

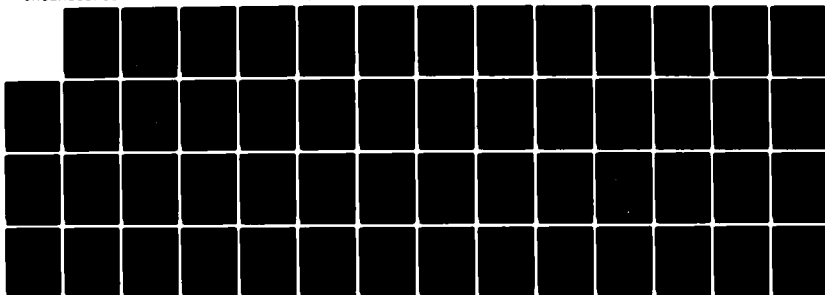
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AN ARCHEOLOGICAL OVERVIEW AND MANAGEMENT PLAN FOR THE  
STRATFORD ARMY ENGINE PLANT(U) ENVIROSPHERE CO NEW YORK  
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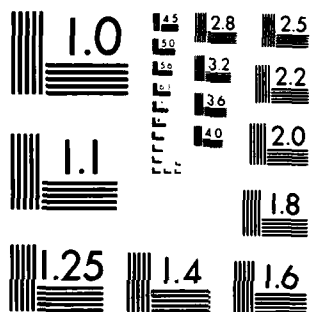
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**Final  
Report No. 5**  
February 1984

**AD-A146 046**

**An Archeological Overview and Management Plan  
for the Stratford Army Engine Plant**

Under Contract CX4000-3-0018  
with the

**National Park Service  
U.S. Department of the Interior**  
Philadelphia, Pennsylvania 19106

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

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by

**Envirosphere Company**

2 World Trade Center  
New York, New York 10048

Prepared under the Supervision of

Joel I. Klein, Principal Investigator

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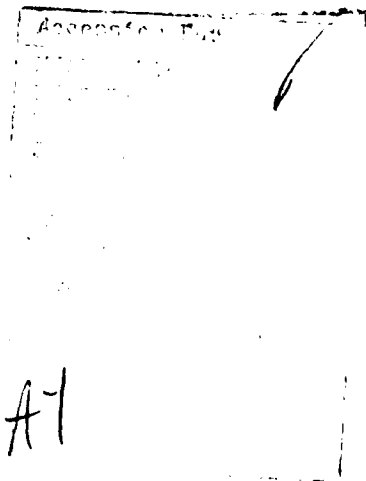
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<b>13. Type of Report &amp; Period Covered</b> Final Report		<b>14.</b>		<b>15. Supplementary Notes</b> This report was prepared as part of the DARCOM Historical Archeological Survey (DHAS), an interagency technical services program, to develop facility-specific archeological overviews and management plans for the U.S. Army Materiel Development and Readiness Command (DARCOM).
<b>16. Abstract (Limit: 200 words)</b>  This archeological overview and management plan provides a tool which can be used to assist DARCOM and decision-makers at the Stratford Army Engine Plant (SAEP) in complying with existing regulations and procedures relating to historic preservation. (Technical Manual 5-801-1, Technical Note No. 78-17, Resources Management; 32 CFR 650.18-650.193; Army Regulation 420; 36 CFR 800). This document summarizes data relating to the area's environmental history; cultural chronology; historic and modern ground disturbances; previous archeological surveys; presently identified 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 effect archeological resources; locational data of known archeological resources; and locational data of potential archeological resources. No significant archeological remains are known to exist on SAEP property. Although prehistoric sites have been reported in the general vicinity, an analysis of prior land uses and ground disturbing activities suggests that there is little likelihood that previously undiscovered, intact, archeological resources exist on the upland portion of the SAEP site. Early prehistoric archeological sites, inundated by rising sea levels, may be present within the riparian rights area of the SAEP. No site or project specific archeological management activities are recommended for the SAEP at this time. It is recommended that procedures be established to (a) insure that potential archeological resources within the riparian rights area are identified prior to the start of construction in that area; and (b) deal with the emergency discovery of archeological resources in upland areas.				
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MANAGEMENT SUMMARY

This archeological overview and management plan provides a tool which can be used to assist DARCOM and decision-makers at the Stratford Army Engine Plant (SAEP) in complying with existing regulations and procedures relating to historic preservation (Technical Manual 5-801-1, Technical Note No. 78-17, Resources Management; 32 CFR 650.18-650.193; Army Regulation 420-XX Army Regulation 200-1; Army Regulation 200-2; 36 CFR 800). This document summarizes data relating to the area's environmental history; cultural chronology; historic and modern ground disturbances; previous archeological surveys; presently identified 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 effect archeological resources; locational data of known archeological resources; and locational data of potential archeological resources.

No significant archeological remains are known to exist on SAEP property. Although prehistoric sites have been reported in the general vicinity, an analysis of prior land uses and ground disturbing activities suggests that there is little likelihood that previously undiscovered, intact, archeological resources exist on the upland portion of the SAEP site. Early prehistoric archeological sites, inundated by rising sea levels, may be present within the riparian rights area of the SAEP.

No site or project specific archeological management activities are recommended for the SAEP at this time. It is recommended that procedures be established to a) insure that potential archeological resources within the riparian rights area are indentified prior to the start of construction in that area, and b) deal with the unanticipated discovery of archeological resources in upland areas.



A-1

## PREPARERS AND QUALIFICATIONS

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Joel I. Klein is Project Manager for the DARCOM project and is the principal author of this Archeological Overview and Management Plan. He holds a B.S. in Anthropology and Physics and M.A. and Ph.D. degrees in Anthropology, and is certified by the Society of Professional Archeologists in field research, and cultural resource management. His 15 years of professional experience have been in anthropological and archeological research, and cultural resource management, including several projects in Connecticut. He has participated in archeological investigations across the United States. He is presently a Principal Engineer with EnviroSphere Company.

Elise M. Brenner is a contributing author. For the DARCOM project Dr. Brenner was directly responsible for the collection of all baseline data and the preparation of the regional culture history for the Stratford Army Engine Plant overview. Dr. Brenner received her M.S. and Ph.D. degrees in Anthropology from the University of Massachusetts-Amherst. She is a specialist in ethnohistory of eastern Massachusetts. She has served as a supervisor on several archeological projects in southern New England.

## ACKNOWLEDGEMENTS

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The authors wish to thank the following individuals, who provided assistance and information during the preparation of this archeological overview and management plan: Major Jimmy A. Watt, U.S.A., Chief, Contract Operations Branch, SAEP; Neal Sansome and Jack Kennedy, Avco Lycoming Stratford Division.

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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 on the Stratford Army Engine Plant.

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 May 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), standards for data recovery (proposed 36 CFR 66), and procedures implementing the Archeological Resources Protection Act (proposed 36 CFR 69)

- 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-XX; Army Regulation 200-1; Army Regulation 200-<sup>^</sup>).

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 data made available by installation representatives between April and September 1983.

## 1.2 THE STRATFORD ARMY ENGINE PLANT

The Stratford Army Engine Plant (SAEP) (Figure 1-1) is a Government-Owned Contractor-Operated (GOCO) industrial facility operated by the Avco Lycoming Division of Avco Corporation. The facility was originally constructed in 1929 by the Sikorsky Aeronautical Engineering Corporation. Subsequently, the Chance Vought Company followed Sikorsky as the operator of the facility. During the World War II era, the U.S. Government procured the facility and expanded it considerably. In 1951 the Air Force reactivated the facility and it was operated by Avco Lycoming Division for production of Curtis Wright's nine cylinder R-1820 radial engine and major components of the J-47 jet aircraft engine under a license agreement.

The facility was transferred from the U.S. Air Force to the U.S. Army in 1976 and was redesignated as the "Stratford Army Engine Plant." Government contracts were received for development of the AGT-1500 engine which was selected in 1976 to power the Army's new Abrams XM1 Main Battle Tank. Selection of the tank engine triggered a major U.S. Army sponsored facility rehabilitation and rearrangement program, essential to tank engine production requirements and helicopter engine mobilization commitments.

Buildings at SAEP consist of a combination of one, two, and three stories; steel frame; steel siding; steel frame with brick; concrete block; reinforced concrete; and wood/wood siding. The two main manufacturing buildings are single story, steel frame, hangar-type, originally built for airframe manufacturing. The property, situated on the western shore of the Housatonic River, consists of 75.31 a. of upland with an additional 39.50 a. of riparian rights in the Housatonic River. The plant consists of 48 buildings and building extensions in five main building areas, with a total gross floor area of approximately 1,539,980 sq. ft. (Figure 1-2).

Avco Lycoming Division pays rent to the U.S. Government on a semi-annual basis for utilization of facilities in connection with non-U.S. Government and Foreign Military Sales (FMS) programs.

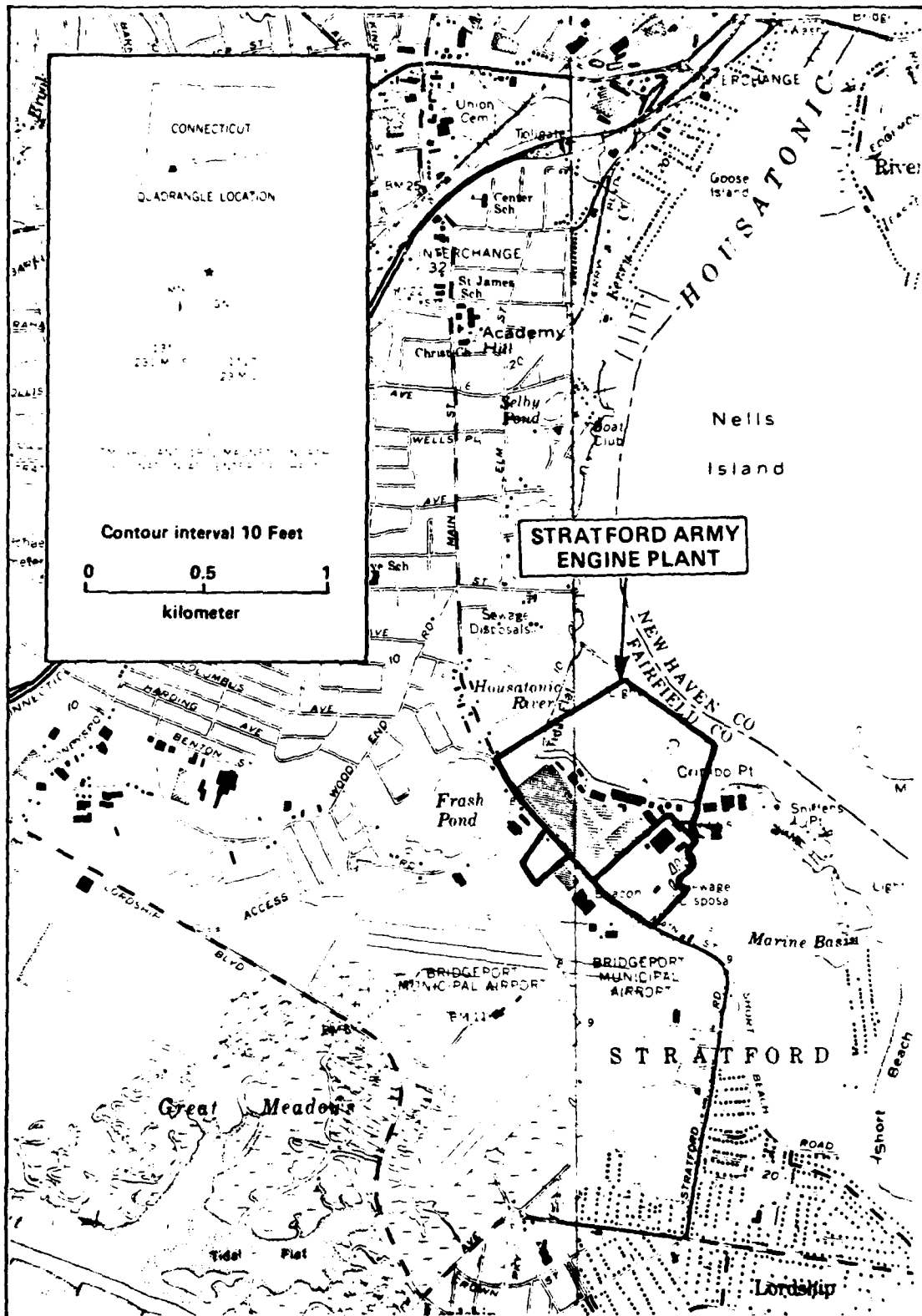


Figure 1-1. MAP OF THE GENERAL VICINITY OF THE STRATFORD ARMY ENGINE PLANT

- LEGEND**
- MAIN BUILDINGS AT THE STRATFORD ARMY ENGINE PLANT**
- 1 - MAIN ADMINISTRATIVE AND GOVERNMENT OFFICES
  - 2 - PRODUCT MANUFACTURING
  - 3 - RESEARCH & DEVELOPMENT
  - 4 - ENGINEERING MATERIALS LABORATORY & RECEIVING INSPECTION MATERIALS STORES
  - 5 - TURBINE ENGINE ENVIRONMENTAL & COMPONENT TEST
  - 10 - MANUFACTURING TANK ENGINE COMPONENTS & ASSEMBLY
  - 16 - PRODUCTION DEVELOPMENT TEST CELLS & SUPPORTING SERVICES

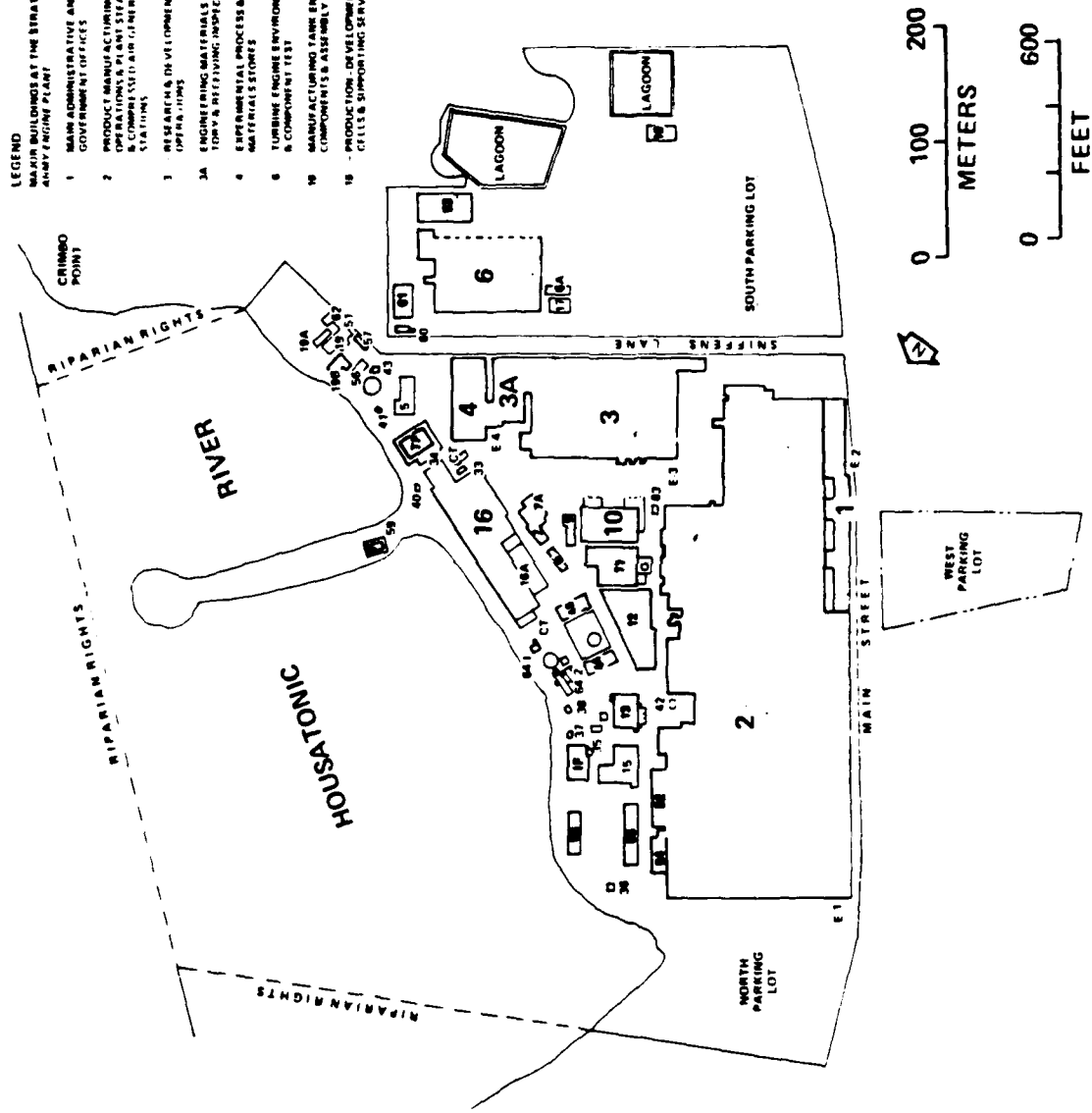


Figure 1-2. DETAILED MASTER MAP OF THE STRATFORD ARMY ENGINE PLANT

### 1.3 SUMMARY OF PREVIOUS ARCHEOLOGICAL WORK CONDUCTED ON THE STRATFORD ARMY ENGINE PLANT

Although no archeological work has been done at SAEP, there have been archeological investigations in the surrounding area. The Prehistoric Archeological Survey Team (P.A.S.T.) of the University of Connecticut at Storrs conducted an archeological survey of Sterling Park in Stratford. The test pits yielded dumps and refuse areas of the historic period in disturbed contexts (Aigner et al. 1977). In the Lordship area of Stratford, an archeological survey located a small shell midden at the edge of a marsh just west of Lordship; a large shell midden in the northern part of Lordship Farms on the banks of Frash Pond; and a prehistoric site on the banks of the Housatonic, north of Marine Basin Inlet (in Aigner et al. 1977:12). The historian Sammual Orcutt provides a description of artifacts recovered from this latter site by local collectors: 3 stone celts, 20 pestles and pestle fragments, 17 chisels, 2 soapstone bowls, 5 rubbing stones, 1 drill, 75 knife or point fragments, fire-cracked rock, and unidentified pits (Orcutt 1886:63-67).

Francis Goldbach, the writer of a pamphlet describing Indian artifacts from Stratford, reports sites and shell middens in cornfields north of Duck Neck Creek and in the vicinity of Frash Pond (Goldbach 1976). At Muskrat Hill a group burial of dogs associated with whelk shell artifacts is reported, as well as three Indian skeletons 100 ft. west of the dog burials (Coffin 1963). Coffin also reports a flexed individual skeleton at the northeastern end of Frash Pond. Coffin (1947) reports on the remains of a fish weir in the Housatonic River west of Nell's Island.

### 1.4 THE SOCIOCULTURAL CONTEXT OF THE ARCHEOLOGICAL RESOURCES ON THE STRATFORD ARMY ENGINE PLANT (SAEP)

Stratford is located in Fairfield County, Connecticut, 60 mi. east of New York City. Today Stratford is an industrial city in the Bridgeport complex, with few hints of its early origin in 1639 (Bixby 1974:266). However, efforts have been made to recall the late colonial aspects of the settlement, named, of course, for Stratford-upon-Avon, England (Bixby 1974:266). The American Shakespeare Festival Theatre and Academy, attended by hundreds of thousands of visitors every year, is an example of the city's recollection of its roots.

In the early years of aircraft development and manufacture, Stratford was the base of world-famous Sikorsky Aircraft. The Sikorsky Division of United Aircraft still operates in Stratford, and parts manufacturers for aircraft are numerous (Bixby 1974:266). In the last 30 years the town has grown rapidly, although in the last decade this growth rate has levelled off. Recently, attention has been paid to preservation of the wetlands along the shore and the Housatonic River estuary.

In terms of Stratford area's Native American population, in 1935 the Golden Hill tribe, along with other tribes in the state, were placed under the jurisdiction of the State Park and Forest Department. In 1941 the State Welfare Department took over control of Indian Affairs, and in 1973 the Commissioner of the Department of Environmental Protection took

control of Connecticut's reservation tribes (Guillette 1979). The Native American population of Connecticut took part in the national movement among Native Americans in the late 1960s. In 1973 the Connecticut Indian Affairs Council was established as part of Connecticut Indians' campaign to gain control over their own lands and affairs (Guillette 1979). In 1977 the descendants of the Golden Hill tribe--in turn, the descendants of Stratford's native population--established in Trumbull, Connecticut, a base for tribal operations; this base also serves as a school, a museum, and a tribal center (Guillette 1979). The Golden Hill Tribal Council has as its basic goal the self-sufficiency of its members. This requires an adequate land base. To this end, the tribe received a grant in 1979 from the Department of Housing and Urban Development to purchase land for a new, larger reservation (Guillette 1979). In the same year, the tribe purchased 69 a. in Colchester, Connecticut to serve as its land base to help the tribe become self-sufficient through economic development.

2.0

AN OVERVIEW OF THE CULTURAL AND RELEVANT NATURAL HISTORY OF THE  
STRATFORD ARMY ENGINE PLANT

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2.1 THE PHYSICAL ENVIRONMENT

2.1.1 Earth Resources

The bedrock in Stratford is composed of Middle and Upper Ordovician materials, predominantly Oronoque member of Derby Hill schist (Fritts 1965). Specifically, the bedrock is mainly slabby to thinly laminated, medium- to fine-grained greenish-gray to medium dark-gray quartz-rich and albitic paragneiss with schistose to phyllitic partings and layers containing abundant muscovite and chlorite (Fritts 1965). The major local mineral used by prehistoric people was quartz (Swigart 1977). Quartz was present in the form of glacial erratics, as major and minor dikes, and still intrusive outcroppings in the exposed bedrock (Swigart 1977). Above the bedrock is a shallow orange to yellow podzol; this soil may become deeper on well-drained glacial alluvial terraces (Brumbach 1965). The topsoil layer is a brown to black loam, approximately 6-10 in. deep. The superficial geology consists of gravel, identified by Flint as Stratford outwash sediments (Flint 1968). The terrain is generally level (Hurd 1881:750); the only unevenness is a rise in the terrain to the north with topographical features elongated in the north-south and northeast-southeast direction (Aigner et al. 1977a:1). In other words, topographically, the land surface slopes gradually from the northern border to the southern coast. The present topography is carved from what was a peneplain several million years ago (Bixby 1974:41).

Where the ocean water has inundated the land surface there is significant alteration of the local topography (Gordon 1983:66). There is evidence that the advancing surf zone has removed over 5 m of glacial deposits along some parts of the Connecticut shore (Gordon 1983:66).

2.1.2 Water Resources

Stratford was formed by the broad mouth of the Housatonic River which widens at its outlet creating a bay between Milford Beach and Stratford Point (Wilcoxson 1939:1). A network of inflowing rivers of fresh water from the Housatonic, small inlets, landlocked retreats, fresh-water springs, ponds, streams, and brooks occur throughout the town (Wilcoxson 1939). The Stratford Army Engine Plant lies at the point

where the Housatonic River enters the Long Island Sound. The Sound achieved its present form around 6000 years ago, and subsequent changes in its form have been the gradual advance of the shoreline landward (Gordon 1983:67).

The Housatonic River drains a region whose highest point is in the northwestern corner of Connecticut (Bixby 1974:39). The land slopes gradually (about 20 ft. per mile) to the shores of the Long Island Sound. The shore is generally rocky, with few sand beaches. The irregularities in the shoreline today are the result of the ocean flooding stream mouths and valleys near the shore. The mouth of the Housatonic River is technically an estuary; only the dams prevent the tidal effect from being noticeable far up the Housatonic River (Bixby 1974:44-45). Currently, the Housatonic River is not navigable very far upstream. In the late nineteenth century, the government made extensive improvements at the mouth of the Housatonic to open it to river transportation. A channel was blasted through a shell bar consisting of millions of oysters, which extended across the mouth of the river, causing the river to be deep, narrow, and swift. A breakwater was built, first in 1888, and then completed in 1897. In the very early historic period, because of the shell bar, the Housatonic was known to change its course as often as seven times in one year (Coffin 1947).

Marsh lands occur where the river meets the ocean and where the tides restrict the outward flow of water (Bixby 1974:45). Along the submerged shores of the Long Island Sound, rivers and streams deposited the silt carried by the waters, and eventually the tidal marshes were produced. These marshes exist from the low-tide mark to the point on shore where the highest of the high tides has ever reached (Bixby 1974:45). They are, most often, periodically drowned horizontal stretches of land near the mouth of the Housatonic (Bixby 1974:56).

To the west of the SAEP lies Frash Pond. The Pond's outlet(s) reportedly passed under the SAEP to the river. Swampy land and marshland occur on all sides of the SAEP. Marine Basin Inlet is situated to the southeast. Several fresh water streams empty into the Housatonic in the vicinity of the Stratford Army Engine Plant.

As will be discussed at greater length later in this report, the original shoreline of the Housatonic River along the northern edge of the Plant has been artificially modified. Similarly, changes in the Long Island Sound will be discussed briefly here, and at greater length elsewhere in this report. In Connecticut the submergence of the coast was caused by an initial rise of the land followed by subsidence (Gordon 1983:62). The land first rose rapidly after the retreat of the glacier, and then began to subside. This subsidence continues today, and is in part responsible for the present rise of sea levels along the coast (Gordon 1983:65). The rest of the rise is due to additional melting of the polar ice caps, which increased the volume of ocean water (Gordon 1983:65). Also there are local variations in the vertical motion of the land surface in southern Connecticut which are responsible for changes in the submergence rate along the shore of the Sound (Gordon 1983:64-65).

### 2.1.3 Modern Climate

The climate of the Stratford Army Engine Plant site is influenced by both continental polar and maritime tropical air masses (Swigart 1977). Average annual high temperature in the vicinity of the SAEP is 59.5°F; the average annual low temperature is 44.3°F; the January high temperature is 36.9°F; the low is 23.4°F. The July high temperature is 76.0°F, and the low is 59.8°F. Annual average precipitation is 38.61 in. Average January precipitation is 2.71 in.; average July precipitation is 2.56 in. The SAEP lies at an elevation of 7 ft. above sea level.

### 2.1.4 Plant Resources

The marshy areas surrounding the facility today, and upon which the SAEP was originally built, provided a variety of edible wild plants as well as diversity of other wild plant resources. Saltwater grass, salt meadow grass, grasswort, sea lavender, gerardia, black grass, switch grass, marsh elder, cattails, bulrushes, sword grass, and sea myrtle grew in marshes. In swampy areas ferns, cat tails, yussock sedge, skunk cabbage, red maple, and white ash are found. Edible fruits included strawberries, blueberries, whortleberries, and grapes (Wilcoxson 1939).

### 2.1.5 Animal Resources

In the Long Island Sound area, including the swamps and marshes, the following fish and shellfish could have been utilized by prehistoric and early historic populations: salmon, shad, striped bass, bluefish, mackerel, flounder, alewives, sand eels, sea worms, oysters, clams, mussels, lobsters, crabs, scallops, scate, snails, and starfish. Snapping turtles and tree frogs were also available. Such birds and ducks as herring quail, gulls, partridge terns, osprey, snipe, pigeons, heron, mallards, wood-ducks, and geese lived in this ecosystem and could be exploited by human populations. Game in the area included turkey and deer.

### 2.1.6 Paleoenvironment

Prior to historic development, the Housatonic River was characterized as much different from the waterbody of today. There is evidence that the river has changed its channel course as often as seven times in one year. This dynamism resulted from the large shell bar that extended across the mouth of the river. The depth of this shell deposit was at least 60 ft. (Coffin 1947). As a result of filling, the shoreline of the Housatonic River in the vicinity of the SAEP has been extended at least 200 ft. It is most likely that the vicinity of the SAEP was quite wet, except perhaps during periods when sea level was lower than at present. The area was swamp and marsh land that underwent periodic flooding with interspersed zones of open fields. This would have been a highly productive ecosystem, providing a variety of edible plants, animals, birds, fish and shellfish. Perhaps most important for the purposes of investigating subsurface cultural remains is the fact that sea levels have risen since the postglacial period. This has resulted in the

altering of the topography of the coastal zone, leading, in turn to the possible submersion of early period prehistoric sites (Luedtke 1978:95). A closer examination of the changes in sea level is necessary in order to ascertain at what time periods the vicinity of the Stratford Army Engine Plant would have been dry land and, therefore, able to support human habitation.

There are three major interpretations of postglacial changes in sea level (Bourne 1972:11):

1. According to Fairbridge (1960a, 1960b, 1977), sea level has fluctuated from about 1.5 m below to 3 m above the present sea level. He argues that between 15,000-10,000 BP (the late Wisconsinian stage) sea level had dropped to -135 m, and was rising eustatically during the melt stage (Fairbridge 1977:90). During this time period the coastline was continually being moved inland from its original location at the edge of the continental shelf (Fairbridge 1977:90).

The mean horizontal transgression rate was almost 10 meters per year, so that no coastal campsites could have been occupied for long periods. In as much as sea level is constantly oscillating in short-term cycles of 10-100 years relatively brief regressions would occur, only to be followed by very rapid transgressions, which would have endangered any riparian settlements (Fairbridge 1977:90).

Fairbridge (1977:91) adds that at approximately 10,000 years ago a temporary climatic cooling associated with a brief marine regression occurred, following which sea level rose rapidly once again. The transgressing sea continued to encroach on the continental shelf through 6000 BP (Fairbridge 1977:91).

With a relatively stable sea level after 6000 BP, seashore locations, especially in protected bays and estuaries, would have become attractive for human habitation. From 6000-3000 years ago, although the sea level became nearly stabilized at its current level, there were occasionally prominent shifts in marine transgression onto the continental shelf (Fairbridge 1977:91). During such times, coastal communities would have been forced to move their campsites. During this same time period (6000-3000 BP):

Along the coast, the isostatic crustal adjustment had become almost stabilized, and progressive wave erosion started building bay-mouth bars, long-shore spits, and barrier islands... A great variety of attractive campsites were thus created. Within the lagoons, estuaries, and bays a vast colonization by shellfish took place... (Fairbridge 1977:92).

At approximately 5600 BP and 4300 BP sudden drops in sea level caused a loss of many shell-fishing spots; however, the rate of fall in sea level, through several decades, allowed for year-to-year community adjustments and demographic shifts to accommodate to these sea level changes. Fairbridge suggests that by accurate radiocarbon dating of shell middens, local trends in the movement of individual campsites could be tracked. Furthermore, he argues that in times of sudden drops in sea level, one could expect to find abrupt breaks in the archeological record of coastal campsites.

2. Sea level has remained at the same level during the past 6000 years.
3. The sea has been rising, and continues to rise up to the present time (Bourn 1972:11). However, at no time during this period was it above its present level (Bourn 1972; Ritchie 1980; Shepard 1964). Radiocarbon dates of peat and wood samples from coastal Connecticut indicate a continuous submergence over the past 7000 years due to an eustatic rise of sea level (Ritchie 1980:169). The submergence of the coast has been 9 ft. in the last 3000 years, and 33 ft. in the last 7000 years (Bourn 1972:11). From 7000-3000 BP there was a rapid rise in sea level, but during the last 3000 years the rate was only half as much (Bourn 1972:11; Ritchie 1980:169; Sears 1963; Shepard 1964). Ritchie claims that there is "no evidence of pauses or reversals in the submergent trend" (Ritchie 1980:169). Several hundred borings in Connecticut tidal marshes indicate over 10 ft. of salt marsh peat overlying bay mud (Ritchie 1980:169). This suggests that sediment accumulation and salt marsh growth equalled submergence rates only during the last 3000 years (Ritchie 1980:169), based on the research of Sears (1963) and Shepard (1964). Prior to 3000 BP the more rapid submergence maintained open, shallow estuaries and lagoons on the sites of the present salt marshes (Ritchie 1980:169, citing the work of Sears [1963] and Shepard [1964]).

It is worth noting the research of Bourne (1972) in coastal Connecticut, where the Connecticut River enters the Long Island Sound. Evidence here indicates the existence of submerged prehistoric archeological sites. The artifact inventories from these sites indicate that the sites were inhabited by communities of the so-called Narrow Point tradition. These communities would have had access to open water ways, at least until 3000 BP. The recovery of gouges and adzes at these sites may be associated with the manufacture of dugout canoes, and the discovery of notched net-sinkers suggests the importance of fishing (Bourn 1972:15). No research concerning submerged sites has been conducted in the immediate vicinity of the SAEP.

## 2.2 THE CULTURAL ENVIRONMENT

### 2.2.1 Prehistory

The cultural history of the vicinity of the Stratford Army Engine Plant is presented in Table 2-1. Evidence for prehistoric occupation of the SAEP vicinity comes, not surprisingly, from around the various water bodies in the area. At the bank of the Housatonic, near the mouth of the river, a collection of artifacts and features is suggestive of a Late Archaic encampment. This site consisted of steatite bowls and fragments, projectile points, fire-cracked rock, charred ash, charred hickory nuts, and heat-treated debris from stone tool manufacture. Late Archaic skeletal remains, associated with stone tools, pestle, axe, and projectile points have been uncovered near Frash Pond.

In the Housatonic River, west of Nell's Island, a fish weir was erected. This fish weir, now submerged and mostly destroyed, consisted of a series of wooden stakes of red oak or jack pine, with wedge-shaped or burned points. The stakes are in double rows; the weirs are 400-500 ft. long (Coffin 1947:36-37).

Along Route 113, approximately 500 m from the Housatonic River, a late Archaic campsite was uncovered on the floodplain at an elevation of 10 ft. The cultural remains consisted of celts, scrapers, knives, hammerstones, and drilled slate. Along Route 113, 50 m from the river a Late Archaic campsite is evidenced by a grooved axe, a celt, small-stemmed points, and net sinkers. The site lies at an elevation of 10 ft. above sea level. There is a predominance of sites dating from the Late Archaic and Late Woodland periods. This may, however, be the result of a bias in data recovery procedures.

Late Archaic sites tend to be temporary campsites, frequently situated on small knolls. Most likely, knolls were chosen for their dry ground surfaces and visibility of the landscape. The Late Archaic period in southern New England was characterized by alternating seasons of aggregation and dispersal. The Late Archaic sites reported from the Stratford region indicate small numbers of people staying at a site for a short period of time.

Sites of the Late Woodland period in the SAEP vicinity are frequently village sites, containing such features as post molds and hearths, an abundance of pottery, and ground stone and chipped stone tools. The high density of Woodland period sites along the coast may indicate a shift from the inland to the coast at this time. Further, Late Woodland village sites may be suggestive of the exploitation of the coast's fertile land for the practice of horticulture. Several cemeteries also occur from the Woodland period in the general region of the Plant.

The lack of sites from Paleo-Indian through Middle Archaic times may be the result of: (1) the submersion of these sites by rising postglacial sea levels; (2) the destruction of these sites by wave action erosion; and (3) bias in data recovery due to the low archeological visibility of small, early period sites.

Table 2-1. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF THE STRATFORD ARMY ENGINE PLANT

Cultural Unit		Period or Phase	Date	General Settlement Patterns	General Subsistence Systems	Kinds of Archeological Remains Representative of Period
American	Installation Activity Begins	AD 1920 to present		Industrial and residential. Building of dikes; cut and fill construction activities in what had been swampy and meadow land filling-in of old shoreline.	Commercial; manufacturing and technology industries; urban market economy.	Subsurface utility lines, metal, glass, concrete, and brick construction materials; pavement; automobile, helicopter, airplane parts; shipping docks; American domestic material culture, high-technology-related items.
Euro-American		AD 1639 to 1920		Plantation agriculture and livestock raising until early nineteenth century. Early nineteenth century until 1920 there is increasing population density in town center, but town is still rural in character.	Cultivation of grains-wheat, rye, corn, oats, flax, grass. Domestic production of cider, cider brandy, cheese, beef, pork, lard. Fishing and cattle-raising. Minimal mechanical and manufacturing employments.	Agricultural tools and implements; roads, fences, dwellings, barns; glass, metal, brick, and wood building materials; textiles.
Native American	Late Woodland	AD 1100 to 1550		Cupeags spend spring and summer fishing and clamming on the shores of the Sound; settlements also practiced horticulture near the coast. Following 1639, the native communities remaining are moved to one of two reservations, outside of the present town of Stratford. Seasonal mobility with base camps; increased sedentism; higher population density. Coastal zone intensively occupied.	Continuation of hunting, fishing, gathering, horticulture, shellfish collecting, with changes due to direct and indirect contact with Europeans.	Hoes, shell middens, triangular points (both lithic and from imported metals), items of European manufacture made for trade with New England native peoples, such as glass beads, bells, cloth.
Middle Woodland		1000 BC to AD 1100		Seasonal mobility with base camps. Hunting, shellfish collecting, wild vegetable food gathering, fishing.	Introduction of cultigens; horticulture; hunting, fishing, gathering shellfish collecting.	East River Tradition pottery; East River cord marked, Rowmans Brook incised, Shantok incised wares, shell middens, triangular projectile points, bone points or awls, isolated burials, hoes, ornaments, dog burials, gorgets, Levanna points.

Table 2-1. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF THE STRATFORD ARMY ENGINE PLANT (Concluded)

Cultural Unit	Period or Phase	Date	General Settlement Patterns	General Subsistence Systems	Kinds of Archeological Remains Representative of Period
Native American (continued)	Transitional	1300 to 1000 BC	Seasonal mobility with base camps.	Shellfish collecting; small-game hunting; gathering; fishing.	Mortar, pestles, gouges, adzes, knives, steatite bowls, narrow "fightail" points, shell middens, dugouts, ornaments.
	Late Archaic	2500 to 1300 BC	River-basin territoriality; decreased mobility; central-based foraging strategy with base camps. Seasonal aggregation and dispersal. Higher population density.	Shellfish collecting. Collection of seeds and nuts, small-game hunting.	Sylvan Lake points, Braveston points, Squibnocket points, Narrow point tradition, Snook Kill points, Atlantic points, knives, scrapers, ground-stone gouges and adzes, steatite bowls, shell middens, mortars, pestle grooved axes, celts, netsinkers, hammerstones.
Middle Archaic	5000 to 2500 BC	Restricted foraging pattern; some larger sites. Sites have more varied locations and there are more sites than in the past, where sites are known.	Hunting of small and medium-mammals size on a seasonal basis. Seasonal shellfish collecting. Seasonal hunting of migratory birds. Seasonal gathering of vegetable foods.	Merrimack, Early Laurentian, Late Laurentian, few Neville or Stark points, scrapers, perforators, fishhooks. Evidence of long-distance trade or transport.	
Early Archaic	7000 to 5000 BC	Small, mobile bands, using seasonal base camps; where sites are known, these occur preferentially in the lowlands.	Foraging for large and small mammals; gathering of wild vegetable foods.	Bifurcate-base tradition. No known sites from SAEP.	
Late Paleo-Indian	9000 to 7000 BC	Small, mobile bands of hunters and gatherers.	Foraging for large and wild small mammals; gathering of vegetable foods.	Assemblages with late fluted point forms. Possible traces of Kirk tradition. No known sites from SAEP.	
Early Paleo-Indian	10,000 to 9000 BC	Small, mobile bands of hunters and gatherers. In areas with known sites, these occur on well-drained soil, such as on terraces, drumlins, knolls.	Hunting of large and small mammals; gathering of wild vegetable foods.	No known sites in area of SAEP. Kinds of artifacts expected: "Clovis" fluted point tradition, utilized flakes, graters, bifacial knives, drills, small end-scrapers.	

### 2.2.2 Ethnohistory

The Native Americans encountered by English settlers in the Stratford area were known as the Cupheag. The Cupheag, as well as the Pequannocks to the west, were members of the Paugusset tribe, part of the Wappinger Confederacy (Aigner et al. 1977; Crofut 1937; Hurd 1881; Wilcoxson 1939).

The first Housatonic Valley Indians may have their origin in the Hudson River Valley, and were, perhaps, Mohegans. The Cupheags were a small local group led by Okenuk, who resided at Pootatuck (Shelton) on the banks of the Housatonic. "Cupheag" means "a harbor" or "a place of shelter" or "a place shur in" (Wilcoxson 1939:7). In historic times, the Cupheags spent the summer on the shores of Long Island Sound fishing and clamming. Middens are found at Great Neck and at Shell-Keep Point at Sandy Hollow. The winters were spent hunting in the forested inland valleys; and in the spring communities returned to the shore.

In 1644 a settlement of wigwams was reported in the southwestern part of Stratford Village, west of Main Street--a tract of land called Wigwam Meadow. In addition, wigwams reportedly stood on Wigwam Hill, located 3 mi. north of the village on a knoll overlooking the Sound (Hurd 1881; Wilcoxson 1939:4). The Pequannocks' territory covered most of the southern portion of Bridgeport between the Pequannock River and the Uncoway River (Ash Creek). Their planting fields were located on the plain at the north end of the cove in Black Rock Harbor. Pequannock means "cleared field" or "open field" or "broken up land"; land from which trees and brush had been removed to prepare the land for cultivation. A group known as the Wepawaugs lived on the east bank of the Housatonic River (Wilcoxson 1939:4-5).

Stratford was in conquered territory held by the Connecticut Colony after the Pequot War. The Pequannocks paid tribute to the Pequots and were their allies against the English in 1637, on the flight of the Pequots through Stratford (Crofut 1937:154). Captain Mason and his company went through Stratford while pursuing the Pequots to Saco Swamp in Fairfield, the site of the "Great Swamp Fight" that ended the Pequot War in 1637.

In 1639 the English acquired Cupheag (Stratford) and Uncoway (Fairfield) by surrender (Orcutt 1882). This is substantiated by written statements in the town's records, despite the fact that early historians maintain that the lands were acquired by purchase. At this time the Indians moved to two reservations: Golden Hill in Bridgeport, Connecticut, and Coram, on the border of Huntington to the north of Stratford (Wilcoxson 1939). Trumbull estimated that in Connecticut there were 20,000 native inhabitants at the time of European settlement; DeForest estimates 6000-7000 (Wilcoxson 1939:5-6). The maximum native population of Fairfield County between the years 1639-1949 has been estimated at 2000-2500 (Wilcoxson 1939:5-6).

### 2.2.3 History

The first European settlement in the vicinity of the SAEP was at Sandy Hollow, a short distance from the Housatonic River. The name Stratford was given to Cupheag in 1643 (Crofut 1937:154). At this time the early Stratford settlers had a palisade built from the west side to the swamp and across Watch-House Hill ((Academy Hill) Wilcoxson 1939). A mill was built a few years later southwest of the village, on Nesumtaw's Creek at Little Neck. The first 17 English proprietors of Stratford did not settle in Stratford themselves, but entered their claims and then sold their land (Hurd 1881:750). The 1639-50 English plantation included four major "common fields": the "Ould Field" lay immediately south of Stratford Village; the "New Field" lay from Clapboard Hill to Mill Creek, including Nesumtaw's Creek; the "New Pasture" was situated just south of Old Mill Green, now in Bridgeport, from Mill Creek, to the river; and the "Great Neck Field" was located south of the "Ould Field." The economy at this time was based on the cultivation of wheat, rye, corn, oats, grass and flax; cider, cider brandy, butter, cheese, pork, lard, and flaxseed were produced. Fishing and cattle raising were also practiced through the 1800s. Mills along the Housatonic and other rivers gave way to a fully industrial based economy in the mid-late nineteenth century.

In 1810 the population of Stratford was 2895, and there were approximately 420 dwelling houses in the city (Wilcoxson 1939:613). In that same year, manufacturing and mechanical activities consisted of one tinware factory, one tannery, two carding machines, three grain mills, three merchant mills for flouring wheat, grinding corn, and plaster of Paris (Wilcoxson 1939:613).

In the early nineteenth century the region around Frash Pond, below Neck Bridge, was described as a broad expanse of salt meadow stretching to the Sound, lying scarcely above sea level; the water at high tide being level with the banks (Wilcoxson 1939:620). The salt grass was cut in the autumn by farmers from Stratford village and from neighboring towns (Wilcoxson 1939:620).

In the 1890s the population of Stratford was 2608. The town was still rural in character; the community pursued predominantly agricultural, rather than manufacturing, pursuits. By 1917 the population of Stratford reached 10,000 and in 1927 capitalists from Bridgeport established the largest airport project in the state near the mouth of the Housatonic River in Stratford (Wilson 1929:324). The airfield was created on marsh land, by pumping sand and gravel from the river bed (Wilson 1929:324). The population of Stratford at this time was 12,347 (Wilson 1929:324).

F. W. Beers' Atlas of New York and Vicinity (1867) shows only a single structure east of Frash Pond and west of Duck Neck Creek (Duck Neck Creek is no longer extant, presumably having been filled at the time of the construction of Bridgeport Airport. Marine Basin, shown on modern maps, is likely a remnant of the creek.). The structure is shown located at the end of a secondary road (Sniffens Lane?) and east of the property presently occupied by the SAEP.

## 2.3 ARCHEOLOGICAL RESEARCH DIRECTIONS

### 2.3.1 Regional Concerns

The state of Connecticut has not yet formulated a State Plan for the management of archeological and historical cultural resources. Further, no comprehensive archeological survey has been conducted in the city of Stratford. However, many sites have been recorded in the region. The area around the SAEF includes a diversity of ecological niches, therefore it offers the opportunity to investigate prehistoric and historic land use patterns across time and space, resource exploitation techniques employed by the succession of peoples that have lived in the area, changes in settlement patterns, and the nature of the interactions between different social groups.

In the absence of a state plan, the following research concerns are offered:

1. Although the coastal zone has been altered by its intense exploitation during the historic period (Luedtke 1978:95-96), it offered prehistoric inhabitants specific resources unavailable in non-coastal areas. It played an integral part in the prehistoric settlement-subsistence system. Therefore, it is important to research food procurement strategies of coastal ecological niches and the part these play in the general subsistence system. At the present time, reconstructions of prehistoric lifeways in the region rely almost exclusively upon the extrapolation of data from Long Island, eastern New York, and upland Connecticut. Further, this research should include an examination of how these coastal sites differ from sites in non-coastal locations.
2. In the state of Connecticut there is little archeological evidence as yet for the presence of horticulture on prehistoric sites, only on protohistoric sites (Swigart 1977:71). More research should be focused on collecting samples for flotation in order to detect carbonized agricultural produce and other pieces of evidence for the practice of horticulture. The extent to which horticulture contributed to the diet and the ways of life in prehistoric Connecticut communities should be examined as well.
3. Examine whether the low frequency of Paleo-Indian through Middle Archaic cultural remains is a product of the submersion of these sites by rising postglacial sea levels, the destruction of these sites by wave action erosion, or bias in data recovery due to the low archeological visibility of small, early period sites.
4. Throughout the historic period, Stratford remained predominantly rural in character; its population pursuing largely agricultural rather than manufacturing activities. In comparison to other locations, Stratford was "slow" in its industrializing and urbanizing development. What was the reason for this trend?

Further, the area of the SAEP specifically was not developed at all until very late. How were the land and resources around the SAEP utilized throughout the historic period?

### 2.3.2 Installation-Specific Archeological Research Directions

There has been no archeological work carried out at the Stratford Army Engine Plant. There are, however, known sites in the vicinity. Any prehistoric archeological sites which may be located in the future at SAEP could provide data useful in addressing problems relating to the prehistoric utilization of the coastal zone in southern New England.

### 3.1 ENVIRONMENTAL CONSTRAINTS TO SITE PRESERVATION

The coastal zone is a particularly dynamic ecosystem (Luedtke 1978:101). At the same time that is a very productive ecological niche, it is highly sensitive and vulnerable to destruction. Therefore, any cultural resources associated with the coastal ecosystem are similarly sensitive. Natural factors, such as the submergence of early period sites due to postglacial rise in sea level (see Section 2.1.6) and erosion by wave action, create conditions for the destruction of subsurface remains. Therefore, the fact that the topography of the coast has been extensively altered by natural agencies has adversely affected site preservation.

According to Gordon (1983:67) the continued rise of sea level over the past 6000 years is attested to by direct physical and archeological evidence. For example, the Stony Brook and Baxter sites, currently located near the sea, contain remains that may be interpreted as evidence for substantially lower sea levels from 2500-4500 years ago (Salwen 1962, cited in Gordon 1983:67). Mammoth and mastodon teeth have been found at many spots on the continental shelf (Edwards and Emery 1977, cited in Gordon 1983:67). If the sites of the communities around Long Island Sound were at the edge of the sea, it is probable that their remains are now submerged (Gordon 1983:67). Chances of finding such remains are small, because these would have passed through the surf zone as they were submerged (Gordon 1983:67). As a result, the smaller remains would have been dispersed by reworking by waves and subsequently buried by marine deposits (Gordon 1983:67).

The most likely spots for locating prehistoric remains would be around the margins of the deep embayments that have now become salt marshes (Gordon 1983:67-68). According to Gordon (1983:68) these sites would have been protected from the action of larger waves of the open Sound and would have been buried under the rapidly-accumulating marsh peat.

Swigart (1977) has investigated site locations in the central Housatonic watershed. He concluded that in the uplands characterized by steep slopes and narrow floodplains, 97.5 percent of the sites were

located within 0.1 mi. of water and all were situated within 0.2 mi. of water; approximately three-quarters of the sites were located at confluence of a large and small river; about 90 percent of the sites are adjacent to water. Areas adjacent to large navigable rivers contain a greater density of sites. Many of the sites were multicomponent; and the majority of sites were from the Late Archaic and Late Woodland periods. During Late Woodland times, lakeside sites were very frequent. Swigart's study provides some general patterns of site distribution through time and space. However, there are gaps in the existing data base which may be the product of data recovery biases. Further, site distribution information itself is not sufficient to indicate prehistoric societies' use of the landscape.

In the coastal zone research concerns include the fact that the topography of the coast has been altered due to the postglacial rise in sea level. Therefore, coastal sites occupied before approximately 3000 BP are either buried under sediments or destroyed by wave action.

### 3.2 HISTORIC AND RECENT LAND USE PATTERNS

As noted in Section 2.2.3, no historical documentation has been found indicating any structures were located on the site of the SAEP prior to the construction of the Sikorsky plant in 1929. The initial phase of construction included the administration building on the east side of Main Street (now incorporated into the present Bldg. 1), the main production facility (now the southern section of Bldg. 2), and a service building (now Bldg. 10). Sikorsky apparently built on the highest available ground on the property (Sansome, 1983, personal communication).

Sikorsky was also responsible for a fourth structure completed in 1930 (the present Bldg. 3). A grading plan dated September 30, 1929 (Dwg. B864x13, on file with Avco Lycoming at SAEP) showing the north central portion of the SAEP site, shows the main production facility and the service building. It labels Bldg. 3 as "Proposed," and indicates a large area, including the site of Bldg. 3 was to be levelled by cut and fill activities (GDAs 3, 4 and 5, Table 3-1, Figure 3-1). A companion grading and contour map (Dwg. B864x2) showing cross sections through the area indicate that as much as 5 ft. was cut from some areas, while other areas were buried by as much as 5 ft. of fill. The same drawing also indicates a "new dyke" and causeway.

The need for the dike suggests that the area was always prone to flooding. Drainage remains a problem at the SAEP site. The problem has been magnified by the fact that nearby Frash Pond apparently has several underground outlets on or near the SAEP (Sansome, 1983, personal communication).

An undated aerial photograph of the site taken sometime between 1930 and 1939 (Photo 7102036, on file at with Avco Lycoming at SAEP) shows the Sikorsky plant and the associated causeway. The area that is now the northern portion of the site and the area west of Main Street are seen as cultivated fields. It seems highly likely that the sites of Bldgs. 2 and 10 were also used for farming.

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE STRATFORD ARMY ENGINE PLANT

GDA No	Type of Disturbance	Date Constructed (Yr)	Reference <sup>a</sup>	Area Disturbed (acres)	Estimated Depth Below Surface (ft.)	Ratio of Disturbed to Total Area	Location of Disturbed Area			USGS Quad Sheet <sup>c</sup>	Coincidental Sites
							UTMB	Legal Reference	Section		
							Northing	Easting	Range		
GDA-1	Filling in of shoreline	1944	Albert Kahn Dwg. Nos. 1019a (Job 1804G, 1804M, Sheet 1) (2-17-44)	7.0	*	9:10	4559273	657511	Stratford	B770 M760R	
	Construction of: Dyke Bldg. 13	1944	Avco-Lycoming Dwg. No. PW 600-62 (11-22-71, rev. 6-29-82).								
	Bldg. 15	1945	"								
	Bldg. 16	1953	"								
	Bldg. 36	1953	"								
	Bldg. 37	1953	"								
	Bldg. 38	1953	"								
	Bldg. 44	1961	"								
	Bldg. 48	1961	"								
	Bldg. 55	1963	"								
	Bldg. 58	1967	"								
	Bldg. 64-1	1975	"								
	Bldg. 64-2	1975	"								
	Associated underground utilities	Var.	"								
GDA-2	Filling in of shoreline	1944	Albert Kahn Dwg. No. 1019a (Job 1804m, Sheet 1) (2-17-44)	0.6	*	9:10	4559196	657683	Stratford	M760R	
	Construction of: Dyke Bldg. 34	1944	"								
	Bldg. 34	1953	Avco-Lycoming Dwg. No. PW 600-62 (11-27-71, rev. 6-29-82)								
	Bldg. 34	1953	"								
	Bldg. 40	1953	"								

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE STRATFORD ARMY ENGINE PLANT (Continued)

CDA No	Type of Disturbance	Date Constructed (yr)	Reference <sup>a</sup>	Area Disturbed (acres)	Estimated Depth Below Surface (ft.)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quad Sheet <sup>c</sup>	Coincidental Sites
							UTMb	Legal Reference	Northing	Easting		
CDA-3	Grading	1929	Fletcher-Thompson Dwg. Nos. B-684x1, B-684x2 (9-30-29)	9.4	0-5	10:10	4559127	657688	Stratford		M760R	
	Construction of:											
	Bldg. 3	1930-44	Avco-Lycoming Dwg. No. PW 600-62 (11-22-71, rev. 6-29-82)		1-2**							
	Bldg. 3A	NA			1-2**							
	Bldg. 4	1945			1-2**							
	Bldg. 5	1944			1-2**							
	Bldg. 14	1944-63			1-2**							
	Bldg. 41	1953			1-2**							
	Bldg. 43	1944			1-2**							
	Bldg. 51	1958			1-2**							
	Bldg. 56	1965			1-2**							
	Bldg. 60	1968			1-2**							
	Bldg. 61	1969			1-2**							
	Bldg. 62	1971			1-2**							
	Associated underground utilities	Var.			1-2**							
CDA-4	Placement of fill	1929	Fletcher-Thompson Dwg. Nos. B-684x1, B-684x2 (9-30-24)	9.3	*	9:10	4559011	657713	Stratford		M760R	
	Construction of:											
	Bldg. 6	1944	Avco-Lycoming Dwg. No. PW 600-62 (11-22-71, rev. 6-29-82)									
	Bldg. 6A	1966										
	17	1952										
	53	1961										
	Lagoons	NA										
	Associated underground utilities	NA										

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE STRATFORD ARMY ENGINE PLANT (Continued)

GDA No	Type of Disturbance	Date Constructed (yr)	Reference <sup>a</sup>	Area Disturbed (acres)	Estimated Depth Below Surface (ft.)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quadrangle Sheet	Coincidental Sites
							Northing	Easting	Township	Range		
GDA-5	Grading	1929	Aeco-Lycoming Dwg. No. PW 600-62 (11-22-71, rev. 6-29-82)	1.0	0-5	10:10	4559044	657630	Stratford			M760R
	Paving	NA	-	-	-	1**						
GDA-6	Construction of: Bldg. 1	1929-65	Aeco-Lycoming Dwg. No. PW 600-62 (11-22-71, rev. 6-29-82)	29.0	1-2	10:10	4559287	657282	Stratford			M760R
	Bldg. 2	1929-44	-	-	1-2	-	4559366	657394				
	Bldg. 7	1942	-	-	1-2	-	4559214	657558				
	Bldg. 7A	1962	-	-	1-2	-	4559398	657791				
	Bldg. 8	1939	-	-	1-2	-	4559099	657529				
	Bldg. 9	1942	-	-	1-2	-	4559026	657612				
	Bldg. 10	1929	-	-	1-2	-	4558940	657492				
	Bldg. 11	1940	-	-	1-2	-						
	Bldg. 12	1941	-	-	1-2	-						
	Bldg. 42	1944	-	-	1-2	-						
	Bldg. 52	1962	-	-	1-2	-						
	Bldg. 54	1963	-	-	1-2	-						
	Bldg. 55	1963	-	-	1-2	-						
	Bldg. 63	1958	-	-	1-2	-						
	Associated underground utilities	Var.	-	-	-	-						
	Paving	NA	-	-	-	-						
GDA-7	Construction of North Parking Lot	NA	-	6.8	1-2	10:10	4559383	657315	Stratford			B770
GDA-8	Construction of West Parking Lot	NA	-	3.5	1-2	10:10	4559032	657334	Stratford			B770

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE STRATFORD ARMY ENGINE PLANT (Concluded)

GDA No	Type of Disturbance	Date Conducted (yr)	Reference <sup>a</sup>	Area Disturbed (acres)	Estimated Depth Below Surface (ft.)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quad Sheet	Coincidental Sites
							UTM	Legal Reference	UTM	Legal Reference		
GDA-9	Construction of South Parking Lot	NA	-	12.5	1-2	10:10	4558908	657620	Stratford	M760R		

a. All drawings are on file with Avco-Lycoming at the Stratford Army Engine Plant.

b. UTM Zone 18.

c. M760R = Milford, Conn. 7.5, photorevised 1971; B770 = Bridgeport, Conn. 7.5'.

d. These areas are covered by 0-5 ft. of fill. Building construction within these areas generally extends 1-2 ft. into this fill; underground utilities may extend below fill.

aa These areas were stripped of 0-5 ft. of soil. Estimated disturbance depths refer to depths below modified ground surface.

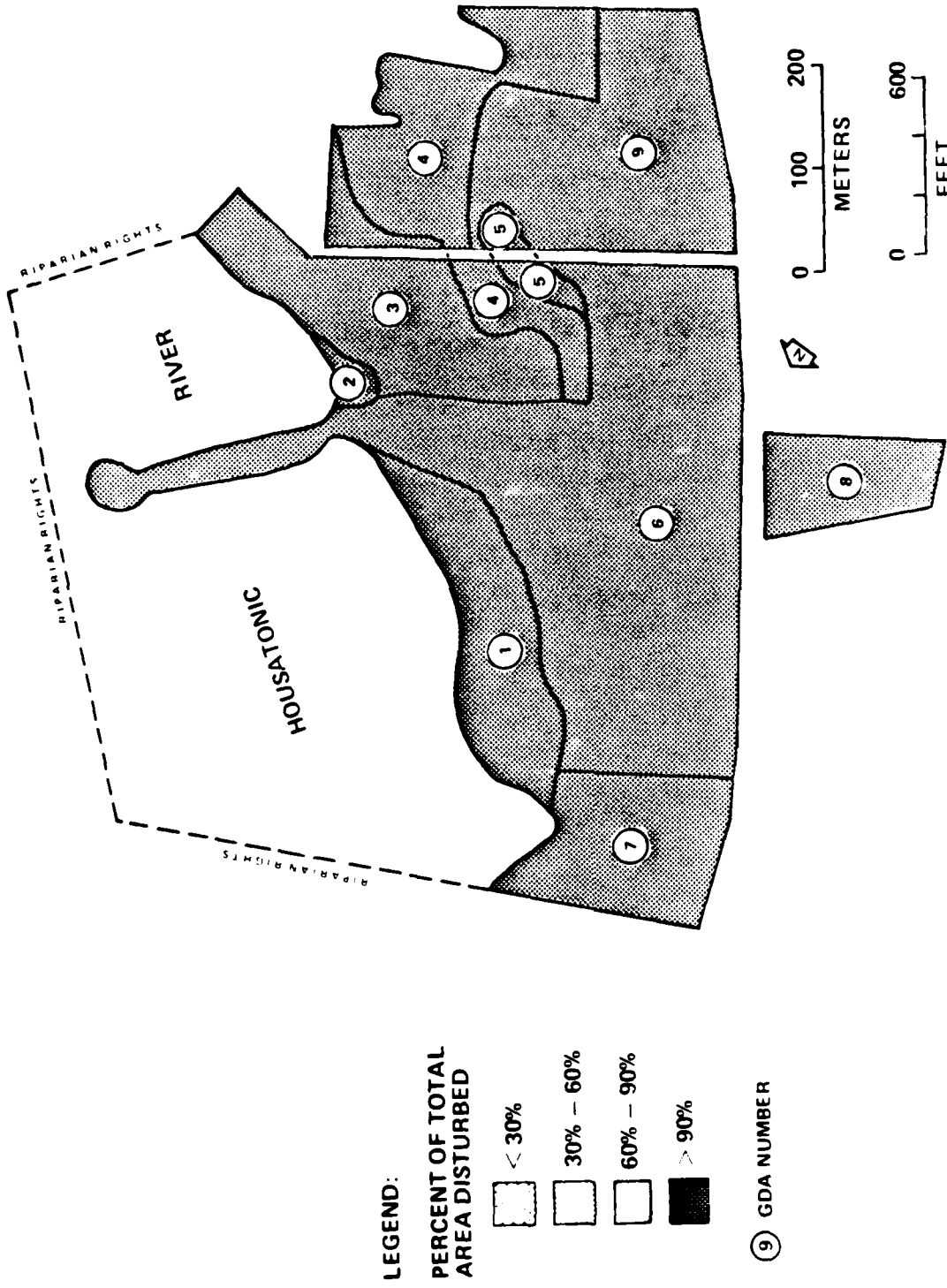


Figure 3-1. MAP OF HISTORIC AND/OR MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE STRATFORD ARMY ENGINE PLANT

A comparison of Photo 7102036 with recent photos also shows that the shoreline of the SAEP has been altered. This is confirmed by two drawings (Chance-Vought Aircraft, Albert Kahn Architects, Dwg. 1019, Sheet 1 and 1019a, Sheet 1, 1944) which indicate a "present shoreline" and a "proposed shoreline." The intervening land area is labelled fill (GDAs 1 and 2, Figure 3-1).

Boring logs recorded in 1953 (Dwg. PW601-3, on file with Avco Lycoming of the SAEP) note the presence of all of these same areas. They also note the presence of rip rap in two borings (nos. 28 and 30) located along what the 1929 and 1944 drawings show as the original shoreline.

Aside from the major cut and fill and shoreline modifications described above, most of the prior ground disturbance at the SAEP has been associated with the construction of buildings and underground utilities. With the exception of the north, south, and west parking areas (GDAs 7, 8, and 9, Figure 3-1) all of the land portions of the SAEP property can be considered fully developed.

All buildings at SAEP have been constructed on either concrete slabs and/or piles, presumably because of the drainage problem at the site. For that reason, it is likely that ground disturbance in developed portions of the SAEP (other than those identified as cut and fill areas) is relatively shallow. However, even shallow disturbance when considered along with the poor drainage characteristics of site is sufficient reason to believe that these areas are not likely to contain extant archeological resources.

Boring logs recorded in 1953 within the area of the south parking lot (GDA 9, Figure 3-1) indicate only 0.2 ft. of asphalt and crushed stone. The west and south parking lots (GDAs 8 and 7) which were also in existence at that time were presumably paved in the same manner. This in itself is suggestive of the possibility of only very minimal disturbance in these areas. However, brief examination of these areas suggest that they were graded, and have even been terraced in some locations, presumably to enhance drainage.

### 3.3 PREVIOUS CULTURAL RESOURCE INVESTIGATIONS; COVERAGE AND INTENSITY

There have been no archeological investigations conducted within the boundaries of the SAEP (Table 3-2). The National Park Service's Historic American Buildings Survey (HABS) has contracted for an inventory and evaluation of standing structures and objects at SAEP.

### 3.4 SUMMARY ASSESSMENT OF DATA ADEQUACY, GAPS

No archeological resources are known to exist or to have existed at SAEP. The evaluation of prior ground disturbance (Section 3.2) when combined with the fact that the drainage characteristics of the area would have rendered it poorly suited for prehistoric occupation, makes it highly unlikely that extant archeological remains exist on the land portions of the SAEP.



The 39.5 a. of riparian area included within the SAEP property do not, however, appear to have been extensively disturbed. It is possible that inundated prehistoric sites may exist within this part of the site.

KNOWN ARCHEOLOGICAL RESOURCES ON THE STRATFORD ARMY ENGINE PLANT

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At present, there are no known historic or prehistoric archeological resources located at the Stratford Army Engine Plant (Tables 4-1 and 4-2). The extensive modification of the shoreline areas combined with the extremely poor drainage characteristics of the site make it highly unlikely that intact, previously unrecorded resources exist on the onshore portion of the SAEP.

As noted in Section 2.2.1 prehistoric sites located along the Housatonic River and dating from the Paleo-Indian and early Archaic periods may have been inundated by rising sea levels. Such sites may exist within the riparian rights area of the SAEP.

Table 4-1. PRESENTLY IDENTIFIED ARCHEOLOGICAL RESOURCES ON THE STRATFORD ARMY ENGINE PLANT: ADMINISTRATIVE DATA

Site Number	Site Recorder	Date of Site Record	SIFO Survey Number	Site Record Repository	Survey Collection Policy	Current Status of Investigation	NRHP Status	State, Local Status	Architectural Association	Bibliographic Reference

(NONE)

Table 4-2. PRESENTLY IDENTIFIED ARCHEOLOGICAL COMPONENTS ON THE STRATFORD ARMY ENGINE PLANT: DESCRIPTION AND EVALUATION

Site Number	Unit Age			Unit Description					Evaluation		
	Date	Temporal Unit		Depositional Context	Landform	Dimension		Per- cent In- tact	Value In- tegrity	RV	CR
		Years BC/AD	Tradition (Period)			Phase	Area (m <sup>2</sup> )				

(NONE)

5.0

AN ASSESSMENT OF THE SIGNIFICANCE OF THE ARCHEOLOGICAL RESOURCE  
BASE ON THE STRATFORD ARMY ENGINE PLANT

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5.1 THE SIGNIFICANT RESOURCE BASE

There are no known archeological resources at the SAEP (Table 5-1). However, prehistoric aboriginal remains, inundated by rising sea levels may exist within the offshore portion (riparian rights area) for the installation. While, given the current state of New England prehistory, it is likely that any such site would be significant, no determinations can be made in the total absence of site-specific data.

5.2 IDEAL GOALS AND OBJECTIVES

Given the total absence of known, significant archeological resources at the SAEP, a discussion of how to best study and manage resources which might be identified in the future would be premature. At the present time, the first objective of any archeological planning program at the SAEP should be the development of a procedure to ensure that potential resources within the riparian rights area are considered in the future.

Table 5-1. SUMMARY OF SIGNIFICANT ARCHEOLOGICAL RESOURCES ON THE STRATFORD ARMY ENGINE PLANT

Temporal Unit	Thematic Unit	Resource Type	Type Occurrence				Landform Assn.	Physical Integrity	Research Value <sup>a</sup>	RV CR <sup>b</sup>	Socio-cultural Value <sup>c</sup>	SCV CR <sup>b</sup>
			Known Occurrences (no.)	Potential Occurrences (no.)	Other Likely Occurrences (no.)	Socio-cultural Assn.						

(NONE)

- a. This is a subjective summary assessment of the overall research value (RV) of the resource class. It is an evaluation of the class quality of preservation, representation of activity diversity or uniqueness, and temporal distinctiveness or reflection of diachronic relationships. It incorporates the need to avoid triviality, but to acquire what may be redundant data so as to discern patterns among those data. Based on these research values, the resource class under discussion is ranked from 0 (no value) to 5 (highest value), including "NA" if such an evaluation is believed to be impossible given the available information.
- b. The Confidence Rating (CR) is a further evaluation of the perceived reliability of the research (RV) or sociocultural (SCV) values of the resource class. The following code records a judgment of that reliability, based on the available information: (1) the judgment is more guess than science, and likely not to be reliable; (2) the judgment is moderately reliable; or (3) the judgment is most likely reliable.
- c. This is a subjective summary assessment of the overall sociocultural value (SCV) of the resource class. It is an evaluation of the social, religious, or political importance of the resource to a contemporary community, from 0 (no value) to 5 (highest value).

6.0

A RECOMMENDED ARCHEOLOGICAL MANAGEMENT PLAN FOR THE  
STRATFORD ARMY ENGINE PLANT

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6.1 FACILITY MASTER PLANS AND PROPOSED IMPACTS

The SAEP site is considered fully developed by the contractor-tenant, Avco Lycoming (N. Sansome, 1983, personal communication). No formal or informal master plans exist for the facility. As a fully developed installation, it seems highly probable that future changes in the facility, necessitated by changes in mission, will primarily involve interior modifications to existing structures, and only minimal ground disturbance. There are no ongoing or planned activities which might impact potential archeological resources within the riparian rights area.

6.2 APPROPRIATE ARCHEOLOGICAL MANAGEMENT GOALS WITHIN THE STRATFORD ARMY ENGINE PLANT'S MASTER PLAN

6.2.1 General Facility Planning

Given the fully developed and almost totally disturbed nature of the onshore portion of the SAEP, it is highly unlikely that any construction-related ground disturbance will occur within areas which might contain intact, previously unrecorded archeological resources. However, very small areas of undisturbed ground are likely to be found randomly scattered across the installation. Such areas may consist of several square yards between utility trenches or areas covered by fill and overlain by a foundation slab. While such areas are also unlikely to contain archeological remains (because of the environmental constraints discussed previously) chance finds are always possible. For this reason any future facility planning should include procedures for the handling of such an eventuality.

6.2.2 Project-Specific Resource Protection or Treatment Options

No project-specific resource protection or treatment options are required as of the date of this study.

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

Two archeological resource management tasks have been identified as a result of this study:

- o development of a program to deal with as yet undiscovered inundated archeological sites lying within the riparian rights area of the SAEP.
- o development of procedures to deal with emergency discoveries of previously unrecorded archeological remains.

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

#### 6.3.1 Management of Archeological Resources Within the Riparian Rights Area of the SAEP

The SAEP site includes an offshore riparian rights area of 39.5 a. (including 4 a. of causeway). Determining the exact nature of the riparian rights involved would require a title search, since conditions may be attached to such rights depending upon how they were acquired. The SAEP does, however, have jurisdiction over this offshore area, and is therefore responsible for managing any archeological resources within it.

Significant archeological resources within the riparian rights area are likely to consist of inundated prehistoric sites dating from the Middle Archaic period or earlier. However, at the present time there is no evidence suggesting that such sites do exist.

The area is predominantly a shallow mudflat. Any construction activity within this area by the SAEP or other parties, will require a Corps of Engineers permit, automatically necessitating compliance under 36 CFR 800. Archeological surveys within the riparian rights area will be necessary in such cases.

An archeological survey of the entire riparian rights area is not recommended as an independent management requirement. As already noted, archeological sites in this area are likely to be Archaic shell middens. Magnetometer and side-scan sonar surveys have, at best, limited effectiveness in identifying such sites (Gagliano 1977:340). Use of sub-bottom profiling, although highly effective in locating such sites, is precluded at the SAEP because of the shallow water depth in the area. Coring and dredging remain as effective site discovery techniques. It is highly probable that coring will be conducted as part of the early design stages of any construction project within the riparian rights area. DARCOM and the SAEP should develop a procedure to ensure that a professional archeologist and a geomorphologist with experience in dealing with archeological sites are allowed to participate in the scoping of any pre-construction coring program. The program should provide for early consultation with these individuals, and ensure that adequate time is provided for analysis of core data (including inspection of the actual cores) and any subsequent data recovery procedures which might be necessary.

It is anticipated that an estimated 1-2 days of DARCOM personnel time will be required to establish the procedure. An optional one day of

an archeological consultant's time at an estimated cost of \$500 would be desirable.

### 6.3.2 Unanticipated Archeological Site Discovery Procedure

Almost all of the upland portion of the SAEP has been disturbed in the past. However, some very small areas may contain intact land surfaces covered by fill or concrete slabs. Such areas may contain remnants of prehistoric occupation. Because of the number and idiosyncratic location of these areas (many under existing buildings), an archeological survey of these areas is not recommended. In addition, because of the relatively low likelihood that even these areas will contain archeological remains, surveys done in conjunction with any future ground disturbing activities are also not recommended because of the costs involved.

DARCOM should be prepared to deal with discoveries of unanticipated prehistoric and historic cultural resources at the Stratford Army Engine Plant. The facility should develop a procedure for handling these situations in consultation with the Connecticut State Historic Preservation Officer and the National Park Service. This procedure should stipulate notification requirements, the process of evaluating the resource and conducting any necessary additional investigations, and the source of funding.

It is anticipated that an estimated 1-2 days of DARCOM personnel time and 1 day of the SHPO's archeologist's time will be required to develop the emergency discovery procedure. An optional one day of an archeological consultant's time at an estimated cost of \$500 would be desirable.

A review of all major information sources likely to have data relating to the archeology of the site occupied by the Stratford Army Engine Plant was conducted for this study. That review indicated that although several prehistoric and historic period sites have been reported in the immediate vicinity of the SAEP, none are known to exist on SAEP property.

Nineteenth and early twentieth century maps of the SAEP indicate that it was farmland prior to the construction of the SAEP facility (originally the Sikorsky Aircraft factory). The site is poorly drained suggesting it would not have been a preferred location for aboriginal occupation during most of the prehistoric period. Extensive cut and fill activities on the site have further reduced the likelihood that intact archeological remains exist on the upland portion of the site. However, rising sea levels may have inundated possible prehistoric sites within riparian rights area.

Among the institutions consulted as part of the basic data gathering for this report were: the Peabody Museum and the Institute for Conservation Archeology, both at Harvard University, the Connecticut Historical Commission (State Historic Preservation Officer), the University of Massachusetts (Amherst) Library, the Stratford, Fairfield, and Trumbull Historical Societies, the Bridgeport Historic District Commission, the Barnum Museum, the American Museum of Natural History, the Museum of the American Indian - Heye Foundation, and the New York Public Library. In addition, the "America: History and Life" data base of Lockheed's Dialog Information Retrieval Service, which contains abstracts from more than 2000 history journals, was consulted.

A site visit to the SAEP was also made by the authors. As part of the visit all portions of the site were viewed. In addition, construction plans maintained by Avco Lycoming for many of the structures at the SAEP were reviewed. Photographs in the possession of the Public Affairs Officer were also examined.

No specific archeological management tasks are recommended at this time. However, prior to undertaking any activities within the riparian

rights area, consideration must be given to the identification and evaluation of potential inundated prehistoric sites. Unanticipated finds should be dealt with in accordance with an installation procedure which should be developed specifically for that purpose, as discussed in Section 6.3.2 Unanticipated Archeological Site Discovery Procedure, above.

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