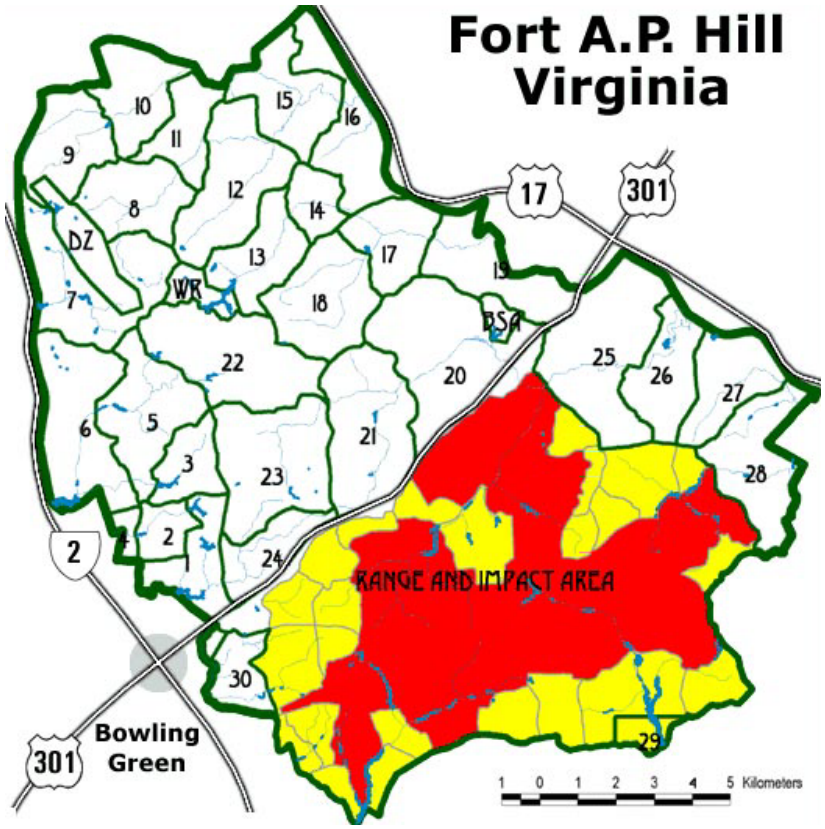


Figure B-7. Colored areas indicate location of ranges and impact areas at Fort A.P. Hill where training causes disturbances to nearby civilian development. Areas of higher-intensity training are shown in red with lower-intensity areas shown in yellow (http://www.aphill.army.mil/hillmap.asp).

Modifications to the ACUB program allowed Fort A.P. Hill to trade protecting culturally sensitive land inside the installation's existing boundaries for protecting more culturally significant sites outside the installation's fence line. In order to lift the restrictions on areas within the expanded training lands, Fort A.P. Hill negotiated a land "trade" with Camden Farm, a neighboring historic landmark. Instead of surveying, preserving, and managing the less-important Civil War-era sites on the training lands, Fort A.P. Hill dedicated funds to protect more-important cultural resources off-base.

Protection of the off-base land was accomplished through two conservation easements. The first easement was granted to the Virginia Outdoors Foundation and the Virginia Department of Historic Resources to protect 500 acres that contained the site of a "17th century American Indian community" (Hall n.d.). The site is one of the "largest and most significant Contact Period Native American archeological village complexes known in the Chesapeake region" (Busby 2011, slide 8). The second easement

allowed the owners of Camden Farm to “retain legal title to the land and the ability to maintain its current use” (Hall n.d.). The mitigation at Camden Farm covered several different requirements. These requirements included having additional field investigations when needed, public outreach through participation in field investigations, producing educational brochures and videos, and development of a historic context (Mullin 2011, slide 17). Figure B-8 illustrates established and proposed buffers around Fort A.P. Hill in 2008.

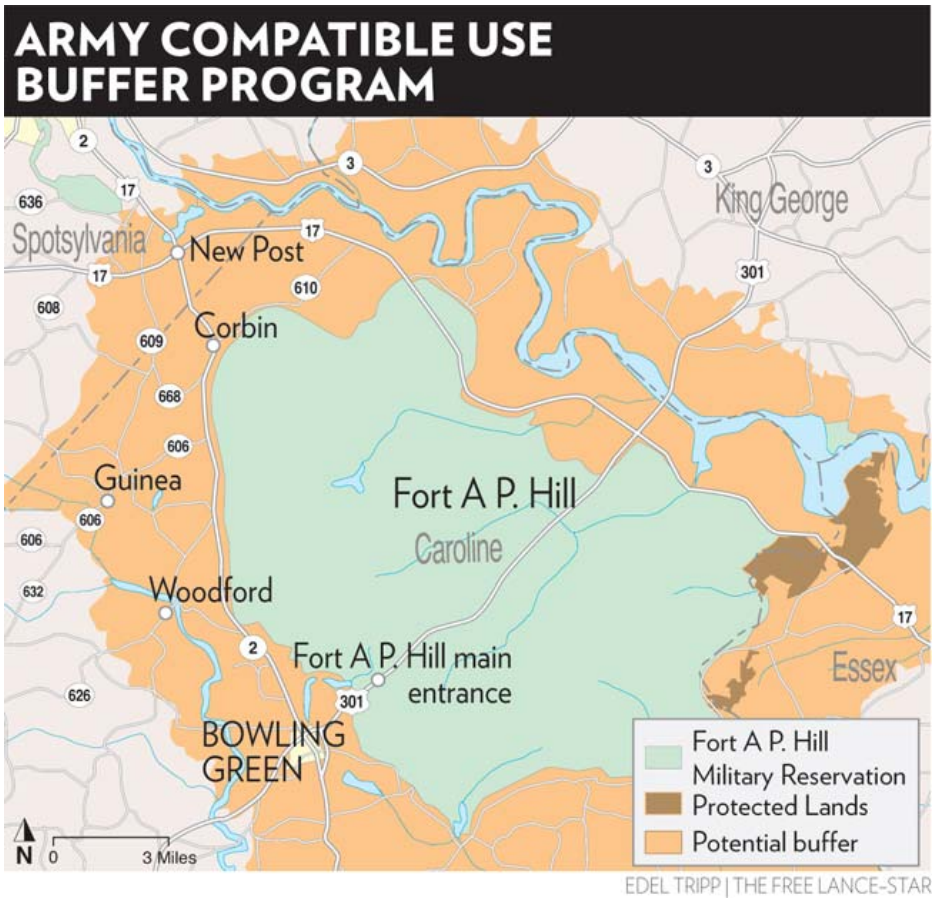


Figure B-8. Fort A.P. Hill operations would benefit from buffers surrounding the property. Lands currently protected by ACUB agreements are to the southeast of the installation, shown here in brown, 2008 (Fredericksburg.com http://fredericksburg.com/News/FLS/2008/092008/09042008/406435/index_html?page=1).

Through these established easements, the installation worked with several external partners to protect land without obtaining ownership of all areas. The partners associated with the Fort A.P. Hill’s ACUB Program were: The Conservation Fund, The Nature Conservancy (Virginia Chapter), The Nature Conservancy, The Trust for Public Land, Virginia Outdoors Foundation, Northern

Neck Land Conservancy, U.S. Fish & Wildlife Service, Virginia Department of Historic Resources, and Virginia Department of Game and Inland Fisheries (Mullin 2011, slide 3).

The agreement between Fort A.P. Hill and Camden Farm was so successful that it won the National Trust/Advisory Council on Historic Preservation Award for Federal Partnerships in 2011 and was considered for the 2010 GSA Achievement Award for Real Property Innovation (Dennen 2011 & Natoli 2010).

Successful results from this ACUB Program were: creating positive partnerships; coordinating efforts with the surrounding archeological community; conducting outreach activities with interested parties; and defining clear historic preservation priorities for the installation and its partners (Mullin 2011, slide 22). Nevertheless, there were some unanticipated delays during the course of the program due to: it was the first attempt of an off-site mitigation at Fort A.P. Hill; each partner wanted to have control of the project; and disparity in the assumptions about what the formal and informal roles of the ACUB partners were to be (ibid.).

The creation of the ACUB agreement for cultural resources preservation and mitigation is a new interpretation of the ACUB program. This new interpretation provides Army CRMs with an effective management strategy that frees land on an installation for training while funding important cultural resource preservation nearby. Although the ACUB program does not replace the efficiencies of predictive modeling, the background information gathered for Fort A.P. Hill’s model enabled the CRMs to successfully pursue the ACUB process. Identifying significant historic properties in a region allows better prioritization of installation resources relative to cultural properties existing off-installation. Prioritizing sites could allow the installation to forgo either the expensive protection or the restriction of training areas of locations where certain less-important or less-significant cultural properties exist at Fort A.P. Hill while ensuring the permanent preservation of more-important cultural resources off-installation via the ACUB agreement.

Appendix C

LESSONS-LEARNED AND PERCEIVED OPPORTUNITIES

Lessons-Learned

Both time and costs can be saved if researchers and CRM personnel have a more complete idea of where archeological sites can be found. Overall, predictive and historical context methods help in three major ways with archaeological sites: to reduce time, to reduce costs, and to support the individual installation's mission. These savings allow more time and resources to be spent caring for sites and finding additional sites. The protection of sites helps the installation carry out their missions. It helps to open up lands, include sites into training, and teach soldiers the importance of dealing with cultural and historic resources in times of combat.

Site hardening, as implemented at Fort Drum, has proven extremely supportive of the installation's mission. Site hardening allows previously restricted areas on training ranges to be actively utilized for key soldier training activities. Revegetation and adding soil to sites reduces erosion, so it is also helpful environmentally. Adding supportive built structures to targeted areas of the site (such as wells or foundations) also assists the site to resist adverse effects from training. Geotextiles can be used to cover the site and when layered with gravel or other aggregate fill material, they can provide extra site stability. Geotextiles also help to reduce or eliminate erosion and can be combined with revegetation strategies, as well as where additional soil overburden is employed to provide an additional layer of site protection. It should be ensured that any added soil will not incur adverse effects to the underlying soil and historic resource. Ideally, the added soil will have similar physical and chemical properties as soils already on the site; soil testing can be done to confirm this similarity. Other neutral media, such as washed gravel or washed sand, can also be utilized as long as the weight does not inflict damage to the underlying resource layers. Imported soil chemical characteristics such as acidity, metals content, and drainage capability can impact the future use, integrity, and value of archeological sites.

Two-step models, such as the one utilized at Fort Leonard Wood, provide a screening process that can identify areas that warrant further investigation and resources. Specifically, the model's landscape approach incorporated with historical significance

allows cultural management teams to find sites specific to the characteristics specified by the management team. For example, once there is some indication of which sites have the best potential for eligibility to the National Register, more time and manpower can be directed to investigate those specific areas, compared to investigating every possible site.

Use of the ACUB program at Fort A.P. Hill, illustrates the effectiveness of a key Army program. An ACUB agreement not only provides opportunities for defragmentation of training lands, but also assists in preserving regional cultural assets in a holistic manner, addresses encroachment, and works toward sustainability.

Future Opportunities

There are several opportunities for military and civilian uses of information gained from creative cultural resources management.

- Soldiers can take the knowledge they gain in nonintrusive training on sites that have been hardened and apply that knowledge to combat elsewhere. Nonintrusive action while in theatre will help soldiers gain respect for the cultural resources of an area. In addition, some educational role-playing within training scenarios can be done to encourage soldiers' engagement and sensitivity to cultural resources.

- An educational story could be created if a site would become hardened and no longer available for public viewing. Computer-animated technologies using old photographs, other historical information, and photographs of the current condition of the site could be compiled and displayed. This "virtual" site would allow information about the site to still be available to the public.

- Significance modeling using a landscape approach not only assists military managers in identifying archaeological sites, but it also adds to the history of a region and illustrates how and why land was used and settled. These models enrich the prehistoric and historic knowledge of the areas impacted by an installation's establishment and development.

- With a cultural resources-focused ACUB agreement, installation partners or individual landowners within the vicinity of the installation become stewards for valuable

resources, helping to preserve the heritage surrounding the installation with the understanding that the external heritage may be more valuable than the heritage which exists on the installation. As a multifunctional asset, an ACUB agreement can be used to protect cultural resources, threatened and endangered species, and species habitats. Thus an ACUB can also provide environmental conservation measures to benefit the entire region surrounding the installation.

Appendix D:

ACRONYMS AND ABBREVIATIONS

Term	Definition
ACHP	Advisory Council on Historic Preservation
ACUB	Army Compatible Use Buffer
AR	Army Regulation
ARPA	Archaeological Resources Protection Act
BMP	Best management practices
CECW	Directorate of Civil Works, United States Army Corps of Engineers
CEMP-CE	Directorate of Military Programs, United States Army Corps of Engineers
CERL	Construction Engineering Research Laboratory
CFR	Code of the Federal Regulations
CONUS	Continental United States
CRM	cultural resource manager
DPW	Directorate of Public Works
DoD	Department of Defense
DoDI	Department of Defense Instruction
DPW	Directorate of Public Works
DPTMS	Directorate of Plans, Training, Mobilization and Security
EMS	Environmental Management System
EO	Executive Order
ERDC	Engineer Research and Development Center
FUDS	formerly used defense site
HQUSACE	Headquarters, United States Army Corps of Engineers

Term	Definition
ICRMP	Integrated Cultural Resources Management Plan
ITAM	Installation Training Area Management
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NTC	National Training Center
PE	professional engineer
P.L.	Public Law
POC	point of contact
PWTB	Public Works Technical Bulletin
SES	Senior Executive Service
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
USACE	United States Army Corps of Engineers
UV	ultraviolet
U.S.C.	United States Code
WWII	World War II

Appendix E:

REFERENCES

Advisory Council on Historic Preservation. 2009. *In A Spirit of Stewardship: A Report on Federal Historic Property Management 2009*. Washington, D.C.: Advisory Council on Historic Preservation.

Busby, V. *Combining 10 USC 2684a Authority and National Historic Preservation Act Compliance: Off Post Innovations at Fort A.P. Hill, Va.* Fort A.P. Hill 24 January 2011. Power Point Presentation. Available through the Fort A.P. Hill Cultural Resource Management Office.

Carlson-Drexler, Carl G., Ellen R. Hartman, Carey L. Baxter, and Susan I. Enscore. 2012. *Prioritizing Historical Archaeological Sites at Fort Leonard Wood, Pulaski County, Missouri*. ERDC/CERL TR-12-6. Champaign, IL: U.S. Army Engineer Research and Development Center-Construction Engineering Research Laboratory.

Dennen, Rusty. 2009. "A.P. Hill Added 3,000 Buffer Acres in '08." Fredericksburg.com. Accessed 20 August 2014. http://fredericksburg.com/News/FLS/2009/062009/06092009/471861

_____. 2011. "Fort A.P. Hill Wins for Preservation." Fredericksburg.com. Accessed 20 August 2014. http://www.fredericksburg.com/News/FLS/2011/102011/10212011/659880?showi=fbi

Edging, Richard, Lucy A. Whalley, Adam D. Smith, Steven D. Smith, D. Mather, Manroop K. Chawla, and Suzanne K. Loechl. 2003. *Fort Leonard Wood Integrated Cultural Resources Management Plan 2002–2006*. Champaign, IL: U.S. Army Engineer Research and Development Center-Construction Engineering Research Laboratory.

Enscore, Susan I., Suzanne K. Loechl, Megan W. Tooker, and Stephanie L. Nutt. 2005. *A Landscape Approach to Determining Significance of 19th and 20th Century Farmsteads and Rural Communities, Fort Leonard Wood, Missouri*. ERDC/CERL SR-05-33. Champaign, IL: U.S. Army Engineer Research and Development Center-Construction Engineering Research Laboratory.

Fort A.P. Hill. 2013a. "Fort A.P. Hill History." Accessed 18 November 2013. http://www.aphill.army.mil/history.asp.

_____. 2013b. *Integrated Cultural Resources Management Plan (ICRMP)*. Available through the Fort A.P. Hill Cultural Resource Management Office.

Fort Drum. 2013. "Fort Drum History." Accessed 18 November 2013. http://www.drum.army.mil/AboutFortDrum/Pages/History_lv2.aspx.

Fort Irwin. 2012. Onsite visit and interview by author with Ruth Sparks, installation ITAM Coordinator, and Brantley Jackson, installation archaeologist.

_____. 2013. "Fort Irwin." Accessed 18 November 2013. http://www.irwin.army.mil/Visitors/Info/Pages/FortIrwinHistory.aspx.

Fort Leonard Wood. 2013. "About Fort Leonard Wood." Accessed 18 November 2013. http://www.wood.army.mil/newweb/about.html

Hall, Reggie. n.d. *Camden Farm*. The Conservation Fund. Accessed 20 August 2014. http://www.conservationfund.org/projects/camden-farm/

Mullin, J. January 2011. “Mitigation through Off-Site Conservation.” Presentation available through the Fort A.P. Hill Cultural Resource Management Office.

Natoli, Nancy. 2010. “Fort A.P. Hill Innovative Mitigation.” Office of the Deputy Under Secretary of Defense for Installations and Environment, Basing Directorate. Accessed 20 August 2014. http://gsa.gov/graphics/ogp/2010AssetMgmntWinner.doc.

Quates, E., M. Schulz, and L. Rush. 2013. *Integrated Cultural Resources Management Plan*. Fort Drum, NY: U.S. Army Fort Drum.

U.S. Army Environmental Command. n.d. "ACUB Fact Sheets: Fort A.P. Hill." Accessed 16 December 2013. http://aec.army.mil/Portals/3/acub/VA-APHill.pdf.

Wagner, Heather, Laurie Rush, and Ian Warden. March 2007. *Best Management Practices for Hardening Nineteenth Century Foundations and Villages for Training*. Legacy Resource Management Program Project No. 06-303. Washington, DC: Department of Defense.