



## ***Integrating Military Training and Archaeological Site Integrity: A Field Analysis Approach***

**Project  
10-435**

### **Background:**

The purpose of this study was to identify practical methods for designing military training activities that do not adversely affect the National Register of Historic Places (NRHP) status of archaeological resources on Department of Defense (DoD) installations, with the ultimate goal of sustaining critical military training while complying with cultural resource stewardship responsibilities.

In order for an archaeological site to remain eligible for the NRHP, it must retain sufficient integrity to convey its significance. How much impact an archaeological site can sustain without losing its necessary integrity and how to measure that impact is as yet unclear. Considerable research has been done both on the effects of military vehicles on soils and on the nature and distribution of archaeological sites on military installations. While some of these studies have focused on the vulnerability of archaeological sites to predictable impacts from vehicle traffic, the research has been primarily qualitative rather than quantitative in nature. The current project proposed a specifically detailed examination of vehicle impacts under actual field conditions, integrating recommendations of a previous Legacy study, #09-435, to assess the particular effects of training on sediments and the archaeological contexts they represent.

### **Objective:**

The objective of the project was to develop information that would assist in designing and executing training exercises that can be conducted in areas containing potentially vulnerable archaeological resources, rather than having to avoid those areas as is now often the case.

### **Summary of Approach:**

The major challenge for this study was assessing ways of modeling the thresholds at which vehicle impacts from military training may adversely affect the NRHP eligibility of an archaeological site. The investigation began with a review of current literature regarding existing studies, most of which have been either conducted under experimental conditions or have been some form of computer modeling, to review current understanding of the current scope of investigative analysis. The study then focused on a specific result of the movement of vehicles across military training landscapes—soil compaction. The extent and degree of soil compaction was measured under actual field conditions, and the implications of this form of soil alteration on archaeological data contained in the soil were assessed.

Field testing was conducted at the Virginia Army National Guard installation at Maneuver Training Center Fort Pickett, and at Marine Corps Base Quantico, Virginia. Both installations represent active military vehicle training centers and have large and diverse archaeological inventories.

At each installation, appropriate non-NRHP-eligible archaeological sites in current training areas were selected. Soils were sampled below visible rut disturbances of varying age and condition at each site. Standard sedimentary data were recorded and columns were extracted for micro-morphological analysis. The columns were treated with resin, thin-sectioned, and examined microscopically in the laboratory.

### **Benefit:**

The project will assist DoD installations nationwide that conduct training exercises in the field in meeting their cultural resources management compliance requirements while maintaining mission-critical training activities. The end result will be the ability to design and execute training exercises that can be conducted in areas containing potentially vulnerable archaeological resources, rather than having to avoid those areas as is currently often the case.

### **Accomplishments:**

The study documented evidence of disturbance from biological agents, but little direct evidence of compaction. Little difference was noted between samples associated with visible ruts and those in control areas without visible surface disturbance. Soil porosity was observed in all of the samples examined and was considered to have been the result of biological activity and surface disturbance associated with plowing.

On the basis of the investigation's findings, a series of recommendations was presented:

- conduct similar actualization studies in different settings with different soil conditions to increase understanding of the range of impacts that may be expected
- conduct similar studies before and after training activity focused on specifically documented vehicle types
- combine soil micro-morphological analysis in a more comprehensive study with other techniques such as bulk density, resistivity, and hydraulic conductivity
- incorporate micromorphology/soil compaction studies into NRHP evaluations of sites within vehicle maneuver areas to provide a better baseline for determining the types of sediments and various conditions wherein soil compaction is liable to occur.

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