Intensive Cultural Resources Survey of the Proposed 77-Acre Pinecrest Energy Center Tract, Lufkin, Angelina County, Texas

By:

Jeffrey D. Owens

HJN 080122.40 AR

Prepared for:

Zephyr Environmental Corporation
Austin, Texas

Prepared by:

Horizon Environmental Services, Inc.
Austin, Texas

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MANAGEMENT SUMMARY

Horizon Environmental Services, Inc. (Horizon), was selected by Zephyr Environmental Corporation (Zephyr), on behalf of Pinecrest Energy Center, LLC (PEC), to conduct an intensive cultural resources inventory and assessment of the proposed location of the Pinecrest Energy Center in Lufkin, Angelina County, Texas. The proposed site of the Pinecrest Energy Center is located in northeastern Lufkin and would be bordered on the north by the Angelina and Neches River Railroad tracks, on the west by US Highway (US) 69, on the east by Farm-to-Market Road (FM) 842, and on the south by the northern end of Commerce Center. The Area of Potential Effect (APE) of the proposed undertaking covers an area of approximately 31 hectares (ha) (77 acres [ac]).

As the proposed upgrades would require a Prevention of Significant Deterioration (PSD) permit issued by the US Environmental Protection Agency (EPA), the undertaking falls under the regulations of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, which is invoked when federal funds are utilized or when federal permitting is required for a proposed project. The NHPA states that the Advisory Council for Historic Preservation (ACHP) and the Texas Historical Commission (THC), which serves as the State Historic Preservation Office (SHPO) for the state of Texas, must be afforded the opportunity to comment when any cultural resources potentially eligible for inclusion in the National Register of Historic Places (NRHP) are present in a project area affected by federal agency actions or covered under federal permits or funding.

On November 28 and 29, 2012, Horizon archeologist Jared Wiersema, under the overall direction of Jeffrey D. Owens, Principal Investigator, performed an intensive cultural resources survey of the APE to locate any cultural resource properties that potentially would be impacted by the proposed undertaking. Horizon's archeologist traversed the 31-ha (77-ac) APE and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. Visibility was excellent (generally 100%) across the entire APE, which had been previously devegetated and graded, and various degrees of ground-disturbance, ranging from moderate to extensive, characterized the entire APE. Horizon excavated a total of 39 shovel tests in the 31-ha (77-ac) APE, thereby meeting the Texas State Minimum Archeological Survey Standards requirements for a project area of this size.

The vast majority of the APE had been surveyed for cultural resources in 2011, and 1 archeological site (41AG203), which represented the remains of a 20th-century farmstead and an ephemeral, undated aboriginal lithic artifact scatter found on the modern ground surface and in shallow subsurface contexts, was recorded in the eastern portion of the current APE during the prior survey (Galan 2011). This site had been determined to be ineligible for inclusion in the NRHP based on the lack of architectural structures associated with the historic-age debris scatter, the shallow archeological deposits, and the disturbed character of sediments containing both the historic-age and prehistoric artifact scatters. The location of this previously recorded site was inspected during the current survey, but this location had been cleared for construction subsequent to the 2011 survey, and no extant cultural resources associated with this site were observed. A relatively high density of naturally occurring petrified wood nodules and broken chunks were observed on the modern ground surface of the APE during the survey, but no specimens exhibiting any signs of cultural modification were observed.

No cultural resources, historic or prehistoric, were identified within the APE as a result of the survey. Based on the results of the survey-level investigations documented in this report, no potentially significant cultural resources would be affected by the proposed undertaking. In accordance with 36 CFR 800.4, Horizon has made a reasonable and good faith effort to identify archeological historic properties within the APE. No archeological resources were identified that meet the criteria for inclusion in the National Register of Historic Places (NRHP) according to 36 CFR 60.4, and no further archeological work is recommended in connection with the proposed undertaking. However, in the unlikely event that any human remains or burial accoutrements are inadvertently discovered at any point during construction, use, or ongoing maintenance in the APE, even in previously surveyed areas, all work should cease immediately and the Texas Historical Commission (THC) should be notified of the discovery.

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1.0 INTRODUCTION

Horizon Environmental Services, Inc. (Horizon), was selected by Zephyr Environmental Corporation (Zephyr), on behalf of Pinecrest Energy Center, LLC (PEC), to conduct an intensive cultural resources inventory and assessment of the proposed location of the Pinecrest Energy Center in Lufkin, Angelina County, Texas. The proposed site of the Pinecrest Energy Center is located in northeastern Lufkin and would be bordered on the north by the Angelina and Neches River Railroad tracks, on the west by US Highway (US) 69, on the east by Farm-to-Market Road (FM) 842, and on the south by the northern end of Commerce Center (Figures 1 and 2). The Area of Potential Effect (APE) of the proposed undertaking covers an area of approximately 31 hectares (ha) (77 acres [ac]).

As the proposed upgrades would require a Prevention of Significant Deterioration (PSD) permit issued by the US Environmental Protection Agency (EPA), the undertaking falls under the regulations of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, which is invoked when federal funds are utilized or when federal permitting is required for a proposed project. The NHPA states that the Advisory Council for Historic Preservation (ACHP) and the Texas Historical Commission (THC), which serves as the State Historic Preservation Office (SHPO) for the state of Texas, must be afforded the opportunity to comment when any cultural resources potentially eligible for inclusion in the National Register of Historic Places (NRHP) are present in a project area affected by federal agency actions or covered under federal permits or funding.

On November 28 and 29, 2012, Horizon archeologist Jared Wiersema, under the overall direction of Jeffrey D. Owens, Principal Investigator, performed an intensive cultural resources survey of the APE to locate any cultural resource properties that potentially would be impacted by the proposed undertaking. The cultural resources investigation consisted of an archival review, an intensive pedestrian survey of the APE, and the production of a report suitable for review by the State Historic Preservation Office (SHPO) in accordance with the Texas Historical Commission's (THC) Rules of Practice and Procedure, Chapter 26, Section 27, and the Council of Texas Archeologists' (CTA) Guidelines for Cultural Resources Management Reports.

This report presents the results of this cultural resource survey. Following this introductory chapter, Chapters 2.0 and 3.0 present the environmental and cultural background, respectively, of the APE. Chapter 4.0 describes the research objectives, results of archival

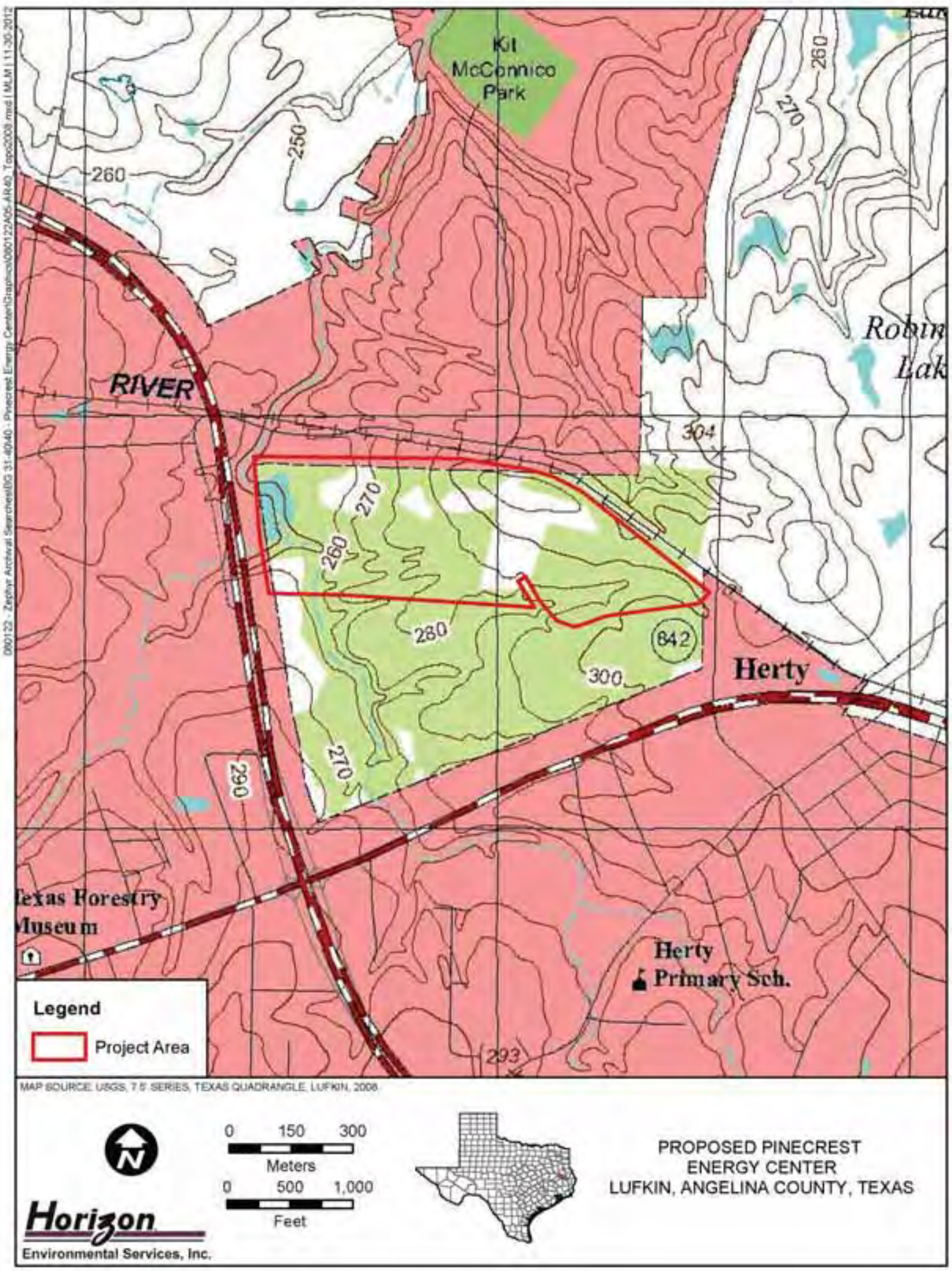

Figure 1. Location of APE on USGS Topographic Quadrangle (2008)

Figure 2. Location of APE on Aerial Photograph (2012)

research, and cultural resource survey methods implemented during the survey. Chapter 5.0 presents the results of the cultural resource survey, and Chapter 6.0 presents cultural resource management recommendations for the project. Chapter 7.0 lists the references cited in the report. Appendix A summarizes shovel test data, and Appendix B provides the resume of the project's archeological principal investigator.

2.0 ENVIRONMENTAL SETTING

2.1 PHYSIOGRAPHY AND HYDROLOGY

The APE is located in northeastern Lufkin in Angelina County, Texas, within the Gulf Coastal Plain physiographic region (Fenneman 1938:605-630). Environmentally, the Gulf Coastal Plain is characterized as:

> an area where the temperate southeastern woodlands gradually give way to the grasslands of the plains. It is a land of mixed forests, pine barrens, open savannas, tall grass prairies, and littoral marshes. Much of the terrain is gently rolling but mountains (the Ouachitas) and costal flats are to be found in the northern and southern margins of the region, respectively. A number of perennial rivers and streams cross the area, ending in the deltas and bays along the…Gulf of Mexico (Story and Guy 1990:2).

Northeastern Texas supports 3 major physiographic communities—the Blackland Prairie, the Post Oak Savanna (or Oak Woodlands), and the Pineywoods (Diamond et al. 1987). The Blackland Prairie is a narrow physiographic zone situated between the Edwards Plateau to the west and the Gulf Coastal Plain to the east. This area consists of low, rolling land that extends in a narrow band along the eastern edge of the Balcones fault zone from the Red River Valley in Northeast Texas to the southern edge of the Edwards Plateau. This is an area of low topographic relief and poor drainage in which water often ponds after rainstorms and streams flow at very gentle gradients. The Blackland Prairie supports a tall-grass community that commonly includes such species as little bluestem, yellow Indian grass, big bluestem, switchgrass, and various forbs (Diamond et al. 1987:209, 211). The distribution of the tall-grass prairie is closely related to patterns of rainfall and soil character, as the prairie tends to occur in areas that receive less than 40 inches of rain annually and that have clayey, calcareous soils (Collins and Bousman 1990:29).

The Post Oak Savanna and Pineywoods support medium-tall to tall broadleaf deciduous forests, and shortleaf loblolly pines are common in the Pineywoods on upland fine sandy loam soils with adequate moisture. Small areas of tall-grass prairie may occur in both communities (cf. Jordan 1981). The Post Oak Savanna is a narrow, southwest-to-northeast-trending woodland belt that marks a natural transition zone, or ecotone, between the more xeric Blackland Prairie to the west and the more mesic Pineywoods to the east (Kuchler 1964). The

Post Oak Savanna is composed primarily of post oak, blackjack oak, hickory, pecan, and ash (Kuchler 1964).

The APE is situated within the Pineywoods, the dominant vegetation region of Northeast Texas. The Pineywoods region is composed of 2 distinct forest communities—mixed pine-hardwood forest and longleaf pine forest. The longleaf pine forest, the specific vegetation region within which the APE is located, is most common in the southern part of Northeast Texas, extending south to the coastal prairies of Southeast Texas. Longleaf, shortleaf, and loblolly pines, as well as a variety of hardwoods, such as oak, hickory, beech, birch, gum, and magnolia, as well as tupelo and bald cypress in swampy floodplain areas, are constituents of this vegetation region. The mixed pine-hardwood forest is characterized by medium-tall to tall broadleaf deciduous hardwoods, including a wide variety of oak, elm, hickory, maple, sweetgum, and other mesic species. In some cases, the presence of pine represents a subclimax vegetation association. Within both Pineywoods vegetation communities, bottomland forests and wetlands are common. These communities are dominated by hardwood and swamp forests, marsh and bog vegetation, herbs, shrubs, and other plants that tolerate extended periods of stream overflow. Common trees in these habitats are sweetgum, black tupelo, elm, green ash, bald cypress, water oak, overcup oak, cottonwood, black willow, and American hornbeam (Diamond et al. 1987:212). Herbs, shrubs, ferns, cane, wax myrtle, sassafras, holly, yaupon, cane, and buttonbush occur along the margins of marshes, bogs, and channel lakes and sloughs.

As a result of moderately high rainfall and extensive aquifers, perennial rivers and streams are common across most of the Gulf Coastal Plain (Story 1990:8-9). With the exception of some small coastal streams, 6 major river basins occur in this region—the Brazos, Neches, Red, Sabine, San Jacinto, and Trinity—all of which flow in a more or less southeasterly direction and discharge into the Gulf of Mexico. Under current climatic conditions, all of the larger rivers are reliable sources of surface water, though smaller streams are more variable. The most dependable are those that receive groundwater discharge and delayed runoff (Thurmond 1981:29-36). The least reliable are those fed solely by direct runoff. Two other sources of surface water, lakes and springs, also occur in the area. With the exception of Caddo Lake (a natural, albeit artificially enlarged, impoundment) on the Cypress River and lakes on the Red and lower Brazos floodplains, most lakes in the region occur on smaller streams, are dry at least part of the year, and have minimal subsistence value. Springs are fairly numerous in the region, and even high-order streams in the region often have sustained water flow because they are fed by groundwater discharge and aquifers (Story 1990:8-9). Changing land use practices, farming, and erosion have caused many springs to dry up over the last 150 years or to have a much reduced flow (Kenmotsu and Perttula 1993:38).

The APE is situated in a predominantly upland setting in the Angelina River watershed. A prominent hill occupies the eastern half of the APE, and elevations slope downwards along the western slope of this hill toward the terraces and channel of an unnamed tributary of Paper Mill Creek that flows northwards just within the western boundary of the APE. This tributary flows generally northeastwards into Paper Mill Creek, which in turn flows generally northeastwards and discharges into the Angelina River along the northern boundary of Angelina

County. Elevations within the APE range from approximately 95 m (310 ft) above mean sea level at the crest of the hill in the eastern portion of the APE to approximately 76 m (250 ft) amsl along the banks of the unnamed tributary that flows through the western portion of the APE. The natural topography within the APE has been extensively modified from prior industrial landscaping activities.

2.2 GEOLOGY AND GEOMORPHOLOGY

The APE is situated within the West Gulf Coastal Plain physiographic province (Perttula and Kenmotsu 1993). Sedimentary bedrock formations of limestone and sandstone laid down during the Cretaceous Period parallel the margins of the ancient, receding coastline of the Gulf of Mexico and crop out as cuestas or escarpments across the generally southwardly dip of the modern land surface (Perttula and Kenmotsu 1993). Little internal relief over 50 m (164 ft) occurs except along the eroded fronts of the cuestas and in the ironstone hills (Fisher 1965; Godfrey et al. 1973).

Soils in Northeast Texas are divided into 2 broad groups—upland soils and alluvial valley soils (Godfrey et al. 1973). Upland soils support tall grasses and hardwoods and tend to form directly on bedrock, except where colluvial deposition has occurred during the Quaternary Period. These soils vary from moist, acidic soils with a sandy to loamy surface horizon and clayey subsoil to soils whose basic loamy surface horizons overlie clay-enriched B-horizons. Bone and shell preservation is common in archeological deposits in the latter soils (Story 1990:9). Mixed hardwood and pine forests occur on the acidic upland soils in Northeast Texas. Tall-grass prairie occurs on the dark, clayey soils of the Blackland Prairie to the west of the APE (Perttula and Kenmotsu 1993).

As a region, Northeast Texas exhibits relatively little topographic relief. The bedrock is exclusively sedimentary and is not very resistant to erosion. Drainage is well developed, including major river systems that arise both outside of the region (i.e., Red and Trinity) as well as within it (i.e., Angelina, Attoyac, Cypress, Neches, Sabine, and Sulphur). Much of Northeast Texas is dominated by fluvial transport systems in which streams tend to meander within their valleys, locally cutting into the outer banks of bends and depositing sediment packages against the inner banks of bends (Perttula and Kenmotsu 1993). Valley soils are important archeologically because they often contain stratified cultural deposits, usually in association with buried, cumulic soils. Point bars, levees, and flood basins are distinctive geomorphic features that share the common attribute of active aggradation. In theory, archeological sites may be expected to form in such landforms and, depending on the rate of sedimentation and human occupation, may develop internal stratification. To date, however, most archeological surveys conducted along streams in Northeast Texas have documented almost no sites on levees or point bars (Hsu 1969; Anderson et al. 1974; Bruseth et al. 1977; Collins and Bousman 1990). The low density of recorded archeological sites in such areas likely results from the low site visibility and difficult survey conditions. In the Angelina and Neches drainages, bottomlands support a diverse hardwood and swamp forest with natural levees, point bar deposits, old stream channels, oxbow lakes, and backwater swamps. The low number of archeological sites recorded in these drainages is almost certainly a function of the difficulty of surveying floodplain environments partially covered by impenetrable swamps (Perttula and Kenmotsu 1993; Pertulla 2004:370).

Natural lakes, ponds, and swamps are also common features of Northeast Texas floodplains, and they typically represent sections of abandoned channels of rivers and streams that have not been filled by alluvial deposits (Perttula and Kenmotsu 1993). Lakes generally contain some open water, marshes are heavily vegetated (usually with grasses) but do not form peat, and bogs are waterlogged, spongy areas in which mosses and other decaying vegetation produce an acidic environment conducive to peat development. Lakes, ponds, and marshes in Northeast Texas are generally of fresh water and form aerobic, basic environments—they may contain excellent stratigraphic records and preserved bone, though they are not conducive to botanical preservation. Bogs, on the other hand, are anaerobic, acidic, and may have remained permanently saturated over long periods of time. Such environments are optimal for the preservation of normally perishable artifacts (Chelf 1946) as well as the entire spectrum of natural organic remains (Bryant 1989). Bog material is suitable for direct radiocarbon dating, and the 2 pollen cores upon which much of the palynological record of Northeast Texas is based were obtained from the Boriack and Weakly bogs in Lee and Leon counties, respectively (Bryant 1969, 1977; Holloway and Bryant 1984; Holloway et al. 1987).

Valley margins in Northeast Texas streams include colluvial slopes and occasional alluvial fans. Such geomorphic features represent areas of natural deposition that may be well suited to some kinds of human activity, a combination favoring the formation of stratified archeological sites (Perttula and Kenmotsu 1993). The lower reaches of such features afford high ground adjacent to flood basin resources, and archeologists commonly find sites in these settings in Northeast Texas.

Aeolian landscape features pose a somewhat more complicated scenario in Northeast Texas (Perttula and Kenmotsu 1993). These are extensive surficial sand deposits that are subject to modification by wind at any time that vegetative cover is disrupted. Some indications of aeolian modification of sand deposits have been noted in and near the region (e.g., Gunn and Brown 1982; Mandel 1987; Perttula et al. 1986), but the validity of some of these interpretations, the possible extent of Quaternary aeolian-modified landscapes, and the timing of any increased aeolian activity are in question.

The APE is underlain by the Eocene-age Yegua Formation, an ancient sedimentary formation composed of clay, quartz sand, and lignite that varies in thickness from 183 to 305 m (600 to 1,000 ft) (Flawn 1968). The APE encompasses a mosaic of mapped soil units characteristic of upland and stream terrace settings (Figure 3; Table 1) (NRCS 2012). Sediments on the upland formations in the eastern portion of the APE are composed of clayey residuum that weathered in situ from local bedrock. Sediments closer to the unnamed tributary of Paper Mill Creek in the western half of the APE typically consist of deposits of loamy alluvium and sand of varying depths overlying clayey subsoil. One of the soil units, designated as Pits (Pa), represents a disturbed context associated with commercial or industrial excavations.

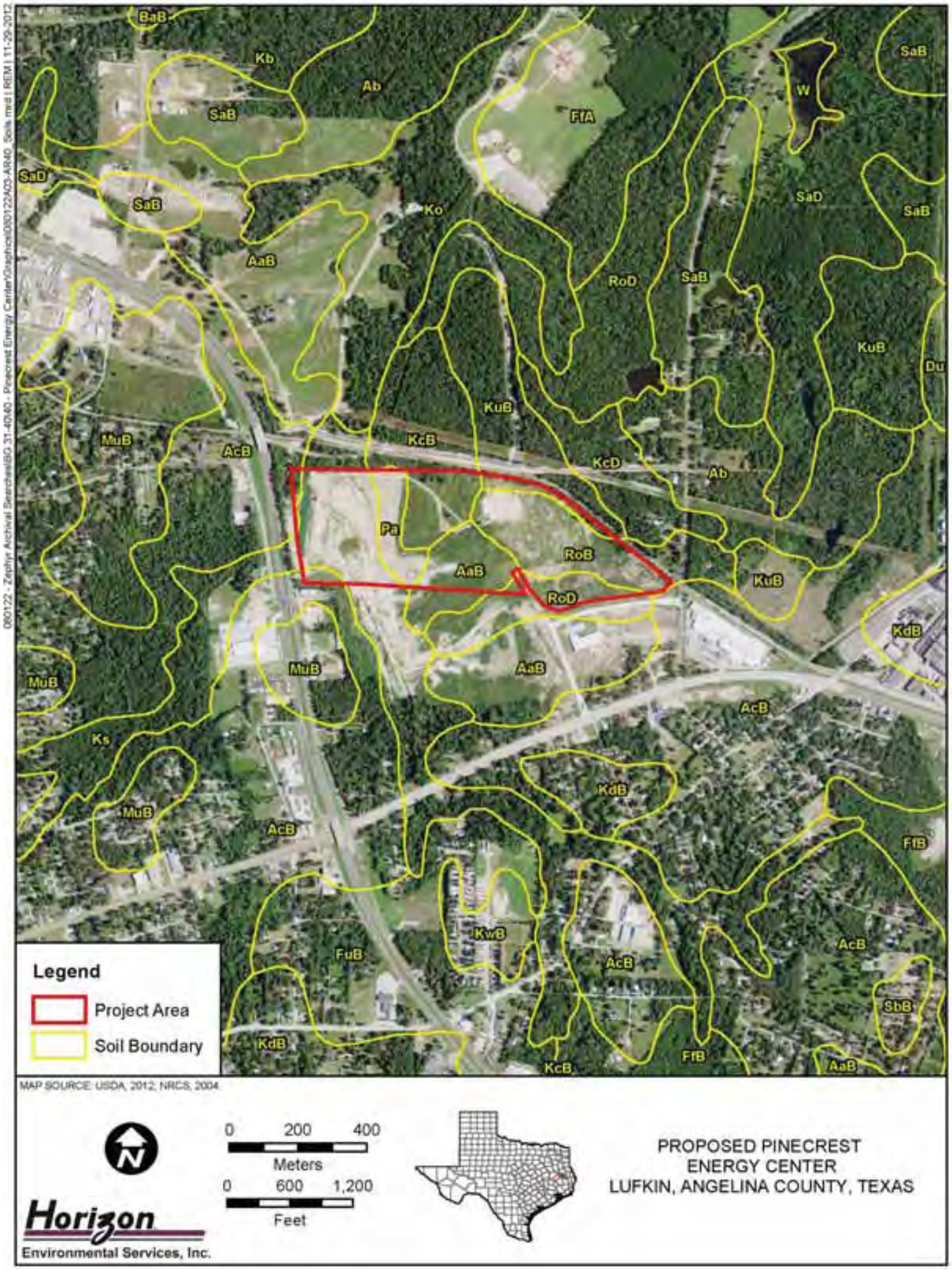

Figure 3. Distribution of Mapped Soils in the APE

Table 1. Summary of Mapped Soils in the APE

NRCS Soil Code	Soil Name	Description	Location
AaB	Alazan very fine sandy loam, 0 to 4% slopes	Loamy alluvium on stream terraces	Upper terraces of unnamed tributary in central portion of APE
AcB	Alazan-Urban land complex, 0 to 4% slopes	Loamy alluvium on stream terraces	Terraces of unnamed tributary in western portion of APE
Ks	Koury-Urban land complex, occasionally flooded	Loamy alluvium on floodplains	Terraces and floodplain of unnamed tributary in western portion of APE
KcB	Keltys fine sandy loam, 1 to 5% slopes	Loamy residuum weathered from sandstone and shale on interfluves	Upper terraces of unnamed tributary in central portion of APE
Pa	Pits	Loamy residuum weathered from sandstone and shale on interfluves (disturbed)	Excavated pits in western portion of APE
RoB	Rosenwall fine sandy loam, 1 to 5% slopes	Clayey residuum weathered from sandstone and shale on interfluves	Uplands in eastern portion of APE
RoD	Rosenwall fine sandy loam, 5 to 15% slopes	Clayey residuum weathered from sandstone and shale on interfluves	Uplands in eastern portion of APE

Source: NRCS 2012

NRCS = National Resource Conservation Service

2.3 CLIMATE

The environment in Northeast Texas has not remained the same throughout the ca. 12,000 years during which humans have lived in the region. Archeological, faunal, geological, and pollen evidence suggest that significant changes have occurred, and these changes have major implications for the development and maintenance of human adaptive strategies in the region (Perttula and Kenmotsu 1993). At present, these changes are poorly understood as only limited evidence of past environments prior to ca. 3,000 years ago has been obtained (Bruseth et al. 1977; Bryant and Holloway 1985; Collins and Bousman 1990; Story 1990).

Evidence for climatic change from the late Pleistocene to the present is most often obtained through studies of pollen sequences (Bryant and Holloway 1985). Few pollen studies have been conducted in Northeast Texas—to date, only a few studies from Buck Creek Marsh and Jewett Mine have provided interpretable pollen data from this portion of the state (Jacobs 1991; Scott-Cummings 1991), but these are poorly dated or have serious gaps in their records. Nevertheless, an important series of pollen sites occur in areas surrounding Northeast Texas (cf. Perttula and Kenmotsu 1993). The best dated and most informative pollen sequences come from Boriack Bog in Lee County and Weakly Bog in Leon County (Bryant 1969, 1977; Holloway and Bryant 1984; Holloway et al. 1987). The radiocarbon dates from Boriack Bog suggest a regular accumulation of deposits and indicate that Boriack Bog surface sediments are approximately 3,000 years old. Bryant (1977) indicates that the bog was drained and the surface peat was excavated in the 20th century; thus, the surface of the peat was lowered to sediments of that age. Weakly Bog, by contrast, covers the last 3,000 years or so, and the bottom samples roughly match the younger portion of Boriack Bog. Thus, Boriack and Weakly bogs cumulatively provide a general picture of vegetation change throughout most of the late Pleistocene and Holocene periods for this region of Texas.

Bryant and Holloway (1985) present a sequence of climatic change for East Texas that includes 3 separate climatic periods—the Wisconsin Full Glacial Period (22,500 to 14,000 B.P.), the Late Glacial Period (14,000 to 10,000 B.P.), and the Post-Glacial Period (10,000 B.P. to present). Evidence from the Wisconsin Full Glacial Period suggests that the climate was considerably cooler and more humid than at present. The limited available evidence suggests that the region was more heavily forested in deciduous woodlands than during later periods and that, prior to ca. 10,000 years B.P., it was forested with species that prefer cool, temperate conditions, including boreal taxa such as spruce (Bryant and Holloway 1985). This late Pleistocene/early Holocene climate is inferred to have been cooler than today, with increased precipitation and/or more effective moisture, but with perhaps less seasonal climatic constraints. The Late Glacial Period was characterized by a slow warming and/or drying trend (Collins 2004) during which the deciduous woodlands were gradually replaced by grasslands and post oak savannas (Bryant and Holloway 1985).

During the Post-Glacial Period, the environment appears to have been more stable. During the early Holocene (ca. 10,000 to 7000 B.P.), warmer temperatures prevailed, with less moisture and presumably a lower density of forest cover. The deciduous forests were replaced by prairies and post oak savannas. Collins and Bousman (1990) suggest that significant expanses of grassland were present along the western edge of the Northeast Texas region. The drying and/or warming trend that began in the Late Glacial Period continued into the mid-Holocene, at which point there appears to have been a brief amelioration to more mesic conditions lasting from roughly 6000 to 5000 B.P. In the middle Holocene, the period between ca. 7000 and 4000 B.P., much drier and warmer conditions may have characterized the region's climate, possibly resulting in even more widespread grasslands and replacement of forests along its western edge. The forest cover in Northeast Texas is suspected to have been at its lowest density during this time period (Collins and Bousman 1990:62).

Following the warm and dry interlude of the middle Holocene, environmental data suggest that a gradual reforestation of the region continued into the late Holocene (ca. 4000 B.P. to present). Collins and Bousman (1990) suggest that prairie areas were replaced first by oak savanna, then by oak-hickory forest in the western part of the region and by oak-hickory-pine forest in the eastern portions of the region. Bryant and Holloway (1985) suggest that essentially modern environmental conditions in Northeast Texas were probably achieved by about 1,500 years ago.

Stable carbon, nitrogen, oxygen, and hydrogen isotope analyses are becoming increasingly important sources of information about past climatic conditions and changes. A 14,000-year stable isotopic record from the Aubrey Site in the Trinity River Basin in North-

Central Texas documents changing climatic conditions with wetter (and perhaps slightly cooler) or more humid climates from ca. 11,000 to 7500 B.P., again between 4000 and 2000 B.P., and yet again after 1,000 years ago (Humphrey and Ferring 1994; Perttula 2004:371). Conversely, the Aubrey Site record suggests periods of warmer-than-present climate between 7,500 and 4,000 years ago and between about 2,000 and 1,000 years ago. Interestingly, fossil vertebrate, pollen, and stable isotope data from Central Texas and the Edwards Plateau tell a somewhat different story, highlighting 2 dry climatic peaks between ca. 7000 and 3000/2500 B.P. and after 1,000 years ago (Toomey et al. 1993; Perttula 2004:371). The timing and nature of such climatic changes have major implications regarding the relative position of the prairie-forest border, the possible presence or absence of bison, and the natural resource potential of the Pineywoods and Post Oak Savanna.

The modern climate of the region is characterized as humid subtropical, with warm, humid weather from the spring to the fall, and cool, humid weather in the fall and winter. The climate is influenced primarily by tropical Maritime air masses from the Gulf of Mexico, but it is modified by polar air masses. Tropical Maritime air masses predominate throughout spring, summer, and fall. Modified polar air masses are dominant in winter and provide a continental climate characterized by considerable variations in temperature. Summers are long and warm. Winters are short and mild and are characterized by short periods of clear, cold, or freezing weather interspersed with cloudy and rainy periods and clear, pleasant days. Extremely hot or cold temperatures are rare. Sudden temperature changes are not very common during summer, but may occur frequently in winter. Rapid drops in winter temperature are caused by cold waves or sudden, strong north winds, though freezing weather is uncommon. Average winter temperatures range between 35 and 50 degrees Fahrenheit (°F), and average summer temperatures range from 85 to 95°F. Valleys and low divides are often covered with frost on early winter mornings, but freezing temperatures are of short duration. The average frost-free season is 246 days (March 15 to November 16) (Bomar 1983; Mowery 1948:3-5).

The region is well watered—precipitation falls rather uniformly over the area and is fairly well distributed throughout the year. Normally, it is heaviest in December, March, April, and May, and lowest in August. Rainfall varies from year to year, but the average is about 45 inches. Torrential rains fall occasionally, especially in winter and spring, and light snows fall occasionally in winter but melt rapidly. Hailstorms are infrequent but do occur in the vicinity of the APE (Mowery 1948:3-5). Precipitation generally increases from north to south across the region and decreases from east to west in a clinal pattern. The wettest counties in the area (Shelby, Sabine, and San Augustine) receive more than 48 inches of annual precipitation, while the driest counties (Fannin, Henderson, and Anderson) receive between 36 and 40 inches of precipitation each year. Droughts are not uncommon, and periods of lower summer precipitation are often accompanied by extended droughts caused by warm continental Pacific air masses moving across the area from the west.

Dendrochronological analyses of tree rings suggest that numerous wet and dry spells occurred during the last 1,000 years (Stahle and Cleaveland 1994, 1995). Dry conditions and the worst droughts occurred in the late A.D. 1200s, in the mid-1400s and 1600s, and then again in the mid-1700s (Stahle and Cleaveland 1995). Stahle et al. (1985) suggest that the worst

June drought to occur in the past 450 years occurred during the period between A.D. 1549 and 1577. More favorable conditions probably occurred during the intervening years, especially between ca. A.D. 1390 and 1440, then in the late part of the 16th and early 17th centuries (Perttula 2004:371). Such climatic perturbations presumably affected the predictability and success of maize harvests during the Caddoan occupation of the Pineywoods and neighboring Post Oak Savanna (Perttula 2004:371). Similar fluctuations throughout the Holocene would also have affected the range, distribution, and abundance of naturally occurring plants and animals upon which non-agricultural human populations relied.

3.0 CULTURAL BACKGROUND

The APE is situated within the Northeast Texas Archeological Region, a subdivision of the THC's Eastern Planning Region (Kenmotsu and Pertulla 1993). The Northeast Texas Archeological Region encompasses a 31-county area bounded on the north by the Red River, on the east by the Louisiana-Texas state line, partially by the Neches River on the south, and by the Trinity River on the west. This region incorporates segments or all of several prehistorically important river systems, including the Angelina, Cypress, Neches, Red, Sabine, Sulphur, and Trinity drainages. The Northeast Texas Archeological Region shares numerous similarities with adjacent portions of Texas, Oklahoma, Louisiana, and Arkansas at various points in prehistory and history, especially during the Late Prehistoric segment of the cultural sequence during which Caddoan peoples occupied the area.

The cultural history of Northeast Texas can be subdivided into 9 broad temporal periods, although the historic period has been differentiated into overlapping Historic Caddoan and Historic EuroAmerican periods to distinguish between the highly divergent historical experiences of the indigenous Native Americans and EuroAmerican settlers during the settlement of Texas (Table 2).

3.1 PaleoIndian Period (ca. 9500 to 7000 B.C.)

The initial human occupation of the New World can be confidently extended back before 10,000 B.C. (Dincauze 1984; Haynes et al. 1984; Kelly and Todd 1988; Lynch 1990; Meltzer 1989). Evidence from Meadowcroft Rockshelter in Pennsylvania suggests that humans were present in Eastern North America as early as 14,000 to 16,000 years ago (Adovasio et al. 1990), while more recent discoveries at Monte Verde in Chile provide unequivocal evidence for human occupation in South America by at least 12,500 years ago (Dillehay 1989, 1997; Meltzer et al. 1997). Most archeologists presently discount claims of much earlier human occupation in North America during the Pleistocene glacial period.

The earliest generalized evidence for human activities in Northeast Texas is represented by the PaleoIndian period (ca. 9500 to 7000 B.C.) (Perttula and Kenmotsu 1993). This period coincided with ameliorating climatic conditions following the close of the Pleistocene epoch that witnessed the extinction of herds of mammoth, horse, camel, and bison. Cultures representing various periods within this stage are characterized by series of distinctive, relatively large, often

Table 2. Chronological Framework for Northeast Texas Archeological Region

Cultural Period	Approximate Dates	Cultural Period	Approximate Dates
PaleoIndian	9500 to 7500 B.C.	Middle Caddoan	A.D. 1200 to 1400
Archaic	7000 to 200 B.C.	Late Caddoan	A.D. 1400 to 1680
Early Ceramic	200 B.C. to A.D. 800	Historic Caddoan	A.D. 1690 to 1860
Formative Caddoan	A.D. 800 to 1000	Historic EuroAmerican	A.D. 1519 to Present
Early Caddoan	A.D. 1000 to 1200		

Source: Perttula and Kenmotsu (1993:44, Tab. 2.1.2)

fluted, lanceolate projectile points. These points are frequently associated with spurred end-scrapers, gravers, and bone foreshafts.

PaleoIndian groups are often inferred to have been organized into egalitarian bands consisting of a few dozen individuals that practiced a fully nomadic subsistence and settlement pattern. Due to poor preservation of floral materials, subsistence patterns are known primarily through the study of faunal remains. Subsistence focused on the exploitation of small animals, fish, and shellfish during the PaleoIndian period. There is little evidence in Northeast Texas for hunting of extinct megafauna, as has been documented elsewhere in North America; rather, a broad-based subsistence pattern appears to have been practiced until the Late Prehistoric period.

In nearby Central Texas, the PaleoIndian period is divided into 2 subperiods based on recognizable differences in projectile point styles. These include the Early PaleoIndian period, which is defined based on large, fluted projectile points (i.e., Clovis, Folsom, Dalton, San Patrice, and Big Sandy), and the Late PaleoIndian period, which is characterized by unfluted lanceolate points (i.e., Plainview, Scottsbluff, Meserve, and Angostura).

Undoubtedly, discrete PaleoIndian components are present in Northeast Texas, but they have proven to be quite difficult to recognize and define (Perttula 2004:373). The Northeast Texas archeological record for the PaleoIndian period consists largely of surficial, mixed, or isolated finds of diagnostic projectile points (cf. Johnson 1989; Meltzer and Bever 1995; Story 1990). Seriation of these projectile point styles is based on comparison with similar forms from well-dated, stratified archeological contexts to the east and west of the region (Anderson et al. 1996; Bousman et al. 2004; Collins 2004; Meltzer and Bever 1995). At the Forrest Murphey site (41MR62), for instance, Clovis, Plainview, Dalton, and other lanceolate projectile point forms and tools were found in several discrete concentrations on an upper terrace above Big Cypress Creek. The Delta Bone Quarry 5 (41DT86) on the North Sulphur River yielded a buried hearth and antler tool (Slaughter and Hoover 1963, 1965), and charcoal from the hearth produced a calibrated 1-sigma age of 9170 to 8082 B.C., broadly contemporaneous with Clovis, Folsom, and Dalton complexes in adjacent regions (Perttula 2004:373).

PaleoIndian artifacts have been found at numerous archeological sites in the Pineywoods and Post Oak Savanna of Northeast Texas (Bousman et al. 2004). Early

PaleoIndian materials include Clovis and Folsom fluted projectile points and scraping tools commonly manufactured on high-quality, non-local raw materials (Story 1990:179, Tab. 44). Unfluted lanceolate points were more common during the Late PaleoIndian period in the region, including Dalton (Johnson 1989; Wyckoff and Bartlett 1995), San Patrice, and Scottsbluff points (Saunders and Allen 1997), as well as early side-notched points and Albany beveled bifaces or knives (Johnson 1989; Webb et al. 1971), Quince-style scrapers, end and side scrapers, denticulates, burins, and bifacial adzes. San Patrice points and associated tools were typically manufactured from local raw materials (Saunders and Allen 1997; Webb et al. 1971), although one unrecorded PaleoIndian site in Gregg County, Texas, contains an abundance of large, early side-notched points crafted from novaculate along with a Dalton point of Ouachita Mountains chert and a San Patrice lanceolate point made from local raw material (Perttula 2004:373).

The distribution of PaleoIndian artifacts within the region suggests that these early aboriginal occupations were principally situated within the valleys of major stream basins (Anderson 1996a; Thurmond 1990; Perttula 2004:373) as well as in resource-rich areas like the Ouachita Mountains escarpment to the north (Anderson 1996a). Anderson (1996a) hypothesizes that the initial and most intensive PaleoIndian settlement of the Southeast (including Northeast Texas) occurred in the resource-rich valleys of the Mississippi River and its principal tributaries. From there, PaleoIndian groups spread throughout the wooded Southeast and East, with concentrations at 250- to 400-kilometer intervals. The relatively sparse PaleoIndian archeological record, combined with the dispersion of artifacts across many different landforms and physiographic settings, seems to indicate that PaleoIndian groups were highly mobile, generalized hunters and gatherers rather than specialized hunters of extinct megafauna (Fields and Tomka 1993), as has been inferred for PaleoIndian populations on the Great Plains.

3.2 ARCHAIC PERIOD (CA. 7000 TO 200 B.C.)

Throughout most of North America, the onset of the hypothesized Hypsithermal drying trend marks the beginning of the Archaic period (ca. 7000 to 200 B.P.) (Perttula and Kenmotsu 1993). In many regions, this climatic trend marked the beginning of a significant reorientation of lifestyle—the changing climatic conditions and corresponding decrease in the big game populations forced people to rely more heavily upon a diversified resource base composed of smaller game and wild plants. In Northeast Texas, however, a generalized hunting and gathering pattern is characteristic of most of prehistory prior to the advent of large-scale agricultural systems during the Late Prehistoric.

Traditionally, the Archaic period is subdivided into Early, Middle, and Late subperiods. Changes in projectile point morphology are often used as markers differentiating these 3 subperiods, though other changes in material culture have been noted as well. Johnson (1962) employs archeological data from the Yarbrough site (41VN6) on the upper Sabine River to bring chronological order to the diverse Archaic archeological record in Northeast Texas. Johnson’s (1962) temporal divisions are based on projectile point sequences and on the introduction of plain ceramics at the end of the Archaic period. More recent refinements of the projectile point sequence (Story 1990; Thurmond 1990) document straight and expanding-stem forms characteristic of the Early and Middle Archaic subperiods and contracting-stem darts during the Late Archaic and subsequent Early Ceramic periods (Schambach 1982, 1998).

Paleoenvironmental research suggests that much of the Archaic period in Northeast Texas, particularly the middle portion of the period, was drier than today, with apparent reductions in biomass and local expansions of prairie habitats along the western margins of the region (see Chapter 2.0, Environmental Overview; cf. Ferring 1995). While archeological data are still rather limited, it appears that group mobility remained high for hunting-and-gathering populations during the Early Archaic subperiod, and the subsistence base included hardwood nuts, deer, shellfish, turtles, and small mammals. Excavations at the Conly Site (16BI19) in northwestern Louisiana suggest that the Early Archaic inhabitants of the site "focused on deer and slack water aquatic species, but a wide range of resources, from varied microenvironments, was exploited" (Girard 2000:63). Hickory nuts and acorns are also common occurrences in archeological deposits. Anderson (1996a, 1996b) suggests that Archaic groups had highly mobile foraging adaptations along the Red River, the central Sabine River, and in interior uplands away from major drainages, and employed expedient lithic tool technologies. Thurmond (1990) suggests that group territories were probably large and poorly defined and that sites were occupied repeatedly and recurrently by small groups at this time.

By the Middle Archaic subperiod, fairly substantial and extensive occupations occurred within the major basins in the region, with limited use of smaller tributaries and headwater areas (Thurmond 1990). Middle Archaic components consist largely of open campsites dominated by hunting tools, including the distinctive blade-notched Evans Point, and generalized cutting and scraping tools, lithic manufacturing debris and cores, and groundstone tools (Perttula 2004:375). Burned rock features, such as hearths, ovens, and roasting pits, and burned rock concentrations have been documented at a few sites in the Sulphur River drainage (Cliff et al. 1996; Gadus et al. 1992), though the large burned rock midden features that begin appearing in Central Texas around this time appear to be absent in Northeast Texas. Lithic raw material data from a possible Middle Archaic assemblage at Lake Fork Reservoir in the upper Sabine River basin suggest that exchange of non-local raw materials, especially finished tools, was commonplace (Perttula 1984), but raw material procurement and utilization patterns were not uniform across Northeast Texas (Fields and Tomka 1993:92). Mound complexes dating to the Middle Archaic subperiod have been documented in northern Louisiana, which suggests the development of more complex hunter-gatherer societies in the Lower Mississippi Valley area at this time (Saunders and Allen 1997).

Late Archaic sites are common in the Pineywoods and Post Oak Savanna, occurring along major streams, near springs, on spring-fed branches, on upland ridges, and on tributary drainages (Cliff and Hunt 1995; Cliff et al. 1996; Dixon et al. 1997; Thurmond 1990). In fact, the distribution of Late Archaic sites suggests that these groups ranged extensively across almost every part of the region (Perttula 2004:375). In particular, Anderson (1996a) notes major concentrations of Late Archaic sites along the Red and Little rivers in southwestern Arkansas and northwestern Louisiana as well as in the Ouachita Mountains. A generalized foraging adaptation appears to have remained the predominant subsistence pattern, and population growth has been inferred based on the substantially larger numbers of sites (in Northeast

Texas, however, only 4 well-dated Late Archaic components have been documented). Some Late Archaic components in riverine settings in the Pineywoods and Post Oak Savanna (e.g., the Yarbrough site on the Sabine River) contain earthen middens, but sites of this age generally contain only small burned rock features (Cliff et al. 1996). Projectile points, bifacial and flake tools, and lithic debris are common in Late Archaic artifact assemblages. Characteristic projectile points include expanding-stem (e.g., Ellis, Ensor, Palmillas, Yarbrough) and contracting-stem (e.g., Gary, Kent) styles. There is no paleobotanical evidence to indicate that Late Archaic populations in Northeast Texas cultivated native plant species (such as sumpweed, sunflower, and chenopod), as was the case in many parts of North America in the first millennium B.C. (cf. Ford 1985; Fritz 1994). Extensive use of local lithic raw materials during the Late Archaic in the Sulphur, Sabine, Cypress, and Angelina-Neches basins speaks to a more limited interregional interaction at this time (Fields and Tomka 1993; Perttula and Bruseth 1995). In contrast, Late Archaic sites in the Mississippi River basin of northern Louisiana are marked by large quantities of non-local lithic raw materials, particularly novaculite and Boone and Pitkin cherts (Saunders and Allen 1997).

While there is no evidence of prolonged sedentism in Northeast Texas in the Late Archaic, the occurrence of relatively more substantial archeological components and an increased number of sites have lead some researchers to infer a higher degree of sedentism in this area than in surrounding regions of Texas (Perttula et al. 1993). Northeast Texas exhibits some similarities in artifact styles with the Prairie-Savanna Archeological region to the west, possibly suggesting increased contact or affiliation with people in that region (Story 1990:220). The large Late Archaic cemeteries that form such a prominent part of the archeological record of the Southeast Texas Archeological Region extend only to the western margins of Northeast Texas in the Trinity River basin. Burial mounds occur in the subsequent Early Ceramic period, but these appear to "reflect the emergence of more complexly organized local groups" (Story 1985:53) rather than an extension of the Late Archaic mortuary pattern of the Gulf Coast.

3.3 EARLY CERAMIC PERIOD (CA. 200 B.C. TO A.D. 800)

The Early Ceramic period (ca. 200 B.C. to A.D. 800), also known as the Woodland period in adjoining regions (Perttula 2004:375-378)[1], is characterized in much of Northeast Texas, especially from the Sabine to the Red rivers, primarily by plain, relatively thick ceramic bowls and flowerpot-shaped jars, double-bitted axe heads, smaller and thinner versions of Gary dart points, and later in the period by corner-notched arrow points (Thurmond 1990). Early Ceramic sites along the Red River in southwestern Arkansas and in Northeast Texas have abundant ceramics, though many sites of this age, especially between the Sulphur and Sabine rivers, do not evince such prevalent use of ceramics (Perttula 2004:376). This situation suggests regional differences in food processing technologies and/or dietary habits, and may further highlight differences in the degree of sedentism among populations across the area

[1] This time period is herein referred to as the Early Ceramic period rather than the Woodland period following Perttula et al. (1993:100) due to some divergences between Early Ceramic components in Northeast Texas and more or less contemporaneous components in the Fourche Maline (Galm 1984; Schambach 1982) and Woodland (Aten 1984; Shafer 1975) areas of the eastern and southeastern US.

(Skibo and Blinman 1999). Lower Mississippi Valley ceramic styles (e.g., Tchefuncte Stamped, Churupa Punctated, Marksville Incised, Troyville Stamped, and Marksville Stamped) occur with some regularity at sites in the Sabine, Sulphur, and Big Cypress basins (Story 1990). These ceramics may provide evidence of contact and interaction between Trans-Mississippi South and Lower Mississippi Valley populations, or they may represent the adoption of Lower Mississippi Valley stylistic and decorative attributes by local potters (Perttula and Bruseth 1995; Schambach 1982, 1998).

The presence of grinding stones, projectile points, ceramics, and/or refuse pits at the Viper Marsh and Mahaffey sites in Oklahoma (Story 1990:298-299), the Fish Lake Site in Arkansas (Jeter and Mintz 1990), and the Sanders (41LR2), Hurricane Hill (41HP106), and other sites in Texas indicates that both plant and animal resources were important during the Early Ceramic period. The Early Ceramic inhabitants of Northeast Texas were still primarily hunter-gatherers, though they may have lived in increasingly large groups and/or resided for longer periods of time at certain sites (Perttula 2004:377). Larger villages and multiple mound centers begin to be constructed during this period on the major streams (e.g., the Red and Sabine rivers). In the Angelina and Attoyac basins, Early Ceramic period sites contain plain, sandy-paste ceramics of the Mossy Grove tradition (Story 1990) as well as decorated ceramics of Lower Mississippi Valley affiliation. Changes in the density and location of Early Ceramic sites, particularly in favor of sandy interfluves, has led some researchers (e.g., Corbin 1998) to suggest that horticulture may have been introduced into the Angelina-Neches basin at this time, though such measures may also have been tied to "moving closer to a significant plant food resource (i.e., plants that were restricted to valley margins and/or the floodplain) whose use was facilitated by processing via cooking in ceramic vessels" (Corbin 1998:115). Settlement data from the McGee Bend area at the confluence of the Angelina River and Attoyac Bayou indicate that middens and occupational components range from 0.5 to 8.0 acres in size (Duffield 1963; Jelks 1965). Some sites have relatively substantial midden deposits, particularly along the Red River and in the upper Sulphur River basin (Fields et al. 1997; Schambach 1982), and some evidence for structures (probably daubed pole and thatch structures), but the degree of settlement permanence is still less than that seen in the subsequent, long-term, Caddoan settlements of Northeast Texas (Perttula et al. 1993:99).

On the basis of available paleobotanical information, Early Ceramic groups may have cultivated squash (McGregor 1996) and used native seeds, tubers, and roots in addition to a variety of woodland and aquatic animal resources (Webb et al. 1969). The presence of chipped stone axes and hoe-shaped tools in Early Ceramic occupations suggests that some level of horticultural activity was occurring, though intensive use of colonizing weedy annuals may similarly account for the presence of these implements. Bruseth (1998) has suggested that maize was being cultivated during the latter portions of this period, but stable isotope analyses of some 25 or more Late Archaic, Fourche Maline, and Formative to Early Caddoan human remains indicate that maize was not a major part of the diet at this time (Rose et al. 1998). Early Ceramic period burial mounds have been documented in bluff top and alluvial valley settings on the Red River in northwestern Louisiana and southwestern Arkansas (Schambach 1982, 1997; Webb 1984) and on the Angelina, Neches, and Sabine rivers in Northeast Texas (Story 1990). Mortuary ceremonialism included the interment of costly, non-local raw materials and artifacts, including chert, copper, and Lower Mississippi Valley ceramic vessels, in the burial mounds. Evidence of mortuary or ritual practices also occurs in non-mound contexts such as the Hurricane Hill Site, which contained a small cemetery on a prominent hill, and the Mahaffey Site on the Kiamichi River in southeastern Oklahoma, which had a large cemetery with flexed and semiflexed burials without grave goods (Perino and Bennett 1978). In the broadest sense, the establishment of bounded cemeteries is often interpreted as a correlate of increasing sedentism in the western Gulf Coastal Plain of Northeast Texas (Pertulla 2004:378).

Early Ceramic components are relatively common in the Angelina and Neches basins, accounting for at least 25 to 50% of known prehistoric archeological sites in the Angelina-Neches confluence area (Martin et al. 1995; Perttula et al. 1993). In the Angelina and Neches basins, Early Ceramic sites are typified by sandy-paste pottery, small Gary points, and possibly Friley expanding-stem arrow points. These sites typically occupy sandy ridges adjacent to stream valleys, although components of this age have been noted in other sandy locations such as alluvial fans.

Early Ceramic occupations in Northeast Texas are usually identified through 1 of 2 methods. One method involves the application of absolute chronometric techniques, such as radiocarbon or thermoluminescence dating (Story 1990). Some of the dates that have been obtained, however, derive from mixed contexts and may not be completely reliable, and most excavated Early Ceramic period sites also contain Late Archaic and/or Formative Caddoan components, thus creating "a degree of uncertainly in assigning some features and specimens to the Early Ceramic components" (Story 1990:293). Early Ceramic Period occupations may also be identified by isolating components that contain sizable collections of Gary dart points or expanding-stem arrow points (e.g., Friley), early types of ceramics (e.g., sandy-paste wares, Williams Plain, Cooper Boneware [Schambach 1982]), and Marksville and Troyville types without late arrow points or Caddoan ceramics.

Early Ceramic components commonly overlie Late Archaic components, and a number of Early Ceramic period components occur in conjunction with Late Caddoan components as well. Frequently, the components are difficult to separate. In fact, the association of Early Ceramic materials with earlier and/or later materials poses something of a problem, and it is possible that Early Ceramic components may not be entirely isolable; that is, some or all of these sites may well be part of a continuum in which Gary points become smaller, sandy-paste pottery appears, and, later, Gary dart points are replaced by Friley expanding-stem arrow points. In this light, it may not be possible to even identify many Ceramic Period components without performing some level of excavation to define the stratigraphic nature and artifact composition of archeological deposits. Isolating Early Ceramic period components in multi-component sites may not be possible based on survey-level information—surface collected artifacts, together with those from shovel tests, may reveal the presence of multiple components but will not aid in determining whether or not the components are too badly mixed to merit further work. Minimally, testing-level investigations may be necessary to address these issues, and then only if the excavations are sufficiently extensive to evaluate the deposits on a site.

Despite these difficulties, Early Ceramic sites in the Angelina-Neches basin seem to be relatively common. Cultural resource surveys and test excavations (Fields 1979; Ippolito 1983) at 2 sites (41HO61 and 41TN27) within the Davy Crockett National Forest show that Early Ceramic components are relatively common in the Neches basin. An archeological survey of Lake Nacogdoches on Loco Bayou, a tributary of the Angelina, also produced a number of sites with Early Ceramic Period components (Prewitt et al. 1972). Excavations at the Deshazo Site (41NA27), primarily a Historic Caddo occupation, revealed an important sandy-paste ceramic component (Story 1982). Other excavated sites on tributaries of the Angelina include 41NA44 on Legg Creek (Corbin et al. 1978), 41NA144 and 41NA157 on Bayou LaNana (Corbin 1988), and 41SA135 on Attoyac Bayou (Middlebrook 1983).

3.4 FORMATIVE, EARLY, AND MIDDLE CADDOAN PERIODS (CA. A.D. 800 TO 1400)

The Caddoan archeological record represents the fluorescence of aboriginal complex societies in northeastern Texas, northwestern Louisiana, southwestern Arkansas, and southeastern Oklahoma, and generations of archeologists have long been captivated by the beautifully manufactured ceramics and other material goods, the earthen mounds, the well-preserved villages and hamlets, and the existence of a paleobotanical record (e.g., Perttula 2004; Swanton 1942). In the Northeast Texas Archeological Region, the timeframe referred to in many surrounding regions as the Late Prehistoric period is usually subdivided into the Formative Caddoan (ca. A.D. 800 to 1000), the Early Caddoan (ca. A.D. 1000 to 1200), the Middle Caddoan (ca. A.D. 1200 to 1400), and the Late Caddoan (ca. A.D. 1400 to 1680) periods (Perttula 1993a). European contact with Caddoan groups in Northeast Texas began around ca. A.D. 1540, but it was sporadic until after ca. A.D. 1680 (Perttula 1992), and the Historic Caddoan period (ca. A.D. 1680 to 1860) therefore covers the period of regular interaction with Spanish, French, and other EuroAmerican settlers up to the expulsion of the Caddo peoples from their homelands and forced removal to Indian Territory in 1859. General characteristics of Caddoan tradition are discussed below, followed by brief overviews of specific archeological periods.

The term *Caddo* derives from the French abbreviation of *Kadohadacho*, a word meaning “real chief” in the Kadohadacho dialect (Newkumet and Meredith 1988); however, depending upon the context of use, *Caddo* or *Caddoan* can refer to a Native American linguistic family or a subdivision of related dialects within that family; be a collective term for up to 25 related tribes or bands, 3 possible confederacies, or specific prehistoric and historic archeological assemblages; or refer to the geographic region containing these archeological assemblages (Perttula 1992; Trubowitz 1984). In general terms, the Caddo were characterized by:

> a large population represented by many small settlements scattered within particular resource areas; a reliance upon horticulture as one of the primary means of subsistence; differentiated and undifferentiated mound/habitation sites with structurally differentiated mound classes (producing an apparently hierarchic division of places on the landscape); differential treatment of the dead reflective of a system of ranking; [and] indications of long-term cooperation in disposal of the dead by groups represented by some of the archeological units (Prewitt 1974:76).

Broadly, these basic characteristics of settlement, subsistence, sociopolitical organization, and mortuary practices are representative of the Caddoan archeological area from ca. A.D. 750 to

1750 and are similar, if not identical, to what constitutes the Mississippian period cultural traditions of the Mississippi River Valley and Eastern Woodlands of North America (Griffin 1967, 1985; Muller 1978; Smith 1986, 1990; Steponaitis 1986). Despite these similarities, Caddoan archeologists maintain that the prehistoric and early historic Caddoan tradition developed largely independently of Mississippian-period chiefdoms elsewhere (Smith 1990).

The overall Caddoan archeological area has been divided into 3 subareas (Perttula 1992:7-9), including (1) the Arkansas, or Northern Caddoan, subarea of northeast Oklahoma, northwest Arkansas, and southwest Missouri, including the Arkansas Valley lowlands, the South Canadian basin, and the western Ozark Highlands (Brown et al. 1978); (2) the Western Caddoan subarea of East Texas and south-central Oklahoma, including the western Gulf Coastal Plain outside the Red River Valley and the Ouachita Mountains (Story 1981, 1990; Wyckoff and Baugh 1980); and (3) the Central Caddoan subarea in the Red and Ouachita river valleys in southwestern Arkansas, northwestern Louisiana, and southeastern Oklahoma (Schambach 1983; Williams and Early 1990). Archeological developments within each of these subareas seem to represent the in situ formation of separate and complex Caddoan cultural traditions (Schambach 1983). Despite the intraregional and diachronic distinctions that characterize the different Caddoan subareas, Caddoan tradition is generally distinguished by:

> the development of more complex social and political systems of authority, ritual, and ceremony; the rise, elaboration, and maintenance of social ranking and status within the Caddoan communities and larger social and political spheres; and the intensification of maize agriculture and a reliance on tropical cultigens over time in local economic systems (Perttula 1992:13).

Throughout prehistoric times, Caddoan peoples lived in dispersed communities of grass- and cane-covered structures that were frequently associated with grass-covered arbors and armadas (Perttula 1992:13). The communities were composed of isolated homesteads or farmsteads, small hamlets, a few larger villages or towns, and large civic-ceremonial centers. Such centers were marked by the construction of earthen mounds that were used as temples, burial mounds, and ceremonial fire mounds (Jeter et al. 1989:2001). The civic-ceremonial centers appear to have “served a local population which [was] dispersed in small social and economic groups around the center” (Schambach and Early 1983:SW107).

The distribution of Caddoan settlements across the landscape suggests that all habitats were used to some extent, either intensively as locations for the sedentary communities and farmsteads (that may have been occupied for single or multiple generations) or periodically by groups in logistical camps where specific natural resources could be procured in bulk by the Caddo. Caddoan sites of Formative to Middle Caddoan age are situated primarily on elevated landforms, such as alluvial terraces and rises, natural levees, and upland edges, adjacent to major streams and along minor tributaries and spring-fed branches (Perttula 2004:378). Settlement locations near arable sandy loam soils were preferred, presumably due to the excellent drainage afforded by such soils for habitation and cultivation purposes. Most of these Caddo sites are:

> permanent settlements that have evidence of the structures, including posts, pits, and features marking their residency, along with the cemeteries and graves where the dead were buried; the middens where the animal and plant food refuse was discarded amidst broken stone tools and pottery vessels; and the material remains of tools and ceramics used in the procurement and processing of the bountiful resources of the region. They represent the settlements of Caddoan communities and sociopolitical entities, and the civic-ceremonial centers that were their focus (Perttula 1993a:125).

Post Oak Savanna and Pineywoods Caddoan groups in Northeast Texas constructed temple and burial mounds, and the larger sites were important civic-ceremonial centers containing multiple mounds and associated villages, generally dating after ca. A.D. 900. The multiple mound sites are evenly spaced along the Red River, Sabine River, and Cypress Bayou, and those that are contemporaneous may represent the nodes of hierarchical systems of an "integrated…regional network of interaction and redistribution" (Thurmond 1990:234). Perttula (1994:12) identified the Jamestown, Boxed Springs, and Hudnall-Pirtle multiple-mound centers as the nodes of such a network during the Early to Middle Caddoan periods in the Sabine River basin. The Hale (41TT12) and Keith (41TT11) multiple-mound sites may have served civic-ceremonial functions in the Big Cypress Creek basin (Perttula 2004:384), and the Roitsch (41RR16), Wright Plantation (41RR7), Fasken (41RR14), and Sanders (41LR2) sites may have served similar roles in the Red River basin (Bruseth 1998; Hamilton 1997).

The premier mound centers in the Angelina-Neches river basins are the George C. Davis and Washington Square sites (Corbin and Hart 1998; Story 1997). Calibrated radiocarbon dates from village contexts at the George C. Davis site establish that the site was occupied beginning in the 9th century and was then continuously settled through the end of the 13th century (Story 2000). Radiocarbon dating of the Washington Square site suggests that it began to flourish after ca. A.D. 1250, when the George C. Davis site may have begun to lose power and social authority (Perttula 2004:386). The proximity of the Washington Square Mound complex to the north-to-south and east-to-west aboriginal trails that later became known as the Caddo trace and the Camino Real, respectively, may suggest reasons why the seat of power shifted away from the George C. Davis site, the preeminent polity on the Neches River, which was abandoned by the early 14th century.

About 80% of the approximately 500 radiocarbon dates available from Northeast Texas archeological sites are from sites with prehistoric and protohistoric Caddoan components. The largest number of radiocarbon dates fall in the Middle Caddoan period, followed by the Early Caddoan period. While the number of dates in this period is probably inflated to some degree by the extensive series of dates from the George C. Davis Site (n=130) (Story 1997; Story and Valastro 1977), it nevertheless appears to be the case that Middle Caddoan occupations are rather commonplace throughout much of Northeast Texas (Middlebrook and Perttula 1997; Perttula 2004:378).

Formative to Middle Caddoan period groups seem to have been horticulturalists, cultivating maize and squash along with several kinds of native seeds (Perttula and Bruseth 1983). They also gathered nuts, tubers, and roots and were proficient hunters of deer, fish, rabbits, raccoon, turkey, squirrel, and turtles. Available paleobotanical and bioarcheological evidence from Northeast Texas and elsewhere within the Caddoan area, including stable carbon isotope analyses of human remains (Rose et al. 1998), suggests that Caddoan groups became dependent primarily upon maize and other domesticated crops only after about A.D. 1300. By ca. A.D. 1450, maize composed more than 50% of the diet (Burnett 1990; Perttula 1996; Rose et al. 1998), though local variation in dependence upon cultivated plants has been noted (Cliff 1997; Largent et al. 1997; Perttula 1999).

The most distinctive material culture item of the Caddo populations living in Northeast Texas was the ceramics they made for cooking, storage, and serving needs (Perttula et al. 1995b). The variety of styles and forms of ceramics recovered from the region hint at the range, temporal span, and geographic extent of prehistoric Caddoan groups across the landscape (Thurmond 1990). Story (1990:246-247, 277-319) suggests that the earliest ceramics in the region date between ca. 500 and 100 B.C. and are closely related to the ceramics being produced in the Lower Mississippi Valley. Between the introduction of ceramics in the region and the emergence of distinctive Caddoan vessel forms and decorative motifs around A.D. 800, the local plainware traditions seem to have continued relatively unchanged. As Story notes:

> Sometime probably between A.D. 700 and A.D. 900 (there is a lot of room for arguing the age), Caddoan ceramics came to dominate the northeastern part of [Texas]. These ceramics are distinguished by certain vessel forms (especially a long-necked bottle with a globular body and a carinated bowl), engraved decorations, and other attributes. Although the bottle form and engraving may have an exotic origin, most of the Caddoan ceramics can be recognized as local developments with strong influences from the [Lower Mississippi Valley] (1990:247).

The diversity in decoration and shape in Caddoan ceramics is substantial, ranging from utility jars and bowls to fineware bottles, carinated bowls, and compound vessels, and precludes any succinct summary in the present context (cf. Perttula 2004; Story 1990). Some general observations and trends may nevertheless be highlighted. Ceramics are quite common in domestic contexts on Caddoan sites, and it is not unusual to recover more than 10,000 sherds from hundreds of vessels during excavations on Caddo settlements, and upwards of 100,000 sherds is common on larger sites such as George C. Davis (Newell and Krieger 1949; Stokes and Woodring 1981), Deshazo (Fields 1981, 1995), Benson's Crossing (Driggers 1985), and 41MX5 (Brewington et al. 1995). The Caddo made both finewares, with very finely crushed temper (Schambach and Miller 1984:109), and utility wares. Almost without exception, Caddoan ceramics were tempered with grog (crushed sherds) or bone, although burned and crushed shells were used after ca. A.D. 1300 among most of the Red River Caddo groups (Bruseth 1998; Schambach and Miller 1984) and on later Caddoan sites in the lower and upper Sulphur River basin (Cliff and Perttula 1995; Fields et al. 1994a and b). These kinds of ceramics were designed to serve utilitarian purposes within the Caddoan community as well as ceremonial functions in burials. In general, earlier Caddoan finewares across Northeast Texas (and indeed across much of the overall Caddoan area) are rather uniform in style and form, suggesting broad and extensive social interaction among groups in the region (Perttula 2004:389). Later Caddoan finewares (after ca. A.D. 1300/1400) are more stylistically diverse across Northeast Texas, and highly distinctive vessel shapes, designs, and decorative attributes characterize ceramics in individual drainages, and sometimes even within segments of specific river and creek basins (Thurmond 1985, 1990; Perttula et al. 1993). This diversity can be reasonably interpreted to represent specific Caddoan social groups. In historic Caddoan times, ceramic vessel forms and decorations were considerably more homogenous across much of the Caddoan area than during prehistory, suggesting extensive intraregional contact among contemporaneous Caddoan groups (Perttula 1992:154).

Aside from ceramics, Formative to Middle Caddoan period populations in the Pineywoods possessed a sophisticated technology based on the use of stone, bone, wood, shell, and other media for the manufacture of tools, clothing, basketry, ornaments, and other items (Perttula 1992:15). Well-made corner-notched and rectangular-stemmed arrow points were common, along with siltstone and greenstone celts, perforators and borers, large Gahagan bifaces, and a variety of more expedient stone tools, such as unifacial flake scraping and cutting implements (Perttula 2004:386). Long-stemmed Red River (Hoffman 1967) and cigar-shaped ceramic pipes, as well as ceramic earspools and figurines, were also manufactured by the Caddo at this time (Newell and Krieger 1949).

Locally available lithic materials were usually employed for the manufacture of stone tools, but non-local raw materials and finished goods made from these raw materials were also obtained through trade (Brown 1983; Perttula 1990). The development and maintenance of long-distance east-to-west and north-to-south trade networks were notable features of prehistoric Caddoan tradition. Trade items included bison hides and salt; raw materials such as copper, stone, and marine shell; and finished objects such as pottery vessels and large ceremonial bifaces (Brown 1983; Creel 1991; Early 1990; Vehik 1988, 1990). Many of the more exotic trade items, especially marine shell and copper artifacts, were obtained from areas more than 300 miles away from the Caddoan area (Perttula 1992).

3.5 Late Caddoan Period (ca. A.D. 1400 to 1680)

As currently defined, the Late Caddoan period extends from ca. A.D. 1400 to 1680 (Story 1990). Late Caddoan occupation in Northeast Texas was arguably centered on the Great Bend area of the Red River, where Late Caddoan archeological sites are included in the contemporaneous Belcher and Texarkana phases (Schambach 1983). Texarkana phase sites occur on the Red River northwest of Texarkana to the Arkansas-Oklahoma state line, as well on the lower Sulphur River (Jelks 1961), while Belcher phase sites are distributed from about Fulton, Arkansas, to below Shreveport, Louisiana (Kelley 1997; Schambach 1983; Webb 1959). The McCurtain phase represents another Late Caddoan archeological complex upstream from the Texarkana phase (Bruseth 1998). Texarkana and Belcher phase sites include large, permanent settlements with mounds and cemeteries, hamlets, and farmsteads (Perttula 2004:393). The mound centers were marked by the construction of earthen mounds used as temples, burial mounds, and/or ceremonial fire mounds, as during earlier Caddoan periods (Kelley 1998; Webb 1959). These settlements were inhabited by sedentary Caddo agricultural communities with complex societies led by individuals with high status (Story 1990). Sites such as Belcher (16CD13), Battle Mound (3LA1), Hatchel (41BW3), Moore/Higginbotham (3MI3/30), and Cabe Mounds (41BW14) represent the larger villages or towns (Creel 1996; Kelley and Coxe 1998; Kelley and Guccione 1997; Perttula et al. 1995a; Sierzchula et al. 1995), while smaller hamlets or farmsteads have been investigated at the Shewin, Atlanta State Park (Harris et al. 1980), and 41MX5 (Brewington et al. 1995) for the Texarkana phase, and Cedar Grove (3LA97), Spirit Lake (3LA83), and Cox for the Belcher phase.

In the Angelina-Neches river basin, the Late Caddoan period is represented by the Frankston phase, which dates from ca. A.D. 1400 to 1650 (Perttula 2004:395), and the Angelina focus or phase in the vicinity of Lake Sam Rayburn (formerly the McGee Bend Reservoir) (Jelks 1965). Only 1 Frankston phase mound site is known, the A.C. Saunders site (41AN19) (Jackson 1936; Kleinschmidt 1982). Other Frankston phase sites include small, residential settlements in dispersed agricultural communities, with small family and/or community cemeteries that appear to have been used over relatively short periods of time (Anderson et al. 1974; Johnson 1961; Shafer 1981). Anderson notes that the concentration of Frankston phase sites in one section of the upper Neches basin comprises:

> base settlement clusters [with middens, burials, and structures, likely representing permanent settlements] on streamside flats with fertile soils in the…uplands. Other site types include scattered sherds, gathering stations in which pitted stones are found with a few sherds, and small campsites (1974:163).

One of the larger known Frankston phase cemeteries is the Omer and Otis Hood cemetery (Kleinschmidt 1982; Suhm et al. 1954), which contains 20 burials, while other, smaller cemeteries contain fewer than 10 individuals generally laid out individually in extended supine position with accompanying grave goods (Kleinschmidt 1982:214). In at least one Frankston phase cemetery in the upper Neches River basin in Smith County, the burial of socially elite individuals occurs in a family and/or village cemetery context rather than in a mound.

Middlebrook (1994:26-29) separates “late” Angelina focus or phase sites in the Lake Sam Rayburn area from earlier Caddoan sites in the lake and nearby areas on the basis of (1) an abundance of ceramic elbow pipes, (2) high proportions of brushed sherds (from Broaddus Brushed jars), and (3) lower proportions of Pineland Punctated-Incised sherds compared to the brushed utility wares. In addition, he notes that these late (ca. post-A.D. 1450/1500) Angelina focus or phase sites have plain:decorated sherd ratios between 0.80 and 1.03 compared to the Middle Caddoan Sawmill (41SA89), Blount (41SA123), and Tyson sites, which have ratios of 1.53 to 1.83.

The other major Late Caddoan manifestation in Northeast Texas is the Titus phase (ca. A.D. 1430 to 1680), which represents the remains of a number of Caddoan groups who lived between the Sabine and Sulphur rivers in the northeastern Texas Pineywoods. Like the Frankston phase groups in the upper Neches and Angelina river basins (Kleinschmidt 1982; Story and Creel 1982) and in the Angelina River and Attoyac Bayou basins (Middlebrook 1994), Titus phase groups lived in dispersed year-round settlements, buried their dead in planned cemeteries, and manufactured culturally distinctive ceramics of considerable stylistic and functional diversity (Perttula 2004:396). Sociopolitically, these Pineywoods Caddo were somewhat akin to the early historic Kadohadacho groups on the Red River that had elite-controlled and hierarchically ranked societies (Barker and Pauketat 1992). Several hundred Titus phase components have been identified, the largest concentration of which is found in the

Cypress Bayou (or Big Cypress Creek) valley (Perttula 2004; Thurmond 1990), with a scatter of sites throughout the Little Cypress Creek valley, the middle portions of the Sulphur River, the middle and upper portions of White Oak Creek, and the upper and middle reaches of the Sabine River drainage (Perttula 2004:396). Thurmond (1985, 1990) has proposed that the Titus phase is composed of 4 contemporaneous spatial subclusters—Three Basins, Tankersley Creek, Swauano Creek, and Big Cypress Creek—within the larger Cypress cluster. By contrast, Turner (1978) proposes early and late chronological subdivisions within the Titus phase based on motif variations on Ripley Engraved carinated bowls and on changes in vessel form. It is likely that both spatial and temporal factors contribute to the archeological character of the Titus phase (Perttula 1992). Despite the prominence of Titus phase groups in the archeological record, Europeans in historic times described these Pineywoods Caddo groups in the Sabine and Cypress basins in only a cursory fashion, unlike the Kadohadacho and Hasinai groups to the north, east, and south (Smith 1995).

Late Caddoan period settlements in the Pineywoods of Northeast Texas have been termed rural Caddoan community systems (Perttula 1991) because they were distributed along secondary streams, were widely dispersed, and consisted of functionally equivalent farmsteads and hamlets. Small mound centers were being constructed by Titus phase and other Late Caddoan groups up until ca. A.D. 1500, and possibly later, in Northeast Texas, but they lack evidence of burial mounds or large platforms; rather, these mounds contain buried, burned structures (Perttula 2004:398). The larger Caddoan towns were distributed along the major stream valleys, such as the Red, Ouachita, and Little Rivers. These communities were hierarchically arranged, with civic-ceremonial centers at the "top" surrounded by associated towns of linear but dispersed farmstead compounds with several structures (such as bark- or brush-covered shelters and storage platforms [Schambach 1983:7-8]), followed by hamlets, farmsteads, and specialized processing and/or procurement locales, such as salt-making sites (Early 1993; Gregory 1980:356-357).

The best information on the distribution of Late Caddoan archeological sites derives from Thurmond's (1990) study of Titus phase settlements in the Big Cypress Creek basin. Titus phase sites tend to occur on valley terraces, upland projections, and upland slope landforms, with the greatest use of minor streams and upland basins. The distribution of Titus phase settlements suggests that both farmsteads and hamlets were equally dispersed in prehistoric times and that they were usually situated near springs and on arable soil and level ground, but the banks along tributary streams also seem to have been preferred settings. Permanent settlements and cemeteries tend to occur in association with freshwater springs, whereas mound centers typically do not occur in proximity to a spring but rather are located on floodplain floors in major and intermediate basins or on upland projections. Associated occupation areas are situated on terraces, floodplain rises, or upland projections but are not found on floodplain floor landforms.

Two types of cemeteries have been documented in the Titus phase—the small, family cemetery and the large, supralocal or community cemetery. More than 115 Titus phase cemeteries have been recorded to date (Perttula and Nelson 1998). Family cemeteries are typically situated in immediate proximity to farmsteads or hamlets, contain few interments (typically about 10 to 20 individuals in cemeteries along the western margins of the Titus phase area and from 20 to 40 individuals in the "heartland" along Big Cypress Bayou [Perttula and Nelson 1998]), and offer no evidence of differential status or social rank in grave goods associations and burial treatment. Large community cemeteries are the product of interments from numerous nearby communities, and they are therefore reflective of wider, community-based participation in ceremonial and mortuary activities (Perttula and Nelson 1998; Story 1990:338-339). These cemeteries typically contain at least 60 to 70 individuals, though some are known that contain at least 150 to 300 interments (Perttula 1993a; Perttula and Nelson 1998, 1999; Story 1990; Thurmond 1990; Turner 1978). Large community cemeteries do contain evidence for the existence of social differentiation within the Titus phase Caddoan communities—they are organized internally by space and structurally divided by rank (Thurmond 1990; Turner 1978). There is little evidence for overlapping graves; rather, the cemeteries appear to have been regularly expanded over time (Perttula 1992). As the cemetery plan was consistently maintained, it may reflect community participation over several generations. Burial populations are roughly evenly divided between males and females (Rose 1984:240). Children were typically buried in subfloor pits within household structures (Perttula 2004:401). In general, community cemeteries were relatively short-term mortuary phenomena that were used intensively in portions of the Pineywoods after ca. A.D. 1550 to the early 1600s, and it is probably no coincidence that the intensive use of these burial grounds occurs generally contemporaneously with the initial contact between Titus phase Caddoan populations and the Spanish de Soto/Moscoso *entrada* of 1542 to 1543 (Perttula 1992; Thurmond 1990).

Late Caddoan material culture is at least as distinctive and diverse as early Caddoan assemblages. The wide variety of ceramic vessel shapes and decorative motifs, as well as their frequency in domestic contexts, demonstrates the importance of ceramics for cooking and serving food, as personal possessions, and as social identifiers. Both finewares and utility wares were manufactured during the Late Caddoan period. Finewares were tempered with finely crushed grog and bone and were well polished. Shell-tempered vessels are quite rare and, when found, are typically trade wares from the Red River Caddo area (Perttula 2004:404). Utility vessels were tempered with grog and grit and utilized a coarser paste and a thicker body. Ceramic earspools and biconical and elbow pipes were made (Jackson 1933), and other types of earspools were manufactured from siltstone, sandstone, and wood (Turner 1992:84). Lithic tools and debris are uncommon on Late Caddoan period sites in the Pineywoods, which presumably reflects the development of a strong wood and bone tool industry, few examples of which are preserved in the archeological record (Perttula 2004:404). Tool diversity is low, consisting primarily of triangular and corner-notched arrow points, flake tools (e.g., drills, scrapers, and retouched flakes), lithic debris and cores, and a variety of groundstone implements, including petaloid and tabular celts, manos and metates, battered and polished cobbles and pebbles, hematite and limonite pigment stones, and abrading slabs (Thurmond 1990; Turner 1992). Bone is not usually well preserved on Late Caddoan sites, though occasional deer mandibles, deer beamers, ulna punches, antler tines, deer and bird bone pins, and turtle shell rattles have been noted (Perttula 2004:405).

Faunal subsistence remains are known from a few sites in Northeast Texas dating to this time period but have so far received relatively little attention (Perttula 1993a; Thurmond 1990).

Vertebrate species represented in trash middens include deer, turkey, cottontail rabbit, jackrabbit, squirrel, beaver, turtle, and fish, though deer and turkey appear to have been the dominant economic species (Perttula et al. 1982; 1993). In general, subsistence evidence suggests that Pineywoods Caddo practiced a strongly maize-based economy at this time (Fritz 1990:421, 425). Floral evidence from trash middens suggests that maize (*Zea mays*) provided a dietary staple, and beans (*Phaseolus vulgaris*) were also an important food source (Perttula 2004:4005). Nuts and seeds were gathered but appear to have been of lesser importance than during earlier time periods (Crane 1982; Perttula and Bruseth 1983; Perttula et al. 1982).

The large Titus phase cemeteries in the Cypress Creek basin form 4 spatial clusters defined by Thurmond (1981, 1985). The earliest expressions of community integration, organization, and social hierarchy occur in the Three Basins, Tankersley Creek, and Swauano Creek subclusters, and the latest expressions occur in the Swauano Creek and Big Cypress Creek subclusters. Presumably, the Three Basins and Tankersley Creek areas were abandoned by resident Caddoan groups after ca. A.D. 1650 to 1670 (Thurmond 1985:198), and it is perhaps not surprising that Norteno phase Wichita sites dating after ca. A.D. 1700 to 1760 are found in the Three Basins subcluster area (Perttula 1992:113). These community cemeteries are primarily protohistoric phenomena of the Titus phase and Cypress Cluster dating to ca. A.D. 1550 to 1650/1700, and they do not extend into the later Historic Caddoan period (ca. 1685 to 1800). Caddoan cemeteries after A.D. 1685 do not exhibit the coherence and internal structure noted in the protohistoric community cemetery centers; rather, they are uniformly small, and each burial contains limited grave goods usually common only to household cemeteries, with the addition of European trade goods. Protohistoric cemetery centers are thus short-term (ca. 150-year maximum), transitory phenomena in the Cypress/upper Sabine river areas. The timing of this development is of considerable significance as Titus phase community cemeteries appear to have replaced mounds by the middle to late 16th century. These changes in the sociopolitical and ceremonial aspects of Caddoan life reflect a reduction in complexity and the scope of community integration between ca. A.D. 1400 and 1600. The uneven dispersion of supralocal community cemeteries throughout the region (Perttula 1992:98, Fig. 14) implies that a spatial coalescence or a decrease in settlement density was occurring in some parts of the 2 basins. This may indicate a systemic change in Caddoan rural communities at approximately the time of initial European contact. Subsequent to the discontinuation of community cemeteries ca. A.D. 1650 to 1700, most of the upper Sabine and Cypress Creek basins were abandoned (Thurmond 1990). The only post-A.D. 1700 Caddoan occupations that can be related to earlier use of the region are found in the lower Sulphur and Sabine rivers at known trade portages or at trail crossings of major streams (Harris et al. 1980; Jones 1968).

By early historic times, the Caddoan nation was composed of at least 25 separate groups, bands, or tribes organized into loosely affiliated kin-based groups referred to by European observers as the Hasinai, Kadohadacho, and Natchitoches confederacies (Perttula 1992). The Hasinai groups lived in the Angelina and Neches river valleys in East Texas, the Kadohadacho groups on the Red River in the Great Bend area, and the Natchitoches groups on the Red River in the vicinity of the French trading post of Natchitoches established in A.D. 1714. In the Angelina-Neches area, protohistoric Caddoan development in the upper Neches River basin shares certain aspects of the sociopolitical and ceremonial change observed for the contemporaneous Titus phase (Perttula 1992:117). Frankston phase mound centers, such as the A.C. Saunders and Pace McDonald sites, both of which were apparently structural mounds without accompanying mortuary events (Story 1981:149), were not used after A.D. 1600. Kleinschmidt (1982:240) places the A.C. Saunders site in the Frankston Phase 2 subdivision, probably just prior to the historic contacts of the early 17th century. Cultural change appears to have been toward a more regionally localized sociopolitical system generally compatible with the A.D. 1680 to 1720 ethnohistorical records from the East Texas Hasinai tribes (Wyckoff and Baugh 1980:246-249), in which ritual and ceremony were conducted in non-mound structures or plazas and cemeteries were strictly for extended family use (Perttula 1992:117).

3.6 HISTORIC CADDOAN PERIOD (CA. A.D. 1519 TO PRESENT)

Protohistoric cultural manifestations in Northeast Texas span the Late Caddoan to early Historic Caddoan period; therefore, a combination of archeological, ethnohistoric, and historic data may be brought to bear to illuminate Caddoan tradition during the period of contact with EuroAmerican explorers and settlers. While there is an abundant Late Caddoan and protohistoric archeological record in the Angelina-Neches basin of Northeast Texas (Story 1990; Perttula 1991, 2004), developing an understanding of that record is hampered by a relative lack of means to identify short-term temporal episodes within the ca. 1400 to 1700 time period (i.e., within the subdivision of the Frankston and Allen phases). Much of the current picture of the protohistoric Caddoan presence in the Angelina-Neches basin, specifically the upper Neches River area (Suhm et al. 1954), derives from a largely undated archeological record (Story 1990; Perttula 1992:115).

The earliest explorations by Europeans in the overall Caddo area began shortly after Spain's Indies commerce was formally organized in 1503 by the creation of the Casa de Contratación (Arnold and Weddle 1978:63; Milanich and Milbreath 1989a, 1989b). Explorations of the Gulf Coast were carried out from Florida to Tampico throughout the early 16th century as part of the regulation and encouragement of New World trade. The first European incursion into what is now known as Texas was in 1519, when Álvarez de Pineda explored the northern shores of the Gulf of Mexico (Weddle 1985). While no documentary evidence exists for direct contact with Caddoan peoples during these initial forays, Europeans were already conducting slave raiding and native resettlement projects along the Texas coast by 1550 (Bolton 1912). From 1528 to 1534, Álvar Núñez Cabeza de Vaca and other survivors of the Narváez Florida expedition crossed South Texas after being shipwrecked along the Texas coast near Galveston Bay (Bandelier 1964). Swanton (1942:29) does not believe that Cabeza de Vaca actually encountered any Caddoan people during his wanderings, though his dealings in Native American trade goods between coastal and inland groups suggest that he might have traveled in the region (Perttula 1992:19). While direct contact between Cabeza de Vaca and Caddoan peoples cannot be established by historical documentation, Perttula (1992) argues that diseases such as typhoid and measles carried by the Narváez party could have been transmitted to Native American groups living elsewhere along the Texas Coast and then inland to Caddoan groups through aboriginal trade and other contact. Thus, the Narváez and Cabeza de Vaca exploration may have been an important benchmark for the initiation of contact between Europeans and Native Americans in the Spanish Borderlands West (Hester 1989:199; Perttula 1992:19, 1993b), and may have introduced epidemic diseases that resulted in substantial population declines prior to the inception of more regular contact later in the 16th century.

In the early 1540s, the Hernando de Soto *entrada*, led by Luis de Moscoso following the death of de Soto along the Mississippi River near present-day Memphis, passed into the Caddoan area, spending several months among the Caddoan groups who lived between the Ouachita and Trinity rivers (Swanton 1939; Perttula 1992:19). The death of de Soto on the Mississippi River at the province of Guachoya in the spring of 1542:

> freed the survivors from continuing upon the original objectives of the expedition. There was only one thought shared by all: to escape from the whole dreadful adventure. Under the leadership of Luis de Moscoso, they officially decided it was hopeless to seek the sea…in fact, the cavaliers were clearly reluctant to take to boats…and instead determined to march west in the direction of New Spain (Brain 1985:xlv).

Within what is now recognized as the Caddoan archeological area, Moscoso described the provinces of Naguatex, Nondacao, and Guasco, for example, as groups that had dense populations in scattered settlements and abundant reserves of maize (Swanton 1939:258-280). Perttula's (1992) examination of Moscoso's travels suggests that his route passed through settlements of aboriginal Caddoan groups known archeologically as the Late Mid-Ouachita (or Social Hill), Belcher, Texarkana, Titus, and Frankston phases. Different versions of Moscoso's route have been proposed by various researchers (e.g., Hudson 1986; Perttula 1992; Swanton 1939); interestingly, all of the proposed routes pass through the Angelina-Neches river basin area in the vicinity of the proposed APE. The basic import of the de Soto-Moscoso expedition in 1542 is that these explorers documented and described aspects of Caddoan settlement, subsistence strategies, aboriginal routes of travel and trade, and social organization that are broadly consistent with inferences that have been made based on the archeological record. In the province of Guasco in the Angelina-Neches basin, the Spanish noted that there was plenty of corn as well as turquoise and shawls of cotton that had been brought from the southwest (Bourne 1904:181).

Between 1520 and 1685, very few Europeans actually lived in the Caddoan area, and it is virtually certain that most Caddoan peoples during this time never saw a European (Perttula 1992:29). As a result, artifactual evidence of this phase of European contact is minimal. As Krieger points out:

> In any one site, something like twenty beads and two bits of iron may be all that can be found to represent perhaps a century of contact; and this being true, there must be scores of sites actually occupied during the same 'historic period' from which the archaeologist cannot recover a single European object (in Davis 1961:120).

The second major phase of European contact in the Caddoan historic period began with the renewed exploration of the Mississippi Valley following the establishment of the Illinois colony by the French in the 1670s. The Mississippi River, initially explored by Marquette and Joliet in 1673 to the mouth of the Arkansas River (Delangez 1946), was fully explored to its mouth by La Salle. Three years later, another expedition directed by La Salle intended to colonize the area and link the Gulf Coast with the growing French colonies of Illinois and Canada. For unknown reasons, this expedition missed the mouth of the Mississippi River and came ashore on the Texas Gulf Coast at Matagorda Bay (Cox 1922; Gilmore 1986). La Salle made several trips from Fort St. Louis to explore the region and try to find the Mississippi River, visiting the Hasinai (or Cenis, in the French transcription) in 1686 before turning back with several horses purchased from the Hasinai. Another effort was made in 1687 by the survivors of Fort St. Louis; however, La Salle was murdered by several of the men partway through this trip, and the remaining party decided to stay on with the Hasinai.

The years between 1685 and 1714 were a time of continual French and Spanish exploration of the Caddoan area. The threat of French settlement in an area the Spanish considered to be officially under their hegemony spurred serious Spanish efforts to settle and missionize the country east of New Mexico and the Rio Grande known to them as the "Kingdom of the Tejas" (Bolton 1912; Perttula 1992:30). At the same time, the French were determined to take advantage of the La Salle explorations to extend their claims in the region. Shortly thereafter, English colonies were established along the South Atlantic Coast that wished to extend trade routes west to Native American groups living on the Mississippi River and the Texas Gulf Coast (Coker and Watson 1986; Crane 1929; Usner 1989; Woods 1980). European political relationship, trade and religious objectives, and the larger spheres of influence under the control of the Spanish, French, and British in the developing world economy all played important parts in the fate of the Caddo between ca. 1685 and 1800 (Braudel 1984:21-85, 387-429; Wallerstein 1974; Wolf 1982:129-231). Trade contacts, rumors of settlement, and exploration by one government were responded to in kind by others as part of the unstable process of colonization. The nature and character of sustained European contact has been comprehensively discussed by many researchers (Bolton 1915, 1987; Giraud 1957, 1963, 1974a, 1974b; Cox 1909; Fieldhouse 1966; Galloway 1982; Gibson 1989; John 1975, 1985; Surrey 1916; Swagerty 1984; Usner 1987; Wade 1989), and only the broad outlines are presented below in the interest of summarizing the varying European objectives as they impacted the Caddo.

The Spanish were determined to achieve political and religious hegemony over the Caddo in East Texas. Their purpose was "to convert him, to civilize him, and to exploit him" (Bolton 1917:45), and a system of missions and presidios (forts to protect missionaries and converts) was established in what is now East Texas and western Louisiana between 1691 and 1721 (Habig 1984). The missions were dependent upon the frontier political situation for government support as well as upon their presumed success in converting the Caddoan peoples in the vicinity to Christianity. They were set up in such a way that it was necessary to try to induce the Caddoan peoples in proximity to the Spanish missions; to have them participate in the religious, social, and economic activities devised by the missionaries (Espinosa 1716); and to try to create a supporting peasantry and feudal system (Hudson 1981:167-168). Periodic inspections of the missions in East Texas (Buckley 1911; Kress and Hatcher 1932; Murphy 1937) lamented not only the lack of success in converting the Hasinai Caddo (except at death), but also the poor economic and military support at these settlements, which were located at great distances from the Spanish supply centers on the Rio Grande and in Coahuila. As a result, the Spanish missions lasted only a short time among the Hasinai and East Texas tribes (1690 to 1693 and 1716 to 1772). The Caddoan peoples were able to acquire trade goods and supplies from French traders, and they failed to develop the desired material dependence upon Spanish missionaries, who were not in a position to foster trade relationships with them (Perttula 1992:34-35). The religious message of the Spanish missionaries was equally inefficient, linked as it was to episodic epidemics among the Caddo after ca. 1687 and the Caddoan belief that the Spanish were the cause of those epidemics (Ewers 1973; Leutenegger 1979).

French objectives in the Louisiana colony were firmly based on developing a mercantilistic trade policy whereby New World goods were produced at lower cost and/or for higher profit than they could be in France and were then sent to France for sale (Eccles 1973). In addition to the fur trade, wood, cotton, rice, and indigo were major goods produced in French Louisiana in the 18th century (Surrey 1916). Involvement in the fur trade was particularly lucrative for the French prior to the stabilization of the French Louisiana economy around other exportable goods (Surrey 1916). For all intents and purposes, the French colonial policy can be described as monopolistic but accommodative, often approaching a symbiosis between French colonists and Native Americans. The French wished to exclusively control the economic exchange and trade with the Indians but were willing to accommodate short-term relationships with some of the Indian groups that were not as profitable as the long-term ones. This accommodative attitude arose not only from the logistical difficulties of carrying out trade ventures in virtually unknown regions of their territory with poor means of supply , but also from their reliance on the aboriginal community for critical food items that they could not produce themselves. This requirement was never overcome completely during the French control of the Louisiana colony.

The British played a late, albeit marginal, role in the Spanish Borderlands West inasmuch as their trade activities were concentrated mainly to the east of the Mississippi River (Woods 1980). By the time of the cessation of French Louisiana to Spanish control in 1767, the British trade network extended from the Atlantic Coast to the Mississippi River, and efforts were underway to penetrate Louisiana and the Gulf Coast of the Texas province (Stevens 1916). British objectives, like those of the French, were to take advantage of opportunities to garner a profit in the Indian trade (Hudson 1981:168; Nash 1972; White 1983). Throughout the 1770s and 1780s, English traders were reported to have been living among the East Texas Caddoan tribes, even at Natchitoches, and Indian groups were also visiting the British supplies and trading houses to purchase goods directly (Bolton 1914).

From the 1790s, containment of the expanding US east of the Mississippi River dominated Spain's concerns in its Texas and Louisiana colonies, and the allegiance of the various Indian nations of the Provincias Internas, such as the Caddo, Wichita, and Comanche, was perceived by the Spanish government as a critical factor in controlling the frontier. The 1790s were a period of growth in the American fur trade, and another major growth period in the industry occurred from 1800 to 1808 (Clayton 1967). Beaver was the primary fur resource in the trade from 1790 to 1820. The Kadohadacho and Hasinai participated in the trade from the outset, and their contributions to the fur trade were considered important parts of the Spanish and Louisiana economies (Ewers 1969:47-48; Flores 1984; Peake 1954:17-18). Following the purchase of the Louisiana Territory in 1803, the US moved rapidly to explore the boundaries and character of its new territory, and the federal government emphasized the establishment of commercial and political relationships with resident aboriginal groups, including Caddoan tribes. The Freeman and Custis expedition of 1806 on the Red River followed specific guidelines regarding interaction with the Indians. This expedition was ultimately abandoned due to interference with the Spanish related to questions about the boundary between Spanish Texas and the Louisiana Territory. The US initiated a border war with Spain that resulted in the 1806 Neutral Ground Agreement. Possession of the Red River, as well as the territorial allegiance of the Kadohadacho, remained unresolved (Flores 1984:287).

As Spanish and American trading ventures evolved during the first 2 decades of the 19th century, the actual settlement of the Red River, its tributaries, and the neutral ground between Louisiana and Texas began in earnest (Strickland 1937; Haggard 1945). By 1818, nearly 3,000 settlers from the Midwest and upper South had squatted illegally in Caddo country along the south side of the Red River from the Great Bend to the Kiamichi River (Lottinville 1980:170-172). Anglo-American settlements increased up to and beyond the time of the Texas Revolution in 1836 (Strickland 1937:64-238). This settlement expansion was also accompanied by an influx of aboriginal groups from east of the Mississippi River and from the Arkansas River, including Choctaw, Cherokee, Delaware, Kickapoo, Quapaw, Shawnee, and Koasati groups (Anderson 1990; Everett 1990; Ewers 1969; Kniffen et al. 1987; Williams 1964). These groups exchanged hides, corn, pumpkins, and beans at the trading house in Nacogdoches (Swanton 1942:88) as well as with American government traders at the new agency house at the mouth of the Sulphur River. As the frontier moved west, Caddoan Indians in Louisiana became more isolated in the Anglo-American community and were under continual pressure from these settlers and from the immigrant Indians (Swanton 1942:88; Williams 1964). In Texas, settlement pressures did not impinge on Caddoan lands until after 1830 (Strickland 1937:318-355), though Stephen F. Austin viewed the aboriginal populations of Texas as a hindrance to the security of settlement (Barker 1925).

Following the death of the Caddo chief Dehahuit in 1833, American pressure in Louisiana on the new Caddo chiefs led to the ceding of Caddo homelands within the limits of the US on 1 July 1835 (Swanton 1942:89-92). The Caddo relinquished their lands for $80,000, agreed to move at their own expense within 1 year of the treaty date, and moved to Texas just prior to the establishment of the Republic of Texas in 1836. The term *Caddo Nation* came to be associated with the Cherokee as well as with the Hasinai, Anadarko, and other related tribes of East Texas, and the Indians became subject to the repressive measures of successive Republic of Texas administrations (Neighbors 1973, 1975). By the early 1840s, the Caddo Nation was composed of remnants of the Kadohadacho, Hasinai, and other once-independent Caddoan tribes, and it had been essentially pushed out of East Texas along with the other groups who had signed the Treaty of Peace and Friendship with the Republic of Texas in 1843 (Strickland 1937:355; Swanton 1942:97). In 1846, the Kadohadacho, Hasinai, and Anadarko lived together in a village of about 150 houses on the Brazos River near the present City of Waco, Texas; shortly thereafter, they moved near the Clear Fork of the Brazos to maintain their distance from Anglo-American frontier communities. From 1846 to 1854, the US government and the Texas legislature founded the Texas Indian Reservation on the Brazos River (Neighbors 1957, 1973), but this reservation lasted only until 1859 due to frictions among white settlers, Indian agents, and the agglomeration of tribal members. Accordingly, in August 1859, the Caddo Nation, then about 1,050 people in number, was removed to the Indian Territory and the Wichita agency in western Oklahoma. Since that time, the history of the Caddo peoples is largely similar to the overall history of the US.

3.7 HISTORIC EUROAMERICAN PERIOD (CA. A.D. 1519 TO PRESENT)

The first European incursion into what is now known as Texas was in 1519, when Álvarez de Pineda explored the northern shores of the Gulf of Mexico. In 1528, Cabeza de Vaca crossed South Texas after being shipwrecked along the Texas Coast near Galveston Bay. However, European settlement did not seriously disrupt native ways of life until after 1700. The first half of the 18th century was the period in which the fur trade and mission system, as well as the first effects of epidemic diseases, began to seriously disrupt the native culture and social systems. This process is clearly discernable at the Mitchell Ridge site, where burial data suggest population declines and group mergers (Ricklis 1994), as well as increased participation on the part of the Native American population in the fur trade. By the time that heavy settlement of Texas began in the early 1800s by Anglo-Americans, the indigenous Indian population was greatly diminished.

Settlement by EuroAmerican settlers in what would become Angelina County began before the Texas Revolution of 1836 (TSHA 2012). The first deed on record, dated May 10, 1801, conveyed 5.5 leagues of land to Vincente Micheli from Surdo, chief of the Bedias Indians, in exchange for a white shirt, 8 brass bracelets, a handful of vermilion, a fathom of ribbon, a gun, and 50 charges of powder and ball. The first Anglo settlers in the district were the Burris family, who in 1820 settled in the northern part of what is now Lufkin at a place then called Burris Prairie. Within a few years, other families came from Alto and Nacogdoches, and from other states, to settle along the rivers. Mexican authorities made land grants in the area in 1834 to 1835.

Settlement was still thin when Texas won its independence. Angelina County was organized on April 22, 1846, when Nacogdoches County was divided. The first permanent settler after the county was formed is thought to have been George W. Collins. The population increased quickly thereafter due to the good farming land and to the rivers, which made steamboat transportation possible. The population reached 1,165, 196 of whom were slaves, in 1850. The first county seat was Marion; successively, Jonesville became county seat in 1854, Homer in 1858, and Lufkin in 1892. Lufkin was favored by the route of the Houston, East and West Texas Railway (now the Southern Pacific), which had been built in 1882 from Houston to Shreveport.

Angelina County was settled predominantly by natives of the southern United States, some of them slaveowners who established plantations in their new Texas home. Large plantations were owned by the Stearns, Oates, Kalty, Stovall, and Ewing families. However, many Angelina County farmers were relatively poor men who owned no slaves. In 1847, slaves numbered 154 out of a total population of 834. In 1859, the number of slaves had grown to 427, and the total population was 4,271. Cotton culture, however, occupied only 2,048 acres of county land in 1858, a relatively small area for East Texas. Between 1850 and 1860, improved land in the county increased from about 3,000 to about 16,000 acres.

In 1861, Angelina County was the only county in East Texas, and one of only a handful of other Texas counties, to reject secession. This election result was startling when compared with that of Angelina County's neighbor to the immediate south, Tyler County, which supported secession by a 99% vote. Angelina County had also given the Constitutional Union party candidate, John Bell, a strong minority vote in the 1860 election. Two companies of county men were organized to fight in the Civil War, but they saw only limited action; only 19 Angelina County men lost their lives in the war, and no Union soldiers entered the county before 1866.

Before the war, a principal source of wealth in Angelina County was the raising of livestock, since most of the early settlers were not slaveholding planters able to concentrate on agriculture. After the war, livestock was largely supplanted by the lumber industry, and therefore the numbers of cattle did not increase proportionately with the population. Residents declined by 1870 to 3,985, but in 1880 they numbered 5,239. In 1890, the population was 6,306; in 1900, 13,481; and in 1910, 17,705, 2,435 of whom were black.

Economically, Angelina County improved greatly in the 1880s because of the arrival of the railroads. Exploitation of the county's pine and hardwood timber became possible, and lumber began quickly to return a bonanza. The construction in 1882 of the Houston, East and West Texas Railway was followed in a few years by the Kansas and Gulf Short Line, which later became the Cotton Belt. Other railroads of the county included the St. Louis and Southwestern, the Texas Southeastern, the Shreveport, Houston and Gulf, the Groveton, Lufkin and Northern, and the Texas and New Orleans, as well as many small tram lines for lumbering. Lufkin was the hub at which most of these rail lines met.

In 1880, county farmers cultivated only about 25,000 acres; landowners were waiting for the railroads so that they could develop their timber. The county had 10,000 cattle and twice as many hogs at this time. It was estimated that the county had 1.3 billion board feet of longleaf and a billion board feet of loblolly pine. After the railroads arrived, the foundation was laid for a way of life and an economy in Angelina County built upon timber and forest products. By 1900, there were at least 17 sawmills operating in the county, and the population, which had increased only from 4,271 to 5,239 in the period 1860 to 1880, more than doubled in the period 1880 to 1900, when it reached 13,481. It doubled again by 1930, when it was 27,803.

The World's Fair of 1893 gave a boost to the popularity of southern pine as a building material, and thus to the new economic base of Angelina County. The Angelina County Lumber Company, founded by Joseph H. Kurth, Sr., and others in 1887 at Keltys, along with the Southern Pine Lumber Company, founded at Diboll in 1893 by T.L.L. Temple, became giant industries as southern pine became the chief commercial wood used in America. In addition to the 2 large mills, about 15 other lumber companies were begun around the turn of the century in Angelina County. From a modest beginning in 1855, when Dr. W.W. Manning operated the first Angelina County sawmill and employed twelve men, to today, when the annual payroll of a single sawmill may be in the millions of dollars, Angelina County has built steadily on its timber resources. Property increased in value from $401,000 in 1870 to $732,282 in 1881, to $4,372,655 in 1903, and to $10,078,407 in 1913. The county also profited greatly from the development of a method for turning southern pine wood into paper. The Southland Paper Mill, established in 1939 near Lufkin, was the pioneer in the manufacture of newsprint from southern pine.

Lumber and other industries, such as foundry and the manufacture of oilfield equipment, made Lufkin the fifth largest industrial area in Texas by the mid-1980s. Such smaller towns in the county as Diboll, Huntington, Fuller Springs, Hudson, Zavalla, and Burke were maintained chiefly by the lumber industry. Still other towns, now defunct or severely depopulated, flourished around early sawmills until the timber was cut out: these included Homer, Baker, Clawson, Emporia, Hamlet, Lay, Popher, Yuno, Baber, Davisville, Renova, and Retrieve. Despite the many ghost towns, lumbering continued to form the economic backbone of Angelina County through the early part of the 20th century. However, after the lumber industry's 1913 peak in the area, Angelina County's potential as an agricultural center was much increased. Of 601,600 total acres in the county, 158,646 was in cultivation in 1916, when the county had 1,569 farms, as compared with 1,403 in 1900. In 1916, the agricultural census counted 18,877 cattle, 3,300 horses and mules, 32,266 hogs, 4,500 sheep and goats, and 50,000 chickens and turkeys. As timber production began to fall off due to wasteful harvesting practices, conservation and sustained maintenance of forest resources led to more stable town and population growth as well. By 1950, lumber-related industries were still the major employer for the county.

The Great Depression hit Angelina County quite hard. By 1933, more than 2,500 residents were on relief rolls—about 10% of the county's population. This was mainly because the timber industry in Texas was particularly vulnerable to the depression. The boom in housing and other businesses that depended on lumber ceased abruptly with the failure of banks and lending institutions and with unemployment. Many Angelina County lumber companies were forced to close or to decrease their activities sharply. and county inhabitants turned back to small farming and stock raising to feed themselves. The 1935 census numbered more than 18,000 cattle and 17,000 hogs. The Civilian Conservation Corps for East Texas was headquartered in Lufkin during the depression. It served 26 counties and 17 camps in efforts to bring about financial recovery.

Angelina County had a respectable total of both state highways (103 miles) and county roads (872 miles) by 1937, toward the end of the depression. It also had more farms (2,802) and more cattle (18,659) than 5 of the 8 counties that bound it. By 1944, Angelina County had 44 firms employing 400 persons, and the value of manufactured goods in 1945 was $25 million. Principal industries at that time were foundries, a creosoting plant, sawmills, and a $10 million newsprint mill, Southland Paper Mills. In 1954 and 1958, wholesale trade in Angelina County amounted to $37,114,000; the county topped a list of 10 East Texas counties. Angelina County was also at or near the top of these 10 counties in the 1950s and 1960s for retail trade, retail trade increases, service industries receipts, bank deposits, poll taxes, auto registrations, and chamber of commerce budgets.

4.0 RESEARCH OBJECTIVES AND METHODOLOGY

The archeological survey described in this report was undertaken with 3 primary research goals in mind:

1. To locate and record cultural resources occurring within the designated APE
2. To provide a preliminary assessment of the significance of these resources regarding their potential for inclusion in the National Register of Historic Places (NRHP)
3. To make recommendations for the treatment of these resources based on their NRHP assessments

The first of these goals was accomplished by means of a review of documentation on file at the Texas Historical Commission's (THC) online *Texas Archeological Sites Atlas* (Atlas), the National Park Service's (NPS) online *National Register Information System* (NRIS), the Texas State Historical Association's (TSHA) *Handbook of Texas Online*, as well as a program of intensive pedestrian survey. No cultural resources were documented within the APE as a result of the survey; as a result, the second and third goals were not brought into play. The rest of this chapter presents the results of archival research, the methodological background for the current investigations, and the specific survey methods used in the field.

4.1 ARCHIVAL RESEARCH

Prior to initiating fieldwork, Horizon personnel reviewed existing information on the THC's online Atlas (THC 2012) and the NPS's NRIS database (NPS 2012) for information on previously recorded archeological sites, cemeteries, and historic properties as well as previous cultural resources investigations conducted within a 1.6-km (1.0-mi) radius of the APE. Based on this archival research, 11 previously recorded archeological sites are present within a 1.6-km (1.0-mi) radius of the proposed project's APE (Table 3), and 7 previous cultural resources surveys have been conducted within 1.6 km (1.0 mi) of the APE (Table 4) (THC 2012; NPS 2012).

Eight of the 11 previously recorded archeological sites (41AG173, 41AG174, 41AG175, 41AG176, 41AG178, 41AG179, 41AG180, and 41AG181), comprise a series of aboriginal lithic and/or ceramic scatters extending along an unnamed tributary of Paper Mill Creek north of the proposed APE. Six of these 8 sites were recorded during a cultural resources survey

Table 3. Previously Recorded Cultural Sites within 1 Mile of the APE

Site No./Name	Site Type	NRHP/SAL Eligibility Status	Distance/Direction from APE	Potential to be Impacted by Project?
41AG6	*No information available*	Undetermined	0.8 miles south	No
41AG173	Aboriginal lithic scatter (undated prehistoric)	Ineligible	0.1 miles north	No
41AG174	Aboriginal lithic scatter (undated prehistoric)	Ineligible	0.4 miles north	No
41AG175	Aboriginal lithic scatter (undated prehistoric)	Ineligible	0.4 miles north	No
41AG176	Aboriginal lithic scatter (undated prehistoric)	Ineligible	0.5 miles north	No
41AG178	Aboriginal lithic scatter (Middle to Late Archaic)	Undetermined	0.3 miles north	No
41AG179	Aboriginal lithic artifact (undet4ermined prehistoric)	Undetermined	0.3 miles north	No
41AG180	Aboriginal lithic and ceramic scatter (Early Ceramic?)/19th-century farmstead	Unknown	0.1 miles north	No
41AG181	Aboriginal lithic and ceramic scatter (Early Ceramic?)/19th-century farmstead	Unknown	0.2 miles north	No
41AG203	Aboriginal lithic scatter (undated prehistoric)/ Early to mid-20th century domestic trash scatter	Ineligible	Within APE	Yes
41AG204	Aboriginal lithic scatter (undated prehistoric)/ Early to mid-20th century domestic trash scatter	Ineligible	0.2 miles south	No

APE	Area of Potential Effect	SAL	State Archeological Landmark
NRHP	National Register of Historic Places	USGS	United States Geological Survey

conducted in association with the proposed development of Kit McConnico Park in 2000 (Murin et al. 2000), and the remaining 2 sites were documented during a survey conducted for the proposed annexation of an adjacent tract to Kit McConnico Park in 2002 (Brownlow 2002). Of these 8 sites, 5 sites consisted of aboriginal lithic artifact scatters that could be dated only to a general prehistoric timeframe, though 3 sites contained temporally diagnostic artifacts indicating prehistoric occupations ranging from the Middle Archaic to Early Ceramic periods. Two of the sites also contained ephemeral scatters of historic-age domestic debris indicative of late 19th-century historic-age occupations, though no standing architectural structures were recorded.

Table 4. Previous Cultural Resource Surveys Conducted within 1 Mile of the APE

Survey Name	Acres Surveyed	Survey Date	No. Sites Recorded within 1 Mile of APE	Site Nos. Recorded within 1 Mile of APE	Reference
Lufkin Industrial Park Survey	148.7	2011	2	41AG203, 41AG204	Galan 2011
McConnico Park Survey	290.0	2000	6	41AG173, 41AG174, 41AG175, 41AG176, 41AG178, 41AG179	Murin et al. 2000
McConnico Park Annex Survey	17.0	2002	2	41AG180, 41AG181	Brownlow 2002
Lufkin Armed Forces Reserve Center Survey	Unknown	2008	0	N/A	Not Available
FM 842 Survey	Unknown	1990	0	N/A	Not Available
Unnamed Utility Survey	Unknown	1983	0	N/A	Not Available

APE Area of Potential Effect (of current project)
NRHP National Register of Historic Places
USGS United States Geological Survey

Four of the sites were recommended as ineligible for inclusion in the NRHP based on the lack of diagnostic artifacts and the disturbed character of the archeological deposits. The NRHP eligibility of 4 of the sites could not be fully assessed based on survey-level data and were recommended as being of unknown eligibility for inclusion in the NRHP. These 8 previously recorded sites are located north of the proposed APE and would have no potential to be affected by the proposed undertaking.

Two of the 11 previously recorded sites (41AG203 and 41AG204) consist of multiple-component sites containing ephemeral scatters of aboriginal lithic artifacts and early 20th-century domestic debris. These 2 sites were recorded during a cultural resources survey conducted for the proposed Lufkin Industrial Park in 2011, which covered large portions of the current APE (Galan 2011). Both sites consisted of ephemeral scatters of aboriginal lithic debitage and early 20th-century domestic debris likely associated with historic-age farmsteads. Site 41AG204 is located south of the proposed APE and would have no potential to be affected by the proposed undertaking. This site was recommended as ineligible for inclusion in the NRHP based on the shallow, disturbed, and ephemeral character of archeological deposits observed on the site.

Site 41AG203 was mapped on the crest of a ridge finger remnant located within the eastern portion of the current APE, and the mapped boundaries of the site fall entirely within the current APE. At the time it was recorded in 2011, the prehistoric component on the site consisted only of 3 petrified wood flakes and 1 petrified wood biface, though no temporally diagnostic aboriginal artifacts were observed. Abundant natural petrified wood nodules and broken chunks were observed on the site, suggesting that the aboriginal use of this locality was probably associated with procurement of raw materials for subsequent manufacture into chipped stone implements. The historic-age component consisted of 28 artifacts, including bottle glass shards, wire nails, whiteware ceramic sherds, and brick fragments, as well as the remains of a green-rock driveway, a cement pad (possibly the foundation of a former structure that was no longer present), and a crepe myrtle tree that may have been an ornamental tree. Shovel testing conducted on the site revealed only shallow, approximately 40-centimeter- (cm-) deep archeological deposits in sediments described as friable, disturbed, loose sand.

The 20th-century historic-age component on site 41AG203 was likely associated with 2 standing structures that are visible at this location on the 1950 and 1980 US Geological Survey (USGS) 7.5-minute Lufkin, Texas, topographic quadrangles (Figures 4 and 5). No earlier maps could be located, but the presence of these 2 structures on the 1950 maps indicates that the historic-age occupation of the site dates at least back to 1950. These 2 structures are no longer visible on the 2008 USGS 7.5-minute Lufkin, Texas, topographic quadrangle (see Figure 1), indicating that they were moved or demolished at some point between 1980 and 2008. No USGS topographic maps spanning the gap between 1980 and 2008 could be located. However, historic aerial imagery available on Google Earth shows at least 1 of these 2 structures was still standing in 2007 (Figure 6), though the structures had been removed and the site had been cleared of vegetation by 2009 (Figure 7) (USDA 2012). Thus, these structures had evidently been removed from site 41AG203 by 2009, 2 years prior to the Galan (2011) cultural resources survey.

Based on the lack of standing structures on site 41AG203, the shallow depth of archeological deposits associated with both the prehistoric and historic-age components, and the extensive prior disturbance observed on the site, site 41AG203 was recommended as ineligible for inclusion in the NRHP (Galan 2011).

Finally, no information was available on the THC's Atlas regarding site 41AG6. The only note included in the site file is that the location of this site was plotted based on a note on some old county maps marking a location where some pots were plowed up. It is unknown whether the pots in question were of historic or prehistoric origin or whether the location has been mapped accurately. Based on the lack of information about this site, it is considered to be of undetermined eligibility for inclusion in the NRHP.

Seven previous cultural resources surveys have been conducted within 1.6 km (1.0 mi) of the APE, though only 6 of these previous surveys are depicted on the THC's Atlas (Table 2) (THC 2012). One of these previous surveys, conducted for the proposed Lufkin Industrial Park in 2011, covered large portions of the current APE and also extended farther to the south (Galan 2011). The 2011 survey was an intensive cultural resources survey that included systematic pedestrian walkover with shovel testing and a geoarcheological assessment that included backhoe trenching. The remaining 6 surveys did not cover any portion of the current APE. The single known archeological site that is located within the current APE, 41AG203, was recorded during the 2011 survey, though no other cultural resources were observed within the current APE during this prior survey. At the time of the 2011 survey, the area incorporated within the current APE had been cleared of vegetation and a relatively extensive degree of ground disturbance was noted.

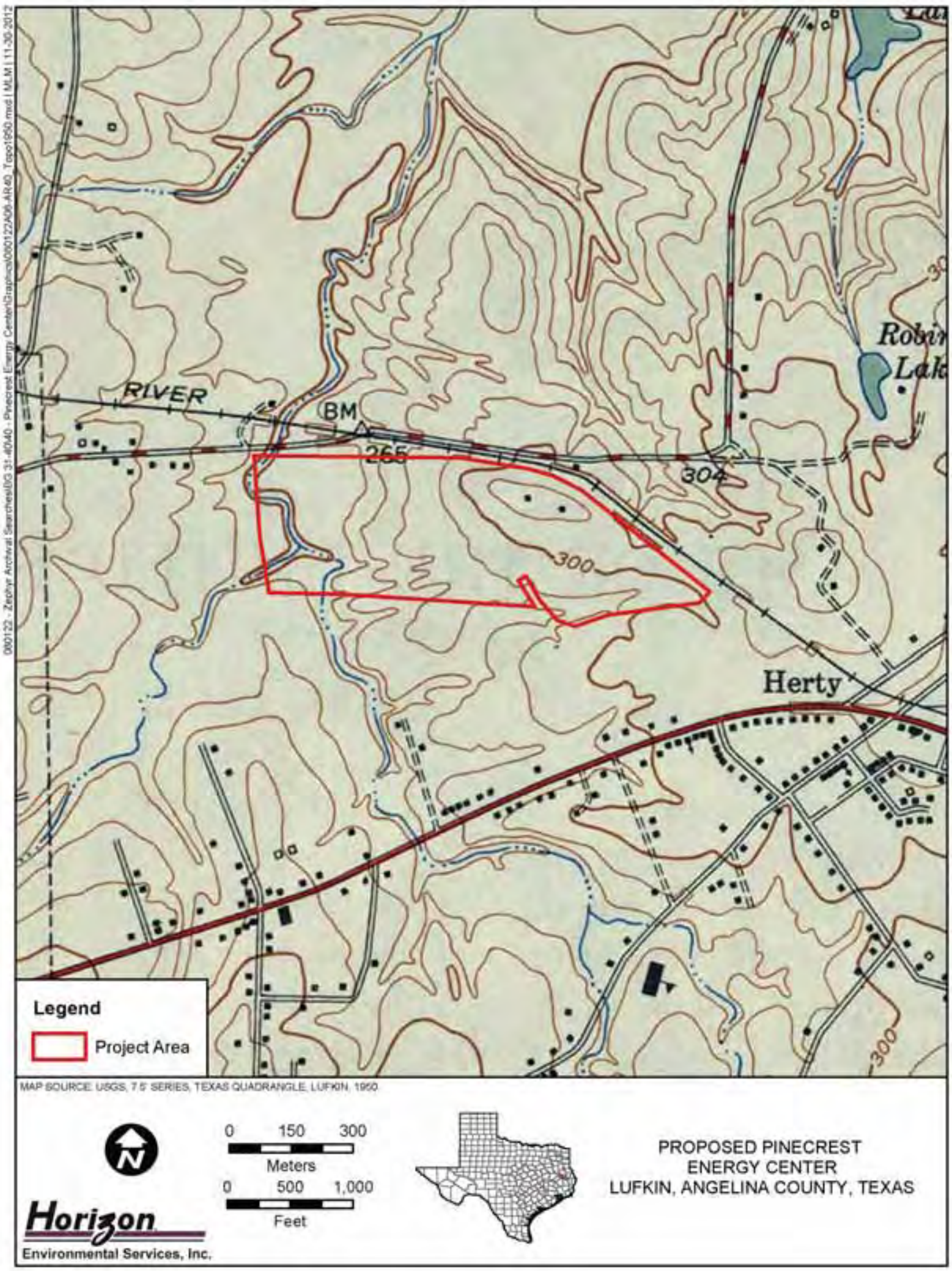

Figure 4. Location of APE on USGS Topographic Quadrangle (1950)

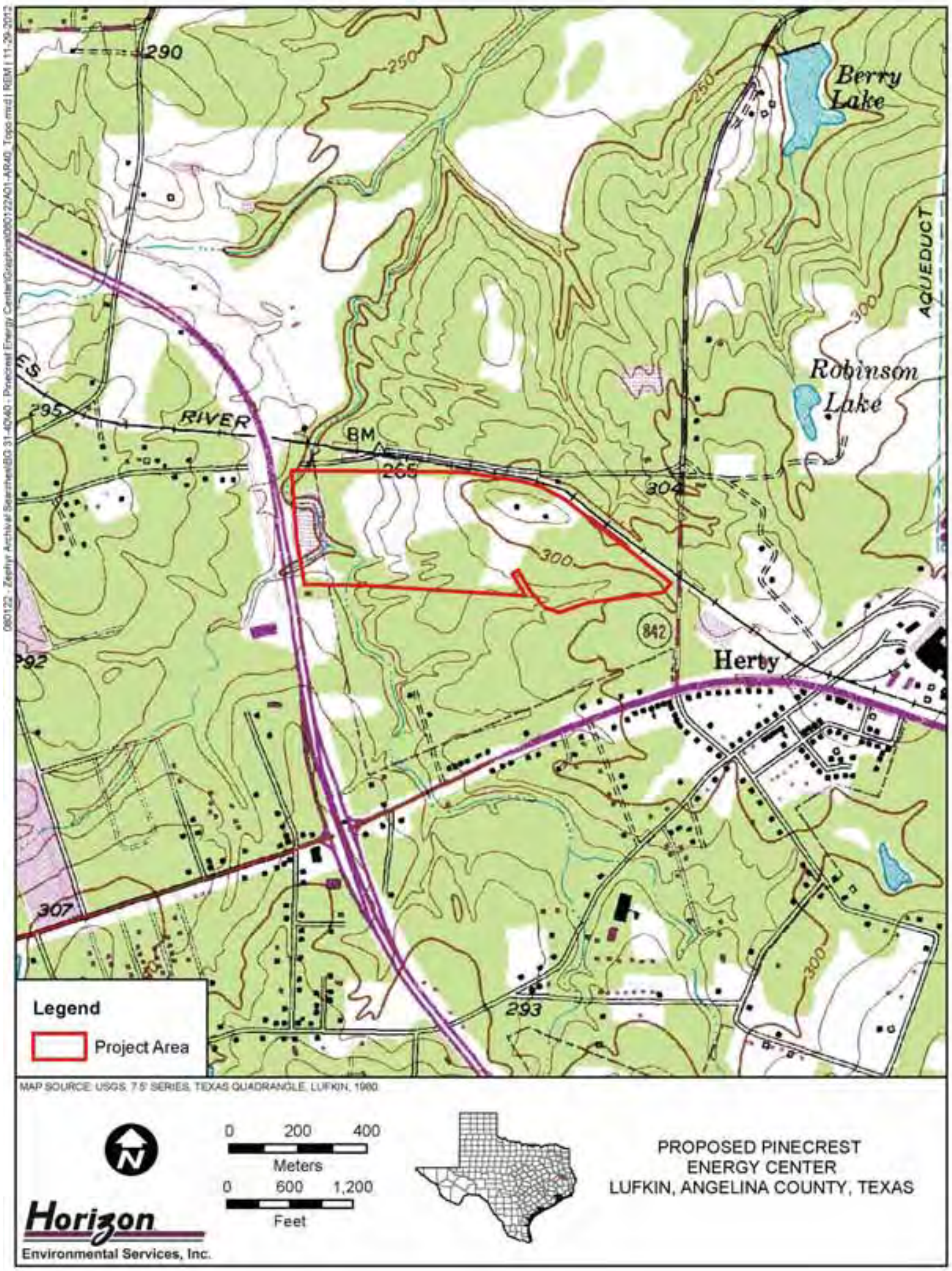

Figure 5. Location of APE on USGS Topographic Quadrangle (1980)

Figure 6. Location of APE on Google Earth Aerial Photograph (2007)

Figure 7. Location of APE on Google Earth Aerial Photograph (2009)

4.2 SURVEY METHODS

On November 28 and 29, 2012, Horizon archeologist Jared Wiersema, under the overall direction of Jeffrey D. Owens, Principal Investigator, performed an intensive cultural resources survey of the APE to locate any cultural resource properties that potentially would be impacted by the proposed undertaking. The APE consists of an approximately 31-ha (77-ac) tract that represents the location of the proposed Pinecrest Energy Center.

Horizon's archeologist traversed the 31-ha (77-ac) APE and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. Visibility was excellent (generally 100%) across the entire APE. The entire APE had been previously devegetated and graded, and various degrees of ground-disturbance characterized the entire APE. In the western portion of the APE, an unnamed tributary of Paper Mill Creek flows south to north just inside the western boundary of the APE (see Figure 1). This stream had been channelized and contoured (Figures 8 and 9). A network of access roads criss-crosses the western portion of the APE, and a large detention pond and storm drain had been constructed in the area (Figures 10 to 13). The central and eastern portions of APE had been previously devegetated and graded, though prior construction-related impacts in these portions of the APE had been somewhat less extensive than in the western portion, and a sparse scatter of short, weedy grasses and shrubs had grown up in these areas (Figures 14 and 15). Signs of extensive erosion via overland sheet flow and gullying were observed throughout the APE (Figure 16). The mapped location of site 41AG203, which represented the remains of a 20th-century farmstead and a sparse scatter of aboriginal lithic debris located atop a low ridge finger remnant in the eastern portion of the APE, was inspected for evidence of any extant cultural resources. The mapped location of this site had been previously devegetated and graded, and the few remaining extant cultural features noted in 2011 when this site was recorded (Galan 2011), including a green-rock driveway, a cement pad (possibly the foundation of a former structure that is no longer present), a crepe myrtle tree, and a low-density scatter of domestic artifacts, are no longer present on the site (Figure 17). Overall, the central and eastern portions of the APE had been slightly less extensively disturbed (10 to 25% intact), whereas the western portion of the APE is effectively 100% disturbed.

Horizon's archeologist traversed the 31-ha (77-ac) APE on foot in parallel transects spaced no more than 30 m (100 ft) apart and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. In addition to pedestrian walkover, the Texas State Minimum Archeological Survey Standards (TSMASS) for cultural resource surveys state that, for block-area projects, a minimum of 1 subsurface probe (i.e., shovel tests, auger tests, backhoe trenches) are required per 2 acres for projects the size of the current project's APE unless field conditions warrant excavation of more probes (e.g., due to the presence of culturally sensitive areas) or less probes (e.g., due to extensive prior disturbances or cultural low-probability areas). In the event that a prove yields evidence of subsurface cultural deposits, additional probes may be necessary to determine the horizontal and vertical extent of the subsurface deposits associated with the cultural resource. Thus, a minimum of 39 subsurface probes would be required within the proposed project's 31-ha (77-ac) APE. Horizon excavated a total of 39 shovel tests in the APE, thereby meeting the TSMASS requirements for a project

Figure 8. Tributary and Culvert under US 69 in Western Portion of APE (Facing NW)

Figure 9. Channelized Tributary in Western Portion of APE (Facing N)

Figure 10. Access Road and Detention Pond in Western Portion of APE (Facing SW)

Figure 11. Detention Pond in Western Portion of APE (Facing SW)

Figure 12. Access Road, Storm Water Drain, and Detention Pond under Construction in Western Portion of APE (Facing S)

Figure 13. Detention Pond and Storm Drain/Culvert in Western Portion of APE (Facing NE)

Figure 14. North-Central Portion of APE (Facing NE)

Figure 15. South-Central Portion of APE (Facing N)

Figure 16. Typical View of Erosional Gullies in APE (Facing SW)

Figure 17. View of Former Location of Site 41AG203 (Facing N)

area of this size (Figure 18). In general, shovel tests measured approximately 30 cm (12 in) in diameter and were excavated to a target depth of 1.0 m (3.3 ft) below ground surface, to the top of pre-Holocene deposits, or to the maximum depth practicable, and all sediments were screened through 6.35-millimeter (mm) (0.25-in) hardware cloth. In practice, many shovel tests were terminated at depths of less than 1.0 m (3.3 ft) below surface due to the presence of pre-Holocene sediments composed of dense clays and/or the presence of mottled subsurface sediments that had clearly been disturbed via prior earth-moving activities in the APE. Several shovel tests reached the target depth of 1.0 m (3.3 ft) below surface, though most subsurface sediments within the APE had clearly been disturbed. The Universal Transverse Mercator (UTM) coordinates of all shovel tests were determined using hand-held Garmin ForeTrex Global Positioning System (GPS) devices based on the North American Datum of 1983 (NAD 83). Specific shovel test data are summarized in Appendix A.

The TSMASS also require backhoe trenching in stream terraces and other areas with the potential to contain buried cultural materials at depths below those that shovel tests are capable of reaching. While many portions of the APE revealed dense, pre-cultural deposits of dense clays and/or mottled, disturbed clayey subsoil, some portions of the APE were characterized by deep sand deposits that extended below the maximum reach of shovel tests (approximately 1.0 m [3.3 ft]) below surface. For the most part, shovel tests were capable of penetrating Holocene-age sediments with the potential to contain subsurface cultural resources. While no backhoe trenches were excavated during the current survey, 3 of the 6 backhoe trenches excavated by Galan (2011) during a prior cultural resources survey conducted for the proposed Lufkin Industrial Park fell within the boundaries of the current APE. These 3 tranches were excavated on the terraces of the unnamed tributary of Paper Mill Creek in the western portion of the current project's APE, and no evidence of deeply buried cultural resources or intact, buried strata likely to contain cultural resources were observed during these prior backhoe trenching operations. The only cultural resources observed during the prior survey within the current APE (Galan 2011) were associated with site 41AG203, which yielded evidence of only shallow, approximately 40-cm-deep archeological deposits in disturbed, sandy sediments. Given that backhoe trenching has been conducted within the current APE during a recent cultural resources survey (Galan 2011), taken together with the extreme disturbance observed in the proposed project APE resulting from prior earth-moving activities, shovel testing was considered to represent an adequate survey technique for identifying cultural resources within the APE, and no backhoe trenching was conducted.

During the survey, field notes were maintained on terrain, vegetation, soils, landforms, survey methods, and shovel test results. Digital photographs were taken, and a photographic log was maintained. Horizon employed a non-collection policy for cultural resources. Diagnostic artifacts (e.g., projectile points, ceramics, historic materials with maker's marks) and non-diagnostic artifacts (e.g., lithic debitage, burned rock, historic glass, and metal scrap) were to be described, sketched, and/or photo-documented in the field and replaced in the same location in which they were found. As no cultural resources were observed during the survey, the collections policy was not brought into play.

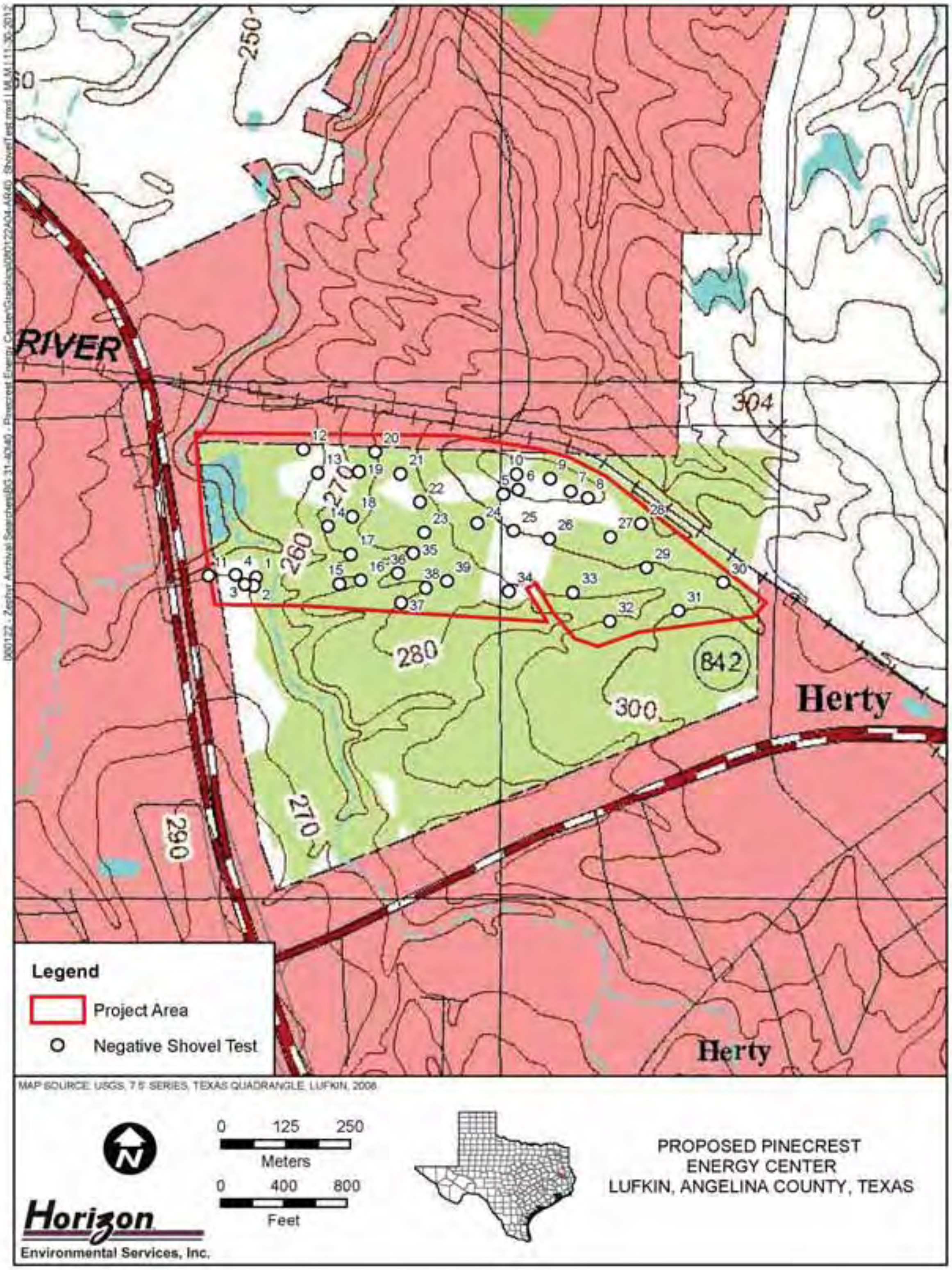

Figure 18. Locations of Shovel Tests Excavated in APE

The survey methods employed during the survey represented a "reasonable and good-faith effort" to locate significant archeological sites within the APE as defined in 36 Code of Federal Regulations (CFR) 800.3.

5.0 RESULTS OF INVESTIGATIONS

Horizon was selected by Zephyr, on behalf of PEC, to conduct an intensive cultural resources inventory and assessment of the proposed location of the Pinecrest Energy Center in Lufkin, Angelina County, Texas. The proposed site of the Pinecrest Energy Center is located in northeastern Lufkin and would be bordered on the north by the Angelina and Neches River Railroad tracks, on the west by US 69, on the east by FM 842, and on the south by the northern end of Commerce Center. The APE of the proposed undertaking covers an area of approximately 31 (ha) (77 ac).

As the proposed upgrades would require a PSD permit issued by the US EPA, the undertaking falls under the regulations of Section 106 of the NHPA of 1966, as amended, which is invoked when federal funds are utilized or when federal permitting is required for a proposed project. The NHPA states that the ACHP and the THC, which serves as the SHPO for the state of Texas, must be afforded the opportunity to comment when any cultural resources potentially eligible for inclusion in the NRHP are present in a project area affected by federal agency actions or covered under federal permits or funding.

On November 28 and 29, 2012, Horizon archeologist Jared Wiersema, under the overall direction of Jeffrey D. Owens, Principal Investigator, performed an intensive cultural resources survey of the APE to locate any cultural resource properties that potentially would be impacted by the proposed undertaking. Horizon's archeologist traversed the 31-ha (77-ac) APE and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. Visibility was excellent (generally 100%) across the entire APE. The entire APE had been previously devegetated and graded, and various degrees of ground-disturbance, ranging from moderate to extensive, characterized the entire APE. Horizon excavated a total of 39 shovel tests in the 31-ha (77-ac) APE, thereby meeting the Texas TSMASS requirements for a project area of this size.

The vast majority of the APE had been surveyed for cultural resources in 2011, and 1 archeological site (41AG203), which represented the remains of a 20th-century farmstead and an ephemeral, undated aboriginal lithic artifact scatter found on the modern ground surface and in shallow subsurface contexts, was recorded in the eastern portion of the current APE during the prior survey (Galan 2011). This site had been determined to be ineligible for inclusion in the NRHP based on the lack of architectural structures associated with the historic-age debris scatter, the shallow archeological deposits, and the disturbed character of sediments containing both the historic-age and prehistoric artifact scatters. The location of this previously recorded site was inspected during the current survey, but this location had been cleared for construction subsequent to the 2011 survey, and no extant cultural resources associated with this site were observed. A relatively high density of naturally occurring petrified wood nodules and broken chunks were observed on the modern ground surface of the APE during the survey, but no specimens exhibiting any signs of cultural modification were observed.

No cultural resources, historic or prehistoric, were identified within the APE as a result of the survey.

6.0 SUMMARY AND RECOMMENDATIONS

6.1 Conceptual Framework

The archeological investigations documented in this report were undertaken with 3 primary management goals in mind:

- Locate all historic and prehistoric archeological resources that occur within the designated survey area.
- Evaluate the significance of these resources regarding their potential for inclusion in the NRHP.
- Formulate recommendations for the treatment of these resources based on their NRHP evaluations.

At the survey level of investigation, the principal research objective is to inventory the cultural resources within the APE and to make preliminary determinations of whether or not the resources meet one or more of the pre-defined eligibility criteria set forth in the state and/or federal codes, as appropriate. Usually, management decisions regarding archeological properties are a function of the potential importance of the sites in addressing defined research needs, though historic-age sites may also be evaluated in terms of their association with important historic events and/or personages. Under the NHPA and the Antiquities Code of Texas, archeological resources are evaluated according to criteria established to determine the significance of archeological resources for inclusion in the NRHP and for designation as SALs, respectively.

Analyses of the limited data obtained at the survey level are rarely sufficient to contribute in a meaningful manner to defined research issues. The objective is rather to determine which archeological sites could be most profitably investigated further in pursuance of regional, methodological, or theoretical research questions. Therefore, adequate information on site function, context, and chronological placement from archeological and, if appropriate, historical perspectives is essential for archeological evaluations. Because research questions vary as a function of geography and temporal period, determination of the site context and chronological placement of cultural properties is a particularly important objective during the inventory process.

6.2 ELIGIBILITY CRITERIA FOR INCLUSION IN THE NATIONAL REGISTER OF HISTORIC PLACES

Determinations of eligibility for inclusion in the NRHP are based on the criteria presented in the Code of Federal Regulations (CFR) in 36 CFR §60.4(a-d). The 4 criteria of eligibility are applied following the identification of relevant historical themes and related research questions:

> The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> a. [T]hat are associated with events that have made a significant contribution to the broad patterns of our history; or,
>
> b. [T]hat are associated with the lives of persons significant in our past; or,
>
> c. [T]hat embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or,
>
> d. [T]hat have yielded, or may be likely to yield, information important in prehistory or history.

The first step in the evaluation process is to define the significance of the property by identifying the particular aspect of history or prehistory to be addressed and the reasons why information on that topic is important. The second step is to define the kinds of evidence or the data requirements that the property must exhibit to provide significant information. These data requirements in turn indicate the kind of integrity that the site must possess to be significant. This concept of integrity relates both to the contextual integrity of such entities as structures, districts, or archeological deposits and to the applicability of the potential database to pertinent research questions. Without such integrity, the significance of a resource is very limited.

For an archeological resource to be eligible for inclusion in the NRHP, it must meet legal standards of eligibility that are determined by 3 requirements: (1) properties must possess significance, (2) the significance must satisfy at least 1 of the 4 criteria for eligibility listed above, and (3) significance should be derived from an understanding of historic context. As discussed here, historic context refers to the organization of information concerning prehistory and history according to various periods of development in various times and at various places. Thus, the significance of a property can best be understood through knowledge of historic development and the relationship of the resource to other, similar properties within a particular period of development. Most prehistoric sites are usually only eligible for inclusion in the NRHP under Criterion D, which considers their potential to contribute data important to an understanding of prehistory. All 4 criteria employed for determining NRHP eligibility potentially can be brought to bear for historic sites.

6.3 SUMMARY OF INVENTORY RESULTS

Horizon archeologists performed an intensive cultural resources survey of the APE to locate any cultural resource properties that potentially would be impacted by the proposed undertaking. The APE was traversed by Horizon's archeologists, the modern ground surface was thoroughly inspected for cultural resources, and a total of 39 shovel tests were excavated within the APE. The TSMASS requirements were met for a project area of this size.

The vast majority of the APE had been surveyed for cultural resources in 2011, and 1 archeological site (41AG203), which represented the remains of a 20th-century farmstead and an ephemeral, undated aboriginal lithic artifact scatter found on the modern ground surface and in shallow subsurface contexts, was recorded in the eastern portion of the current APE during the prior survey (Galan 2011). This site had been determined to be ineligible for inclusion in the NRHP based on the lack of architectural structures associated with the historic-age debris scatter, the shallow archeological deposits, and the disturbed character of sediments containing both the historic-age and prehistoric artifact scatters. The location of this previously recorded site was inspected during the current survey, but this location had been cleared for construction subsequent to the 2011 survey, and no extant cultural resources associated with this site were observed. A relatively high density of naturally occurring petrified wood nodules and broken chunks were observed on the modern ground surface of the APE during the survey, but no specimens exhibiting any signs of cultural modification were observed.

6.4 MANAGEMENT RECOMMENDATIONS

No cultural resources, historic or prehistoric, were identified within the APE as a result of the survey. Based on the results of the survey-level investigations documented in this report, no potentially significant cultural resources would be affected by the proposed undertaking. In accordance with 36 CFR 800.4, Horizon has made a reasonable and good faith effort to identify archeological historic properties within the APE. No archeological resources were identified that meet the criteria for inclusion in the NRHP according to 36 CFR 60.4, and no further archeological work is recommended in connection with the proposed undertaking. However, in the unlikely event that any human remains or burial accoutrements are inadvertently discovered at any point during construction, use, or ongoing maintenance in the APE, even in previously surveyed areas, all work should cease immediately and the THC should be notified of the discovery.

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APPENDIX A:

Shovel Test Data

Table A-1. Shovel Test Summary Data

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JW-1	338512	3470639	0-30	Yellowish-brown sand	None
			30+	Yellowish brown sandy clay	
JW-2	338507	3470623	0-10	Very compact grayish-brown sandy clay	None
JW-3	338490	3470625	0-20+	Mottled grayish-brown sandy clay	None
JW-4	338472	3470644	0-50	Yellowish-brown sandy loam	None
			50+	Yellowish-brown sandy clay	
JW-5	338990	3470800	0-40	Pale brown sand	None
			40+	Reddish-brown sandy clay	
JW-6	339019	3470809	0-40	Reddish-brown sandy loam	None
			40-100	Pale brown sand	
JW-7	339120	3470806	0-20	Pale reddish-brown sandy clay loam	None
			20+	Pale reddish-brown sandy clay	
JW-8	339153	3470793	0-45+	Mottled red and pale brown sandy clay	None
JW-9	339080	3470830	0-10	Pale brown sand	None
			10-30	Reddish-brown sandy clay	
			30+	Very compact reddish-brown sandy clay	
JW-10	339016	3470839	0-50	Reddish-brown sandy loam	None
			50+	Reddish-brown sandy clay	
JW-11	338420	3470642	0-20	Mottled red and pale brown sandy clay	None
JW-12	338603	3470887	0-30	Mottled red and brown clay loam	None
			30+	Mottled dark brown clay	
JW-13	338631	3470841	0-30	Mottled red and brown clay loam	None
			30+	Mottled dark brown clay	
JW-14	338651	3470738	0-20	Pale brown sand	None
			20+	Very dark brown clay	
JW-15	338673	3470626	0-20	Pale brown sand	None
			20+	Very dark brown clay	
JW-16	338714	3470633	0-20	Reddish-brown clay	None
JW-17	338695	3470684	0-20	Reddish-brown clay	None
JW-18	338698	3470757	0-20	Reddish-brown clay	None
JW-19	338711	3470844	0-20	Mottled red and brown clay	None
JW-20	338742	3470882	0-100	Pale brown sand	None

Table A-1. Shovel Test Summary Data

ST No.	UTM Coordinates[1] Easting	Northing	Depth (cmbs)	Soils	Artifacts
JW-21	338791	3470840	0-70	Pale brown sand	None
			70-100	Yellowish-brown sand	
JW-22	338829	3470785	0-20	Dense reddish-brown clay	None
JW-23	338837	3470726	0-60	Pale brown sand	None
			60+	Yellowish-brown sandy clay	
JW-24	338939	3470744	0-20+	Grayish-brown silty clay	None
JW-25	339009	3470729	0-40	Pale brown sand	None
			40-100	Yellowish-brown sandy clay	
JW-26	339079	3470714	0-15	Pale brown sand	None
			15+	Yellowish-brown clay	
JW-27	339197	3470717	0-10	Pale brown sand	None
			10+	Mottled red and brown clay	
JW-28	339256	3470743	0-40	Pale brown sand	None
			40+	Yellowish-brown sandy clay	
JW-29	339267	3470658	0-30	Brown sandy loam	None
			30+	Reddish-brown sandy clay	
JW-30	339415	3470629	0-30	Mottled red and gray sandy clay	None
JW-31	339329	3470574	0-20	Grayish-brown sandy loam	None
			20-40	Reddish-brown sandy loam	
			40+	Reddish-brown sandy clay	
JW-32	339196	3470554	0-5	Grayish-brown sandy loam	None
			5-20+	Reddish-brown clay	
JW-33	339125	3470610	0-25	Mottled gray/reddish brown clay	None
JW-34	339000	3470612	0-20	Grayish-brown sandy clay	None
JW-35	338816	3470686	0-40	Grayish-brown sandy loam	None
			40+	Grayish-brown/red clay	
JW-36	338786	3470647	0-100	Brown sandy loam	None
JW-37	338792	3470590	0-100	Brown sandy loam	None
JW-38	338840	3470619	0-40	Brown sandy loam	None
			40+	Mottled red and brown sandy clay	
JW-39	338881	3470632	0-50	Brown sandy loam	None
			50+	Mottled red and brown sandy clay	

[1] All UTM coordinates are located in Zone 15 and utilize the North American Datum of 1983 (NAD 83)

APPENDIX B:

Curriculum Vitae of Principal Investigator

Horizon Environmental Services, Inc.

Jeffrey D. Owens, M.A., R.P.A.

Archeological Principal Investigator/Project Manager

EXPERTISE

- Prehistoric Archeology
- Historic Archeology

RESEARCH AREAS

- Eastern North America (esp. Midwest, Southeast)
- Great Plains
- American Southwest

AREAS OF EXPERTISE

- Project Management
- Archival and Historical Research
- Archeological Survey, Testing, and Data Recovery
- National Register of Historic Places (NRHP) Evaluations
- Section 106 of the National Historic Preservation Act (NHPA)
- Antiquities Code of Texas (ACT)
- Native American Graves Protection and Repatriation Act (NAGPRA)
- Lithic and Ceramic Analysis
- Technical Writing and Editing
- Quality Assurance/ Quality Control

EDUCATION

- A.B.D., Anthropology, Southern Methodist University, 1997
- M.A., Anthropology, New York University, 1995
- B.A., Anthropology, New York University, 1991

Mr. Owens is an accomplished cultural resources professional with more than 23 years of experience in archeological fieldwork, research and analysis, and cultural resources management (CRM). He is an adept principal investigator and project manager, proficient at managing suites of turnkey, fast-turnaround projects as well as long-term, multidisciplinary research projects. He is fully versed in historic and environmental preservation laws, assessing the National Register of Historic Places (NRHP) eligibility of cultural resources, and developing management plans for historic properties that ensure compliance with applicable federal, state, and local laws while ensuring projects meet construction schedules and adhere to budgetary constraints.

Mr. Owens has planned, implemented, and successfully completed cultural resources survey, testing, and data recovery projects in Arizona, Arkansas, Illinois, Louisiana, Mississippi, Missouri, New Jersey, New Mexico, New York, Oklahoma, Pennsylvania, and Texas. He has completed hundreds of projects for a broad range of clients in the public and private sectors, including oil and gas exploration, development, and transportation; ethanol and petrochemical production; coastal and inland residential, commercial, and industrial land development; solid waste landfills; dredging activities; municipal planning; reservoir development; coastal port and channel improvements; transportation infrastructure; water and wastewater transportation and treatment; electricity generation and transportation; military reservations; and university research.

Mr. Owens also regularly contributes cultural resources oversight to the preparation of environmental regulatory documents, including Environmental Assessments (EA), Environmental Impact Statements (EIS), Biological Assessments (BA), and Categorical Exclusions (CE) for National Environmental Policy Act (NEPA) compliance projects.

Mr. Owens' project management style incorporates innovative leadership skills, resourcefulness, versatility, swift adaptability, and attention to the bottom line. His success is due in part to his thorough familiarity with federal, state, and local historic preservation laws and long-standing personal relationships with regulatory agency reviewers.

CERTIFICATIONS/QUALIFICATIONS

- Meets all Secretary of the Interior's standards for performing cultural resources investigations
- Permittable to perform cultural resource investigations on federal and state projects
- Listed on qualified cultural resource consultant lists in numerous states
- Pre-certified by TxDOT for Service 2.10.1 (Archeological Surveys, Documentation, Excavations, Testing, Reports, and Data Recovery Plans) and Service 2.11.1 (Historical and Archival Research)

PROFESSIONAL AFFILIATIONS

- Register of Professional Archaeologists (RPA)
- Council of Texas Archeologists (CTA)
- Texas Archeological Society (TAS)

PROFESSIONAL EXPERIENCE

Archaeological Principal Investigator/Project Manager Jan 2005 Present
Horizon Environmental Services, Inc.
1507 South IH-35
Austin, Texas 78741
(512) 328-2430

Project Archaeologist/Managing Editor Mar 2002 – Jan 2005
TRC Environmental Corporation
505 East Huntland Drive, Suite 250
Austin, Texas 78752
(512) 454-8716

Senior Editor Oct 1999 – Aug 2001
Consulting Partners (now part of Beeline Learning Solutions)
14911 Quorum Drive, Suite 120
Dallas, Texas 75254
(972) 813-0465

Project Archaeologist Aug 1997 – Oct 1999
Geo-Marine, Inc.
2201 K Avenue, Suite A2
Plano, Texas 75074
(972) 423-5480

Departmental/Teaching Assistant Sep 1995 – Jun 1997
Southern Methodist University
Department of Anthropology
3225 Daniel Avenue, Room 208
Dallas, Texas 75205
(214) 768-2684

Project Archaeologist Oct 1994 – Sep 1995
Soil Systems, Inc. (now part of PaleoWest)
1121 North 2nd Street
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(602) 261-7253

Archeological Field Technician Jun 1994 – Oct 1994
John Milner Associates, Inc. Nov 1993 – Dec 1993
535 North Church Street
West Chester, Pennsylvania 19380
(610) 436-9000

Departmental Assistant Aug 1991 – Jun 1994
New York University
Department of Anthropology
25 Waverly Place, Rufus D. Smith Hall
New York, New York 10003
(212) 998-8550

Field Technician Dec 1993
Institute for Long Island Archaeology
State University of New York – Stonybrook
Department of Anthropology
Circle Road, Social & Behavioral Sciences Buildings, 5th Floor
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(631) 632-7620

Crew Chief Sep 1993 – Nov 1993
Greenhouse Consultants, Inc.
32 Park Place
Newark, New Jersey 07102
(973) 623-9091

Research Associate May 1993 – Sep 1993
AquaTerra Environmental Services Corporation
(now AquaTerra Environmental Solutions, Inc.)
[New York office no longer in business]
New York, New York

Crew Chief Jun 1992 – Jul 1992
New York University Jun 1990 – Jul 1990
Department of Anthropology
25 Waverly Place, Rufus D. Smith Hall
New York, New York 10003
(212) 998-8550

Archaeological Consultant Nov 1991 – Dec 1991
TAMS Consultants, Inc.
300 Broadacres Drive
Bloomfield, New Jersey 07003
(973) 338-6680

TECHNICAL PUBLICATIONS

n.d. *Intensive Cultural Resources Survey of the Proposed 77-Acre Pinecrest Energy Center Tract, Lufkin, Angelina County, Texas. Addendum—Linear Facilities*. HJN 080122.40 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the County Road 60 Realignment Project, San Patricio, San Patricio County, Texas*. HJN 140028 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of a Proposed 121.0-Acre Beaumont Polyethylene Plant Area, Beaumont, Jefferson County, Texas*. HJN 140020 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the 42.2-Acre Saltgrass Tract, La Marque, Galveston County, Texas*. HJN 140047 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed Eagle Mountain Stream Electric Station, Tarrant County, Texas*. HJN 080122.80 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed Tradinghouse Power Plant Tract, McLennan County, Texas*. HJN 080122.79 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed DeCordova II Power Plant Tract, Hood County, Texas*. HJN 080122.78 AR. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Cultural Resources Survey Report: Proposed Prue Road at French Creek (LC-6) Improvements, San Antonio, Bexar County, Texas*. HJN 130025. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Cultural Resources Survey and Construction Monitoring for the Proposed Kansas City Southern K478.0 Bridge Construction and Railroad Alignment Project, Bowie County, Texas*. HJN 130023. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Proposed Alpha Olefin Chemical Company, LLC, Alpha Olefins Plant, Freeport, Brazoria County, Texas—Cultural Resources Assessment*. HJN 110012.21. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed 0.67-acre Lindshire Lane Wastewater System Improvements Project, Austin, Travis County, Texas*. HJN 130138. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Archeological and Geoarcheological Investigations, M&G Resins USA, LLC/ChemTex International, Inc., Proposed Jumbo Project, Corpus Christi, Nueces County, Texas* (with Charles D. Frederick). HJN 080122.56. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed Enterprise Mont Belvieu Complex Fractionation Units 9 and 10 Project, Chambers County, Texas*. HJN 110012.17. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of 5.9 Miles of Proposed Subsurface Utility Relocations, FM 1637 Expansion Project, Waco, McLennan County, Texas*. HJN 130031. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Proposed Victoria Power Station Expansion Project, Victoria, Victoria County, Texas—Cultural Resources Review*. HJN 110012.11. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey for the Proposed INVENERGY Energy Center, Ector County, Texas*. HJN 080122.54. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey for the Proposed Kansas City Southern K478.0 Bridge Construction and Railroad Alignment Project, Little River County, Arkansas*. HJN 130023. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey for the Proposed Southern Company Natural Gas Plant, Trinidad, Henderson County, Texas*. HJN 080122.53. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of Proposed Yoakum Cryogenic Gas Processing Plant Expansion Areas, Lavaca County, Texas*. HJN 110012.15. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Assessment of Proposed INVISTA Victoria Plant Improvements, Victoria County, Texas*. HJN 130035. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Proposed Equistar Chemicals, L.P., Corpus Christi Complex Expansion Project, Corpus Christi, Nueces County, Texas—Cultural Resources Assessment*. HJN 110012.13. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed 78-Acre La Paloma Energy Center Tract, Harlingen, Cameron County, Texas*. HJN 080122.31. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Proposed Clinker Production Increase at the CEMEX Construction Materials South, LLC, Balcones Cement Plant, Comal County, Texas—Cultural Resources Review*. HJN 080122.39. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed 77-Acre Pinecrest Energy Center Tract, Lufkin, Angelina County, Texas*. HJN 080122.40. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Proposed Guadalupe Generating Station Expansion Project, Marion, Guadalupe County, Texas—Cultural Resources Review*. HJN 130016. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of the Proposed 181-Acre Enterprise Mont Belvieu Complex Propane Dehydrogenation Unit Project, Chambers County, Texas*. HJN 110012.12. Horizon Environmental Services, Inc., Austin, Texas.

n.d. *Intensive Cultural Resources Survey of a Proposed 20-Acre Expansion Tract Adjacent to an Existing PL Propylene, LLC, Facility, Houston, Harris County, Texas*. HJN 080122.30. Horizon Environmental Services, Inc., Austin, Texas.

2014 *Results of Cultural Resources Survey: ExxonMobil Baytown Olefins Plant, Areas 17 & 75, Baytown, Harris County, Texas*. Letter report dated March 14, 2014. HJN 130264 AR. Horizon Environmental Services, Inc., Austin, Texas.

2014 *Archeological and Historical Investigations for the Proposed Dell Medical School Phase 1 Project, Austin, Travis County, Texas*. HJN 130112. Horizon Environmental Services, Inc., Austin, Texas.

2013 2013 *Results of Cultural Resources Survey: ExxonMobil Baytown Olefins Plant Natural Gas Odorizer Area, Baytown, Harris County, Texas*. Letter report dated December 13, 2013. HJN 130264 AR. Horizon Environmental Services, Inc., Austin, Texas.

Intensive Cultural Resources of a Proposed 12.6-acre Apartment Complex Development, Belton, Bell County, Texas. HJN 130212. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of the Proposed University Boulevard and Parcel 150 Pipeline Rights-of-Way, Round Rock, Williamson County, Texas*. HJN 130118. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of a Proposed 171.0-Acre Residential Development, Conroe, Montgomery County, Texas*. HJN 130162. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of Segments of Browder Loop Road, Eldridge Lane, and North Butch Arthur Road, San Jacinto County, Texas*. HJN 130103. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of 4 USACE Jurisdictional Areas on Chesapeake Energy Corporation's Proposed JEA West Lateral Pipeline Right-of-Way, Dimmit County, Texas* (with R.K. Brownlow). HJN 130087.04. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of Chesapeake Energy Corporation's Proposed Sugarland DIM H Well Pad and Access Road, Dimmit County, Texas* (with R.K. Brownlow). HJN 130087.03. Horizon Environmental Services, Inc., Austin, Texas.

2013 *A Cultural Resources Assessment of the USACE Jurisdictional Areas along BridgeTex Pipeline Company, LLC's, Proposed BridgeTex North Pipeline ROW* (with R.K. Brownlow and J.L. Cochran). HJN 120166 AR. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of the Proposed 545-Acre Kansas City Southern Railroad Wylie Intermodal Facility, Wylie, Collin County, Texas*. HJN 130042. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of a USACE Jurisdictional Area on a Proposed 4.6-Acre HEB Grocery Store Expansion Tract, Georgetown, Williamson County, Texas*. HJN 120085. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Cultural Resources Investigations along the Proposed Lone Star Competitive Renewable Energy Zone (CREZ) 345-kV Transmission Line Right-of-Way in North-Central Texas*, Vols. I and II (with Jennifer L. Cochran, Russell K. Brownlow, and Raymundo Chapa). HJN 100137. Horizon Environmental Services, Inc., Austin, Texas.

2013 *Intensive Cultural Resources Survey of the San Antonio River Outfall Project, San Antonio, Bexar County, Texas*. HJN 120150. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Archeological Survey for the Proposed Brushy Creek Regional Trail Gap Project, Round Rock, Williamson County, Texas*. HJN 080151. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Archeological Survey for the Proposed San Gabriel River Trail Extension Project, Georgetown, Williamson County, Texas*. HJN 120057. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey of the 1,102-Acre Creekside Park West Tract, Harris County, Texas* (with Raymundo Chapa). HJN 100142. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey of Two 0.9-Acre HDD Locations on the Trinity River, Madison and Houston Counties, Texas*. HJN 120009.14. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey of a USACE Jurisdictional Area on the Proposed 18.5-Acre Esperanza Crossing Tract, Austin, Travis County, Texas*. HJN 120052. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey, One USACE Jurisdictional Area, Existing East Red Segment 1 Pipeline Maintenance Activities, Clay County, Missouri*. HJN 120075. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey, Two USACE Jurisdictional Area Dig Sites (#253 and #261) on the Existing Eskridge to Kearney Pipeline Maintenance Activities, Clay County, Missouri*. HJN 120075. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey for the Penn City Coal Expansion Project, Houston, Harris County, Texas*. HJN 110097. Horizon Environmental Services, Inc., Austin, Texas.

2012 *Intensive Cultural Resources Survey for the Lake Anahuac East Levee Project, Anahuac, Chambers County, Texas* (with Sally Victor). HJN 120004. Horizon Environmental Services, Inc., Austin, Texas.

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