

AN ARCHEOLOGICAL OVERVIEW AND MANAGEMENT PLAN FOR THE
HARRY DIAMOND LABOR. (U) ENVIROSPHERE CO NEW YORK
W M GARDNER ET AL. JUL 85 CX4000-3-0010

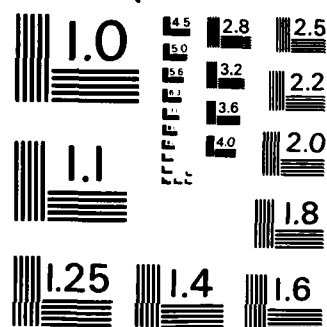
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Final
Report No. 15
July 1985

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**An Archeological Overview and Management Plan
for the Harry Diamond Laboratories-
Woodbridge Research Facility**

Under Contract CX4000-3-0018 ✓
with the

National Park Service
U.S. Department of the Interior

Philadelphia, Pennsylvania 19106

for the
U.S. Army Material Development and
Readiness Command

by

Thunderbird Archeological Associates, Inc.

Front Royal, Virginia 22630

and

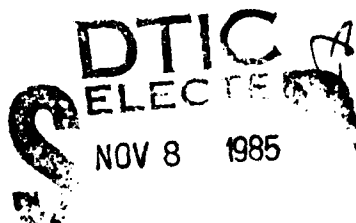
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2 World Trade Center
New York, New York 10048

Prepared under the Supervision of

Joel I. Klein, Principal Investigator
Envirosphere Company

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AD-A161029

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REPORT DOCUMENTATION PAGE		1. REPORT NO.	2.	3. Recipient's Accession No.
4. Title and Subtitle		5. Report Date		
An Archeological Overview and Management Plan for the Harry Diamond Laboratories-Woodbridge Research Facility		July, 1985		
7. Author(s)		8. Performing Organization Rept. No.		
William M. Gardner, James L. Nolan, Edward Otter and Joel I. Klein		DARCOM Report No. 15		
9. Performing Organization Name and Address		10. Project/Task/Work Unit No.		
Envirosphere Company 2 World Trade Center New York, New York 10048				
12. Sponsoring Organization Name and Address		11. Contract(C) or Grant(G) No.		
National Park Service Mid-Atlantic Regional Office 600 Arch Street Philadelphia, PA 19106		(C) CX 4000-3-0018 (G)		
13. Supplementary Notes		14. Type of Report & Period Covered		
This report was prepared as part of the DARCOM Historical Archeological Survey (DHAS), an interagency technical services program to develop facility-specific archeological overviews and management plans for the U.S. Army Material Development and Readiness Command (DARCOM).		Final Report		
16. Abstract (Limit: 200 words)				
This archeological overview and management plan provides a tool which can be used by DARCOM and decision-makers at the Harry Diamond Laboratories - Woodbridge Research Facility to assist in complying with regulations and procedures relating to historic preservation. (Technical Manual 5-801-1; Technical Note No. 78-17; Resources Management; 32 CFR 650.181-650.193; Army Regulation 420-40; Army Regulation 200-1; Army Regulation 200-2; 36 CFR 800). This document summarizes data relating to the area's environmental history; previous archeological surveys; presently identifiable archeological resources; known artifact, ecofact, and/or documentary collections relating to archeological resources; potentially identifiable but not presently recorded archeological resources; significant archeological resources; ongoing and planned activities that could affect archeological resources; locational data of known archeological resources; and locational data of potential archeological resources. A total of six archeological sites are known to exist at the Harry Diamond Laboratories - Woodbridge Research Facility (three prehistoric and three historic). Available data are inadequate to assess the archeological significance of any of the known sites, though it is probable that significant archeological resources exist on the facility. Recommended studies include: 1) testing at the locations of future development projects; 2) surveying undisturbed areas of the facility for archeological resources; 3) testing the resources located in the survey for National Register of Historic Places eligibility; 4) reviewing facility publications and orientation procedures to include mention of DARCOM's historic preservation responsibilities; and 5) establishing an on-call relationship with an entity capable of delivering professional archeological consulting services to deal with the unanticipated discovery of archeological remains.				
17. Document Analysis a. Descriptors				
Archeological Management Army Installation Management Environmental Analysis				
b. Identifiers/Open-Ended Terms				
Cultural Resource Management Archeological Resource Management The Harry Diamond Laboratories-Woodbridge Research Facility				
c. COSATI Field/Group				
18. Availability Statement:		19. Security Class (This Report)		21. No. of Pages
Available for public release without appended site locational data				x1+73
		20. Security Class (This Page)		22. Price

MANAGEMENT SUMMARY

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PREPARERS AND QUALIFICATIONS

William M. Gardner directed Thunderbird Archeological Associates, Inc. in data collection and analysis for this overview. He holds a PhD degree in Anthropology and is a Professor at Catholic University of American in addition to being President of Thunderbird Archeological Associates, Inc. Dr. Gardner has had extensive experience in archeological research and cultural resource management in the Mid-Atlantic region.

James L. Nolan is Assistant Technical Manager for the DARCOM project, responsible for day-to-day operations. He is the principal author of this archeological overview and management plan. He holds a BA degree in English and Anthropology, a PhD in Anthropology, and an MBA in Finance. Over the past 12 years, Dr. Nolan has participated in excavation, analysis, management and reporting of many archeological projects in the northeastern and southwestern United States as well as in Peru. He is currently an Engineer with Envirosphere Company.

Edward Otter participated in the data collection and report preparation phases of this overview. He received BA and MA degrees in Anthropology and is currently working toward a PhD in Anthropology. He has worked on numerous archeological projects in the Mid-Atlantic region.

Joel I. Klein is Project Manager for the DARCOM project. He is a contributing author of this archeological overview and management plan. He holds a BS in Anthropology and Physics and MA and PhD degrees in Anthropology. He is certified in field research and cultural resource management by the Society of Professional Archeologists. He has participated in archeological investigations across the United States over the past 15 years. He is currently a Principal Engineer with Envirosphere Company.

ACKNOWLEDGEMENTS

This archeological overview and management plan could not have been written without the cooperation of Robert J. Gunther, Jim Shropshire, Ralph M. Peck, Milton Brown, John Ganz and Rodney Metzger of the Harry Diamond Laboratories. All gave generously of their time and provided essential data relating to the history of the facility's development.

Stephanie Rodeffer, National Park Service, provided guidance throughout the course of this project.

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1.1 PURPOSE AND NEED

This archeological overview and management plan will assist the U.S. Army Materiel Development and Readiness Command (DARCOM) in its efforts to comply with laws and regulations concerning the management of archeological resources at the Harry Diamond Laboratories-Woodbridge Research Facility (HDL-WRF).

The National Historic Preservation Act of 1966 as amended (94 Stat. 2988) affirmed the policy of the federal government (Sec. 2(3)) to "administer federally owned, administered or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations." Section 110(a)(1) of that code specifies that each federal agency is responsible for the preservation of such resources on agency-owned or controlled lands. DARCOM is committed to the implementation of that policy, following the guidelines for historic resource management set forth in the 1966 Act and related laws, regulations, and technical guidance.

DARCOM has contracted with the U.S. Department of the Interior's National Park Service to provide technical guidance for the development of DARCOM installation cultural resource overviews and management plans. The program is entitled the DARCOM Historical/Archeological Survey (DHAS). The National Park Service has in turn separated this review and planning program into two major elements, architectural and archeological. The architectural review and planning function is being directed by the Service's Historic American Buildings Survey (HABS), while the archeological resource assessment and planning function is being handled through the Service's Interagency Resources Management Division (IRMD). The archeological function includes both prehistoric and historical archeology.

Under the requirements of the National Historic Preservation Act (NHPA) of 1966 as amended (80 Stat. 915, 94 Stat. 2987; 16 USC 470), DARCOM must:

- inventory, evaluate, and where appropriate nominate to the National Register of Historic Places all archeological properties under agency ownership or control (Sec. 110(a)(2))
- prior to the approval of any ground-disturbing undertaking, take into account the project's effect on any National Register -

listed or eligible property; afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed project (Sec. 106)

- complete an appropriate data recovery program on an eligible or listed National Register archeological site prior to its being heavily damaged or destroyed (Sec. 110(b), as reported by the House Committee on Interior and Insular Affairs [96th Congress, 2d Session, House Report No. 96-1457, p. 36-37])

Since the passage of the National Historic Preservation Act Amendments of 1980, DARCOM has begun a more active commandwide program in historic resource management. DARCOM's management program involves several steps. The first step is a literature review and preliminary evaluation of known cultural resources on DARCOM facilities. This provides a basis for prediction of the overall resource base requiring management. The second step involves applying the understood parameters of the resource base in a plan which takes into consideration both short- and long-term command activities and goals.

Other compliance regulations taken into consideration by this archeological overview and management plan include:

- o The Archeological and Historic Preservation Act of 1974 (88 Stat. 174, 16 USC 469), which requires that notice of an agency project that will destroy a significant archeological site be provided to the Secretary of the Interior; either the Secretary or the notifying agent may support survey or data recovery programs to preserve the resource's information values.
- o The Archeological Resources Protection Act of 1979 (93 Stat. 721, 16 USC 470aa; this supersedes the Antiquities Act of 1906 [93 Stat. 225, 16 USC 431-43]), with provisions that effectively mean that
 - The Secretary of the Army may issue excavation permits for archeological resources on DARCOM lands (Sec. 4)
 - Anyone damaging an archeological resource on DARCOM lands may incur criminal (Sec. 6) or civil penalties (Sec. 7).
- o 36 CFR 800, "Protection of Historic and Cultural Properties" (44 FR 6068, as amended in July 1982); these regulations from the Advisory Council on Historic Preservation set forth procedures for compliance with Section 106 of the National Historic Preservation Act.
- o Regulations from the Department of the Interior setting forth procedures for determining site eligibility for the National Register of Historic Places (36 CFR 60, 36 CFR 63), procedures implementing the Archeological Resources Protection Act (43 CFR 7) (also published as Department of Defense regulation 36

CFR 229), and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716)

- o Guidance from the U.S. Department of the Army as to procedures and standards for the preservation of historic properties (32 CFR 650.181-650.193; Technical Manual 5-801-1; Technical Note 78-17; Army Regulation 420-40; Army Regulation 200-1; Army Regulation 200-2).

The formulation of archeological plans for DARCOM installations is part of a developing national acceptance of the historic Resource Protection Planning Process (RP3) (HCRS 1980). RP3 presents an outline for the development of preservation plans, which, in turn, provide an analytical structure for preservation decision-making. This archeological overview and management plan has been prepared with those guidelines in mind.

This report is based on information made available by installation representatives as of August 1984.

1.2 THE HARRY DIAMOND LABORATORIES WOODBRIDGE RESEARCH FACILITY

The Woodbridge Research Facility (WRF), occupying 578.85 a. of federally owned land in the eastern section of Prince William County, Virginia, is a satellite facility of Harry Diamond Laboratories-(HDL), Adelphi, Maryland. HDL is a part of the U.S. Army Electronics Research and Development Command (ERADCOM), a major subordinate command of the U.S. Army Material Development and Readiness Command (DARCOM).

WRF is located 25 mi. southwest of Washington, D.C. on a small neck of land on the west side of the Potomac River between Belmont Bay and Occoquan Bay. In 1950 the Department of the Army purchased 648.61 a. in fee at Woodbridge, Virginia and the following year purchased .07 a. for road access. The site was designated as the Department of the Army Transmitting Station under the U.S. Army Command and Administrative Communications Agencies, Chief Signal Officer in 1952. Following a major army reorganization in 1962, the station, one of the largest communications facilities in the world, was redesignated the U.S. Army CONUS Regional Communications Command, East Coast Radio Transmitting Station, Woodbridge, Virginia. The station was placed in 1965 under the U.S. Army Strategic Communications Command, CONUS (USA STRATCOM-CONUS). In July 1969, the station was inactivated and excessed (WRF 1982 a).

Designated the USAMC Woodbridge Research Facility, Woodbridge, Virginia, 641.68 fee owned acres were transferred to the U.S. Army Material Command (USAMC) in July 1970. At this time the seven a. Woodbridge Housing Site near the main entrance was transferred to the U.S. Army Engineer Center and Ft. Belvoir, Virginia (USA ECFB). Harry Diamond Laboratories acquired the WRF from Army Material Command - USA Mobility Equipment R & D Center as part of a consolidation of USAMC nuclear weapons effects research and test activities. In December 1972, 62.03 acres along Marumsco Creek was excessed and transferred in August

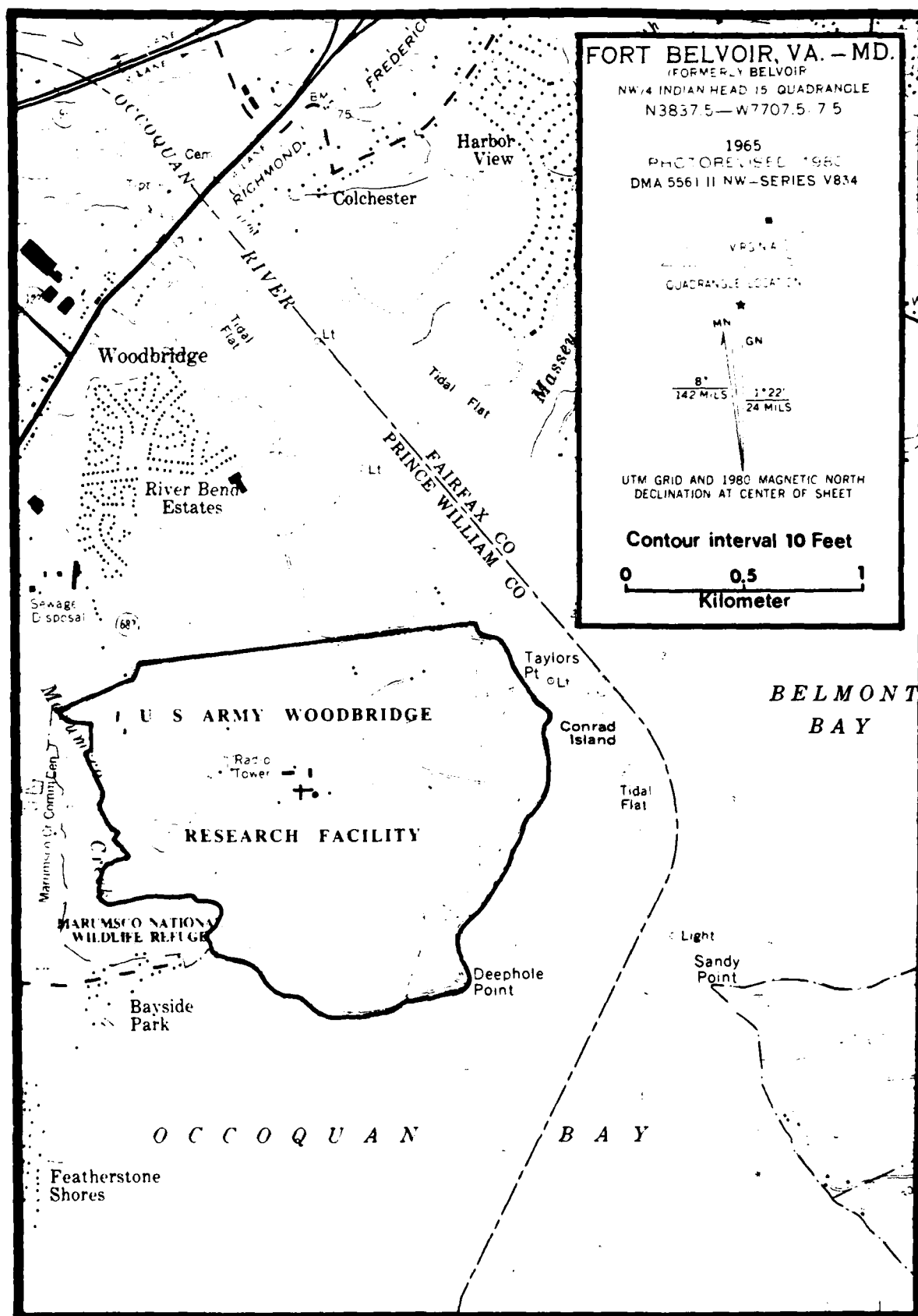


Figure 1-1. MAP OF THE GENERAL VICINITY OF THE HARRY DIAMOND LABORATORIES, WOODBRIDGE RESEARCH FACILITY

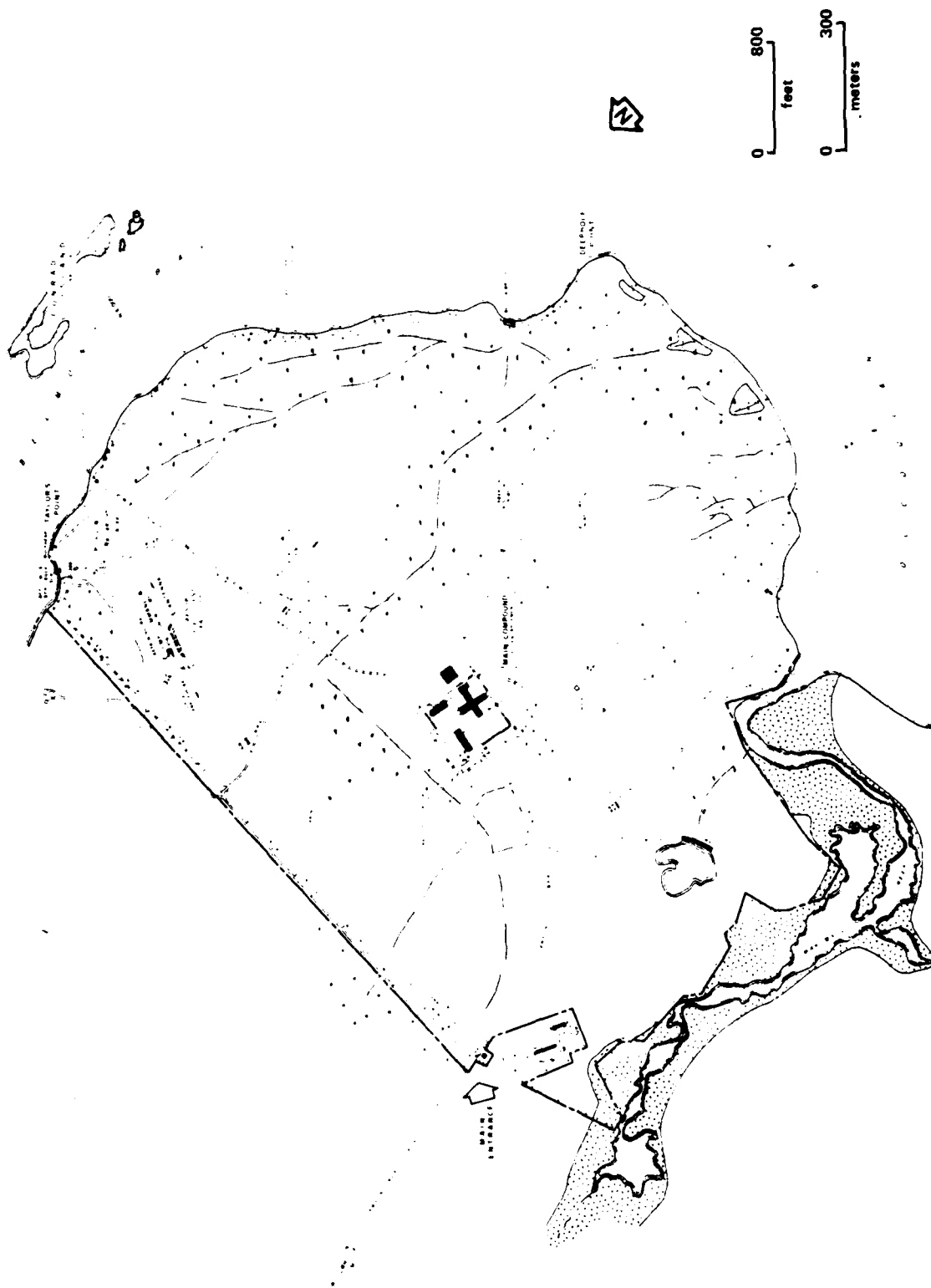


Figure 1-2. MASTER BASE MAP OF THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

1973 to the Department of the Interior, Bureau of Sports, Fisheries, and Wildlife (WRF 1982).

WRF's current missions are to identify, plan, and execute research on nuclear weapon generated electromagnetic pulse (EMP) effects and apply research results to EMP vulnerability evaluation and hardening of critical military systems (WRF 1982a:3). As part of ERADCOM, WRF is responsible for the Army's research and development tactical Intelligence, Surveillance, and Target Acquisition (ISTA) material resources (WRF 1982a:4).

1.3 SUMMARY OF PREVIOUS ARCHEOLOGICAL WORK CONDUCTED ON THE HARRY DIAMOND LABORATORIES-WOODBRIDGE RESEARCH FACILITY

No systematic archeological research has been conducted at the Woodbridge Research Facility. Artifact collections have been made, primarily by avocational archeologists, with an emphasis on collecting temporally diagnostic artifacts. These collections indicate possible prehistoric sites from the Early Archaic to Late Woodland periods and at least one historic site dating from the late seventeenth century/early eighteenth century to the Civil War. Collections made prior to 1980, however, lack information accurately recording the provenience of the artifacts in the collections, and locations of sites are general and vague; no maps showing site locations were made. One problem involved in locating these sites relates to a change in the names of two points of land that protrude into Occoquan Creek and Occoquan Bay. The southerly point is now identified as Deep Hole Point and the easterly point, on Occoquan Creek, is labelled Taylor's Point. Earlier maps (e.g., Brown 1901) have these names reversed. Notes of site locations which are based on proximity to Taylor's Point or Deep Hole Point, then, are unreliable based on the impossibility of determining which of the two points of land is indicated. The only positively identified site from the facility is 44PW126, identified by amateur archeologists on Conrad Island, just east of Taylor's Point and recorded by the Fairfax County Archeological Survey.

Many archeological sites, prehistoric and historic, have been recorded for the vicinity of the Woodbridge Facility. The Fairfax County Archeological Survey has, to date, recorded 22 sites along Belmont Bay, on the mouth of Occoquan Creek, as part of an extensive survey of Mason Neck (Michael Johnson 1983: personal communication; Fairfax County Archeological Survey Site Files; see also Whitmore 1974).

Most of the sites reported by the Fairfax County Archeological Survey lack temporal diagnostics, as work has only progressed through the location of sites. Where diagnostics are reported, however, they tend to be from the Late Archaic through Late Woodland periods, with emphasis on the Late Woodland (Michael Johnson, 1983, personal communication). The Fairfax County Archeologist feels that the village of Tauxenent, occupied by the Dogue Indians at the time of European contact according to John Smith, may be located on Mason Neck, perhaps along Belmont Bay.

Considerably less research has been conducted on the Prince William

County side of Occoquan Creek. During the late nineteenth century and early twentieth century a number of prehistoric sites were identified along the Potomac River. Site 44PW3 is recorded as a Late Archaic through Late Woodland site along the edge of Occoquan Bay, south of the Research Facility. More recent work was conducted in the early 1980's under the auspices of the Thunderbird Regional Preservation Office, part of a now defunct system of regional offices under the direction of the Virginia Historic Landmarks Commission. These investigations consisted of environmental impact surveys of specifically defined areas in imminent danger of impact. Most of these surveys were away from the Potomac or Occoquan shorelines, and indicate few sites in the Coastal Plain/Piedmont interface zone away from the rivers and major creeks (see Walker 1981 for a summary of impact surveys conducted in Prince William County as part of the Regional Preservation Office program). An additional survey of the drainages of Nebasco and Powell's Creeks, just south of the Woodbridge Facility, indicated a number of sites, including Late Woodland on these creeks, particularly where they enter the Potomac (Barse and Gardner 1982). The number of sites drops precipitously with distance upstream from the Potomac.

1.4 THE SOCIOCULTURAL CONTEXT OF THE ARCHEOLOGICAL RESOURCES ON THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

The area around WRF was sparsely populated until after World War II. The main occupation of the area was agriculture until that time, when population began to increase commensurate with the growth of the Washington D.C. metropolitan area suburbs. Between 1960 and 1970, population in Prince William County increased 121.5 percent and between 1970 and 1980 there was an increase of 30.2 percent to 144,703 inhabitants (Census of Population 1982). The county is considered to be roughly 80 percent urban and 20 percent rural, and the population of the Woodbridge administration unit was 4051 in 1980 (Census of Population 1982).

Prehistoric sites located on the Woodbridge Facility would be of interest primarily to the archeological community. Late Woodland/Contact sites, particularly those associated with the Dogue Indians, a Piscataway (Conoy) group, might be of interest to local Native Americans, but little such interest has been evidenced (no contacts have been made with the Fairfax County Archeological Survey, which is actively trying to locate the major Dogue site on Mason Neck). Native American groups are active in the Washington, D.C., area, but their attention appears to be more Pan-Indian, or, in the case of the modern Piscataway Indians, focused on the Maryland side of the Potomac River. The Piscataway are descendants of early historic period Amerinds living in the general vicinity of the District of Columbia, especially in eastern and southeastern Prince George County and Charles County Maryland, across the Potomac River from the Woodbridge facility. They are, however, not concentrated in any residential clusters but rather are dispersed throughout the general population (Feest 1978a). Within the last decade there has been a resurgence of pride among the Piscataway commensurate with the general national Pan-Indian movement, although, unfortunately for tribal cohesiveness, several factions have developed.

Currently, the Woodbridge vicinity is undergoing a change in demography as the suburban spread from the District of Columbia area moves further south. Suburban communities already extend into Prince William County, including smaller developments that are built, being built, or planned for the U.S. Route 1 corridor just northwest of the Woodbridge facility. The older communities were more rurally oriented, often inhabited by descendants from the earliest settlers who came to the area during the late seventeenth century. These people are often intensely interested in local history, and oppose the modernization of the area that accompanies suburban spread. The presence of a site from the late seventeenth to early eighteenth century, indicated by Capt. Johnson's collection, would be of interest to such groups, as the Prince William and Fairfax County Historic Societies.

Prince William County also has a community of Black Americans with a long history in the area. Most of the pre-Civil War farmers owned slaves, and communities of freed slaves were established following the end of the war. Local Black Americans might be interested in a late seventeenth and eighteenth century site that could provide evidence of Black American culture for that period. Because of the relatively few studies of early Black communities, slave or freed, this potential would also be of interest to the scientific community.

2.0

AN OVERVIEW OF THE CULTURAL AND RELEVANT NATURAL HISTORY
OF THE HARRY DIAMOND LABORATORIES-WOODBRIDGE RESEARCH FACILITY

2.1 THE PHYSICAL ENVIRONMENT

2.1.1 Earth Resources

The Woodbridge Facility is located on the southern edge of the embayed mouth of Occoquan Creek, at its point of junction with the Potomac River. Physiographically the facility lies in the western or inner part of the Coastal Plain Province, relatively close to (less than 5 km to the east of) the Piedmont Province. The southern portion of the facility is marsh, underlain by alluvium from the Potomac River and Occoquan Creek, while the northern portion of the facility is situated on a slightly higher, Post Pleistocene terrace of the Potomac. Much of the northern one-third of the facility, and a small section of the center of the facility, where the main installation is located, is underlain by deep, well drained soils of the Wickham loam (Kaster and Porter n.d.). The Wickham loam is described by Kaster and Porter (n.d.) as "developed from sediments washed from upland soils derived from the weathered products of quartzite, granitic, or micaceous schist rocks". This soil is often underlain by gravels or small cobbles, which can be exposed if the deposits have been eroded. It is the major soil on the facility with agricultural potential, proving good to excellent for most crops. The major portion of the remainder of the non-marsh area in the facility is classed with the Elkton silt loam, a poorly drained soil developed from marine sediments (Kaster and Porter n.d.).

No exposed cobble beds are reported for the Woodbridge facility but cobbles and gravels should occur throughout the facility and immediately adjacent to it. These cobbles serve as the primary source of lithics for the prehistoric Coastal Plain populations (Gardner 1978). Most of the cobbles and gravels derive originally from the ancestral Potomac and include a variety of cherts, jasper, quartzite, rhyolite, silicified sandstone, and quartz. Tributary streams such as Occoquan and smaller streams also carry this material as they cut through the various cobble deposits and quartz float and veins in the adjacent Piedmont.

2.1.2 Water Resources

Three sides of the Woodbridge facility are bordered by water courses: Occoquan Creek, including Belmont Bay, to the east, the Potomac River to the south; and Marumsco Creek to the west. The Potomac and Occoquan are embayed but are generally of quite low salinity and would

have been potable during the prehistoric period. Salinity would have varied depending on cycles of precipitation. Extended periods of drought would have allowed upriver creep of salinity with wet periods having the opposite effect. Before ca. 3000 years ago, all of the local water would have been fresh. Marumsco Creek was likely always fresh. In addition, several springs occur in the northern part of the facility and a high water table enables shallow, hand dug wells to reach water. Historic period siltation resulting from deforestation, land clearing and modern pollution have severely altered these conditions.

2.1.3 Modern Climate

The modern climate of the Woodbridge Research Facility is typified by moderately cold winters and warm, humid summers. The mean annual temperature is 56°F; the average precipitation is 42.2 in. The winter climate is influenced by the position of the upper westerlies just to the north, producing a climate characterized as continental, with winds from the north or northwest and occasional episodes of warm and cold fronts moving through in rapid succession (Gale Research 1980:340). The mean temperature for the three coldest months, December, January and February, is 35°F, with an average minimum temperature of 27°F, although minimum temperatures to -15°F have been recorded (DARCOM 1981).

The summer climate is influenced by a semi-permanent high pressure system to the south, producing southerly winds carrying moisture from the Atlantic Ocean inland (Gale Research 1981:340,252). The mean temperature for the three warmest months, June, July and August, is 75°F; the mean temperature for the warmest month, July, is 77.5°F. The mean summer maximum is 84°F, although temperatures as high as 106°F have been recorded (DARCOM 1981). Because of the circulation of air from the Atlantic Ocean, summer high temperatures are usually associated with high humidity.

The climate of the northern Virginia Tidewater produces a long growing season with an average frost free period of 225 days and a minimum frost free period of 185 days. The average date of the last freeze is March 29 and the average first fall freeze is November 10. The latest spring freeze is April 16 and the earliest fall freeze is October 21.

2.1.4 Plant Resources

The Woodbridge Research Facility is located within the Southern and Lowland Region of the Temperate Forest Biome (Shelford 1963). The original forest type was described as Oak-Hickory, and included various oak species, predominantly post oak, but also white, black, blackjack and scarlet oak; various hickory species, such as shagbark, mockernut and occasionally pignut hickory; occasionally chestnut, tulip tree (poplar), American Beech and pines (Shelford 1963:57). Oak acorns and hickory nuts served as food for prehistoric human populations as well as for a variety animal species.

2.1.5 Animal Resources

A variety of animals would have been present at the Woodbridge Research Facility during the Prehistoric period, including: (1) land animals of the mast forest, (2) animals of the Potomac River, (3) animals of the fresh water Occoquan River, and (4) seasonal animals associated with the proximity to Chesapeake Bay. Major mast feeding animals include white tailed deer, turkey, and squirrel; minor animals include bear, raccoon, opossum, skunk, box turtle and passenger pigeon. Ecotone settings were favored by deer and rabbit, and prehistoric populations created such settings by cultivating domestic plants or by intentionally burning undergrowth.

Since the Woodbridge facility is situated at the mouth of Occoquan Creek, available resources would include animals of the brackish Potomac River and of the relatively fresh water Occoquan. Salt tolerant fish, and cockles would have been available; oysters and salt water clams were probably not available as the facility is slightly further upriver than their extent. Fresh water animals including perch, rockfish, crappie, red drumfish, and catfish as well as frogs, crayfish and fresh water mussels would have been available. The brackish Potomac would have served as a source for a variety of fish. Menhaden, bluefish, harvestfish, butterfish, mullets, summer and winter flounder, puffer, and others entered the estuaries to feed on the abundant phytoplankton (Wiley 1970). Spring spawning anadromous fish such as sturgeon, striped and white bass, blueback herring, alewife and shad would have been available seasonally in great abundance. Wiley (1970:153) reports that almost a million pounds of sturgeon were harvested in the Chesapeake Bay in 1890. Catadromous eels were also plentiful. Besides fish, the shallow estuaries and adjacent marshes attracted migratory birds of the Atlantic coast flyway, with great numbers of geese and ducks available on a seasonal basis.

While no inventories of animal resources exist for the Woodbridge facility, extensive surveys have been conducted on the Mason Neck Wildlife Refuge directly across the mouth of Occoquan Creek from the facility. These surveys reported 196 species of birds (Klimkiewicz 1970; U.S. Dept of Interior 1971), including a large number of migratory waterfowl; 45 species of mammals (Jones and Klimkiewicz 1971); 29 species of amphibians (Klimkiewicz 1972a) and 46 species of reptiles (Klimkiewicz 1972b).

2.1.6 Paleoenvironment

Paleoenvironmental reconstructions for the Middle Atlantic area (Carbone 1976, 1983; Dent 1978; Gardner 1978, 1979, 1980, 1982) divide the post 12,000 BP period into four major climatic episodes (Table 2-1): Late Glacial (14,000 BP to 10,500 BP), Early Post-Glacial (10,500 to 8500 BP), Mid Post-Glacial (3500 to 8500 BP) and Late Post-Glacial/modern (3500 BP to present). No paleoenvironmental data from the Woodbridge facility are known. Reconstructions are based on summaries of data from other sources, primarily pollen from bogs. Reconstructions by Carbone

Table 2-1 A SUMMARY OF THE ENVIRONMENTAL HISTORY OF THE AREA OF THE HARRY DIAMOND LABORATORIES-WOODBRIDGE RESEARCH FACILITY

Carbone 1976 combines Whitehead 1972 and Harrison et. al. 1965
Middle Atlantic Region
(Southeastern Virginia--Dismal Swamp)
Pollen

Date	Inferred Climate	Date	Inferred Climate
3500 BP to present	Cypress-Gum (also oak, pine, hickory)	3500 BP - present	Late Post Glacial/modern climates; cooler and moister than Sub-Boreal; Chesapeake Bay and embayed tributaries at current levels; increase in chestnut in mast forests; includes Sub-Atlantic, Scandic, Neo-Atlantic and Pacific climatic episode
8200 - 3500 BP	Oak-Hickory 8200-6000 BP--sweet gum, grasses and lianophytes	8500 - 3500 BP	Mid Post-Glacial climate 8500-6000 B.P.--Atlantic Episode; "hypsithermal" interval; warmer and moister than modern climate; more rapid sea level rise than earlier, embayment of Chesapeake Bay and tributary mouths; mesic forest--oak dominance, but other nut bearing trees also present
10,600 - 8200 BP	6000-3500 BP--Orontium-Composite--fern Beech, hemlock, birch (oak also)	6000-3500 B.P.--Sub-Boreal episode; "xerothermic" interval; warm and dry, but with fluctuations of temperature and rainfall; increase in hickory; oak-hickory forest; increase in chestnut	Early Post-Glacial climate (Pre-Boreal and Boreal episodes); slightly warmer and drier than Late Glacial; melting northern glaciers cause sea level rise; beginning of major embayment of Susquehanna River to form Chesapeake Bay and embayment of mouths of tributaries; mixed coniferous/hardwood forest--hemlock, birch, beech, with increase in oak and hickory at end of period; reduction of non-arboreal floral zones
15,300 - 10,600 BP	Pine, spruce, low non-arboreal pollen	To 10,500 BP	Late Glacial climate; colder and wetter than modern; particularly wetter during winter; reduced sea level; coastal plain rivers in narrow channels draining into Susquehanna River/early Chesapeake; mosaic of floral zones--arboreal and non-arboreal; trees are spruce and pine; non-arboreal grasses, sedges, heliophytes, hydrophytes.

(1976, 1983) were based on a large number of pollen sequences, including one from Dismal Swamp in southeast Virginia. Carbone's interpretations follow an episodic model of climatic change (following Wendland and Bryson 1974) rather than a gradual model.

Late Glacial (14,000-10,500 BP). The Late Glacial climate was colder and wetter than modern with a mean July temperature approximately 5° less than current. Summer precipitation probably approximated modern levels but there were substantially greater amounts during the winters in the form of snow. In addition, a combination of greater cloud cover and reduced temperatures lowered the evaporation rate. This period was, however, warmer than the previous mid-glacial episode as evidenced by the retreat of the continental glacier to northern New York state.

The changes in distribution and extent of animal and plant species in relation to climatic change was complex producing communities for which there are no modern analogs (Carbone 1983:6). The current model is of a mosaic pattern of plant communities with marked vertical and horizontal zonation. Mixed conifer, mainly pine and spruce with some deciduous elements, coexisted with open grasslands in well-drained uplands. Lower elevations were typified by a variety of deciduous species. The makeup of the faunal community is not well known, and the Late Pleistocene appears to be a period of considerable change. While a mixed mosaic forest would tend to support both grazers and browsers, there is no specific information available. Extinction of Pleistocene megafauna, including mammoth and mastodon, may or may not predate the Late Glacial. Major game animals may have been deer and elk. Deer may have become the dominant game animal increasing in abundance along the extensive edge areas of the mosaic plant community coupled with reduced competition due to terminal Pleistocene extinctions.

The beginning of glacial retreat also changed the drainage patterns of major streams and rivers. During full glaciation (20,000 to 18,000 BP) sea level may have been reduced by 30-100 m due to the amount of water held in the glaciers. Hydrologically, a lower sea level would produce down-cutting in streams and rivers to reestablish grade. The Lower Potomac in the vicinity of the Woodbridge facility may have been entirely fresh water and non-tidal; the Occoquan almost certainly was. With retreat of the glaciers, sea level rose, probably drowning the mouth of the Chesapeake Bay by 12,000 to 11,000 BP. The modern extent of embayment of the mouths of tributaries of the Potomac River and lower Susquehanna River/Chesapeake Bay would not occur until later.

Early Post-Glacial (10,500-8500 BP). The Early Post-Glacial is marked by the continued trend toward warmer and drier conditions, coupled with a decrease in cold adapted plant species and an increase in temperate ones. The mixed mosaic forest begins to close, and greater numbers of deciduous species are present. Carbone (1976:54) notes that dominant trees were beech, hemlock, burchard oak. This forest would still support a high density of edge adapted browsers such as deer and elk.

The rise in sea level continued (and probably accelerated), and the

tidal limits moved up the Potomac. In addition, with the increased sea level, streams and rivers were in the process of aggrading, probably accomplished by increased meandering. These situations could have helped to increase populations of fish. The embayed lower Chesapeake Bay began to attract migratory waterfowl during this period.

Mid Post-Glacial (8500-3500 BP). This period is characterized by rapid increase in temperature to the highest post-glacial mean temperature, and during the later part of the period by a decrease in precipitation. Because of the changes in precipitation this period is usually divided into two episodes: Atlantic (8500-6000 BP) and Sub-Boreal (6000-3500 BP).

The beginning of the Atlantic episode is marked by a "dramatic shift in circulation patterns . . . at around 8700 BP" (Carbone 1976:106). The average temperature rose steadily, but precipitation remained the same or even increased, leading to a warm, humid environment. Upland forests closed, and are characterized as oak-hickory dominated. Lowland forests also had high percentages of oak and hickory, but pine appeared also. Pollen cores from the lower Chesapeake Bay (Carbone 1976:50-56) show an increase in grasses and hydrophytic plants related to the spread of marshlands caused by the increase in sea level. The rapid temperature increase caused the final retreat of the continental glacier by the end of this period, with sea level approaching modern levels (although it continues to rise throughout the Holocene period). A list of dominant animals still includes deer, but populations of mast feeding animals such as turkey and squirrel probably increased. Populations of estuary related species, including anadromous fish and migratory waterfowl, probably increased dramatically.

The Sub-Boreal episode (6000-3500 BP), also termed the xerothermic interval, is characterized as warm and dry, with an average temperature at least 20°F greater than present. Annual rainfall amounts may have fluctuated more greatly than during previous periods, but the overall characterization is toward reduced rainfall coupled with a higher evaporation rate. The upland forest was oak-hickory dominated, but with an increase in chestnut. In the Coastal Plain southern species, for example, southern pines, and cypress appeared to the south and the Potomac River coastal plain area was probably characterized as an oak-pine-hickory forest. Dominant forest animals continued to be deer, turkey and squirrel.

By this period sea level had almost reached modern levels, and the lower Potomac River was tidal probably to the Georgetown area. The mouth of Occoquan Creek was certainly embayed and possibly brackish by this time, supporting both brackish and fresh water fish. By this time runs of anadromous fish were probably reaching pre-Contact levels, and these fish, including sturgeon and shad were numerous during the fish runs. By this time the Chesapeake Bay area, including the lower Potomac, was a major stop on the migration route of waterfowl, and these birds became a plentiful, seasonal resource.

Late Post-Glacial/Modern (3500 BP - Present). At about 3500 BP the

climate became roughly modern. Although fluctuations occurred during that 3500 year period, they are not so great as differences between periods. Basically, the climate became cooler and moister than the preceding Sub-Boreal episode, supporting modern floral and faunal communities.

2.2 THE CULTURAL ENVIRONMENT

This section presents a summary of the prehistory, ethnohistory and history of the region around the Woodbridge Facility. Prehistoric and ethnohistoric summaries are more general in nature, based on regional summaries by Gardner (1974, 1977, 1978, 1979, 1980, 1982) and Gardner and Carbone (n.d.), Walker (1981) and Feest (1978a,b,c). Information that specifically applies to the Woodbridge Facility is available only for the ethnohistory and history, primarily the post-Contact history. An outline of the cultural chronology is presented in Table 2-2.

2.2.1 Prehistory

The prehistory of the Middle Atlantic region is generally divided into three periods: (1) Paleo-Indian (9500-7500 B.C.), (2) Archaic (7500 - 1000 B.C.) and (3) Woodland (1000 B.C. to Contact, approximately A.D. 1550). Each of these periods is further divided into three phases: early, middle and late. In general, the Paleo-Indian period is described as a hunting and gathering adaptation to Late Glacial and Early Post-Glacial environments which emphasized hunting. The Archaic period is typified as a more generalized foraging adaptation to the mild mid Post-Glacial environments. The Woodland period is marked by the appearance of ceramics. During the Woodland, cultivation of domesticated plants began and by the end of the period, is marked by increasing dependence on domesticates.

Paleo-Indian (9500-7500 B.C.). The Paleo-Indian period is the oldest currently accepted human occupation in the Middle Atlantic area. The potential for earlier occupation exists, and sites with earlier dates have been reported in Pennsylvania, and in other areas of North and South America. However, these sites are considered controversial, and, in any event, no general summaries of the cultures have been made. Three phases for the Paleo-Indian period have been defined by Gardner (1974): Clovis (9500-9000 B.C.), Mid-Paleo (9000-8500 B.C.) and Dalton (8500-7500 B.C.), based on changes in projectile point styles in the Shenandoah Valley of Virginia. Based on identified Paleo-Indian sites from the Shenandoah Valley (Gardner 1974, 1977, 1978) and the Williamson site in Dinwiddie County, Virginia (Benthall 1973; McCary 1951), typical assemblages of stone tools include unifacial scrapers, wedges, and graters as well as bifacial projectile points and knives throughout all three phases. While preservation is poor from sites of this period, stone tools point to a flaked stone technology emphasizing animal processing tools made from high-grade materials.

One of the hallmarks of the Paleo-Indian period in the United States is the emphasis placed on cryptocrystalline rocks--chert, chalcedony and

Table 2-2. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

Cultural Unit		Kinds of Archeological Remains Representative of Period				
Tradition	Period or Phase	Date	General Settlement Patterns	General Subsistence Systems		
American	Commercial	AD 1920 to present	Rural small farms with large market focus (Washington), becoming more suburban residence related to Washington	Agriculture, tied to regional and national markets; light industry, often service oriented; national government employment	American manufactured goods; plastics; beverage bottles (bottle machine made); cans, crimped seam and seamless; pull tabs, aluminum foil; automobile parts; frame houses; ceramics--whitewares	
	Post Civil War/Industrial	AD 1865 to 1920	Small farms with local focus; some small, locally focused industry; surplus traded to regional markets (Washington and Alexandria)	Agriculture; small service industry; overland trade by railroads and highways	Frame structures; rural outbuildings; mills; privies and trash pits on rural sites; ceramics--whitewares	
	Pre Civil War/Early Industrial	AD 1820 to 1865	Small farms with local focus; some large farms; tenant farming; use of slaves; reduction in trade; local ports closed (silted up)	Agriculture; small local industry; trade by overland transport on roads	Frame structures/ruins; outbuildings/possible slave quarters; mills; wells, privies, trash pits; tobacco pipes ceramics--pearlware	
Colonial	Post Revolution	AD 1781 to 1820	Mixed large farms and small farms/tenant farms; some use of slaves; local small industry; small port towns	Agriculture; reduction in tobacco and other exports; local industry; water transport increasingly replaced by overland transport	Frame structures/foundations; outbuildings/possible slave quarters; wells, privies, trash pits; tobacco pipes ceramics--pearlware, some creamware, salt-glazed stoneware	
	Late Colonial	AD 1700 to 1781	Mixed large and small landholdings; florescence of plantations; tenant farms; some use of slaves, especially on large farms; tobacco as cash crop (trade to England); small trade towns/ports	Agriculture; cash crop of tobacco; small industries for local production and export; water transport	Foundations and house outlines of large and small frame structures; outbuildings; slave quarters, wells, privies, trash pits; tobacco pipes ceramics--salt-glazed stoneware, creamware, gray stoneware	
	Early Colonial/Late Contact	AD 1600 to 1700	European: isolated large landholdings; tenant farms; very small villages in southern Tidewater region	Agriculture; development of as cash crop traded in international market	Farm sites, foundations and house outlines of frame structures; wells, privies, trash pits; tobacco pipes ceramics--lead glazed red bodied earthenwares, slipwares, tin glazed earthenwares, stoneware	

Table 2-2. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY (CONTINUED)

Cultural Unit					Kinds of Archeological Remains Representative of Period	
Tradition	Period or Phase	Date	General Settlement Patterns	General Subsistence Systems		
	Discovery and Exploration	AD 1550 to 1600	Aboriginal: major population depletion due to disease; major shifts in population; dislocation, fragmentation European: camps, trading posts, missions Aboriginal: shifts in population due to trade; increased nucleation of settlements; increased warfare	Horticulture, hunting and gathering; trade with Europeans Sponsored exploration Horticulture/agriculture, hunting and gathering; trade of furs to international markets; regional trade of European goods	Triangular and metal points; metal trade goods--axes and kettles; glass beads; European flint Small sites; metal and glass trade goods; tobacco pipes Triangular points; shell tempered pottery; European trade goods including glass beads, metal items; European flint; palisaded villages	
Woodland	Late Woodland	AD 1000 to ca 1550	Larger sites, palisaded in later part; long term settlement/villages in areas near agricultural land and estuary resources; smaller inland sites (hunting?)	Maize horticulture/agriculture; hunting and gathering to supplement; shellfish and fish along rivers and estuaries	Village sites (some palisaded); camp sites; ossuaries; ceramics--Potomac Creek, Rappahannock/Townsend Series, Shephard points--small triangles	
	Middle Woodland	500 BC to AD 1000	Camp sites near riverine/marine resources, especially near embayed estuaries of streams and rivers; small upland sites	Hunting and gathering; probably horticulture; shellfish and fish at river/estuary sites	Shell middens; camp sites; small upland sites; ceramics--Popes Creek, Albemarle, Mockley; points--Calvert, Rossville, Claggett, Selby Bay	
	Early Woodland	1000 BC to 500 BC	Camp sites near riverine/marine resources, especially near embayed estuaries of streams and rivers; small upland sites	Hunting and gathering; seasonal resources; shellfish and fish at river/estuary sites	Shell middens; camp sites; small upland sites; ceramics--Marcey Creek, Selden Island, Accokeek; Point--Vernon, corner and side notched variants	
Archaic	Late Archaic (or Transitional)	2500 BC to 1000 BC	Larger riverine/marine camp sites, especially at embayed estuaries of streams and rivers; small upland camps	Hunting and gathering; riverine focus--shellfish and fish; gathering includes hickory nuts and acorns	Shell middens; camp sites; smaller upland sites; points--broadspear variants, fishtail points; steatite bowls	
	Middle Archaic	6500 BC to 2500 BC	Many widely distributed small sites in most environmental zones; no quarry sites, no emphasis on quality of lithic raw material; many limited activity sites keyed to seasonally available resources	Hunting and gathering; emphasis on gathering/foraging, especially vegetal foods (acorns and nuts important)	Small camp sites; large sites where variety of resources; points--bifurcates (LeCroy, St. Albans, Kanawha), stemmed (Stanly, Morrow Mt., Guilford), side notched (Halifax); ground stone tools	

Table 2-2. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY (CONCLUDED)

Cultural Unit					Kinds of Archeological Remains Representative of Period	
Tradition	Period or Phase	Date	General Settlement Patterns	General Subsistence Systems		
Paleo- Indian	Early Archaic	8000 BC to 6500 BC	Expansion into more areas than Paleo-Indian, but still large camps near lithic sources; shift to deemphasis of lithic material and emphasis on seasonal resources	Hunting and gathering; shift to more foraging, especially seasonally available resources	Small camp sites; base camps/ large sites near desired resources; points--corner and side notched (Palmer, Kirk et al.)	
	Late Paleo or Dalton	7500 BC to 8000 BC	Fewer sites; large sites re- lated to lithic procurement areas; hunting sites	Hunting and gathering	Quarry sites, stone tool manufacturing sites; small hunting sites; points--Dalton, Dalton/Hardaway	
	Mid-Paleo	8500 BC to 8000	Few sites; related to lithic procurement; small hunting sites	Hunting and gathering	Quarry sites, stone tool manufacturing sites; small hunting sites; point--Middle Paleo (small fluted point)	
	Clovis	9500 BC to 8500	Large camps related to lithic procurement areas; quarry sites at sources of crypto- crystalline rocks; hunting sites	Hunting and gathering; apparent emphasis on hunting technology	Quarry sites, stone tool manufacturing sites; base camps near sources of lithics; small hunting/extraction sites; point-- Clovis	

jasper-- as raw materials for stone tools. In areas where raw material sources are few or are localized, location of sources of these raw materials has proved an effective analytic and predictive tool for archeological site location. Emphasizing the source of lithic raw material, Gardner (1974, 1977, 1979, 1980, 1983) has defined five types of sites for this period: 1) quarries, (2) lithic reduction stations, (3) quarry associated base camps, (4) base camp maintenance stations and (5) hunting camps. A sixth category is added for completeness, (6) individual finds of Paleo-Indian points, even though these may not represent sites per se. All except the hunting site and point finds are locationally dependent on lithic deposit, as well as such variables as water, nearby high biomass habitats, site aspects, level topography, and drainage. Hunting sites and point finds are also dependent on the location of the desired lithic types in that they tend to define the overall exploitation area, and such sites and finds decrease in frequency in relation to their distance from raw material sources. Near sources of raw material, sites tend also to be near the junctions of low order streams with higher order streams, on terraces or fans in floodplains.

For the Virginia-Maryland area, known base camps are in the Shenandoah Valley (Ridge and Valley physiographic province), the Potomac River edge of the Piedmont-Blue Ridge interface, and the Virginia Piedmont below the James River. Relatively high densities of Paleo-Indian point finds have been reported for the Eastern Shore of Maryland, opposite the mouth of the Potomac (Brown 1979), associated with cobble beds which include cherts and jaspers deposited by the ancestral Susquehanna River.

While no known Paleo-Indian sites have been reported within the vicinity of the Woodbridge facility, individual point finds have been made. Surveys in Fairfax County, Virginia, have reported Paleo-Indian points from several areas within the county, including along a tributary of Occoquan Creek (Cub Run) and Accotink Creek, the second stream north of the mouth of the Occoquan (Johnson 1980). In addition, a Paleo-Indian point was found along Occoquan Creek about one mile north of the town of Occoquan (Michael Johnson, 1983, personal communication). At least three fluted points have been reported from the Bennings area overlooking the Anacostia River in southwest Washington, D.C., which is across the Potomac and a few miles upstream from the facility (Site Files, Washington D.C., Consortium of Universities Potomac River Archeological Site Survey, American University).

Archaic Period - Early Archaic (7500 - 6500 B.C.). For the Middle Atlantic area Gardner (1974, 1977, 1979, 1980, 1983) considers the Early Archaic phase to be an extension and continuation of the Paleo-Indian period, based on similarities of stone tool kit, settlement patterns, and focus on cryptocrystalline lithic raw material. The Early Archaic differs from the Paleo-Indian in the appearance of axes and drills in the stone tool assemblages and an increase in the number of sites. The increased number of sites, including expansion into topographic areas where no earlier sites have been found, probably reflects population growth and increased exploitation of a diversity of terrain. During this

phase the emphasis on cryptocrystalline rock diminishes, and by the end of the phase a more eclectic selection of raw material is apparent.

A number of sub-phases have been created for the Early Archaic, based on subtle changes in projectile point styles (Coe 1964; Broyles 1971). Gardner (Gardner and Carbone n.d.) has summarized the point typologies into the following sequence: Corner Notched Horizon, Side Notched Horizon, and Stem Indented Horizon.

While more Early Archaic projectile points have been found than Paleo-Indian ones in northern Virginia, the number is still relatively low. The Fairfax County Archeological survey reports Early Archaic points from several sources, notably along tributaries of the Occoquan Creek (especially Cub Run, near where Paleo-Indian points were also found) and along the northern bank of Occoquan Creek, directly across from Occoquan. In addition, a collection made on the Woodbridge facility by Judge William Graham includes an Early Archaic point.

Archaic Period - Middle Archaic (6500-2500 B.C.). The Middle Archaic period represents a major culture change from the earlier Paleo-Indian-Early Archaic continuum. Changes in artifact types and assemblages and in settlement patterns which began in the Early Archaic were completed in the Middle Archaic. Ground stone tools appeared for the first time during this period and the raw material for the flaked stone tools was whatever was locally available. The basic adaptive strategy was one of exploitation of seasonally ripening resources in a variety of niches and habitats. Populations moved from the riverine areas after the early spring, into the inter-riverine uplands and smaller streams during the summer and fall, and back to the rivers in the late fall or early winter. As contrasted to the Paleo-Indian and Early Archaic, this is generally viewed as a broad based or generalized hunting and gathering economy, as opposed to the more focal economies of the earlier periods. The Middle Archaic witnesses a de-emphasis of the hunting aspect and a broadening of the more generalized aspects of subsistence. Within the Middle Archaic several horizons have been defined, based almost entirely on changes in projectile point styles. The beginning of the Middle Archaic in the Middle Atlantic area is marked by the appearance of bifurcate-based points. Following this, Gardner (Gardner and Carbone n.d.) defines a Stem Indented Horizon, a Contracting Stem Horizon, and the first Side Notched horizon.

Middle Archaic sites can be located virtually anywhere. The only limiting factor is water. Middle Archaic sites are usually no more than 200 to 400 ft. from a water source, e.g., a spring, stream, river, pond, lake, creek, or swamp. Sites are often near sources of lithic material, but since tools are made from locally available materials, this is not useful in predicting site locations.

Lithic material is available in the form of cobbles throughout the area of the Woodbridge Facility. The Middle Archaic settlement pattern probably included large base camps as well as smaller base camps and more transient, small sites. Large base camps tend to be located in

especially high biomass habitats. Winter and early spring base camps were in the most dependable and productive habitats, the floodplains of the major rivers. Other seasonal base camps were located in any especially productive habitats such as the fluvial swamps in the Coastal Plain. These types of camps can be considered fusion stage sites in which the largest clusters of people gathered at any particular time. In the fission stage the larger population clusters broke down into varying size smaller cooperating social units. These were the most numerous of the base camps and tended to be located where water and lithic raw material were available, where there was an immediately contiguous productive habitat, and where other productive habitats were within easy access. The most numerous Middle Archaic sites were much smaller, the type of site which is usually included under the category of lithic scatter or transient camp. The best interpretation of these sites is that they were support camps or exploitative camps which radiate out from the different types of base camps. In this sense, the base camps can be viewed as the staging area for these smaller, more specialized, limited stay sites.

One of the more striking phenomena in Middle Atlantic archeology is the sudden proliferation of Middle Archaic period sites. This is true not only for the total number of sites and point finds, but also of the tremendous diversity of terrain in which they are found. It seems obvious that this represents a marked population increase over the preceding period. Based on the location of the Woodbridge Facility and the almost ubiquitous nature of Middle Archaic sites, sites of this period are likely present at the facility.

The Fairfax County Archeological Survey has reported a large number of Middle Archaic points found along tributaries of Occoquan Creek and along the Creek itself, close to the Woodbridge facility. In addition, artifact collections from the facility indicate at least a minimal Middle Archaic occupation.

Archaic Period-Late Archaic (2500-1000 B.C.). The change from Middle to Late Archaic is marked in the archeological record by an apparently abrupt shift from small side notched point variants to a broad bladed form. The most frequent type, and probably the earliest, is the Savannah River BROADSPEAR, which has a nearly pan-regional distribution from central Florida along the Atlantic Coast to at least New Hampshire, and inland to the Appalachian Plateau. In the Potomac Piedmont and Coastal Plain, this point is invariably made of quartzite which is available in cobble form.

Also associated with this is the widespread use of bowls made of soft stone such as steatite or talc. Quarries of this material are known in the adjacent Piedmont of Virginia and Washington, D.C. Stone bowls are most common in base camp settings and more infrequent in transient camps, a factor which probably reflects portability.

At some point in time, the Savannah River BROADSPEAR diverges into two distinct styles, the Perkiomen and narrow bladed Savannah River

variant. Kinsey (1974) suggests this occurs around 1900 to 1800 B.C. The Susquehanna Broadspire, a kindred form, may evolve out of the Perkiomen or directly from the Savannah River. Populations making this style were extremely riverine oriented and radiate throughout the riparian Piedmont. In the greater Washington area, points of the Susquehanna style while common in the Piedmont rarely cross over into the Potomac Coastal Plain. The point style in the Coastal Plain is the Savannah River variant known as Holmes. This stylistic boundary is the first example of a marked border between apparently different populations. This border remains viable until the middle of the Late Woodland period. Subsequent developments during the latter part of the Late Archaic see side notched forms such as Dry Brook and Orient developing out of the Susquehanna style, while a straight stemmed, narrow bladed, and slightly reduced type known as Vernon evolves out of the Savannah River continuum.

The earliest part of the Late Archaic continues a relatively unmodified base camp fusion-fission pattern (Gardner 1982), but by the time of the split in point styles toward the middle and later portions of the period, riverine sedentism becomes a reality. This seems to occur first in the adjacent Piedmont but by the end of the period most all groups in the Inner Coastal Plain have reached a sedentary hamlet lifestyle. The sedentary focus in the Inner Coastal Plain is in and around the estuaries in strategic locations for the harvest of anadromous fish as well as marsh and upland terrestrial resources. The correlation here is with the deceleration of sea level rise, establishment of a stable marine-estuarine environment, and radiation of resources associated with these habitats, in particular the anadromous fish. With the move to a focal economy, the overall number of Late Archaic period sites decreased particularly in the inter-riverine, inter-estuarine setting. However, riverine and estuarine sites became larger and perhaps more numerous although there is insufficient information to demonstrate this. This reduction in total numbers of sites indicates the reduction in seasonal shifting noted above and a rise in longer term stays. Satellite extractive camps radiating out from the base camp-hamlet settings remain as support elements in the system.

Most of the Late Archaic sites are, as noted, concentrated in the riverine or estuarine setting, generally at the junction of a stream with a river or estuary, or in the Piedmont, on islands in a river. Large base camps have been noted in a number of areas, generally in settings strategic for the exploitation of anadromous fish. Smaller satellite sites, replicating in most respects the larger sites, occur at other strategic spots. Within some minimal distance of these sites, a number of smaller upland inter-riverine sites may also occur. These types of sites decrease markedly with an increase in the distance from the major rivers. The Woodbridge Facility is in an excellent position for sites of this period, and broadspire type points are reported from the facility.

Woodland Period - Early Woodland (1000 - 500 B.C.). The Early Woodland in the vicinity of the Woodbridge Facility is technologically characterized by the appearance of ceramics which replace and are

initially made in the form of precursor stone bowls. For the vicinity of the Woodbridge Facility the Early Woodland is also marked by the appearance of the Vernon projectile point, apparently derived from the Savannah River Broadsphear. The earliest ceramic type, known as Marcey Creek, is succeeded by types known as Seldon Island and Accokeek, both of which have cord impressed exteriors as opposed to the plain exteriors of Marcey Creek. With the Seldon Island type there also appears the introduction of the annular ring or coiling technique of pottery manufacture and the basic conoidal based pot form.

Coiling manufacture, conoidal based pots, and decoration on the exterior vessel walls with some form of textile impression mark aboriginal ceramics until the loss of indigenous technology in the historic period. While pottery is significant as a temporal marker, it is even more significant as an indicator of the sedentary way of life which is also a hallmark of the Early Woodland. While the later pattern of corn, beans, and squash agriculture is not known to be present at this time, it is suspected that manipulation of local plant resources in a fashion approaching horticulture was probably developed as a supplement to the previously existing fishing and general foraging pattern, enabling establishment of a sedentary way of life. There were probably also advances in storage technology, as well as increased social emphasis on the generation of surpluses.

Although information is limited, there is little to support any suggestion of a population increase during this period. Site sizes tend to remain the same, and there seems to be no increase in the number of sites, satellite or otherwise. Although sedentism in a hamlet, or cluster of small numbers of dwellings, became the way of life at this time, the outlying support sites continued. Sites of this phase appear in the same locations as Late Archaic sites, and Early Woodland ceramics have been reported from the Woodbridge Facility. Large concentrations of Early Woodland material are known from the immediate vicinity in the Potomac Piedmont and across the river in adjacent Prince Georges County (Stephenson 1963).

Woodland Period - Middle Woodland (500 B.C. - A.D. 1000). There is little change locally from the preceding phase. Site sizes and locations continue virtually identical to Early Woodland sites. Elsewhere in the Middle Atlantic region extensive trade systems, elaborate funeral complexes and low level ranked societies evolve. The Middle Woodland period is marked by changes in ceramic styles as pottery with net marked exteriors appears in the Coastal Plain and net markings and cordmarking appears on Piedmont ceramics. The Piedmont types are known as Albermarle Cordmarked and Net Impressed, while the Coastal Plain type is labelled Popes Creek Net Marked. This divergence in ceramic styles appears to be associated with a divergence in point styles, with a contracting stem form called Rossville (or Rossville-like) in the Piedmont and a small side notched type called Calvert in the Coastal Plain.

Around A.D. 200 a second period of the Middle Woodland begins, marked by changes in ceramic styles and a marked stylistic divergence between

Coastal Plain and Piedmont ceramics. In the Coastal Plain, a shell tempered type, Mockley Ware, replaced the previous sand tempered wares, which had begun with Accokeek and had continued through Popes Creek types. The Albemarle style of the Piedmont continued unchanged. The type of projectile point associated with shell tempered pottery is called Selby Bay. Widespread localized trade is noted.

Sites of the Middle Woodland are reported for the general area of the Woodbridge Facility, and artifacts from this period have been collected on the facility.

Woodland Period - Late Woodland (A.D. 1000 - 1550). The Late Woodland represents a clear break from the earlier Middle Woodland in subsistence and site locations. At the beginning of the Late Woodland it appears that corn, bean and squash agriculture had become a major component of the subsistence system. While major sites are still located in areas with fresh water and a variety of natural resources, the most important variable appears to be proximity tracts of arable and easily tilled land. Large sites are about the same size as Middle Woodland sites, and hunting and gathering satellite sites continue to be occupied.

The beginning of the Late Woodland is also marked by the widespread use of the bow and arrow and the almost universal spread of triangular projectile points used to tip the arrows. Ceramic styles change slowly through the Late Woodland. Coastal Plain shell tempered types slowly develop into those of the Rappahannock/Towsend Series. Fabric impressed exteriors replace other forms of surface treatment. Decorative embellishments of pottery, using a cord wrapped stick, become more common.

In the Piedmont the Albermarle Tradition develops into what is known as the Montgomery Focus with associated Shephard ware. In this series, cordmarked surfaces predominate. Strips of clay, or pseudo-collars, are added to the rim-lip of the vessels. By around 700 B.P. this tradition expands into the Potomac Coastal Plain, replacing the Townsend/Rappahannock series. After this, there is continued expansion of this tradition along the Western shore of the Chesapeake Bay as far south as the Rappahannock River. The Potomac Creek series develops from Shephard ware and is embellished with cord wrapped stick stamping over a portion of the vessel body. East of the Bay and south of the Rappahannock River the Townsend/Rappahannock series develops into incised decorated types associated with Algonquian speaking groups of southeastern Virginia and the Eastern Shore. The Potomac Creek series is associated with the historic Piscataway, Conoy and Patuxent and allied groups such as the Dogue.

Sometime just before the arrival of Europeans, or just after the fur trade had begun in the mid-sixteenth century, inter-Indian rivalries led to the coalescence of hamlets into villages with nearby individual farmsteads. Many of these villages, particularly those in frontier areas, become stockaded.

Many Late Woodland sites are recorded along the Potomac River. Very

large sites are usually located along major creeks and rivers where large creeks enter the Potomac, such as the mouth of Occoquan Creek. This is reinforced by historic accounts of the seat of the Dogue Indian group at the mouth of Occoquan Creek, and by collections of Late Woodland artifacts from Masons Neck (Michael Johnson, 1983, personal communication) and from the Woodbridge Facility.

2.2.2 Ethnohistory

Discovery and Exploration/Early Contact. The earliest contacts by Europeans with Middle Atlantic Indians are assumed to have been by the Spanish sometime in the first half of the sixteenth century. This was followed by an attempt to establish missions in the Chesapeake Bay area perhaps as early as 1565. Harrison (1964:31) states "The Jesuit Martyrology . . . is accepted as evidence that the Spanish were in the Chesapeake as early as 1565, and in 1570 established a mission somewhere on the waters in the territory of a native chief, described as the 'Cacique of Axacan'; that this mission was massacred by the Indians and later avenged by a punitive expedition from St. Augustine."

In the Woodbridge vicinity the popular interpretation equates "Axacan" with Occoquan (McConnon 1969; Woodbridge-Dale City Mirror 1973), but this is largely speculation and not supported by any additional evidence. Feest (1978b) places the Jesuit mission on the York River. The next attempt at European settlement in the Middle Atlantic was the short-lived Roanoke colony in coastal North Carolina in 1585. The subsequent English venture at colonization, the Jamestown colony in 1607, proved more successful and established the beachhead for subsequent English colonization. Captain John Smith sailed to the head of the Chesapeake Bay and the Little Falls area of the Potomac in 1608-1609 where he encountered Indians already in possession of European trade goods. The group at the head of the Bay were the Iroquoian Susquehannocks, while those along the tidal area of the Potomac were Algonkian groups including a group called the Dogue Indians whose main village was on Dogue Island on the north side of the mouth of Occoquan Creek. The Susquehannocks seem to have been in control of trade, or at the minimum, effective middlemen, and had apparently begun active participation in the burgeoning fur trade with the French and (probably) the Dutch shortly after 1550, the general time when the fur trade began to accelerate. At that time the Susquehannocks migrated from the upper Susquehanna River to its lower course. The Susquehannocks proved to be the most powerful force in the subsequent history of the area, yielding their sovereignty to the League of the Iroquois only after their defeat during Bacon's Rebellion in 1675-76 (Feest 1978b).

The Indians who resided in the Upper Potomac Coastal Plain were Algonquian speakers with loose territorial affiliations grouped under the general rubric Piscataway or Conoy (the Iroquoian name applied to them). To the east were other Coastal Algonquian groups including the Nanticoke and Choptank of the Eastern Shore of Maryland, and to the south were a number of Virginia Algonquian groups. Through linkage with the Potomac Creek ceramic series, the Piscataway are estimated to have resided in the

area of their historic homeland since at least the fourteenth century. At the time of contact, and during much of the early Colonial Period, they were grouped under a larger political entity known as a confederacy. This is, probably, a misnomer, and the structure was that of a ranked chiefdom with hereditary power. The extent of the Piscataway Confederacy is unknown, but it was centered in southern Maryland and apparently covered much of the area between the Upper Machado Creek to the Fall Zone, including the Virginia side of the Potomac River in the Woodbridge area. The Piscataway Confederacy was one of many minor chiefdoms or mini-states in the Virginia-Maryland tidewater, with the largest and most well known being the Powhatan Confederacy along the York River. The particular band of the Piscataway Confederacy which lived in the Woodbridge area is called the Dagues or Dogue by early land grants (Harrison 1964). They resided on what is now Mason Neck, then referred to as Doag Island. According to Feest (1978a,b) the Dogue are equivalent to Tauxenent village on John Smith's 1612 map. They are also called Taux or Toags. Apparently they resided on both sides of the Potomac and moved back and forth across. MacCord (1958) feels Tauxenent was in the vicinity of Mount Vernon and not on Mason Neck at all (Feest 1978a:240).

The settlement system consisted of towns, or villages, some of which were stockaded, located on the major tributaries just upstream from their junction with the Potomac. These communities were agricultural with the basic crops supplemented by hunting and foraging. At various locations were smaller clusters of dwellings and individual farmsteads connected to each other and the central village by a series of paths. The basic allegiance was to the village, neighboring villages, and the Confederacy (Feest 1978a,b,c).

The Piscataway Indians suffered the same fate, with some variations, of all the other Indians in the Middle Atlantic during the early historic period. The first disaster came from other Indians, in particular, attacks by the Susquehannocks. This was followed by rapid population loss as a result of diseases introduced by the Europeans. Throughout the history of their relationship with Maryland and Virginia the Piscataway were alternately at peace and at war with the European settlers. With the upriver and westward spread of the colonists during the late seventeenth century, the Piscataway were subject to pressures for their land culminating in treaties with various groups. With the signing of a treaty between the Susquehannocks and the Marylanders the final fate of the Piscataway was sealed. Just before 1700 and in the decade thereafter they began moving out of the area settling first on the islands in the Potomac Piedmont and finally moving north into Pennsylvania. A number remained in the area, ultimately becoming wage workers and farm hands for the Maryland plantations. The descendants of this group remain in the Prince Georges and Charles County areas of Maryland (Feest 1978a).

2.2.3 History

Captain John Smith was the first European to venture up the Potomac River to the Fall Line area in the immediate vicinity of current Washington, D.C. He was followed by various English traders some two

decades later, with Henry Fleet being the most noted. In 1634 the Maryland colony was established in St. Marys County, near the mouth of the Potomac. In 1639 Father John White established a Jesuit mission in the heart of the Piscataway area near Port Tobacco. In Maryland Jesuit missionaries spread upriver to the Anacostia area followed by English settlers.

English settlement of the Virginia side of the Potomac was considerably slower, due to fear of Indian raids. The early settlers of Virginia quickly earned the distrust and eventual hatred of the native Indians by various actions and atrocities. In retaliation, raiding of outlying English farmsteads was conducted sporadically. In 1622 several members of the Powhatan Confederacy led by Opechancanough, launched a systematic attack against the English settlements in the vicinity of Jamestown killing 350 colonists (Washburn 1978:96). Raiding on whites by Indians, and vice versa, continued sporadically until 1644 when a second systematic Indian attack against white settlements was launched again led by Opechancanough, killing about 500 colonists. In 1646 Opechancanough was defeated, captured by Governor William Berkeley and assassinated. In a treaty dictated to the Indians, they ceded all ownership to lands between the York and Blackwater rivers but the English settlements were not to enter Indian land north of the York River.

The prohibition against English settlement north of the York was unenforceable, and when the defeat of the Indians in 1644 reduced the Indian threat, expansion northward began in earnest. Washburn (1978:96) also cites the breakdown of English control on the expansion of the Virginia colony as a result of the Civil War in England, noting "rapid population growth combined with looser governmental controls allowed undisciplined expansion up Virginia's many tidewater estuaries in violation of the treaty of 1646." In addition, colonists from Maryland were crossing the Potomac to settle on the Virginia side. Notable among the Maryland emigrants is Giles Brent who settled on the north shore of Aquia Creek with his Piscataway Indian wife by 1647 (Harrison 1964:43). In response to settlements in what was called the "northern neck" of Virginia, Northumberland County was created in 1648 to include all of the land north of the major English settlements. The northern neck was included in Stafford County, which was created from Westmoreland County in 1664. In 1731, Prince William County was created from Stafford County. Very quickly following this action landowners in southern Virginia began patenting land along the Potomac River, apparently as investments for potential resale to immigrant colonists.

In the vicinity of the Woodbridge Facility, the first patent was to Richard Turney for Dogg's Island, or Mason's Neck, in 1651 (Turney was later executed by Governor Berkeley). Patents on the north and south shores of Occoquan Creek quickly followed. In 1653 Thomas Burbage patented the land of "the neck formed by Neapsco and the Occoquan . . ." except for "the point of the neck where, in 1654, Robert Heaberd (or Hebbard . . . reserved 400 acres, describing it as adjoining Burbage and known as the 'Raggett or Sandy Poynt opposite the Dauges present seat (Harrison 1964:46). These early patents locate the Dogue village on the

end of what is now Mason Neck, which the Indians called Myampses, quickly named Dogg's Island by the patents. There may have been additional Dogue settlement on the south shore of the Occoquan as well according to Harrison (1964:41) based on examination of John Smith's earlier maps and descriptions.

While the lands had been patented, apparently few settlers actually moved in probably because of the fear of new Indian hostilities. Besides the Algonkian groups of the Piscataway Confederacy, which included the Dogues, in 1674 the Iroquoian Susquehannock migrated from the Lower Susquehanna River to take over an abandoned Piscataway village at the mouth of Piscataway Creek. In 1675 a war between colonists and Indians was precipitated by a dispute over rightful ownership of some hogs. As the dispute escalated, the Virginia militia mistakenly attacked and killed some Susquehannocks, leading the Susquehannocks to retaliate. Eventually the combined Virginia and Maryland militias drove the Susquehannocks from their fort, but the action against the Indians also appears to have spurred what is called Bacon's Rebellion.

Nathaniel Bacon, Jr., in response to the Indian wars, took it upon himself to raise a small army for the purpose of plundering Indian villages, regardless of whether the Indians were friendly or not. When Governor Berkeley tried to restrain him, he attacked Berkeley, burning Jamestown in the process. Eventually Bacon was defeated, and a peace treaty was negotiated with local Indian groups. The overall effect, however, was to drive many of the Indian groups from the area but also to cause the shrinkage of English settlements to the vicinity of Aquia Creek or even further south for about ten years. The majority of the Susquehannocks migrated north, while many of the Algonkian groups migrated west or simply disappeared. The last reference in Virginia records to the Dogues is in 1677, where they are referred to as "formerly resident in Virginia" (Harrison 1964:71). In 1699 the Piscataways removed themselves from the Maryland side of the Potomac. Following Bacon's Rebellion Indian raids against English settlements largely ceased. Sporadic raids from the Iroquois, particularly Seneca, travelling down the trails adjacent to the Blue Ridge, occurred until the 1768 general treaty with the Six Nations, but these raids were mainly against settlements to the west.

During the late seventeenth century, with the final removal of Indians, the large plantations that typify the tidewater were established, by families that were to be labeled the Barons of the Potomac. Their fortunes were made on the growing of tobacco for export to England, with labor by indentured immigrants initially but increasingly by slaves imported from Africa. In the Woodbridge area one of the dominant families was the Mason family with large land holdings on both sides of the Occoquan, including Masons Neck. Martin Scarlet purchased land in Burbages neck, and built Deep Hole Farm which appears to have included the Woodbridge Research Facility. Scarlet was important locally, being elected county clerk on several occasions, and noted for his vicious feud with William Fitzhugh (Harrison 1964).

The large plantations, along with the local economy, continued to flourish until the late eighteenth century. During the middle eighteenth century the great plantation mansions were built including in 1750 Gunston Hall, the house of the fourth George Mason on Mason Neck, Belvoir and Mount Vernon. While the export of tobacco was the major economic factor, there were fisheries, hide tanneries and cooperages. Records also note a sizeable trade in cider. Port towns developed rapidly at Colchester and Dumfries, inspiring additional economic expansion in the form of mines, factories and iron furnaces during the mid eighteenth century. Wheat grown on farms in the interior was transported to mills near the port cities of Colchester and Dumfries (and to a lesser extent Occoquan), ground into flour and shipped out (Harrison 1964).

Following the American Revolution the economy of the Woodbridge area began a slow decline. Several factors appear to have been important, among them reduction in soil fertility from constant tobacco crops and the silting in of the harbors. Stripping of surface cover and plowing techniques of the seventeenth and eighteenth centuries led to significant erosion of lands in the Piedmont. Eroded soils were transported downstream to be deposited in the mouths of these streams. The silting up of ports had reached critical levels during the early nineteenth century, closing the ports of Dumfries, Colchester and Quantico. Many of the associated industries also closed, and what mills remained conducted a mainly local business. While the volume of materials sold to national and international markets declined, farming remained the primary occupation in this area, with some large farms worked by slaves, tenant farmers, or small farms. Fisheries, including one on the southern edge of the Woodbridge facility, also remained important economically and are located on Civil war maps (Davis et al. 1978). The main export crop was still tobacco. This was carried to markets overland on the roads which replaced the King's Highway and which ran just below the Piedmont uplands, close to the Potomac River (and is roughly paralleled by modern U.S. Route 1) (Harrison 1964).

The main road crossed Occoquan Creek at the village of Occoquan. This road replaced the earlier one which crossed by ferry at Colchester. Another ferry operated, at times, between Deep Hole Point (then called Taylor's point) and Sandy Point on the end of Mason Neck. The breakup of larger estates is illustrated by events concerning the land on which the Woodbridge Facility is now located. The Deep Hole farm and surrounding property was owned by Colonel John Taylor in the early nineteenth century. At his death Taylor's will instructs his sons to offer the various farms within his estate for sale to the people who were currently leasing them. Isaac Newton purchased several of the farms and quickly resold them to separate individuals. It is clear that the large estate actually consisted of defined, separate entities, which as units were leased or farmed by tenants (apparently some of the lessors, such as Newton, had tenants on the land they rented from Taylor). With Taylor's death, the ownership of the farms was dispersed. With increasing localization of the economy, the pattern of large estates gave way to one involving tenant farming of cash commodities and crops of local importance. This tenant farmer pattern persisted to the Civil War and after.

The county remained in the control of the Confederacy for most of the war, despite Union incursions into and through the county. The best known events, the battles of the first and second Manassas, occurred in the western part of the county. Frequent small actions occurred, however, along the Potomac River as Southern forces tried to block transport up the river to Washington and Northern forces tried to break the blockade. Southern batteries were constructed in the vicinity of the Woodbridge Facility, as close as Freestone Point at the mouth of Neabsco Creek and Cockpit point, south of the mouth of Powells Creek. Gun emplacements were also built at Occoquan, and "rifle pits" were constructed on the south bank of the Occoquan, facing Colchester, to defend against Union forces attempting to cross the creek (Davis et al. 1978).

Coupled with the disruption of the local economy caused by the war was the post-war emancipation of the slaves who had been important sources of farm labor. While many of the freed slaves probably left the area as part of the influx of freed Blacks into Washington following the war, some stayed in the county. The economy stabilized again around farming, primarily small farms, which continued to be the norm into the middle twentieth century.

Suburban spread from Washington reached Prince William County following World War II, but has increased dramatically in the past 15 years. Families were attracted by the rural setting, low land prices, and reduced travel time brought about by improvements to highways linking the county to Washington. While the main commuter residential areas are still in the northern part of the county, for example the Dale City communities and Lake Ridge developments, the spread of housing developments is continuing, particularly adjacent to transportation corridors such as U.S. Route 1.

2.3 ARCHEOLOGICAL RESEARCH DIRECTIONS

2.3.1 Regional Concerns

Specific statements of regional research concerns for the vicinity of the Woodbridge Research Facility are difficult to make since the State of Virginia has no specific guidelines for a State plan and because most of the recent research in the area has been impact assessments of specific areas. The Fairfax County Archeological Survey has initiated steps toward identifying research goals, but it is still in a site identification phase of operations, intending to use site location data to create prehistoric settlement pattern models.

Most of the major theoretical and synthetic work for the area has been done by Gardner (1974, 1977, 1978, 1979, 1980, 1982) and Gardner and his students (c.f. Gardner and Curry 1977; Brown 1979; Custer 1978; 1983) and while some of this has been tested, considerable investigation for any particular time period or problem remains to be done. Much of this is based on surveys and limited excavations leaving major gaps in the data base. The major site excavation report for the area, and virtually

the only one approaching a complete site excavation, was the Accokeek Creek site (Stephenson 1963) and this needs serious updating.

The themes of greatest interest to area archeologists involve following subsistence and later cash economies as they develop through time. It is likely that archeological material exists to investigate economic adaptation from the Early Archaic when the shift toward the more generalized pattern of the Middle Archaic was developing. This generalization continued to the Late Archaic, when estuarine niche specialization is noted in the record. This economic trend parallels the changes occurring in climate and environment. As the environment changed, there should be evidence of concurrent shifts in settlement pattern, site types, and technology. Changes in demographic pattern should also be expected, especially given the surge in the number of Middle Archaic sites noted throughout the region. The shift to sedentism and horticulture beginning in the Early Woodland also provides an important research topic which persists as the pattern develops through the Woodland periods to the time of European contact.

The assessment of ranking and its associated political themes for the Late Woodland and Early Contact periods are also important. The implication of ranking as an organizational mode and early interaction between local groups and European settlers are important topics.

For the historic periods, little work has been done on the social, political, and economic themes of the settlement of the area. The tobacco economy with its implication for interaction among local, regional, and world markets in this cash commodity crop is of interest as is the specialization in fishing which developed in the nineteenth century. These themes mesh with the effects of rural isolation and the development of transportation networks. The post Civil War development is also poorly known and deserves investigation.

2.3.2 Installation - Specific Archeological Research Direction

The Woodbridge Facility is in a relatively unique location: it is one of the only remaining relatively intact lowland settings in the upper Potomac Coastal Plain, and one of the few on the Virginia side of the Potomac north of the Potomac Creek area. It also remains unsurveyed in a systematic sense. Given the high probability that archeological remains exist at the Woodbridge Facility beginning with Early Archaic and continuing through contact and into the Historic periods, many of these regional themes could probably be profitably dealt with.

First, the actual number and variety of archeological sites in the area would provide significant information. Such sites could provide the opportunity to investigate the shift to estuarine resources in the Late Archaic and to horticulture in the Early Woodland. Evidence of Late Woodland settlement hierarchies could help with the question of ranking and the archeological data could aid in cross-checking the ethnohistoric data in understanding the mechanisms of contact. A comparison between early subsistence pursuits and their degree of specialization (farming

versus fishing) and those of later historic periods would be of interest, as would demographic density information. For the historic periods, the development of cash cropping and the shift from a plantation to a tenant small-farming economy is worthy of investigation. In addition, the role of local transportation networks, specifically the ferry running into Occoquon Bay, should be investigated with respect to rural isolation.

AN ASSESSMENT OF ARCHEOLOGICAL RESOURCES PRESERVATION AND SURVEY ADEQUACY

3.1 ENVIRONMENTAL CONSTRAINTS TO SITE PRESERVATION

The Woodbridge Research Facility is located on a point of land in the embayed mouth of the Occoquan River. The highest point on the post is only about 35 ft. above mean sea level, and the average slope is very gradual except for the extreme northern and western portions. The primary constraints to preservation are (1) the systematic rise in sea level and concomitant flooding of the lower Occoquan River which occurred during the Early Holocene period and (2) erosion of the banks of the Occoquan River and Occoquan Bay. Because of sea level rise, sites prior to the Late Archaic period may be present below the current water level. Belmont Bay and Occoquan Bay, the drowned areas of the Occoquan mouth, are very shallow, with depths to bottom outside the river channel ranging from two to five ft. It is unknown, however, how closely this shallow depth reflects the actual elevation of the now embayed area, as extensive silting in the mouth occurred during the eighteenth century associated with destructive farming practices up river. It is difficult to assess the degree of damage to possible early sites caused by the rise in sea level; a slow, gradual rise in sea level may have been accompanied by extensive reworking of shoreline sediments and any prehistoric sites, whereas rapid rise could cause rapid siltation of a site with minimal reworking of soil.

Erosion of the banks and tidal flats continues and shoreline sites identified by amateur archeologists and collectors are probably truncated. The process of further erosion is continuing. Site 44PW126, on Conrad Island, is noted on the State of Virginia site form as being actively eroded, with the potential for artifacts being minimal at the site. Away from the shoreline, however, the potential for erosion is low except for the extreme northwest corner of the facility, adjacent to Marumsco Creek. The rest of the facility has a relatively gentle slope. Much of the south and east portions of the facility are boggy and almost flat.

3.2 HISTORIC AND RECENT LAND USE PATTERNS

Until the construction of the Woodbridge Research Facility, the primary land use on the facility appears to have been farming, especially of the northern half of the facility. Farm residences and outbuildings were likely present on the facility, and all the land on this portion of the facility was undoubtedly plowed. Because of the generally low elevation, erosion of the facility has probably been minimal, with the exceptions of the western edge facing Marumsco Creek, and possibly borders of a small drainage just north of the present main structures.

Other uses of the land have probably not been destructive. For example, the fisheries located on the southern shore and the ferry indicated as running from the southeast corner to Sandy Point on Mason Neck would not have caused land disturbance.

One destructive event is documented for the late nineteenth century when William Metzgar, the owner of the farm, supposedly removed all of the gravestones from an old cemetery. He used some of them to construct a foundation of a barn and dumped others in the river. Two of the stones were rescued by the next land owner who used them as property boundary markers (Ratcliffe 1978:34).

To better facilitate the discussion of ground disturbance, the land area within the Woodbridge Research Facility has been divided into seven separate Ground Disturbance Areas (GDAs) (Figure 3-1, Table 3-1). These GDAs will be discussed below.

GDA-1 This GDA includes the Picnic Pavillion (Building 305), a softball field and a parking area. Building 305 was constructed in 1964 (IMRP 3-31-84). No information was available regarding the depth of disturbance caused by the construction related grading and/or fill in GDA-1. This GDA covers 10 a.

GDA-2 This GDA includes the EMP command and Control Building (Building 306), a retaining wall for flood control, an underground 300 gallon fuel oil tank, and a parking lot. Building 306 was constructed in 1964 (IMRP 3-21-84). Construction required 4-11 ft of fill and the construction of a retaining wall. This GDA covers 4.75 a.

GDA-3 This GDA consists of the Main Compound of the Woodbridge Facility. It includes nine buildings: the Electronics Laboratory (Building 201); the High Voltage EMP Simulations Building (Building 202); the Electronics Laboratory and Administration Building (Building 203); the Flammable Storage Building (Building 204); a shed (Building 205); a gas pump (Building 207); the Antenna Tower (Building 208); the Guard House (Building 210); the High Voltage EMP Simulation Laboratory (Building 211). Buildings 201, 202 and 203 were constructed in 1952; Building 204 was constructed in 1964; Buildings 205 and 207 were constructed in 1953; Building 210 was constructed in 1958; and Building

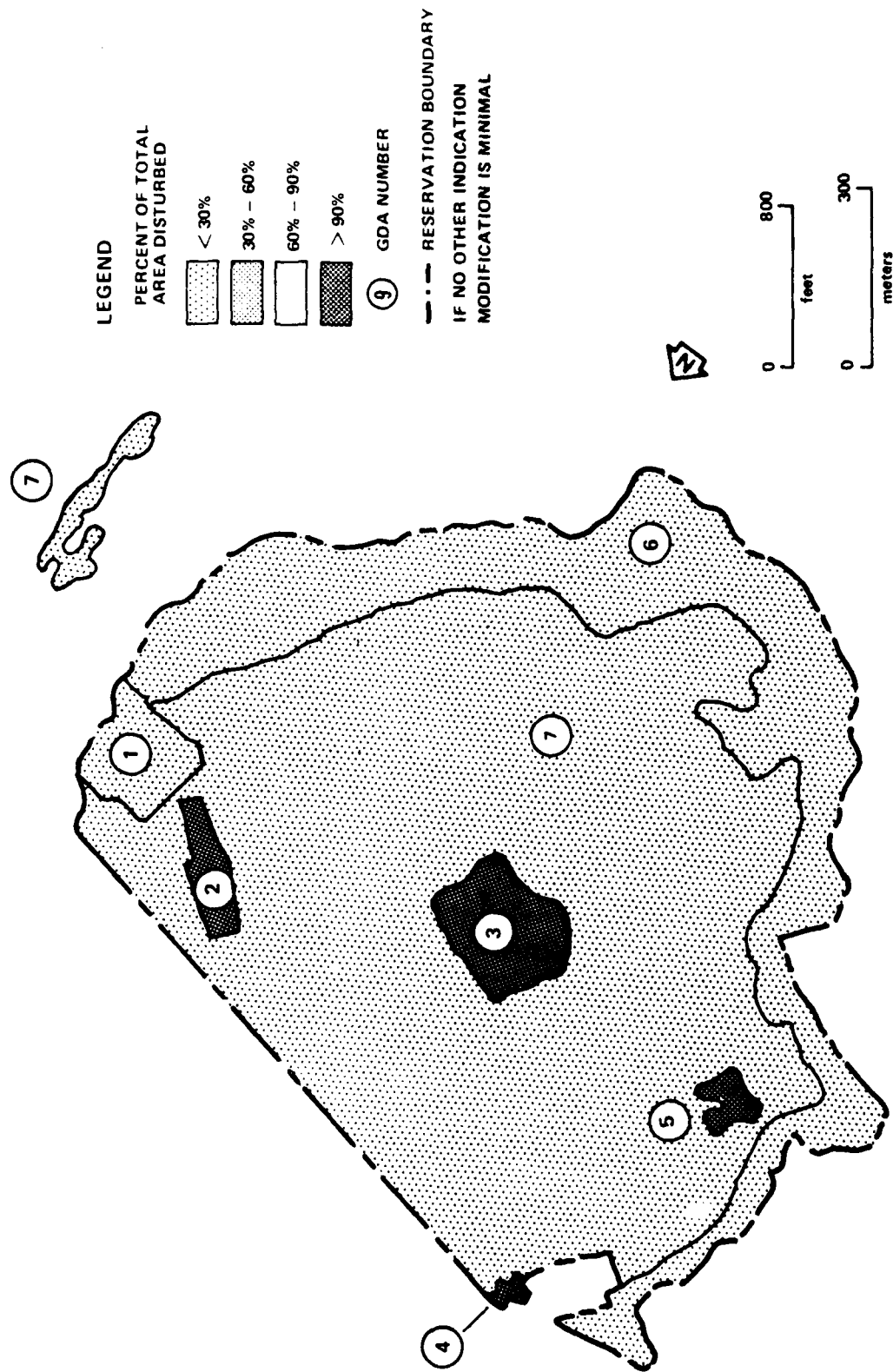


Figure 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE HARRY DIAMOND LABORATORIES. WOODBRIDGE RESEARCH FACILITY

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

GDA No	Type of Disturbance ^a	Date Constructed (yr)	Reference ^b	Area Disturbed (acres)	Estimated Depth Below Surface (ft)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quad Sheet	Coincidental Site
							UTMC		Legal Reference	Township	Range	Section
							Northing	Easting				
GDA-1	Construction of Building 305 Softball Field Parking Lot	1964	IMRP 3-31-84	10	3	3:10						FB765R
		1964	BIMP 7-80		0-2							
		1964	BIMP 7-80		0-2							
GDA-2	Construction of: Building 306 Retaining Wall Underground 300 gallon fuel oil tank Parking Area	1979	IMRP 3-31-84	4.75	4	9:10						FB765R
		1979	MAP 18-002-35		?							
		1979	PL3 7-30-80		?							
			MAP 18-02-84									
		1979	MAP 18-02-35		0-2							
GDA-3	Construction of: Building 201 Building 202 Building 203 Building 204 Building 205 Shed Gas Pump 207 Antenna 208 Tower Guardhouse 210 Building 211 Parking Area Cable Trench Underground valve pit Underground 1000 gal oil separation tank 4 Underground 10,000 gallon fuel oil tanks	1952	IMRP 3-31-84	13.5	0-2	9:10						FB765R
		1952	IMRP 3-31-84		0-2							
		1952	IMRP 3-31-84		0-2							
		1964	IMRP 3-31-84		0-2							
		1953	IMRP 3-31-84		0-2							
		1953	IMRP 3-31-84		0-2							
			MAP 18-02-35		0-2							
			PL3 7-30-80		0-2							
		1958	IMRP 3-31-84		0-2							
		1979	IMRP 3-31-84		0-2							
			MAP 18-002-35		0-2							
			PL3 7-20-80		0-2							
			BIMP 7-80		0-2							
			MAP 18-02-35		?							
			PL3 7-30-80		?							
			MAP 18-02-35		?							
			PL3 7-30-80		?							
			MAP 18-02-35		?							
			PL3 7-30-80		?							

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY (continued)

GDA No	Type of Disturbance ^a	Date Constructed (yr)	Reference ^b	Area Disturbed (acres)	Estimated Depth Below Surface (ft)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USCS Quad Sheet	Coincidental Site
							UTMC	Northing	Easting	Township Range		
3-cont'd	Underground 1000 gallon gasoline tank		MAP 18-02-35		?							
	Steam Trench		BIMP 7-80		0-4							
	Underground 1000 gallon diesel tank		MAP 18-04-35 PL3 7-30-80 MAP 18-02-35 PL3 7-30-80		?							
	Transformer Yard		MAP 18-02-35 PL3 7-30-80		0-2							
	Underground 2000 gallon holding tank		UAP 18-02-35 PL3 7-30-80		?							
	Underground 1500 gallon fuel oil tank		MAP 18-02-35 PL3 7-30-80		?							
	Underground acid neutralization tank		MAP 18-02-35 PL3 7-30-80		?							
	Underground oil separation tank		MAP 18-02-35 PL3 7-30-80		?							
	Construction of: Building 101	1970	IMRP 3-31-84	1.25	0-3	9:10					FB765R	
	Building 102	1963	IMRP 3-31-84		0-3							
GDA-4	Underground 1000 gallon fuel oil tank		MAP 18-02-35 PL3 7-30-84		?							
GDA-5	Construction of: Pond & Dam	1959	BIMP 7-80	2.5	12	9:10					FB765R	

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY (continued)

GDA No	Type of Disturbance ^a	Date Conducted (yr)	Reference ^b	Area Disturbed (acres)	Estimated Depth Below Surface (ft)	Ratio of Disturbed to Total Area	Location of Disturbed Area						USGS Quad Sheet	Coincidental Sites
							UTMC		Legal Reference					
							Northing	Easting	Township	Range	Section			
GDA-6	Tree cover-Coastal Area	N/A	MAP 18-02-35 7-30-80 PL12	106	0	0:10						FB765R	HDLW-1 HDLW-2 HDLW-7 HDLW-8 HDLW-9 HDLW-1 44PW126	
GDA-7	Remainder of Installation	N/A	BIMP 7-80	440.6	0	0:10						FB765R		

Notes:

- Type of Disturbance: numbers refer to Building/Facilities Real Property Inventory numbers.
- BIMP 7-80: Basic Information Master Plan - Analysis of Existing Facilities and Environmental Assessment July, 1980.
IMRP 3-31-84: Inventory of Military Real Property, March 31, 1984
- UTM Zone 18
- FB765R: Fort Belvoir, Virginia - Maryland 7.5' Quadrangle 1965, photo revised 1980
- HDLW = Harry Diamond Laboratories - Woodbridge Research Facility;
44PW### = Sites designated by three element code: 44 = Virginia; PW = Prince William County; ### = sequential number

211 was constructed in 1979 (IMRP 3-31-84). Also included in this GDA are a parking lot; cable trench, underground valve pit; underground 1000 gallon oil separation tank; 4 underground 10,000 gallon fuel oil tanks; underground 1000 gallon gasoline tank; transformer yard; underground 2000 gallon holding tank; underground 1500 gallon fuel oil tank; underground acid neutralization tank; underground oil separation tank (MAP 18-02-35 7-30-80). This GDA covers 13.5 a. Construction required grading of 0-2 ft. in GDA-3.

GDA-4 This GDA consists of the Visitor Control Building (101), Sentry Station B (Building 102), an underground 1000 gallon fuel oil tank, and an electric substation. Building 101 was constructed in 1970 and Building 102 was constructed in 1963 (IMRP 3-31-84). No information was available regarding the depth of disturbance cause by construction-related grading or filling. This GDA covers 1.25 a.

GDA-5 This GDA consists of a man-made pond and dam. The pond was constructed in 1959 (BIMP 7-80). It is 12 ft. deep and covers an area of 2.5 a.

GDA-6 This GDA consists of the tree cover area along the coast. There are no buildings in this GDA and disturbance is probably minimal. It covers 106 a.

GDA-7 This GDA is the remainder of the installation, which has been cleared but contains no buildings. Disturbance is probably minimal. This GDA covers 440.6 a.

3.3 PREVIOUS CULTURAL RESOURCE INVESTIGATIONS: COVERAGE AND INTENSITY

No systematic archeological research has been conducted at the Woodbridge Research Facility. Only one site on the facility is recorded in the State of Virginia site files -- 44PW126, an eroding Late Archaic through Late Woodland site located on Conrad Island, just east of Taylor's Point. This site was identified by amateur archeologists from Fairfax County, Mark Kelly and Steve Procelli, who reported it to the Fairfax County Archeological Survey, who recorded it with the State.

Extensive non-systematic surface collections have been made on the facility (Tables 3-2, 3-3), however, indicating the presence of a number of prehistoric and historic sites. The first recorded collection was made by David Bushnell in the mid-to-late 1880s as part of a search for the location of the Dogue village (Tauxenent) reported by John Smith (Bushnell's notes). Judge William Graham collected artifacts in the 1920s and 1930s from sites along the shoreline of the Potomac River and recorded two prehistoric sites on the Woodbridge Facility. Unfortunately, his sites are vaguely indicated as very large ovals, and the precise locations cannot be determined beyond a general description. Graham collected diagnostic artifacts from the Early Archaic and the Late Archaic through Late Woodland. A more recent collection of artifacts

TABLE 3-2 ARCHEOLOGICAL SURVEYS CONDUCTED ON THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

SHPO Sur- vey No.	Survey Administration		Survey Location		Survey Characteristics										Identified Archeo- logical Resources			
	Survey Insti- tution Firm	Sur- vey Date (yr)	Survey Record Biblio- graphic Reference	North- ing	East- ing	Town- ship	Range	Section	USGS Quad Map	Col- lec- tion Pol- icy	Cura- torial Repos- itory	Sur- vey Type Area	Tem- poral Cover- age	Tran- sect Type, (a./ inter- val (m.))		Rate (a./ per- son day)	Sub- sur- face Tests	Iso- lated Fea- tures Sites

NONE

TABLE 3-3 ARCHEOLOGICALLY RELEVANT RESEARCH INVESTIGATION, EXCLUSIVE OF ARCHEOLOGICAL SURVEYS, CONDUCTED ON THE
HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

Study No.	Study Type	Study Date	Institution Agency, Firm	Principal Investigator	Bibliographic Reference	Location						USGS Quad Map	Associated Archeological Resources
						UTMA			Legal				
						Northing	Easting	Township	Range	Section			
1	Artifact Collection	1880's	Unknown	David Bushnell	None	Entire	Facility				FB765K		
2	Artifact Collection	1930's	None	William Graham	None	Entire	Facility				FB765K	HDLW-1 HDLW-2	
3	Artifact Collection	1960's	None	Captain Johnson	None	Entire	Facility				FB765K	HDLW-1 HDLW-2 HDLW-3? HDLW-4? HDLW-5?	

Notes:

- UTM Zone 18
- FB765K = Fort Belvoir Va-Md, 7.5 minute quadrangle 1964, photorevised 1980
- Site numbers assigned for this study; HDLW = Harry Diamond Laboratories - Woodbridge Research Facility

from the facility now in the possession of the Fairfax County Archeological Survey was that made by the late Capt (USN) Arthur Johnson during the 1960s. Johnson's collection includes temporal diagnostics from the Middle Archaic to Late Woodland and at least one historic site dating from the seventeenth or early eighteenth century to about the start of the Civil War.

These last two collections, however, were unsystematic and focused on temporal diagnostics. In addition, particularly in regard to the Johnson collection, provenience information is vague or lacking (Johnson did not indicate site locations on any map). In addition many references to site location are made regarding their distance from Taylor Point or Deep Hole Point. Modern maps show Deep Hole Point at the southern end of the facility and Taylor Point on the eastern edge, reversing the names as noted on earlier maps. It is impossible to determine the reference points noted by Graham and Johnson. Thus, while a number of prehistoric and historic sites are known to be on the Woodbridge Facility, the precise location is not known.

3.4 SUMMARY ASSESSMENT OF DATA ADEQUACY, GAPS

The major gap in data adequacy is that no systematic work at the facility has been conducted. An unknown number of sites, of unknown integrity, in poorly or undefined locations are present on the facility. These sites, known to be present, should be relocated and accurate provenience information properly recorded. Then, subsurface testing should be conducted to indicate site integrity and potential for preserved features. In addition, the areal coverage of the facility as represented by the artifact collections is unknown. Collectors often prefer to return to areas that are known to have artifacts rather than explore for new sites. Current knowledge of the facility indicates that potentially significant prehistoric and historic sites are present, but without the minimal information indicated above, the data from these sites are woefully inadequate.

KNOWN ARCHEOLOGICAL RESOURCES ON THE HARRY DIAMOND LABORATORIES -
WOODBIDGE RESEARCH FACILITY

4.1 KNOWN ARCHEOLOGICAL RESOURCES

A discussion of known archeological resources is made difficult by the lack of data concerning the locations of sites whose presence is indicated by artifacts from uncontrolled surface collections. The only site recorded for the facility is 44PWL26, on Conrad Island east of Taylor's Point (Tables 4-1, 4-2, 4-3). The site record notes artifacts from the Late Archaic through Late Woodland periods.

Uncontrolled surface collections on the facility indicate additional prehistoric sites from the Early Archaic through Contact/Late Woodland and at least one historic site that may date from the late seventeenth century. Because of the lack of provenience information, these sites, known to be somewhere on the facility, are discussed with potential resources.

Three additional sites, historic graves, are indicated by maps supplied by the Harry Diamond Laboratories for the Woodbridge Research Facility. Two possible graves, one near Taylor's Point (HDLW-7) and the other near the mouth of the Marumsco Creek (HDLW-8), are identified by the presence of gravestones (Hutton 1903). The tombstones are genuine, one being that of Martin Scarlet who died in 1695 and the other that of his son, John Scarlet, who died in 1697. These stones had been removed from cemetery (HDLW-10) (located somewhere on the Woodbridge Facility) by the late nineteenth century landowner William Metzgar, who used the tombstones from the cemetery as part of the foundation for a barn. The Scarlet tombstones were apparently too large and were dumped into Occoquan Creek. The subsequent landowner, J. L. Dawson, retrieved them from the creek and used them as property boundary markers (Ratcliffe 1978:34). Their modern location is not based on their earlier function but rather to mark the ends of Dawson's property. In addition, the facility map indicates two gravesites south of Taylor's Point on Occoquan

Table 4-1. PRESENTLY IDENTIFIED ARCHEOLOGICAL RESOURCES AT THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY: ADMINISTRATIVE DATA

Site Number	Site Recorder	Date of Site Record	SHPO Survey Number	Site Record Repository	Survey Collection Policy	Current Status of Investigation	NKHP Status	State, Local Status	Architectural Association	Bibliographic Reference
HDLW-1	Graham	1935	None	USMNH	CDM	SCLe	INSF	None	None	None
HDLW-2	Graham	1935	None	USMNH	CDM	SCLe	INSF	None	None	None
HDLW-7	Johnson	1966	None	FCASh	CDM	SCLe	INSF	Unknown	None	Hutton 1903
	Hutton	1903	None	None	N/A	N/A	INSF	Unknown	None	Katcliffe 1978
HDLW-8	Hutton	1903	None	None	N/A	N/A	INSF	Unknown	None	Hutton 1903
										Katcliffe 1978
HDLW-9	US Army	1976	None	None	N/A	N/A	INSF	Unknown	None	None
44PW126j	FCASh	1982	None	FCASh	CDM	SCLe	INSF	None	None	None

a. Site Number assigned by this study designated HDLW-#, HDLW abbreviation for Harry Diamond Laboratories - Woodbridge Research Facility

b. Graham - Judge William Graham

c. USMNH - United States Museum of Natural History collections

d. CDM - collection of diagnostics only without mapping

e. SCL - surface collected only; in these cases, unsystematic surface collection

f. INSF - Insufficient information available to make a judgment

g. Johnson - collection of Captain Johnson

h. FCAS - Fairfax County (Virginia) Archeological Survey

i. Hutton - Henry I. Hutton

j. 44PW126 - site registered in Virginia for Conrad Island, technically not on the Woodbridge Research Facility

Table 4-2. PRESENTLY IDENTIFIED ARCHEOLOGICAL COMPONENTS AT THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY: DESCRIPTION AND EVALUATION

Site Number	Unit Age			Unit Description						Evaluation					
	Date		Temporal Unit		Artifacts ^b	Features	Depositional Context	Landform	Dimension		Ascribed Function	Per-cent In-tact	Value Inte-grity	RV ^f CR ^g	
	DM	Years BC/AD	Period	Phase					Area (m ²)	Depth (m)					
HDLW-1	--	--	Prehis-toric	Unknown	Unknown	Unknown	Shoreline	Unk	Unk	Unknown	Unk	Unk	NA	1	
HDLW-2	--	--	Prehis-toric	Unknown	Unknown	Unknown	Shoreline	Unk	Unk	Unknown	Unk	Unk	NA	1	
HDLW-7	INS ^f	1695 AD	Colonial	Late	GVS	Unknown	Surface	Shoreline	1m ²	0m	Gravestone/property boundary marker	0	A ^g	0	2
HDLW-8	INS ^f	1697 AD	Colonial	Late	GVS	Unknown	Surface	Shoreline	1m ²	0m	Gravestone/boundary marker	0	A ^g	0	2
HDLW-9	--	--	Colonial	Late	Unknown	Possible BR ^h	Unknown	Shoreline	6m ²	Unk	Burials	Unk	Unk	NA	1
44FW126	--	--	Archaic Woodland	Late Early Middle Late	FL FL,PC FL,PC FL,PC	Unknown	Unknown	Island, Mud flat	80000 m ²	Unk	Habitation	50%	Unk	NA	1

Notes:

- Site Numbers assigned by this study designated HDLW-#; HDLW = Harry Diamond Laboratories - Woodbridge Research Facility
- Codes for artifacts: FL=flaked lithics; GVS=gravestone; PC=prehistoric ceramics
- Research Value ranked from 0 (no value) to 5 (highest value); NA=insufficient information for evaluation
- Confidence Rating codes: (1) the judgment is more guess than science; (2) the judgment is moderately reliable (3) the judgment is most likely reliable
- Collections by Graham and Johnson include no information about provenience other than that the artifacts came from the Woodbridge Facility. Phases and periods included are: Archaic (Early, Middle and Late), Aboriginal and Late Colonial (European), and American (through Civil War). Artifacts include: flaked lithics, prehistoric ceramics, bone, historic metal, glass, historic ceramics and bricks. Without provenience information these artifacts cannot be ascribed to any particular site.
- Dating Method code: INS=inscription
- Value Integrity code: A=association
- Feature code: BR=normal human burial

Table 4-3. PRESENTLY KNOWN ARTIFACT, ECOFACT, OR DOCUMENTARY COLLECTIONS FROM ARCHEOLOGICAL RESOURCES AT THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

Site Number, Name	Collection Characteristics					
	Collection Location	Artifact	Size/No.	Brief Description	Ecofact	Documentary
	Curatorial Repository	Accession Number(s)	Size/No.	Brief Description	Size/No.	Brief Description
Nonea (Bushnell)	National Anthropological Archives	4001	None	None	N/A	Ref. to site on Taylor's Point
Nonea (Graham)	National Anthropological Archives/Museum of Natural History	187689	1 ft ³	Lithics, ceramics	N/A	Maps
Nonea (Johnson)	Fairfax County Archeological Survey	82-42	2 ft ³	Lithics, ceramics, historic ceramics, glass, metal	N/A	None
						N/A

Note for Table 4-3:

- a. Collections by Bushnell, Graham and Johnson include no provenience information other than that artifacts came from the Woodbridge facility. Bushnell collected no artifacts.

Bay, indicated as Historical Site (76-26) and Scarlet Gravesite, Location Approximate. Based on research for this report, there is no evidence to indicate this was the original location of the Scarlet graves, although the original gravesite is somewhere on the Woodbridge Facility. It is discussed later with potential sites.

As part of the background for this report an unsystematic, perfunctory ground examination was done in several locations on the facility. Historic artifacts resembling those in Captain Johnson's collection were seen on the surface (no collections were made) at the ball diamond on the picnic and recreational facilities at Taylor's Point. Whether this is the area collected by Captain Johnson is not known. In addition, prehistoric artifacts, quartz flakes, were observed on the surface on the western edge of the facility overlooking Marumsc Creek. This examination was in no way systematic and was limited by the scope of work for this report. It does reinforce, however, the presence of historic and prehistoric sites and pinpoints at least two locations. No testing was conducted to evaluate the extent and integrity of the two areas indicated.

4.2 POTENTIAL ARCHEOLOGICAL RESOURCES

As indicated in the previous section, prehistoric and historic sites are known to be present on the Woodbridge Facility but are here treated as potential sites because of the lack of information to accurately locate them (Table 4-4).

Based on surface examination, Judge William Graham in the 1930s identified two sites on the facility, here indicated as HDLW-1 and HDLW-2. One of these sites, HDLW-1, consists of almost the entire eastern edge of the facility facing Belmont Bay. It is unlikely that one single occupation takes up this area, and it is unknown whether the area represents a series of overlapping sites or if Graham was indicating only a very general location. In any event, his artifact collections do not indicate specific locations within this area. One Early Archaic point was found in his collection. The remainder of the temporally diagnostic artifacts come from the Late Archaic through Late Woodland phases. The second site identified by Graham (HDLW-2) was at Deephole Point, again a prehistoric site ranging from Late Archaic probably through the Late Woodland. As with the first site, the location is very general, including most of the vicinity of Deephole Point. For both the sites identified by Graham there is a good degree of certainty that at least one prehistoric site exists within each of the general site boundaries he maps. The exact location and number(s) of sites and their integrity are unknown.

The second major collection from the facility is that of Captain Johnson which indicated Late Archaic through Contact (Late Woodland) occupation as well as an early historic, possibly late seventeenth century site. Captain Johnson's collection included cryptic notes

Table 4-4. POTENTIALLY IDENTIFIABLE BUT NOT PRESENTLY RECORDED
 ARCHEOLOGICAL RESOURCES AT THE HARRY DIAMOND LABORATORIES -
 WOODBRIDGE RESEARCH FACILITY

Site Number, Name ^a	Reference ^c	Description	Research Value CR ^b
HDLW-2	Civil War Map (Davis et al. 1978)	Historic ferry landing	1
HDLW-3	None (Johnson collection)	Historic artifact scatter	1
HDLW-4	None (Johnson collection)	Historic artifact scatter, possible structure	2
HDLW-5	None (Johnson collection)	Lithic scatter	2
HDLW-6	Civil War Map (Davis et al. 1978)	Fisheries (historic)	2
HDLW-10	Ratcliffe (1978:34)	Colonial cemetery	1

Notes:

- a. Site Numbers assigned by this study designated HDLW-# HDLW=Harry
 Diamond Laboratories - Woodbridge Research Facility
- b. Confidence Rating of the potential resource research value code:
 - (1) resource may have little value or information about it is
 unreliable
 - (2) resource may have research value and there is moderate confidence
 that the information about it is reliable

concerning locations of sites. Specific site locations were impossible to determine solely on the abbreviated information on these notes. Based on differences in the descriptions, the notes appear to indicate at least six different sites on the facility. One of Johnson's sites probably corresponds to the first site of Graham (HDLW-1). Artifacts collected by Johnson included Late Archaic points and Early Woodland ceramics correlating with artifacts found by Graham and those found on the adjacent Conrad Island. Another site, location unknown, identified by Johnson included Middle to Late Woodland ceramics as well as Contact period artifacts that included an aboriginally flaked European flint ballast stone. At least four of Johnson's sites included historic artifacts. One site, location unknown, is identified as a Colonial trash pit. Historic artifacts include delftware, Buckley ware, and white salt-glazed stoneware, indicating a late seventeenth century to early eighteenth century site context. Additional artifacts include clay pipes, bottle glass, and later ceramic types including creamware and pearlware were also part of the collection. Five whiteware ceramics were represented in Johnson's collection. Johnson's collection clearly indicates the presence of prehistoric and historic sites, but since they cannot be located, they are listed as potential.

Besides these potential sites based on artifact collections there are a number of potential sites indicated by historic records which may or may not overlap with those implied by the collections from the facility.

Early-Late Contact Phase Indian Site. Records left by John Smith indicate the village he calls Tauxenent on the north side of Occoquan Creek, and patent records place the Dogue village on Mason Neck. Harrison (1964:41) interprets notes by Smith to indicate that the Dogue's "King's House" as more of a shrine, or religious place. The potential for a site relating to the Dogue village is very good, and may be reinforced by the Contact period artifacts (including modified European flint) in the Captain Johnson collection.

Late Seventeenth Century (Early/Late Colonial Phase Through Nineteenth Century) Residence. The point of land which the Woodbridge Facility occupies was called Deep Hole Farm from the late seventeenth century, when it was identified as the residence of Martin Scarlet. Scarlet's residence is confirmed by the presence of his gravestone, albeit moved from the grave. The Deep Hole farm house indicated by Civil War maps (Davis et al. 1978), the 1901 William Brown map, and the 1925 USGS topographic map may or may not be the same as that originally built by Scarlet at Deep Hole Farm. The potential exists, therefore, for archeological remains from two historic structures, one of which was constructed during the late seventeenth century by Martin Scarlet. The late seventeenth century/early eighteenth century artifacts from Captain Johnson's collection may correlate with the Deep Hole Farm residence occupied by Scarlet. The maps cited above show the farmhouse (at least during the mid to late nineteenth century) in the north central part of the facility.

Historic Outbuildings (Barns, Privies, Wells) and Trash Pits/Dumps. Any number of historic outbuildings may have been constructed in relation to the operation of Deep Hole Farm. Historic records indicate at least one such barn was constructed in the late nineteenth century by William Metzgar. Its foundation was built of gravestones. It is highly likely that earlier such outbuildings were also constructed, at unknown locations. In addition, Johnson's notes indicate a Colonial trash pit on the facility.

Cemetery (HDLW-10). Based on oral evidence recorded by Ratcliffe (1978:34), J. L. Dawson reported that tombstones from a cemetery on Deep Hole Farm were used by the previous landowner, William Metzgar, to construct a foundation for a barn. The cemetery is believed to be on the Woodbridge Facility, and should contain the graves of Martin Scarlet (died 1695), John Scarlet (died 1697) and unknown others.

Fishery Site(s) (HDLW-6). The southern portion of the facility, facing Occoquan Bay, was used extensively as a fishery. It appears on Civil War maps (Davis et al. 1978) and is indicated in various deeds and wills relating to Deep Hole Farm during the eighteenth and nineteenth centuries. Particularly during the Spring spawnings of anadromous fish (especially sturgeon, shad and alewife) the Potomac would have had a large fish population. Fish were caught in the river or in Occoquan Bay as they entered Occoquan Creek, taken to the adjacent fishery, split or cut up, and smoked/cured or salted for preservation. Remains of this fishing industry could be present along the south/southwest border of the facility.

Historic Ferry Landing Pier (HDLW-2). The point of land jutting into the mouth of the Occoquan, now called Deephole Point, faces another point (Sandy Point) on Mason Neck and the two points separate Belmont Bay from Occoquan Bay. A ferry was operated at one time between the two points, as indicated by the Civil War map (Davis et al. 1978). The major ferries, prior to the construction of a bridge across the Occoquan south of Colchester, were in the Colchester vicinity, where the creek narrowed, but below the uplands of the Piedmont boundary. The ferry shown by the Civil War map may parallel an earlier ferry route initiated by Martin Scarlet. Scarlet received permission to start a ferry in December 1692 (Stafford County Order Book 318) to run to Mason Neck. The location of the proposed landing site is unknown, and it is not known whether Scarlet ever ran a ferry at all.

Based on this discussion, there is a great potential for sites at the Woodbridge Facility, both those indicated as present by artifact collections and those which may be present based on historic records.

AN ASSESSMENT OF THE SIGNIFICANCE OF THE ARCHEOLOGICAL RESOURCE BASE ON
THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

5.1 THE SIGNIFICANT RESOURCE BASE

Because of the lack of systematic research on the Woodbridge Facility, it is impossible to accurately discuss the significant resource base in any but the most general manner (Table 5-1). Data are clearly needed concerning specific locations, extent and integrity of sites on the facility to make evaluations of significance. The potential for significance, however, is great. Aboriginal sites of at least the Early Archaic through Contact phases are indicated, as are historic sites dating from the late seventeenth century. Any, all, or none of these sites could be eligible for the National Register of Historic Places.

5.1.1 Prehistoric Sites

The significance of the potential and recorded prehistoric sites cannot be evaluated without systematic testing. For example, few Early Archaic sites have been recorded along the Coastal Plain. If the possible Early Archaic site indicated by the single point in Judge Graham's collection does exist in a reasonably undisturbed setting it would be significant simply based on the scarcity of such sites and the lack of knowledge concerning that phase. Scientific value of sites from the Middle Archaic through Contact phase sites would depend on site integrity. If testing indicates that these are large sites or base camps of any period, they could be significant because of the information they could produce concerning settlement patterns and subsistence systems. A contact phase site, particularly if coupled with organic preservation, would be significant in providing data concerning culture change of the resident (presumably Dogue) Indians in response to the changing nature of European contact.

Table 5-1. SUMMARY OF SIGNIFICANT ARCHEOLOGICAL RESOURCES AT THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

Temporal Unit	Thematic Unit	Resource Type	Type Occurrence			Socio-cultural Ascn.	Landform Ascn.	Physical Integrity	Re-search Value ^a	RV CR ^b	Socio-cultural Value ^c	SCV CR ^d
			Known Occurrences (no.)	Potential Occurrences	Other Likely Occurrences							
Archaic	Unknown	Unknown	0	1	+	Native Am.	Unknown	Unknown	NA	-	0	1
	Unknown	Unknown	0	1	+	Native Am.	Unknown	Unknown	NA	-	0	1
	Unknown	Unknown	1	2	++	Native Am.	Unknown	Unknown	NA	-	0	1
	Unknown	Unknown	1	2	++	Native Am.	Island/shore	Unknown	NA	-	0	1
	Unknown	Unknown	1	2	++	Native Am.	Island/shore	Unknown	NA	-	0	1
	Unknown	Unknown	1	2	++	Native Am.	Island/shore	Unknown	NA	-	0	1
	Unknown	Unknown	0	1	+	Native Am.	Unknown	Unknown	NA	-	1	1
	Tobacco farm	Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3	1
	Tobacco farm	Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
Late	Tobacco farm	Cemetery	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	5	1
	Tobacco farm	Gravestones	2	0	-	Euro-Amer.	Shoreline	None	0	2	5	1
	Tobacco farm	Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
	Tobacco farm	Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3	1
	Tobacco farm	Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Cemetery	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	5	1
	Tobacco farm	Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
	Tobacco farm	Fishing	0	1	+	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
	American Post revolution	Tobacco farm	Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3
Tobacco farm		Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
Tobacco farm		Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
Tobacco farm		Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
Tobacco farm		Fishing	0	1	+	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
Tobacco farm		Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3	1
Tobacco farm		Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
Tobacco farm		Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
Tobacco farm		Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
Tobacco farm		Fishing	0	1	+	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
Pre Civil War	Tobacco farm	Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3	1
	Tobacco farm	Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
	Tobacco farm	Fishing	0	1	+	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
	Tobacco farm	Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3	1
	Tobacco farm	Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1
	Tobacco farm	Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
	Tobacco farm	Fishing	0	1	+	Euro-Amer.	Shoreline	Unknown	NA	-	2	1
Post Civil War	Tobacco farm	Residence	0	1	-	Euro-Amer.	Unknown	Unknown	NA	-	3	1
	Tobacco farm	Outbuilding	0	0	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1

Table 5-1. SUMMARY OF SIGNIFICANT ARCHEOLOGICAL RESOURCES AT THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY (Continued)

Temporal Unit	Thematic Unit	Resource Type	Type Occurrence				Socio-cultural Assn.	Landform Assn.	Physical Integrity	Re-search Value ^a	RV CR ^b	Socio-cultural Value ^c	SCV CR ^d
			Known Occur- rences (no.)	Potential Occur- rences (no.)	Other Likely Occur- rences	Socio-cultural Assn.							
American (Cont'd) Post Civil War	Tobacco farm	Privies, well	0	1	++	Euro-Amer.	Unknown	Unknown	NA	-	2	1	
	Tobacco farm	Ferry landing	0	1	-	Euro-Amer.	Shoreline	Unknown	NA	-	2	1	
	Fishing	Fisheries	0	1	+	Euro-Amer.	Shoreline	Unknown	NA	-	2	1	

Notes:

- a. Likelihood for other occurrences indicated as positive (+) or negative (-); if the likelihood is believed greater than 50%, it is noted as double positive (++)
- b. Research Value (RV) codes--ranking from 0 (no value) to 5 (highest value); NA=insufficient information
- c. Confidence Rating (CR) codes: (1) the judgment is more guess than science, and likely not to be reliable; (2) the judgment is moderately reliable; (3) the judgment is most likely reliable
- d. Socio-cultural value (SCV) is the evaluation of the social, religious, or political importance of the resource to a contemporary community, from 0 (no value) to 5 (highest value)

5.1.2 Historic Sites

Again, the significance of historic period sites cannot be determined without data concerning site extent and integrity. The potential for significance is, however, high for several of the sites indicated by artifact collections and historic documentation. If the foundation and associated artifact scatter, trash pits, or filled in wells and privies associated with the structure constructed in the late seventeenth century remain, this site would probably be eligible for the National Register because of its relationship with the historical figure Martin Scarlet. In addition, the potential for scientific significance is high as this period is the poorest documented for the settlements in northern Virginia due both to of the scarcity of sites and the focus of research in seventeenth century Virginia on southern Virginia.

The cemetery that is probably located on the facility would be of significance to the descendants of the people who were buried there, if the cemetery has not been destroyed and if it can be located. The potential significance of other historic sites would have to be evaluated on an individual basis. However, if preservation and integrity were sufficient for many of the historic sites, the possibility of the entire facility becoming part of an historic district, emphasizing the different economic subsistence strategies and land use during the eighteenth and early nineteenth centuries, should not be ignored.

5.2 IDEAL GOALS AND OBJECTIVES

The first step in the management of archeological resources at the Woodbridge Facility is the more specific identification of these resources. At present, there are only vague general locations of surface exposed artifacts or collections of artifacts from sites of unknown location. Minimally, systematic archeological reconnaissance of the Woodbridge Facility should be conducted to (1) identify and verify site locations, (2) determine the site extents, (3) determine site integrity, (4) determine nature of preservation, and (5) determine periods and phases represented at the sites. Such information can only be obtained through systematic survey, including subsurface testing. Once this testing has been accomplished, significance of the sites can be evaluated and management plans devised. At present it appears highly likely that potentially significant sites are present on the Woodbridge Facility, and future construction and ground disturbance should be curtailed until the recommended reconnaissance has been completed.

A RECOMMENDED ARCHEOLOGICAL MANAGEMENT PLAN FOR THE HARRY
DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

6.1 FACILITY MASTER PLANS

6.1.1 Proposed Construction

Woodbridge Research Facility has 10 proposed development projects which will involve ground disturbance (Dwg. No. 18-04-32, sheet 3, 15 January 1982; FDMP 1982) (Table 6-1; Figure 6-1). This development includes construction of:

- a) a 100 ft. by 100 ft. open storage area north of Dawson Beach Road and east of Lake Drive;
- b) a 60 ft. by 60 ft. helipad east of the main compound;
- c) an 850 ft.² visitor control building on the site of Building 101;
- d) a 200 ft. by 225 ft. electronics laboratory with an adjoining 400 ft. by 100 ft. parking lot south of Dawson Beach Road;
- e) a 50 ft. by 20 ft. salt and sand storage building north of Building 202;
- f) a 40 ft. by 50 ft. command and control building at the Continuous Wave (CW) Test Facility southeast of Charlie Road;
- g) a 40 ft. by 50 ft. command and control building at the Installation Security Radar (ISR) facility east of Lake Drive;
- h) a 40 ft. by 50 ft. command and control building at the Vertical Electromagnetic Pulse Simulator (VEMPS) west of Fox Road;
- i) a 40 ft. by 50 ft. command and control building at the Repetition Electromagnetic Pulse Simulator (REPS) west of Fox Road; and
- j) construction of 1445 ft. of paved and 2600 ft. of unpaved roads associated with these various additions.

The open storage area will be located in GDA 7 in a previously undisturbed area. It is anticipated that 5 ft. of fill will be required at this location which will be screened by fencing and trees. Construction and fill operations could bury and extant archeological resources. The four command and control buildings (CW, ISR, VEMPS and REPS) will also be located in GDA 7 at the sites of previously existing test facility structures. All buildings will be constructed of reinforced concrete with underground sewage holding tanks. Floors will be below the existing ground level. These features will involve excavation to an undetermined depth, which could disturb any extant archeological materials. The helipad, located in GDA 7 and adjoining GDA

Table 6-1. A SUMMARY OF ON-GOING AND PLANNED ACTIVITIES ON THE HARRY DIAMOND LABORATORIES-WOODBRIDGE RESEARCH FACILITY THAT COULD AFFECT ARCHEOLOGICAL RESOURCES

Activities						Associated Resources				Impacts		
Description	Date	Area ^a	Size (a.)	Esti- mated Depth Below Surface (ft.)	Ratio of Dis- turbed to Total Area	Resource Class	Resources Known or Predicted	NRHP Sta- tus	Other Value	Direct	Indirect	Mitigation Options
Construction of Open Storage Area	1985	7	0.2	5b		NA	NA	NA	NA	NA	NA	NA
Construction of Helipad	1985	7	0.1	?		Prehistoric/ Historic	HDLW-3	NA	NA	?	?	?
Construction of Visitor Control Building	1986	4	0.2	?		NA	NA	NA	NA	NA	NA	NA
Construction of Electronics Laboratory and Parking	NA	7	2.0	?		NA	NA	NA	NA	NA	NA	NA
Construction of Salt and Sand Storage Building	NA	3	0.1	?		Prehistoric/ Historic	HDLW-3	NA	NA	?	?	?
Construction of CW Test Command and Control Building	NA	7	0.1	?		NA	NA	NA	NA	NA	NA	NA
Construction of ISR Test Command and Control Building	NA	7	0.1	?		NA	NA	NA	NA	NA	NA	NA
Construction of VEMPS Command and Control Building	NA	7	0.1	?		NA	NA	NA	NA	NA	NA	NA
Construction of REPS Command and Control Building	NA	7	0.1	?		NA	NA	NA	NA	NA	NA	NA
Construction of Roads	NA	7	4.5	?		NA	NA	NA	NA	NA	NA	NA

Notes: a = Ground Disturbance Area
b = Fill above surface

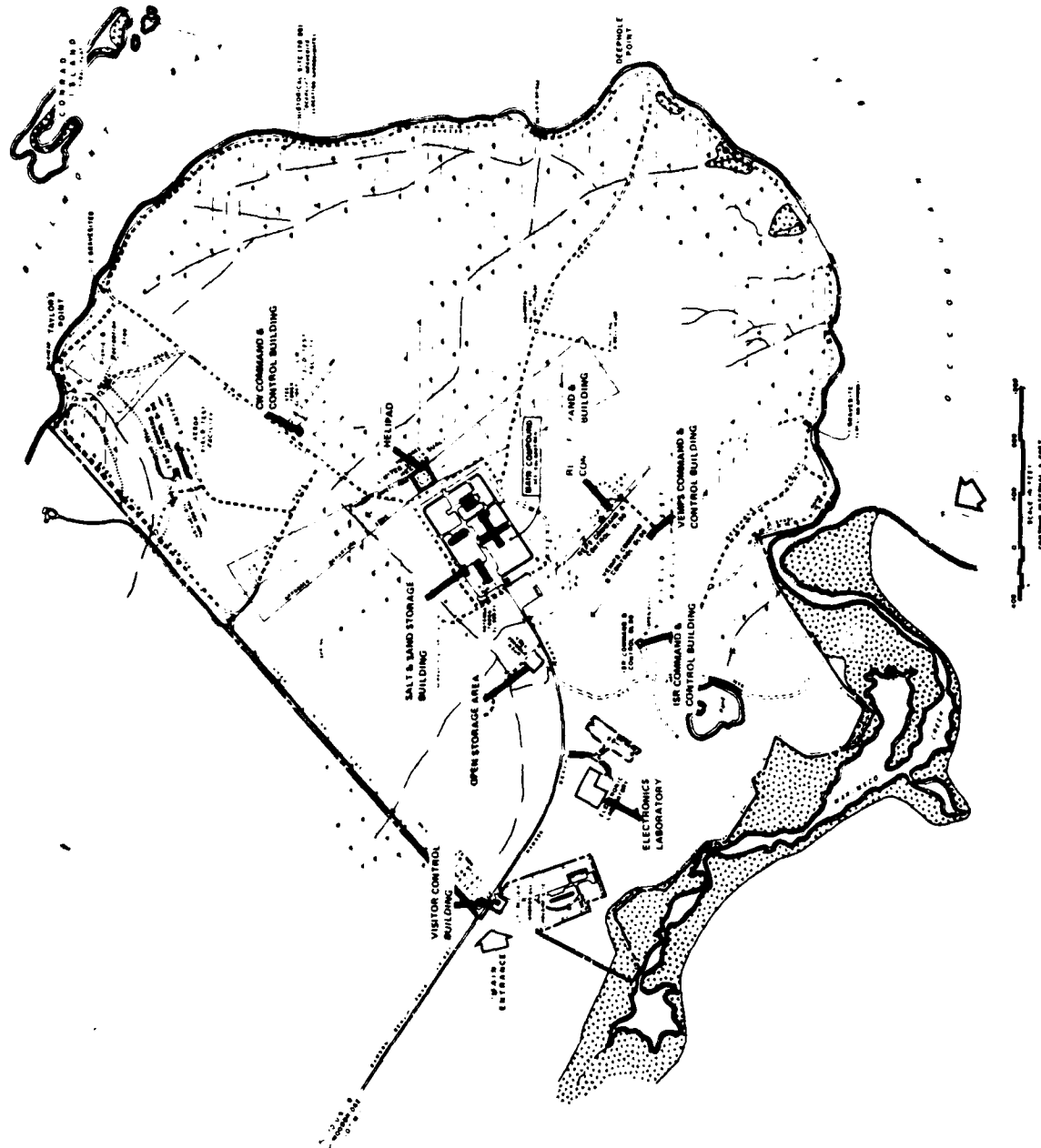


Figure 6-1. A MAP OF AREAS ONGOING OR PLANNED ACTIVITIES ON THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY.

3, will require an undetermined amount of grading and/or fill, which could disturb any existing archeological sites. The construction of the proposed electronics laboratory and associated parking lot, also in GDA 7, would involve construction and grading and/or fill operations to an undetermined depth in a previously undisturbed area, which would disturb any existing archeological material. The roads associated with these constructions will require grading and fill to an undetermined depth which could disturb any existing archeological materials in the affected areas.

The construction of the visitor control building will occupy the site of the existing guard post in GDA 4. It will involve excavation to an undetermined depth which could disturb any existing archeological remains.

The preparation of the salt and sand storage building in GDA 3 will involve grading and/or fill and the construction of a roof which could disturb any existing archeological remains, though the location is the site of an existing wash rack facility which may have been previously disturbed any cultural remains.

The construction of the open storage area and the helipad is imminent, while the visitor control building is slated to be built in 1986. The remaining projects are long range developments with no scheduled start dates (FDMP 1982).

6.2 APPROPRIATE ARCHEOLOGICAL MANAGEMENT GOALS WITHIN THE HARRY DIAMOND LABORATORIES - WOODBRIDGE RESEARCH FACILITY

6.2.1 General Facility Planning

Very little of the area of WRF has been significantly disturbed. There is little topographic relief (except along Marumsco Creek and along portions of the shoreline). A total of 67 percent of the facility lies within the range of the 100 year tidal floodplain and 26 percent of that is classed as tidal wetlands (BIMP 1980:14), which has placed limits on use and development. The higher areas to the north have been plowed. Given the low level of disturbance, the likelihood that significant archeological cultural resources exist at WRF is correspondingly high. Such resources are known to be present, though their location, extent, and integrity are not known. A primary planning goal for WRF, in accordance with Sec. 110(a) (2) of the National Historic Preservation Act, is to determine if any of these areas contain cultural resources requiring further management. In general, it appears that future development could have an impact on such resources. All areas of the facility should be formally and intensively surveyed to assess the presence and status of archeological remains.

Until such time as all archeological resources at WRF have been identified, it is recommended that any future development projects involving below ground disturbance (including new structures, utility lines, excavations, fill, grading, paving and/or landscaping) include provisions for an archeological survey of the affected area. Disturbance

of known sites should be avoided if at all possible.

Current and new employees at WRF should be made aware of DARCOM's historic preservation responsibilities and told to report any archeological finds on WRF property to the facility engineer (who should notify DARCOM and the SHPO). Any installation publication concerning rules and conduct should be revised to note that the removal or disturbance of archeological remains from WRF IS prohibited. It is important to protect such resources from artifact hunters to preserve the integrity of the remains.

Finally, procedures should be developed for dealing with the unanticipated discovery of previously unrecorded archeological remains.

6.2.2 Project-Specific Resources Protection or Treatment Options

At the present time several projects are planned which could adversely affect archeological remains at WRF. Given the uncertainty over location, extent and integrity of archeological remains, archeological survey should precede any ground disturbing activity at all project locations.

6.2.3 A Summary of Recommended Management Directions and Priorities for Effective Compliance and Program Development

The following rank-ordered archeological resource management tasks and policies should be implemented by WRF:

- o Conduct archeological survey at known future development project locations;
- o Conduct archeological survey to identify and locate archeological remains;
- o Document site extent, integrity, stratigraphy and subsurface features at identified sites consistent with assessment for nomination to the National Register of Historic Places;
- o Inform WRF employees of DARCOM's historic preservation responsibilities and revise facility literature; and
- o Develop procedures for dealing with the unanticipated discovery of previously unrecorded archeological remains and on-call archeologist arrangements.

Additional recommendations are dependent upon results of studies suggested above and approval of future development plans.

6.3 ESTIMATED SOCPEs-OF-WORK AND COST LEVELS FOR PRESENTLY IDENTIFIABLE MANAGEMENT NEEDS

This section contains preliminary scopes-of-work for each of the various components of the archeological management program outlined in Section 6.2.3. Certain specifics are common to many recommended work scopes, and unless specific mention is made of variations in these it should be assumed that they apply in all cases.

- o All work should conform to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.
- o All personnel must meet the minimum qualifications established in AR 420-40C for the position they will hold.
- o All excavation should be of a depth sufficient to reach sterile Pleistocene deposits or confirm prior disturbance.
- o All excavated material except that from excavation within clearly disturbed areas should be screened through 1/4 in hardware cloth.

6.3.1 Archeological Survey at Known Future Development Project Locations

Areas slated for ground disturbing development projects should be surveyed (including subsurface testing) for archeological remains prior to initiation of construction. The recommended model would involve shovel testing at 15m intervals, with 1m² test pits being placed at the discretion of the Field Director to acquire data on stratigraphy, site character and integrity. In the event that cultural remains are discovered, the testing should be expanded to acquire data consistent with assessment for nomination to the National Register of Historic Places. Testing of the 10 proposed project areas will require approximately 16 person-days for field work and 8 person-days for analysis and report preparation at a cost of about \$8800-10,000, including out of pocket expenses of about \$2200. If significant indications of cultural remains are found in this phase, a more intensive program of excavation and analysis will be required, though the extent of further work and its cost is impossible to estimate.

6.3.2 Archeological Reconnaissance to Identify and Locate Archeological Remains

The remaining areas of WRF should be formally surveyed for the presence of archeological remains. This survey should include all areas not obviously disturbed by extant construction or submerged tidal wetlands areas. Together these areas occupy roughly 30 percent, leaving roughly 400 a. in need of survey treatment. The recommended model involves 75m wide transects with small diameter auger tests at 30m intervals to test for the presence of shell and/or other organic deposits. These tests should be supplemented by shovel tests at the discretion of the Field Director where ground cover obscures the surface and in high-probability site locations, such as terraces along watercourses. This will require approximately 42 person-days for fieldwork and 22 person-days for analysis and report preparation at a cost of \$33,000-35,000, including approximately \$6500 in out-of-pocket expenses.

6.3.3 Subsurface Testing at Identified Archeological Sites

While archeological sites are known to exist at WRF, the exact locations of these sites remain to be identified. Until the work

discussed in Section 6.3.2 is completed and these sites are located and enumerated, it is not possible to estimate the time and costs which would be involved in assessing these sites. Sites located in the reconnaissance phase must still be assessed to determine eligibility for the National Register of Historic Places. Once such sites have been identified, a program of subsurface testing should be undertaken to assess site size, integrity, and cultural associations. This should involve shovel and auger testing to establish extent, depth, and stratigraphy, and excavation of squares and/or trenches to recover artifactual material to assess cultural associations and depositional sequences. This should involve at least one 1m² test excavation per site to assess stratigraphy, with more at larger sites, located to examine the diversity of the site (i.e., near water, away from water, areas of different topographic relief, etc.). Shovel tests at 15m intervals and auger tests at 3m intervals should be used to establish site extent, with test excavation units placed at the discretion of the Field Director. Auger testing is required for fine-grained control of site extent.

6.3.4 Education Programs

During any orientation for newly assigned personnel or employees, mention should be made of DARCOM's historic preservation responsibilities. In addition, all contractors, Army personnel, dependents, and visitors should be advised to immediately report the discovery of any archeological remains to the Facility Engineer (who should in turn notify DARCOM and the State Historic Preservation Officer). These same individuals should also be advised that, as per AR 420-40-1.4f(5), unauthorized collection of archeological and cultural materials is a felony and subject to prosecution. Any installation publication concerning rules and conduct at WRF should be reviewed to include these requirements and warnings. In addition, in accordance with AR 420-40-1.4e(11), military police and other security personnel should be trained to enforce laws protecting historical and cultural properties. It is estimated that revision of installation publications will require one day of a professional archeologist's time at an estimated cost of \$500. Unestimated expenses would include publication costs and time expended by installation personnel during briefings and orientations.

6.3.5 Emergency Discovery Procedures

Procedures for dealing with the discovery of historic properties (including archeological sites) are detailed in AR 420-40-4.10. In the event of an unanticipated discovery, the installation commander or his designee should notify the Department of the Interior Departmental Consulting Archeologist. DARCOM and the State Historic Preservation Officer should be notified at the same time.

To assist WRF in conducting any archeological evaluations and/or necessary data recovery activities which may be required as a result of an unanticipated discovery in the shortest time possible, it is

recommended that WRF enter into an on-call service agreement with an institution or firm which can provide professional archeological consulting services. At the option of WRF, a contract for the services could be issued on either a sole-source or competitive basis. In the case of the former, approximately three days of installation personnel would be required. In the latter case, a greater but unknown amount of time would be required of installation personnel to prepare and issue a formal Request-for-Proposal and to evaluate responses.

7.0
SUMMARY

A review of all the major information sources likely to have data pertinent to the prehistoric and historic archeology of the site occupied by the Harry Diamond Laboratories-Woodbridge Research Facility was conducted for this study. The review indicated that three prehistoric and three historic sites are known to exist on WRF property and that numerous prehistoric and historic sites have been reported in the immediate vicinity of WRF as well. Six specific potential archeological sites were identified from WRF documentary materials. These include 2 historic artifact scatters, a historic fisheries facility, a colonial cemetery, a historic ferry landing, and a prehistoric lithic scatter for which exact locational data are unavailable. The physical integrity of the known and potential sites is unknown. Only a portion of these sites are believed to possess sufficient significance to be potentially eligible for the National Register of Historic Places. Because WRF occupies one of the few relatively undisturbed locations in the area, the potential significance of its archeological remains is considered to be of a high order.

Institutions consulted as part of the basic data gathering for this overview include: Library of Congress; National Archives-Modern Military Branch, Navy and Old Army Branch, and the Still Photo Branch; Anthropological Archives-National History Museum-Smithsonian Institution; the Museum of the American Indian-Heyle Foundation; the New York Public Library Map Division; Catholic University of America Library; and the Virginia Room-Manassas County Library. In addition, the "America: History and Life" database of Lockheed's Dialog Information Retrieval Service, with abstracts from more than 2000 history journals, was also consulted. One visit was made to the Harry Diamond Laboratories - Woodbridge Research Facility by the authors. In addition to a general walkover of the site, drawings and materials maintained by the Facilities Engineer's Office were examined.

Portions of WRF have been disturbed by construction of extant structures. However, large portions of the facility are essentially undisturbed. The presence, location, and physical integrity of the archeological cultural resources within any of these areas cannot be determined at this time. All ground disturbing activities in the vicinity of all known and potential sites identified in this study should be avoided if possible.

Recommendations offered in this overview include archeological survey of the sites of proposed development projects; formal survey of all undisturbed areas of the facility; testing at sites identified in the survey to establish potential eligibility for the National Register; establishment of an education program for WRF personnel; and establishment of emergency archeological recovery procedures.

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