Intensive Cultural Resources Survey of a Proposed 20-Acre Expansion Tract Adjacent to an Existing PL Propylene, LLC, Facility, Houston, Harris County, Texas

By:

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HJN 080122 AR 31

Prepared for:

Zephyr Environmental Corporation
Austin, Texas

Prepared by:

Horizon Environmental Services, Inc.
Austin, Texas

December 2012

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MANAGEMENT SUMMARY

Horizon Environmental Services, Inc. (Horizon), was selected by Zephyr Environmental Corporation (Zephyr), on behalf of PL Propylene, LLC (PLP), to conduct an intensive cultural resources inventory and assessment of a proposed 8-hectare (ha) (20-acre [ac]) expansion of PLP's existing facility located at 9822 La Porte Freeway, Houston, Texas 77017. PLP currently operates a propane dehydrogenation unit at this plant site and is proposing to build a second dehydrogenation unit on an approximately 8-ha (20-ac) tract located within the overall plant complex. The PLP facility is an existing chemical processing plant surrounded by areas that have been developed for mixed commercial, industrial, and residential uses. The existing plant is bordered on the north by the eastbound La Porte Freeway frontage road, residential subdivisions are located to the east and south, and another industrial plant is located to the west. The Area of Potential Effect (APE) of the proposed undertaking consists of the entire proposed 8-ha (20-ac) expansion tract.

The proposed expansion would entail the addition of a number of combustion sources whose emissions of carbon dioxide (CO_2), nitrogen dioxide (NO_2), and methane (CH_4) are sufficiently high to result in Prevention of Significant Deterioration (PSD) review for Greenhouse Gasses (GHG) by the US Environmental Protection Agency (EPA). As construction of the proposed facility would require a PSD permit issued by the US 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.

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NRHP are present in a project area affected by federal agency actions or covered under federal permits or funding.

On November 30, 2012, Horizon archeologist Briana Nicole Smith, under the overall direction of Russell K. Brownlow, 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 8-ha (20-ac) APE and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. Visibility was excellent (generally 100%) across the entire project area. As the proposed expansion site is located within an existing industrial complex, the APE had experienced extensive prior disturbance from construction of a network of graded dirt and gravel roads, deposition of artificial fill to bring the lot to grade, and installation of machinery related to plant operations on a concrete pad in the southeastern corner of the tract. Less than 10% of the proposed expansion tract appeared to be intact. Horizon excavated a total of 14 shovel tests in the 8-ha (20-ac) APE, thereby exceeding the Texas State Minimum Archeological Survey Standards requirements for a project area of this size.

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 project area, even in previously surveyed areas, all work should cease immediately and the 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 PL Propylene, LLC (PLP), to conduct an intensive cultural resources inventory and assessment of a proposed 8-hectare (ha) (20-acre [ac]) expansion of PLP's existing facility located at 9822 La Porte Freeway, Houston, Texas 77017. PLP currently operates a propane dehydrogenation unit at this plant site and is proposing to build a second dehydrogenation unit on an approximately 8-ha (20-ac) tract located within the overall plant complex. The PLP facility is an existing chemical processing plant surrounded by areas that have been developed for mixed commercial, industrial, and residential uses. The existing plant is bordered on the north by the eastbound La Porte Freeway frontage road, residential subdivisions are located to the east and south, and another industrial plant is located to the west. The Area of Potential Effect (APE) of the proposed undertaking consists of the entire proposed 8-ha (20-ac) expansion tract (Figures 1 and 2).

The proposed expansion would entail the addition of a number of combustion sources whose emissions of carbon dioxide (CO_2), nitrogen dioxide (NO_2), and methane (CH_4) are sufficiently high to result in Prevention of Significant Deterioration (PSD) review for Greenhouse Gasses (GHG) by the US Environmental Protection Agency (EPA). As construction of the proposed facility would require a PSD permit issued by the US 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 30, 2012, Horizon archeologist Briana Nicole Smith, under the overall direction of Russell K. Brownlow, 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

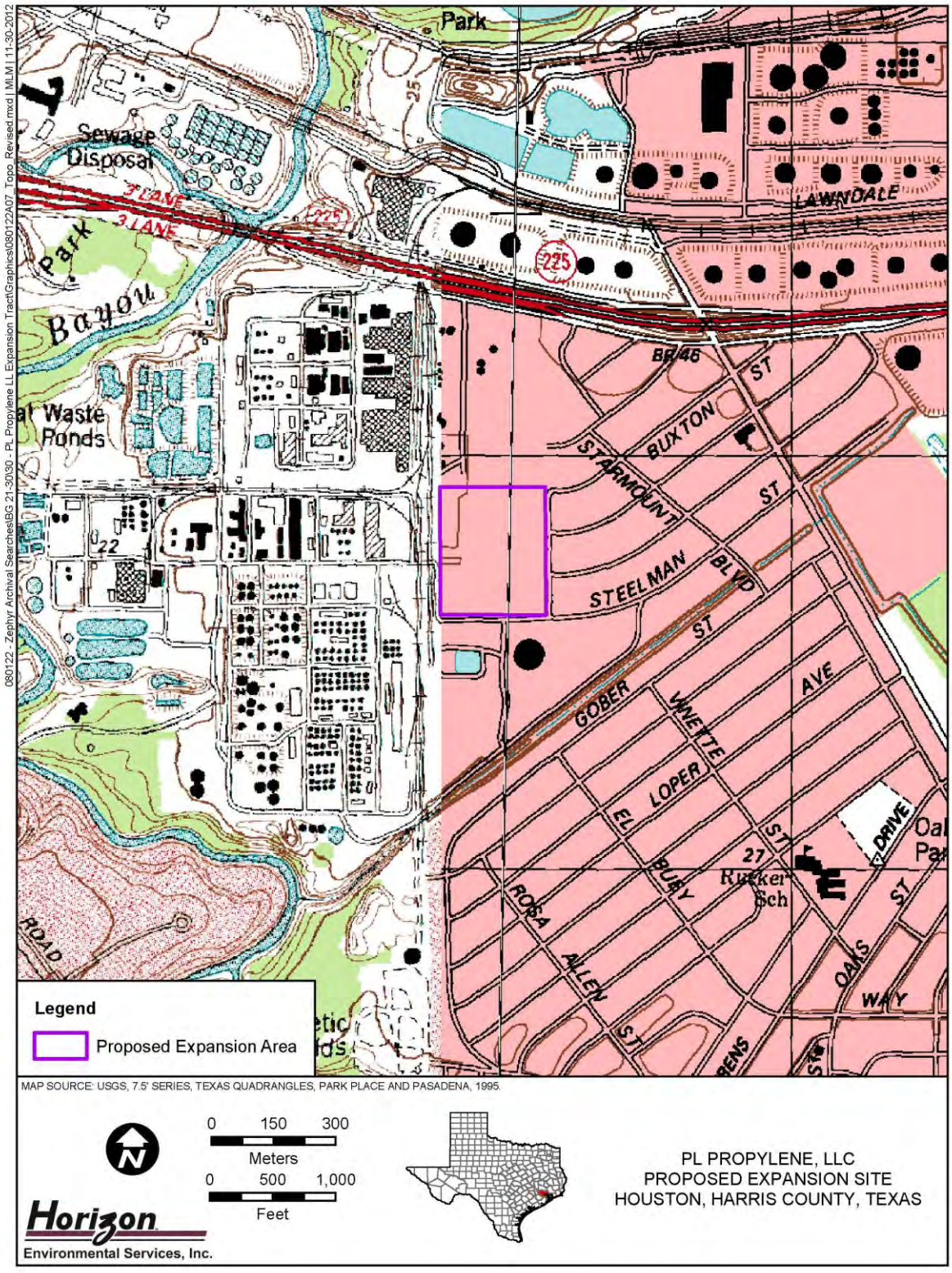

Figure 1. Location of Project Area on USGS Topographic Quadrangle

Figure 2. Location of Project Area on Aerial Photograph

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 project area. Chapter 4.0 describes the research objectives, results of archival 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 contains the curriculum vitae of the Principal Investigator.

2.0 ENVIRONMENTAL SETTING

2.1 PHYSIOGRAPHY AND HYDROLOGY

The project area is located in southeastern Houston in eastern Harris County, Texas. Harris County is situated on the Gulf Coastal Plain in southeastern Texas, and the project area is located about 24 kilometers (km) (15 miles [mi]) west of Trinity Bay, an inlet of the Gulf of Mexico formed by the confluence of Buffalo Bayou and the San Jacinto River between Houston and Baytown, Texas. The Gulf of Mexico represents a structural basin formed by lithosphere deformation. The Texas Coastal Plain, which extends as far north as the Ouachita uplift in southern Oklahoma and westward to the Balcones Escarpment, consists of seaward-dipping bodies of sedimentary rock, most of which are of terrigenous clastic origin, that reflect the gradual infilling of the basin from its margins (Abbott 2001). The Houston area is underlain by rocks and unconsolidated sediments that are quite young in a geological sense, ranging from modern to Miocene in age. These consist predominantly of a series of fluviodeltaic bodies arranged in an offlapped sequence, with interdigitated and capping eolian, littoral, and estuarine facies making up a relatively minor component of the lithology. Major bounding disconformities between these formations are usually interpreted to represent depositional hiatuses that occurred during periods of sea level low stand. The oldest rocks in this fill are of Late Cretaceous age. As a result of the geometry of basin filling, successively younger rock units crop out in subparallel bands from the basin margin toward the modern coastline.

The project area is situated on low-lying uplands east of Sims Bayou, a waterway that forms part of the Buffalo Bayou system. Sims Bayou flows generally northeastwards to its confluence with Buffalo Bayou approximately 1.1 mi north of the project area. Buffalo Bayou, in turn, flows eastwards and discharges into the Gulf of Mexico about 24 km (15 mi) east of the project area. Elevations across the project area are relatively flat, averaging approximately 8 m (25 ft) above mean sea level (amsl).

2.2 GEOLOGY AND GEOMORPHOLOGY

The project area is underlain by the Beaumont Formation (Fisher 1982; Shelby et al. 1968). The Beaumont, or Prairie, terrace is the youngest continuous coastwise terrace fronting the modern Gulf (Abbott 2001). The Beaumont Formation consists of clay, silt, and fine sand arranged in spatial patterns that reflect the distribution of fluvial (e.g., channel, point bar, levee,

and backswamp) and mudflat/coastal marsh facies (Van Siclen 1985). Sandy deposits associated with littoral facies are also frequently considered part of the Beaumont. Many investigators (cf. DuBar et al. 1991; Fisk 1938, 1940) have correlated the Beaumont terrace with the Sangamon Interglacial (ca. 130 to 75 thousand years ago [kya]), although age estimates range from Middle Wisconsinan (Alford and Holmes 1985) to 100 to 600 kya (Blum and Price 1994). While debate about the temporal affiliations of and correlations among the deposits that underlie the major coastline terraces remain active, they are of little direct geoarcheological relevance because virtually all investigators agree that these deposits considerably predate the earliest demonstrated dates of human occupation in North America.

Specifically, the project area is underlain by soils of the Lake Charles-Urban Land Complex (Lu) (Figure 3) (NRCS 2012), which consists of clayey fluviomarine deposits of Late Pleistocene age. A typical profile of this soil type consists of deep, undifferentiated deposits of clay extending to depths of more than 203 centimeters (cm) (80 inches [in]) below surface. This soil is moderately well drained and tends to have a relatively flat surface. The southern portion of the proposed expansion site is mapped as consisting of Water (W) (see Figure 3) (NRCS 2012), though this area has been filled in with artificial fill materials to bring the land surface within the PLP industrial complex to grade.

2.3 CLIMATE

Evidence for climatic change from the Pleistocene to the present is most often obtained through studies of pollen and faunal sequences (Bryant and Holloway 1985; Collins 1995). While the paleoclimatic history of the coastal region remains unclear, Bryant and Holloway (1985) present a sequence of climatic change for nearby east-central 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 in east-central Texas was considerably cooler and more humid than at present. Pollen data indicate that the region was more heavily forested in deciduous woodlands than during later periods (Bryant and Holloway 1985). The Late Glacial Period was characterized by slow climatic deterioration and a slow warming and/or drying trend (Collins 1995). In east-central Texas, the deciduous woodlands were gradually replaced by grasslands and post oak savannas (Bryant and Holloway 1985). During the Post-Glacial Period, the east-central Texas environment appears to have been more stable. The deciduous forests had long since been replaced by prairies and post oak savannas. 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. Recent studies by Bryant and Holloway (1985) indicate that modern environmental conditions in east-central Texas were probably achieved by 1,500 years ago.

The modern climate of the upper Texas coast, including the region surrounding Houston, is classified as subtropical humid (Abbott 2001; Larkin and Bomar 1983), forming a transitional zone between the humid southeastern US and the semiarid to arid west. The climate reflects the influences of latitude, low elevation, and proximity to the Gulf of Mexico, which combine with

Figure 3. Distribution of Mapped Soils in Project Area

the urban heat island formed by the tremendous concentration of asphalt and concrete to give the Houston area a notorious modern climate that is oppressively warm and moist throughout much of the year. As a result of proximity to the Gulf and the abundance of surface water, humidity in the early morning can approach 100% even on cloudless summer days, and it often exceeds 50% even on the warmest afternoons. Largely as a consequence of the relatively high humidity characteristic of the region, temperature patterns exhibit a moderate annual range and a modest diurnal range that increases slightly with distance from the coast. Average monthly high temperature ranges from a low of 17 to 19°Celcius (°C) (59 to 63°Fahrenheit [°F]) in January to a high of 38 to 40°C (89 to 96°F) in August. Average monthly lows range from 4 to 9°C (38 to 47°F) in January to 25 to 29°C (72 to 79°F) in July and August. Annually, average low temperatures range from 15 to 21°C (56 to 65°F), and average high temperatures range from 27 to 29°C (75 to 79°F) (Abbott 2001; Larkin and Bomar 1983).

The Houston region experiences 2 precipitation peaks throughout the year (Abbott 2001; Wheeler 1976). The first occurs in the late spring (i.e., May to June) due to the passage of infrequent cold fronts that spawn chains of powerful frontal thunderstorms. The second occurs in the late summer to early autumn (i.e., August to September) due to the incidence of tropical storms and hurricanes from the Atlantic and, occasionally, Pacific oceans. In contrast, winter and early spring are relatively dry, and high summer rainfall is dominated by convectional thunderstorms that are relatively brief and localized, albeit frequently intense. Average annual precipitation varies from a low of approximately 100 centimeters (cm) (40 inches [in]) to a high of more than 132 cm (52 in). Average monthly precipitation varies from less than 5 to 8 cm (2 to 3 in) in March to more than 19 cm (7.5 in) occurring locally on the coast during September. Almost all of the measurable precipitation falls as rain—snowfall is extremely rare, occurring in measurable amounts in only 1 in 10 years.

2.4 FLORA AND FAUNA

Harris County is situated near the southeastern edge of the Texas biotic province (Blair 1950), an intermediate zone between the forests of the Austroriparian and Carolinian provinces and the grasslands of the Kansas, Balconian, and Tamaulipan provinces. Some species reach the limits of their ecological range within the Texas province. McMahon et al. (1984) further define 4 broad communities that characterize that portion of the Texas biotic province that lies on the Gulf Coastal Plain: (1) coastal marsh/barrier island, (2) coastal prairie, (3) coastal gallery forest, and (4) pine-hardwood forest (cf. Abbott 2001:24-26).

The coastal marsh/barrier island category includes well-drained, sandy, coastal environments and saline and freshwater wetlands in the coastal zone (Abbott 2001:24). Marsh vegetation is typical of areas that are seasonally wet and have substrates composed primarily of sands and silts, clays, or organic decomposition products. Vegetation assemblages are strongly controlled by texture, salinity, frequency and duration of inundation, and depth of the seasonal water table. Sandy, relatively well-drained, freshwater environments are typically dominated by little bluestem, switchgrass, Florida paspalum, and brownseed paspalum. Wetter environments are often dominated by marshhay cordgrass, seashore saltgrass, saggitaria, bulrushes, smooth cordgrass, seashore paspalum, seashore dropseed, olney bulrush,

saltmarsh bulrush, saltmarsh aster, longtom, sprangletop, burhead, arrowhead, coastal waterhyssop, needlegrass rush, and other sedges and rushes. Slightly higher, better-drained environments are characterized by such taxa as seashore saltgrass, seashore paspalum, gulfdune paspalum, shoregrass, gulf cordgrass, red lovegrass, bushy sea-oxey, and glasswort. A variety of fauna are characteristic of the shore zone. Important larger taxa include raccoon, nutria, alligators, turtles, swamp rabbit, and many birds, including ducks, geese, herons, and many smaller species. Aquatic taxa, including a wealth of fish and shellfish adapted to brackish to hypersaline conditions, are also important in the coastal zone.

The coastal prairie category consists primarily of grasses with minor amounts of forbs and woody plants in areas that are not saturated on a seasonal basis (Abbott 2001:24-26). This community is characteristic of upland areas and grades into the pine-hardwood forest to the north and east and into the coastal marsh/barrier island to the south. A wide variety of grasses are found in the prairie environments, but the principal taxa include big bluestem, little bluestem, indiangrass, eastern grama, switchgrass, brownseed paspalum, sideoats grama, silver bluestem, buffalograss, threeawn, and Texas wintergrass. Common forbs include Maximilian sunflower, Engelman daisy, blacksalmon, penstemon, dotted gayfeather, bundleflower, yellow neptunia, snoutbean, prairie clover, tickclover, wildbean, western indigo, paintbrush, bluebonnet, ragweed, croton, milkweed, vetch, verbena, and winecup. Woody plants occurring in the coastal prairie include mesquite, honey locust, huisache, eastern baccharis, sesbania, live oak, elm, hackberry, bumelia, and coralberry. The frequency of trees increases dramatically as the coastal prairie grades into the pine-hardwood forest, forming an open woodland environment with common stands of hardwood trees and occasional pines. The coastal prairie is home to a diverse fauna, including coyote, white-tailed deer, skunks, cottontail rabbit, many small rodents, amphibians, reptiles, and a variety of permanent and migratory birds. Bison and pronghorn were also present at various times in the past.

The coastal gallery forest consists of diverse, principally deciduous trees and associated understory in floodplains and streams that traverse the outer coastal plain (Abbott 2001:26). Important taxa include water oak, pecan, poplar, American elm, cedar elm, sugarberry, ash, loblolly pine, post oak, cherrybark oak, mulberry, swamp chestnut oak, willow oak, sweetgum, hawthorn, dogwood, hickory, bois d'arc, sassafras cypress, willow, cottonwood, and sumac. Shrubs and vines such as mustang grape, greenbriar, yaupon, coralberry, possumhaw, elderberry, honeysuckle, dewberry, and blackberry are common in the understory, as are grasses such as little bluestem, big bluestem, and indiangrass. The fauna of the gallery forest include white-tailed deer, opossum, raccoon, squirrel, turkey, a variety of small mammals and rodents, turtles, snakes, and many birds. Black bear was also present at various times in the past, and a number of fish and a few varieties of shellfish are present in the streams.

The pine-hardwood forest is characterized by a mix of coniferous and deciduous trees, including longleaf pine, shortleaf pine, loblolly pine, post oak, red oak, white oak, blackjack oak, willow oak, and live oak (Abbott 2001:26). Riparian environments often support larger deciduous trees like pecan, cottonwood, hickory, beech, and American elm. Understory vegetation varies from relatively open to quite dense, and consists of shrubs, vines, forbs, and young trees. Common shrubs include acacia, yaupon, mayhaw, wild persimmon, myrtle,

greenbriar, Virginia creeper, blackberry, dewberry, trumpet vine, gourd, and poison ivy. A variety of fauna is also present, including white-tailed deer, opossum, raccoon, squirrel, rabbit, mink, skunk, various small rodents, turtles, reptiles, and many different birds. Black bear was also present at times in the past, and bison and pronghorn were occasionally present in the transition zone to the coastal prairie environment.

3.0 CULTURAL BACKGROUND

The project area is located within the Southeast Texas Archeological Region, a 21-county area extending from the Colorado River on the west to the Sabine River on the east and measuring about 200 km (124 mi) inland from the Gulf of Mexico coastline. Much of the archeological record in Southeast Texas represents an interface between the Southern Great Plains and the Southeastern Woodlands (Aten 1983, 1984; Patterson 1995; Story 1990). Further distinctions are often made between the inland and coastal margin subregions of Southeast Texas. These 2 subregions are somewhat culturally distinct, and the inland subregion has a much longer chronological record. The coastal margin of Southeast Texas comprises a zone about 25 km (16 mi) inland from the coast that covers the area influenced by Gulf tidal flows on the salinity of streams, lakes, and bays. Considerable ecological variability characterizes this subregion, including woodlands, coastal prairie, lakes, wetlands, marine coastline, and barrier islands. The inland subregion also encompasses considerable ecological diversity, including mixed woodlands, coastal prairies, and dense piney woods.

The human inhabitants of Southeast Texas practiced a generally nomadic hunting and gathering lifestyle throughout all of prehistory. While many of the same labels are used to denote Southeast Texas cultural/chronological periods, the timeframe and cultural characteristics of Southeast Texas culture periods are often different than in neighboring regions. For instance, the Archaic and Late Prehistoric time periods are different in Central and Southeast Texas, and Central Texas lacks the Early Ceramic period that has been defined for Southeast Texas.

Mobility and settlement patterns do not appear to have changed markedly through time in Southeast Texas. Inland sites are usually found near a water source, usually exhibit evidence of reoccupation through time, have well-defined intrasite activity areas, tend not to be associated with satellite activity sites or separate base camps, and exhibit a range of subsistence-related activities. Inland sites also tend to contain modest pottery assemblages, fired clay balls (at some sites), abundant lithic material, and an absence of shell tools. Coastal sites tend to consist of multicomponent *Rangia* shell middens that contain oyster shell tools, large quantities of pottery (in later cultural components), numerous bone tools, and only a few lithic artifacts.

3.1 PALEOINDIAN PERIOD (10,000 TO 5000 B.C.)

The initial human occupations in the New World can now 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 during the Pleistocene glacial period.

The earliest generalized evidence for human activities in Southeast Texas is represented by the PaleoIndian period (10,000 to 5000 B.C.) (Patterson 1995). This stage 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 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 in Southeast Texas are known primarily through the study of faunal remains. Subsistence focused on the exploitation of small animals, fish, and shellfish, even during the PaleoIndian period. There is little evidence in this region for hunting of extinct megafauna, as has been documented elsewhere in North America; rather, a broad-based subsistence pattern appears to have been practiced during all prehistoric time periods.

In Southeast Texas, the PaleoIndian stage is divided into 2 periods based on recognizable differences in projectile point styles (Patterson 1995). These include the Early PaleoIndian period (10,000 to 8000 B.C.), which is recognized based on large, fluted projectile points (i.e., Clovis, Folsom, Dalton, San Patrice, and Big Sandy), and the Late PaleoIndian period (8000 to 5000 B.C.), which is characterized by unfluted lanceolate points (i.e., Plainview, Scottsbluff, Meserve, and Angostura).

3.2 ARCHAIC PERIOD (5000 B.C. TO A.D. 100)

The onset of the Hypsithermal drying trend signaled the beginning of the Archaic stage (5000 B.C. to A.D. 100) (Patterson 1995). This climatic trend marked the beginning of a significant reorientation of lifestyle throughout most of North America, but this change was far less pronounced in Southeast Texas. Elsewhere, 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 Southeast Texas, however, this hunting and gathering pattern is characteristic of most of prehistory. The appearance of a more diversified tool kit, the development of an expanded groundstone assemblage, and a general decrease in the size of projectile points are hallmarks of this cultural

stage. Material culture shows greater diversity during this broad cultural period, especially in the application of groundstone technology.

Traditionally, the Archaic period is subdivided into Early, Middle, and Late subperiods. In Southeast Texas, the Early Archaic period (5000 to 3000 B.C.) is marked by the presence of Bell, Carrollton, Morrill, Trinity, Wells, and miscellaneous Early Stemmed projectile points. The Bell point is the only type in this period that is closely associated with the Southern Plains. Many of the latter point types continue into the Middle Archaic period (3000 to 1500 B.C.) and several new types appear, including Bulverde, Lange, Pedernales, Williams, Travis, and probably the Gary-Kent series. The Late Archaic period (1,500 B.C. to A.D. 100) is characterized by Gary, Kent, Darl, Yarbrough, Ensor, Ellis, Fairland, Palmillas, and Marcos points.

In the western part of inland Southeast Texas, a Late Archaic mortuary tradition developed in the lower Brazos and Colorado river valleys and in the intervening area (Hall 1981; Patterson 1995). Organized burial practices actually started during the Middle Archaic period but reached full development in the Late Archaic with the use of exotic grave goods such as boatstones and bannerstones (probably used as atlatl weights), stone gorgets, corner-tang knives, stingray spines, shark teeth, and marine shell beads and pendants. Other burial practices included the systematic orientation of burial direction, body position, use of red ochre, and use of locally made grave goods, such as longbone implements and bone pins. Most burials are found in extended supine position, though some extended prone and bundle burials are also known. Burial direction is usually consistent within single sites but varies from site to site. Patterson et al. (1993) report that at least 11 sites are associated with this mortuary tradition in Austin, Fort Bend, and Wharton counties.

3.3 EARLY CERAMIC PERIOD (A.D. 100 TO 600)

The use of pottery did not start uniformly throughout Southeast Texas. Pottery manufacture appears to have diffused into this region from adjacent regions, primarily from the east along the coastal margin. Aten (1983:297) argues that pottery was being manufactured on the coastal margin of the Texas-Louisiana border by about 70 B.C., in the Galveston Bay area by about A.D. 100, in the western part of the coastal margin by about A.D. 300, and in the Conroe-Livingston inland area by about A.D. 500. The practice of pottery manufacture appears to have progressed first along the coastal margin and then moved inland (Patterson 1995). Southeastern Texas ceramic chronologies are best known in the Galveston Bay area, where Aten (1983) established a detailed chronological sequence.

The earliest ceramic periods in the Galveston Bay and neighboring Sabine Lake areas appear to be approximately contemporaneous with the earliest ceramic periods of the lower Mississippi Valley (Aten 1984). Early assemblages contain substantial quantities of Tchefuncte ceramics. In the Sabine Lake region, grog-tempered varieties of Baytown Plain and Marksville Stamped are common, while grog-tempered ceramics do not occur in the Galveston Bay area 129 km (80 mi) to the west until several hundred years later. With the principal exception of a few Tchefuncte ceramic types, other southern Louisiana ceramics are not found on the Gulf coast west of the Sabine Lake area.

Goose Creek sandy-paste pottery was used throughout Southeast Texas and somewhat farther north in the Early Ceramic, Late Prehistoric, and the early part of the Historic periods (Aten 1984; Patterson 1995; Pertulla et al. 1995). The Goose Creek series is the primary utility ware throughout the prehistoric sequence in Southeast Texas, though it gives way to Baytown Plain for about 200 years during the transition between the Late Prehistoric and Historic periods before once again becoming predominant into the Historic period (Aten 1984). A minor variety, Goose Creek Stamped, occurs only in the Early Ceramic period (Aten 1983). Three other minor pottery types—Tchefuncte (Plain and Stamped), Mandeville, and O'Neal Plain *variety Conway* (Aten 1983)—were used only during the Early Ceramic period. The Mandeville and Tchefuncte types are characterized by contorted paste and poor coil wedging. Mandeville has sandy paste (like Goose Creek), while Tchefuncte paste has relatively little sand. Given their technological similarities, Mandeville and Tchefuncte may represent different clay sources rather than distinct pottery types (Patterson 1995). The bone-tempered pottery that characterizes ceramic assemblages elsewhere in Texas is not common in Southeast Texas.

3.4 LATE PREHISTORIC PERIOD (A.D. 600 TO 1500)

The onset of the Late Prehistoric period (A.D. 600 to 1500) (Patterson 1995) is defined by the appearance of the bow and arrow. Elsewhere in Texas, pottery also appears during the latter part of the Late Prehistoric period, but, as already discussed, ceramics appear earlier in Southeast Texas. Along the coastal margin of Southeast Texas, use of the atlatl (i.e., spearthrower) and spear was generally discontinued during the Late Prehistoric period, though they continued to be used in the inland subregion along with the bow and arrow through the Late Prehistoric period (Ensor and Carlson 1991; Keller and Weir 1979; Patterson 1980, 1995; Wheat 1953). In fact, Patterson (1995:254) proposes that use of the bow and arrow started in Southeast Texas as early as the end of the Middle Archaic period, using unifacial arrow points that consisted of marginally retouched flakes. In contrast, Prewitt (1981) argues for a generalized date of adoption of the bow-and-arrow hunting system at about the same time (ca. A.D. 600) in Central and Southeast Texas. In Southeast Texas, unifacial arrow points appear to be associated with a small prismatic blade technology. Bifacial arrow point types include Alba, Catahoula, Perdiz, and Scallorn. A serial sequence for these point types has not been established in Southeast Texas, though Scallorn points appear to predate Perdiz points throughout the rest of Texas.

Grog- (i.e., crushed-sherd-) tempered pottery was used in the Late Prehistoric and Protohistoric periods in Southeast Texas. The grog-tempered varieties include San Jacinto Plain and Baytown Plain *variety Phoenix Lake*. San Jacinto pottery contains a relatively small proportion of small-sized temper, while Baytown Plain has larger amounts of sherd pieces that are often visible on vessel surfaces. As previously mentioned, sandy-paste Goose Creek pottery remained in use throughout the Late Prehistoric period. Rockport Plain and Asphalt Coated pottery from the Central Texas Coast (Ricklis 1995) are found at a few sites in Southeast Texas during the Late Prehistoric and Protohistoric periods.

3.5 PROTOHISTORIC PERIOD (A.D. 1500 TO 1700)

For the most part, Protohistoric and early Historic Indian sites in Southeast Texas have not been articulated with the ethnographic record (Story 1990:258). Similarly, reconciling the ethnographic record to prehistoric Indian groups in this region is problematic. Late Prehistoric and Historic population movements further complicate this issue. Aten (1983) has reconstructed the territories of native groups present in this region in the early 18th century, including the Akokisa, Atakapa, Bidai, Coco (possibly Karankawa), and Tonkawa. The presence of the Tonkawa in Southeast Texas may be due to their rapid expansion from Central Texas in the 17th and 18th centuries (Newcomb 1993:27). The Karankawa Indians are thought to have occupied the coastal margin of this region as far east as Galveston Island and the corresponding mainland (Aten 1983). Judging by the scarcity of Rockport pottery on sites east of the San Bernard River, the ethnic association of the Karankawa Indians with the Coco tribe may be in doubt.

Protohistoric and Historic Indian sites may not be systematically recognized as such because few aboriginal artifact types changed from the Late Prehistoric to the Historic periods (Patterson 1995). Only a few non-European artifact types are useful in identifying Historic Indian sites, including Bulbar Stemmed and Guerrero arrow points and possibly Fresno and Cuney points after A.D. 1500 (Hudgins 1986). Historic period Indian sites are usually identified by the presence of glass and metal artifacts, gunflints, and European types of pottery.

3.6 HISTORIC PERIOD (CA. A.D. 1700 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, Álvar Núñez 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 the 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 heavy settlement of Texas began in the early 1800s by Anglo-Americans, the indigenous Indian population was greatly diminished. The Alabama/Coushatta Indians who currently reside in Southeast Texas are migrants who were displaced from the east in the late 18th to early 19th centuries (Newcomb 1961).

Although Spain claimed the Texas Gulf Coast, few Europeans visited the future Harris County between 1528 and 1821[1]. It is possible that de Vaca ascended the San Jacinto River

[1] The following history of Harris County, Texas, derives from Bolton (1970), Freund (1954), Gray (1965), Henson and Ladd (1988), Henson (1986), Jenkins (1973), McComb (1981), Pomeroy (1994), Puryear and Winfield (1976), Sibley (1968), Taylor (1955), and Woods (1959), as summarized in *The Handbook of Texas Online* (TSHA 2012).

from Galveston Island around 1529 to trade with the woodland Indians, but his adventures failed to stimulate interest in the Texas coast. A few French traders from Louisiana visited Indians living on Spring Creek between the 1730s and 1745, but they established no settlements. A Spanish mission and presidio complex, El Orcoquisac, was maintained near the mouth of the Trinity from 1756 to 1771 to monitor and oppose the intrusion of foreigners. In 1746, Captain Joaquín de Orobio y Basterra from La Bahía visited the Orcoquisac villages along Spring Creek while looking for French traders. He reported the lack of roads or maps and on his return blazed a trail westward to find the Old San Antonio Road, on which he had traveled to Nacogdoches on his way to the lower Trinity and San Jacinto rivers. The first Anglo-Americans to explore Harris County were members of the various filibustering expeditions launched from New Orleans between 1815 and 1820 to aid the Mexican Republicans rebelling against Spain. Using Galveston Island and Bolivar Peninsula as a base, the men belonging to the expeditions and encampments of Louis Michel Aury, Francisco Xavier Mina, Jean Laffite, and James Long looked around the San Jacinto estuary for future home sites—their expected reward for freeing Mexico from Spain. Some of these men were among the pioneer settlers arriving by boat from Louisiana in early 1822, just after the Mexican War of Independence.

Responding to Stephen F. Austin's advertisements, the families wrongly assumed that the San Jacinto estuary was part of his *empresario* grant. Some moved to the Brazos River in 1824, but merchants and boatmen remained to exploit what turned out to be the best transportation system in Texas and to petition successfully for inclusion in the Austin grant. Since Galveston Island and the Gulf shore were forbidden to Anglo settlement, Harris County was the southeastern border of the colony. The pioneers found no Indians living in the future Harris County. In July 1824, a state land commissioner, the Baron de Bastrop, arrived and spent 2 months issuing 29 titles to settlers, even though surveys were incomplete. The pioneers, including Nathaniel Lynch, William Scott, and John R. Harris, chose sites along Buffalo Bayou, the San Jacinto River, and the San Jacinto estuary. Between 1828 and 1833, when Austin's colonization effort virtually ended, 23 more families secured titles elsewhere in the county, usually along watercourses. In 1826, John R. Harris laid out Harrisburg on his league where Brays Bayou joined Buffalo Bayou, the head of navigation. He opened a store and built a saw and grist mill, while his brothers captained vessels between there and New Orleans and even Tampico.

By 1833, Harrisburg was an established port of entry for immigrants and freight destined for the upper Brazos River communities of San Felipe and Washington. Moreover, it was the hub for east-to-west roads. Eastward from Harrisburg in 1830, travelers crossed the San Jacinto River on Lynch's Ferry on their way to Anahuac, Liberty, or Nacogdoches. Opposite Harrisburg, a road paralleled Buffalo Bayou heading northwest to a community on Spring Creek, then forked for the Brazos villages. A third important road followed the south bank of Brays Bayou for 24 km (15 mi) to a community on Oyster Creek near the site of present-day Stafford in Fort Bend County. This area was known as the San Jacinto District from 1824 until 1833, when it was renamed the Harrisburg District. From 1824 through 1827, Humphrey Jackson was the alcalde for the San Jacinto District, which stretched from Lynchburg on the San Jacinto River to the site of present-day Richmond on the west, and from Spring Creek to Clear Creek. Jackson reported to Stephen F. Austin until 1828, when the newly instituted *ayuntamiento* at

San Felipe relieved the *empresario* and *comisarios* were named. The final stage of development under the Mexican system occurred on December 30,1835, when the General Council set the boundaries of Harrisburg Municipality.

Harrisburg Municipality was the home of both President David G. Burnet and Vice President Lorenzo de Zavala of the new Republic of Texas. They were elected by the delegates at Washington after midnight on 16 March 1836, and the next morning left for Harrisburg, where water transportation offered an escape if the Mexican army should win. On 25 March, the group reached Harrisburg, where the president conducted business for the next 2 weeks. Burnet and his bride had moved to Lynchburg from New Jersey in 1831 with equipment for a steam sawmill that he built on the San Jacinto River above Lynch's Ferry. Declining to claim a headright, he bought land from Lynch for his home on a small bay below the ferry. He was not chosen to represent his neighborhood in 1832, 1833, 1835, or 1836 because of his pro-Mexican views. Delegates, torn by rivalries, chose him because he was not a delegate. Zavala, a refugee from Santa Antonio López de Santa Anna's wrath, bought a house on the north side of Buffalo Bayou below Harrisburg in August 1835, and his New York-born second wife and 2 children joined him in December. The republic's officials evacuated Harrisburg by steamboat to Lynchburg on 12 April, when word arrived that Santa Anna's troops were crossing the Brazos below Richmond. The steamboat *Cayuga* later took the officials and their families to Galveston Island. A constant stream of refugees from the upper Brazos settlements had been crossing Harrisburg Municipality since mid-March en route to the US.

Santa Anna and his advance units reached Harrisburg at midnight on 14 April and, after a day of looting, set fire to the settlement on 16 April. The general dispatched a cavalry troop to Morgan's Point on 16 April that almost captured the Burnet family. The battle of San Jacinto took place on 20 and 21 April opposite Zavala's house on widow Peggy McCormick's farm, where perhaps 600 dead soldiers remained unburied when neither commander ordered interment.

Harrisburg County was formed by the First Congress on December 22, 1836. The lawmakers also named Andrew Briscoe chief justice, and the infant city of Houston the county seat and national capital. The county encompassed the territory of the old municipality plus Galveston Island (the mainland was attached to Brazoria County) until May 1838, when its modern boundaries were established. In December 1839, Congress changed the name to Harris County in honor of John R. Harris. The county briefly lost its northwest corner in 1841 when Spring Creek residents tried to form a separate county. The first county court, convened in February 1837, was composed of the chief justice (called the county judge after 1861), the sheriff, the clerk, and 2 justices of the peace who served as associate justices.

Harrisburg recovered from the Mexican Revolution slowly. By 1853, it had a steam mill and was the terminus for the Buffalo Bayou, Brazos, and Colorado Railway, which crossed the county to Stafford's Point to facilitate the shipment of cotton and sugar. Five other railroads followed before the Civil War. The Galveston, Houston, and Henderson connected the island to the mainland, while the Texas and New Orleans constructed tracks along the north side of Buffalo Bayou to Liberty and Orange, thus enabling Confederate troops from Harris County to reach the Neches River on their way to Virginia. The Houston and Texas Central ran west from

town to Cypress, Hockley, and Hempstead. The Houston Tap and Brazoria linked Houston with the Buffalo Bayou, Brazos, and Colorado south of town and had a line to Columbia to serve the Brazoria County sugar plantations.

Early settlers in Harris County were mainly southerners bringing their black slaves. Besides cultivating field crops, some of the African Americans worked the cattle on the open-range ranches, particularly in the area south of Buffalo Bayou, which remained ranching country into the early 20th century. By the 1840s, a number of Germans and French had immigrated to Harris County. Both groups included city-dwelling artisans, merchants, and farmers—some Catholic, some Protestant. Many of the immigrant agrarians settled north and west of Houston and established successful truck and dairy farms that drew Europeans through the turn of the century. Contrary to legend, few Mexican prisoners chose to remain in Harris County when all were released on 21 April 1837 by President Sam Houston. The 1850 US census revealed no Mexican-born males of the right age in Harris County or surrounding counties. A few Mexican families lived in Houston in the 1880s. It was the economic opportunities offered by the Houston Ship Channel and the railroads, combined with the unsettled political conditions following the Mexican Revolution, that brought Mexicans to Houston. Most settled in the city close to their work and the Catholic churches.

While the first settlers lived along the streams, those arriving after the Civil War chose sites along the railroads that crisscrossed Harris County. By 1890, land developers in the Midwest had purchased land along the new North Galveston, Houston, and Kansas City Railroad, which ran east from Houston along the south side of Buffalo Bayou towards Morgan's Point and south to the mouth of Clear Creek. They expected to attract other Midwesterners to raise fruit, berries, and vegetables or just to seek relief from cold winters. Pasadena, Deer Park, and La Porte were established in 1892, and Seabrook followed in 1900. South Houston, Genoa, and Webster developed along the Galveston, Houston, and Henderson Railroad after the 1870s. Around the turn of the century, Japanese were invited to the Webster area to develop rice farms on the flat prairies and also at a site on a branch line of the Gulf, Colorado, and Santa Fe Railway south of Houston that became Mykawa. Between 1911 and 1936, the Galveston-Houston Electric Railway, called the Interurban, ran parallel to the Galveston, Houston, and Henderson Railroad and provided 30-minute service from Webster to Houston.

In the 1960s, the land east of Webster became the home of the National Aeronautics and Space Administration (NASA) Manned Spacecraft Center, renamed the Lyndon B. Johnson Space Center in 1973. Houston quickly annexed the area. The development changed the rural aspect of the area when several new towns sprang up along the north shore of Clear Lake, the largest being Clear Lake City.

Northern Harris County developed similarly. After the Civil War, other railways such as the Houston and Great Northern, the Trinity and Brazos Valley, the Houston East and West Texas, and the Burlington-Rock Island entered north Harris County to converge on Houston. The lumbering and farming interests established small towns such as Spring and Tomball along the tracks. The population of Humble, near the Houston East and West Texas Railway, increased with the oil boom at Moonshine Hill in 1905.

Harris County east of the San Jacinto River remained an agricultural community focusing on rice culture in the 1890s. Its only commercial developments were small boatyards at Lynchburg and Goose Creek and a brick factory on Cedar Bayou that mushroomed during the 1880s to supply a building boom in Galveston. Between 1903 and 1907, oil was discovered on the eastern shore of the San Jacinto estuary at Goose Creek and Tabbs Bay. Migrant roughnecks and their families moved to the area and established a temporary boomtown amid the derricks between 1915 and 1917. The shantytown was replaced in 1917 by Pelly, which was built on private land above the noisy and dirty oil camp. In 1919, Ross Sterling and his Humble Oil and Refining Company (now ExxonMobil) built a refinery on the San Jacinto above the mouth of Goose Creek. The site was bordered by the Humble company town, Baytown, for workers, and a middle-class enclave, Goose Creek, for executives and others. Pelly and Goose Creek vied for dominance, and after Humble sold the company houses to the workers beginning in the late 1920s, the 3 towns consolidated to become the "Tri-Cities" in the 1930s and finally to be renamed Baytown in 1948. Eastern Harris County also had an electric interurban train, the Houston-North Shore Railroad, which in 1925 connected the 3 towns to Crosby and ran along the north side of Buffalo Bayou to downtown Houston.

The development of Harris County as an industrial power began in 1911, when voters approved the formation of the Harris County Ship Channel Navigation District. Authorized by Congress and approved by the state legislature, the district could improve the waterway and manage the waterfront within the county. It immediately issued bonds to widen and deepen the channel to make the Houston port accessible to oceangoing vessels. In 1914, the US Army Corps of Engineers finished deepening the existing 80-km- (50-mi-) long channel to 8 m (25 ft) from the Gulf through Galveston Bay and up the San Jacinto River and Buffalo Bayou to the district's turning basin at the Port of Houston. By 1918, petroleum refineries began locating along Buffalo Bayou and the San Jacinto River, as did various other industries. Since that time, the channel has been deepened to 15 m (50 ft) and widened to accommodate larger vessels. The very profitable Harris County Navigation District owns the wharves and warehouses around the turning basin (about 3.2 km [2.0 mi] above old Harrisburg), the Long Reach docks, and various other facilities, including a bulk handling plant at Greens Bayou, the terminal railroad, and the container facility at the Bayport industrial complex below Morgan's Point. In addition, in the 1950s, the district joined national and state governments to build the Washburn Tunnel under Buffalo Bayou from Pasadena to the north side and the Baytown-La Porte tunnel beneath the San Jacinto River to reduce the number of hazardous automobile ferries. Exports from the port include rice, wheat, grain sorghums, cotton, caustic soda, cement, and petroleum products. Imports include crude oil, iron ore, molasses, coffee, gypsum, and automobiles.

Another venture authorized by Harris County voters was the Harris County Domed Stadium, which was completed in 1965 and has been leased to the Houston Sports Association. The Astrodome, the first stadium of its kind, was touted as the "Eighth Wonder of the World." The county also maintains 2 public hospitals in Houston and, since 1935, has worked to control flooding through the Harris County Flood Control District.

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 project area
2. To provide a preliminary assessment of the significance of these resources regarding their potential for inclusion in the 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 project area 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 project area. Based on this archival research, no previously recorded historic or prehistoric archeological sites, cemeteries, listed NRHP properties or districts, or State Archeological Landmarks (SALs) are present on or within a 1.0-mile radius of the proposed project site (THC 2012). No previous cultural resources surveys have covered any portion of the proposed 8-ha (20-ac) expansion site.

4.2 SURVEY METHODS

On November 30, 2012, Horizon archeologist Briana Nicole Smith, under the overall direction of Russell K. Brownlow, 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 8-ha (20-ac) expansion tract located within PLP's existing plant facility. The PLP facility is an existing chemical processing plant surrounded by areas that have been developed for mixed commercial, industrial, and residential uses. The existing plant is bordered on the north by the eastbound La Porte Freeway frontage road, residential subdivisions are located to the east and south, and another industrial plant is located to the west.

Horizon's archeologist traversed the 8-ha (20-ac) APE and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. Visibility was excellent (generally 100%) across the entire project area. As the proposed expansion site is located within an existing industrial complex, the APE had experienced extensive prior disturbance from construction of a network of graded dirt and gravel roads, deposition of artificial fill to bring the lot to grade, and installation of machinery related to plant operations on a concrete pad in the southeastern corner of the tract (Figures 4 to 9). Overall, the APE had experienced extensive prior disturbances associated with industrial development, and less than 10% of the proposed expansion tract appeared to be intact.

Horizon's archeologist traversed the 8-ha (20-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 probe 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 10 subsurface probes would be required within the proposed project's 8-ha (20-ac) APE. Horizon excavated a total of 14 shovel tests in the APE, thereby exceeding the TSMASS requirements for a project area of this size (Figure 10).

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, all shovel tests were terminated at depths of less than 1.0 m (3.3 ft) below surface due to the extensively disturbed character of sediments observed in shovel tests. Shovel testing revealed mixed deposits of native black and very dark grayish-brown clay and clay loam associated with the Late Pleistocene Beaumont Formation intermingled with artificial fill materials. The Universal Transverse Mercator (UTM) coordinates

Figure 4. View of Existing Plant from Expansion Site (Facing North)

Figure 5. Overview of Expansion Site (Existing Plant in Background) (Facing Northeast)

Figure 6. View of Expansion Site from Northwest Corner (Facing Southeast)

Figure 7. View of Expansion Site from Northwest Corner (Facing East)

Figure 8. Overview of Southern End of Expansion Site (Facing Southeast)

Figure 9. Existing Facility in Southeastern Corner of Expansion Site (Facing South)

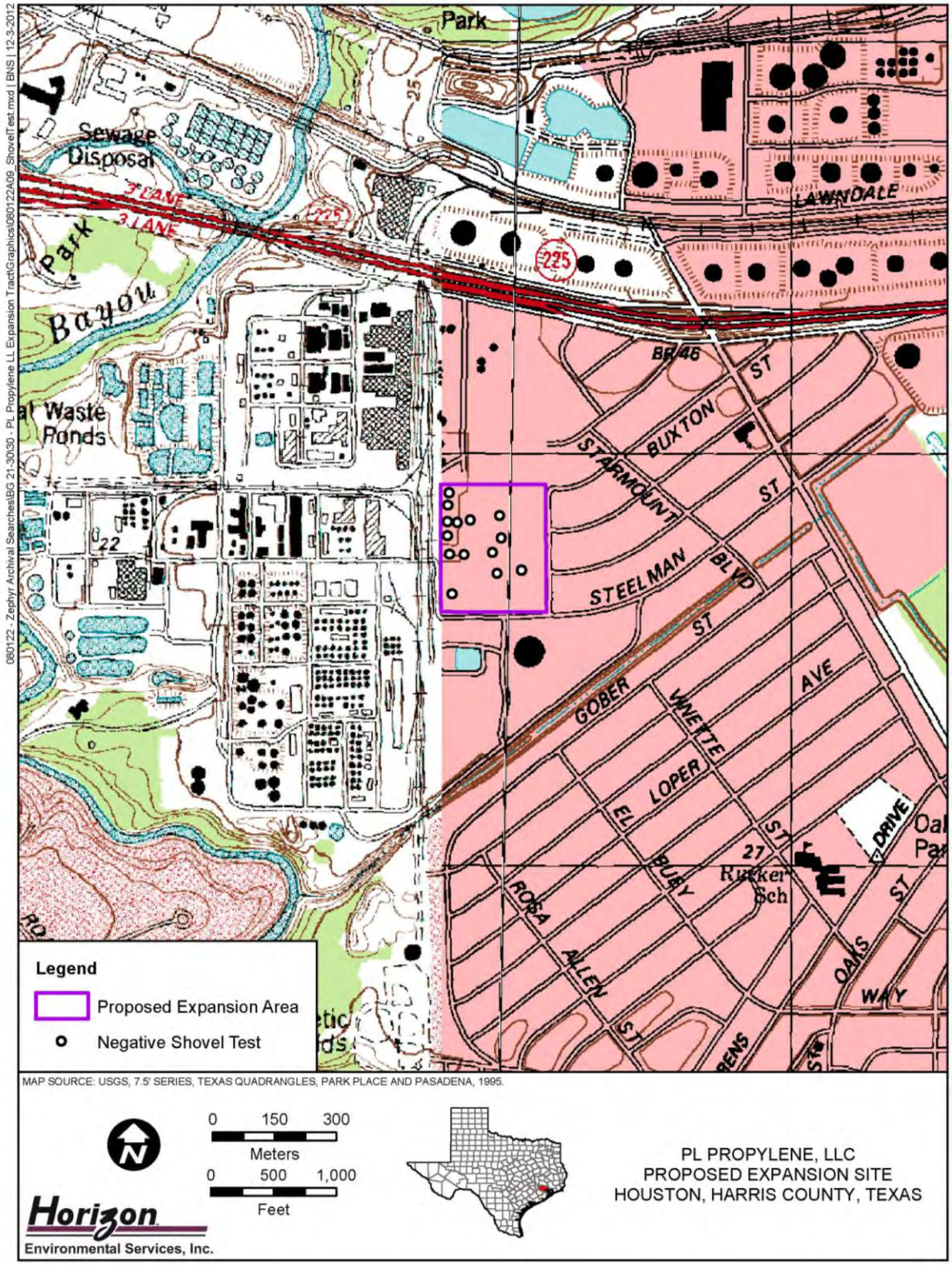

Figure 10. Locations of Shovel Tests Excavated in Project Area

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). Based on the extensively disturbed character of sediments observed in shovel tests excavated within the proposed project's APE, combined with the generally low potential of the Late Pleistocene-age fluviodeltaic sediments mapped within the project area to contain cultural resources, shovel testing was considered to represent an adequate survey technique for identifying cultural resources within the APE.

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.

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

5.0 RESULTS OF INVESTIGATIONS

Horizon was selected by Zephyr, on behalf of PLP, to conduct an intensive cultural resources inventory and assessment of a proposed 8-ha (20-ac) expansion of PLP's existing facility located at 9822 La Porte Freeway, Houston, Texas 77017. PLP currently operates a propane dehydrogenation unit at this plant site and is proposing to build a second dehydrogenation unit on an approximately 8-ha (20-ac) tract located within the overall plant complex. The PLP facility is an existing chemical processing plant surrounded by areas that have been developed for mixed commercial, industrial, and residential uses. The existing plant is bordered on the north by the eastbound La Porte Freeway frontage road, residential subdivisions are located to the east and south, and another industrial plant is located to the west. The APE of the proposed undertaking consists of the entire proposed 8-ha (20-ac) expansion tract.

The proposed expansion would entail the addition of a number of combustion sources whose emissions of CO_2, NO_2, and CH_4 are sufficiently high to result in PSD review for GHG by the US EPA. 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 30, 2012, Horizon archeologist Briana Nicole Smith, under the overall direction of Russell K. Brownlow, 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 8-ha (20-ac) APE and thoroughly inspected the modern ground surface for aboriginal and historic-age cultural resources. Visibility was excellent (generally 100%) across the entire project area. As the proposed expansion site is located within an existing industrial complex, the APE had experienced extensive prior disturbance from construction of a network of graded dirt and gravel roads, deposition of artificial fill to bring the lot to grade, and installation of machinery related to plant operations on a concrete pad in the southeastern corner of the tract. Less than 10% of the proposed expansion tract appeared to be intact. Horizon excavated a total of 14 shovel tests in the 8-ha (20-ac) APE, thereby exceeding the requirements for a project area of this size.

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 and for designation as SALs.
- Formulate recommendations for the treatment of these resources based on their NRHP and SAL 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 14 shovel tests were excavated within the APE. The TSMASS requirements were exceeded for a project area of this size. No cultural resources, historic or prehistoric, were identified within the APE as a result of the survey.

6.4 MANAGEMENT RECOMMENDATIONS

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 project area, even in previously surveyed areas, all work should cease immediately and the THC should be notified of the discovery.

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Texas Historical Commission (THC)

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1995 Park Place, Texas, 7.5-minute topographic quadrangle.

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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			
BS-1	282170	3287904	0-10+	Black clay with artificial fill	None
BS-2	282168	3287873	0-15+	Very dark grayish-brown clay with artificial fill	None
BS-3	282166	3287834	0-15+	Very dark grayish-brown clay with artificial fill	None
BS-4	282166	3287799	0-20+	Black clay with artificial fill	None
BS-5	282171	3287755	0-20+	Black clay with artificial fill	None
BS-6	282207	3287754	0-15+	Black clay with artificial fill	None
BS-7	282191	3287832	0-15+	Black clay with artificial fill	None
BS-8	282222	3287838	0-15+	Very dark grayish-brown clay with artificial fill	None
BS-9	282276	3287759	0-20+	Black clay with artificial fill	None
BS-10	282178	3287658	0-10+	Very dark grayish-brown clay with artificial fill	None
BS-11	282287	3287707	0-20 20+	Very dark grayish-brown clay loam with artificial fill Very dark grayish-brown clay with artificial fill	None
BS-12	282346	3287716	0-10+	Black clay with artificial fill	None
BS-13	282297	3287794	0-10+	Artificial fill	None
BS-14	282294	3287849	0+10+	Artificial fill	None

[1] All UTM coordinates are located in Zone 14 and utilize the North American Datum of 1983 (NAD 14)

cmbs = Centimeters below surface

ST = Shovel test

UTM = Universal Transverse Mercator

APPENDIX B:

Curriculum Vitae for Principal Investigator

RUSSELL K. BROWNLOW

PRINCIPAL / CULTURAL RESOURCES DIRECTOR

TECHNICAL SPECIALTIES

- Cultural resource management (CRM);
- Prehistoric archeology of Texas, Oklahoma, and Louisiana;
- Compliance with the Antiquities Code of Texas (ACT), Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and the Native American Graves Protection and Repatriation Act (NAGPRA);
- Prehistoric lithic technology (flint knapping);
- Ethnohistory;
- Project management;
- Archeological survey, testing, and data recovery;
- Technical report writing

EDUCATION

- B.A., Anthropology / Archeology, The University of Texas at Austin, 1992
- M.A., Anthropology, The University of Houston, 1998

PROFESSIONAL REGISTRATIONS AND TRAINING

- Registered Professional Archeologist since 2001 (RPA ID# 11924)
- TxDOT pre-certified for Service 2.10.1 (Archeological Surveys, Documentation, Excavations, Testing, Reports, and Data Recovery Plans)
- Mine Safety and Health Administration (MSHA) certified through 11/23/12

PROFESSIONAL / TECHNICAL SOCIETIES

- Texas Archeological Society (TAS)
- Council of Texas Archeologists (CTA)
- Register of Professional Archeologists (RPA)
- Texas Association of Environmental Professionals (TAEP)

AWARDS

- Texas Historical Commission Award of Merit (2004) for exceptional field research, laboratory analysis, and report production associated with 41WM815 in Williamson County, Texas

PROFESSIONAL EXPERIENCE

- Horizon Environmental Services, Inc., Austin, Texas
  - 2000 to present
  - Horizon Principal / Cultural Resources Director / Principal Investigator / Project Manager
- Texas Archeological Research Laboratory, University of Texas at Austin
  - 1998 to 2000
  - Research Associate
- Archeological and Environmental Consultants, Inc., Austin, Texas
  - 1999
  - Project Archeologist
- Houston Museum of Natural Science, Houston, Texas
  - 1998
  - Consultant
- University of Houston, Department of Anthropology, Houston, Texas
  - 1997 to 1998
  - Teaching Assistant
- Espey, Huston & Associates, Inc., Austin, Texas (now PBS&J)
  - 1994 to 1998
  - Field Technician, Laboratory Technician, Crew Chief, Field Director
- Prewitt and Associates, Inc., Austin, Texas
  - 1993
  - Field Technician
- Texas Archeological Research Laboratory, University of Texas at Austin
  - 1992
  - Laboratory Technician

FIELDS OF EXPERIENCE

Mr. Brownlow has over 19 years of experience conducting archeological research for both public institutions and private consulting firms. Examples of his archeological project experience include the following:

- In excess of 300 cultural resources surveys completed for a wide array of projects within Texas, Oklahoma, and Louisiana;
- National Register of Historic Places and/or State Archeological Landmark eligibility testing on a minimum of 36 archeological sites;
- Data recovery/mitigation efforts on a minimum of 11 archeological sites;

- Excavation of human burials from at least 7 different archeological sites including a historic cemetery containing in excess of 431 human interments, a Caddoan cemetery containing 16 human interments, and a burned rock midden site containing at least 4 human interments;
- Archeo-Geophysical (remote sensing) sampling on 3 archeological sites;
- Authoring or co-authoring over 250 technical reports of archeological investigations;
- Preparation of several archeological avoidance plans for seismic projects;
- Countless desktop archival reviews to determine the potential for cultural resources on various properties for inclusion in non-archeological documents (i.e. Phase I Environmental Site Assessments, Categorical Exclusions, etc.);
- Section 106 and/or Antiquities Code of Texas consultation for hundreds of projects with various permitting agencies including the Texas Historical Commission, Texas Water Development Board, Texas Parks and Wildlife Department, US Army Corps of Engineers, US Fish and Wildlife Service, Oklahoma State Historic Preservation Office, the Louisiana Department of Culture, Recreation, and Tourism, as well as a vast array of Tribal Historic Preservation Officers;
- In addition to his cultural resources experiences, Mr. Brownlow has also prepared a variety of non-archeological documents includes numerous Categorical Exclusions (CEs), Phase I Environmental Site Assessments (Phase I ESAs), Environmental Reports (ERs), and Environmental Assessments (EAs). He has also contributed to the production of several Environmental Impacts Statements (EISs).

Types of projects in which Mr. Brownlow has participated in or managed cultural resources services include:

- Oil and gas exploration, development, and transportation;
- Ethanol production;
- Coastal and inland residential, commercial, and industrial land development;
- Solid waste landfills;
- Dredging activities;
- Surface lignite mines;
- Municipal planning;
- Reservoir development;
- Coastal port and channel improvements;
- Transportation corridors;
- Water and wastewater transportation and treatment;
- Electricity generation and transportation;
- University research;
- Military installations.

PRESENTATIONS

- Flint knapping and stone tool technology lecture for the 1997 spring semester Introduction to Archeology class at the Department of Anthropology, University of Houston.
- Flint knapping and stone tool technology lecture for the 1997 spring semester Archeology of Texas class at the Department of Anthropology, University of Houston.
- Flint knapping and stone tool technology lecture for the 1997 fall semester Introduction to Archeology class at the Department of Anthropology, University of Houston.
- Flint knapping and stone tool technology lecture for the 1997 fall semester Introduction to Physical Anthropology class at the Department of Anthropology, University of Houston.
- Two flint knapping demonstrations for the Brazoria County summer archeology programs sponsored by BCI Long Distance.
- Perdiz Arrow Point Origins for the TARL Brown Bag Lunch, 1998.
- Perdiz Arrow Point Origins for the Houston Archeological Society, 1998.
- Perdiz Arrow Point Origins for the Travis County Archeological Society, 1998.
- Flint knapping demonstration for the Austin French Legation's annual summer camp program, 1999.
- Data Recovery Investigations at the Holt Site (41HY341). "Burned Rock Midden" Symposium at the Annual Council of Texas Archeologists Spring Meeting, 2005.
- Yearly flint knapping demonstrations for Camp Mabry's annual "Muster Day" Event.
- Routine visits to various elementary school classes to conduct flint knapping demonstrations and present archeological career details for "career days".

ARTICLES

Brownlow, R.K.

2000 Excavations at Rice's Crossing (41WM815). *Current Archeology in Texas*. November 2000, Volume 2, No. 2. Texas Historical Commission. Austin, Texas.

2009 In Search of the Lost Community of Nottingham: Archival and Archeo-Geophysical Investigations on Site 41GV71. *Current Archeology in Texas*. April 2009, Volume 11, No. 1. Texas Historical Commission. Austin, Texas.

TECHNICAL PUBLICATIONS

Espey, Huston & Associates (EH&A now PBS&J):

Brownlow, R.K.

1994 *Facilities Response Plan for Holly Street Power Plant, Austin, Texas*. EH&A Doc. No. 941257. Austin, Texas.

1995 *Facilities Response Plan for Decker Lake Power Plant, Austin, Texas*. EH&A Doc. No.950028. Austin, Texas.

1996 *Intensive Cultural Resource Survey of Proposed ORYX-MOYER 1-5 New 4-inch Pipeline Project*. EH&A Doc. No. 960270. Austin, Texas.

Schmidt, J.S., M.E. Cruse, and R.K. Brownlow

1995 *Cultural Resources Survey of Camp Swift, Bastrop County, Texas*. EH&A Doc. No. 951178. Austin, Texas.

Masters Thesis:

Brownlow, R.K.

1998 *Evaluating the Co-occurrence of Arrow Point Types in South Texas: Archaeological Excavations at the Batot-Hooker Site (41ME34), Medina County, Texas*. Masters Thesis presented to the Anthropology Department of the University of Houston. Houston, Texas.

Texas Archeological Research Laboratory (TARL):

Brownlow, R.K.

1999 Intensive Cultural Resource Survey of Fort Wolters Army National Guard Base, Parker and Palo Pinto Counties, Texas. *Studies in Archeology 32*. Texas Archeological Research Laboratory, The University of Texas at Austin.

2000 *Emergency Burial Salvage at 41PR88 on the Fort Wolters Training Facility, Parker Co., Texas*. Letter Report. Texas Archeological Research Laboratory, The University of Texas at Austin.

2000 Archeological Investigations at 41WM815, A Blackland Prairie Site, Williamson County, Texas. *Studies in Archeology 36*. Texas Archeological Research Laboratory, The University of Texas at Austin.

2001 National Register Eligibility of Four Sites at the Texas Army National Guard's Fort Wolters Facility, Parker Co., Texas. *Studies in Archeology 37*. Texas Archeological Research Laboratory, The University of Texas at Austin.

Contributing author in:

Takac, P.R., J.G. Paine, and M.B. Collins

2000 Reassessment of Ten Archeological Sites along the Houston Ship Channel – Morgan's Point to Buffalo Bayou, Harris County, Texas. *Studies in Archeology 38*. Texas Archeological Research Laboratory, The University of Texas at Austin.

Archeological and Environmental Consultants, Inc.:

Pertulla, T.K. and R.K. Brownlow

1999 An Archeological Survey of the Jett Road Water Project in Bexar County, Texas. *Letter Report of Investigations, No. 37*. Archeological & Environmental Consultants, Inc. Austin, Texas.

Horizon Environmental Services, Inc.:

Brownlow, R.K.

2000 *An Intensive Cultural Resources Survey of a Proposed Wal-Mart Site at the Northwestern Corner of the Intersection of U.S. Highway 183 and FM 1431, Cedar Park, Williamson County, Texas*. HJN 000255 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *Backhoe Trench Investigations for a Proposed Wastewater Line Crossing Brushy Creek on the Ivie Tract, Williamson County, Texas*. HJN 010016 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *Profile Documentation of Erosional Gullies in Borrow Pits Nos. 1 and 2 on Site 41WA255 for the Texas Department of Criminal Justice's Estelle Unit, Huntsville, Walker County, Texas*. Texas Antiquities Committee Permit No. 2509. HJN 000425 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of Centennial Pipeline's Proposed Pump Stations A, B, and C, Bearegard, La Salle, and West Carroll Parishes, Louisiana*. HJN 000302 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of the Proposed Centennial Pipeline Right-of-Way, Beauregard Parish, Louisiana*. HJN 000151 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of the Proposed Centennial Pipeline Right-of-Way, Jefferson, Orange, Jasper, and Newton Counties, Texas*. HJN 000151 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of a Proposed 15-acre Leander Independent School District School Site Located on the Steiner Ranch Tract, Travis County, Texas*. Texas Antiquities Committee Permit No. 2583. HJN 010136 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey and Subsequent Testing Along a Proposed Water/Wastewater Line within the Northern Right-of-Way of FM 1431 East, Williamson County, Texas*. Texas Antiquities Committee Permit Nos. 2385 and 2433. HJN 000053 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of 15 Proposed Well Sites and Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of 22 Proposed Well Sites and Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of 13 Proposed Well Sites and Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of the Proposed Legacy Ridge Estates Residential Subdivision and Golf Course, Bonham, Fannin County, Texas*. HJN 010348 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of the Proposed UNOCAL Keystone Gas Storage Project, Winkler County, Texas*. HJN 000256 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of 300 Acres on the Phillips Ranch, Hays County, Texas*. HJN 010367 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of the approximately 25-acre United RV Campground, San Marcos, Hays County, Texas*. HJN 010382 AR. Horizon Environmental Services, Inc. Austin, Texas.

2001 *An Intensive Cultural Resources Survey of a Proposed Lower Neches Valley Authority 33-acre Water Treatment Plant Site and Associated Waterline Routes, Winnie, Chambers County, Texas*. HJN 010090. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the 4.5-mile Rainbolt Lateral Pipeline Right-of-Way, Robertson and Leon Counties, Texas*. HJN 010392 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the Proposed Widening of Ranch-to-Market Road 2243 (Alternates A and B), Leander, Williamson County, Texas*. Texas Antiquities Committee Permit No. 2722. HJN 010185 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of 12 Proposed Well Sites and Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of a Proposed 1.25-mile Natural Gas Pipeline Right-of-Way, Sweeny, Brazoria County, Texas*. HJN 020041 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of a Proposed 12-acre Home Depot Site at the Rivery, Georgetown, Williamson County, Texas*. HJN 020027 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey for a Proposed 29-mile Crude Oil Pipeline Right-of-Way, Port Neches Route of the Cameron Highway Pipeline Project, Jefferson County, Texas*. HJN 010344 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the Proposed 27-acre Target in Bee Cave #2 Site, Bee Cave, Travis County, Texas*. HJN 020067 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of The Rivery, A Proposed 125-acre Development Site in Georgetown, Williamson County, Texas*. HJN 020046 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the Buttercup Creek Channelization and Wetland Mitigation Project (30 Acres), Cedar Park, Williamson County, Texas*. HJN 010333 PA. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of 5 Proposed Well Sites and Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of a Proposed 122-acre Target Store Site Located at Parmer Lane and Interstate Highway 35, Austin, Travis County, Texas*. HJN 010354 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of a Proposed 17-acre Tract to be Annexed to Kit McConnico Park Located in Lufkin, Angelina County, Texas*. Texas Antiquities Committee Permit No. 2876. HJN 020113 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of 11 Proposed Well Sites and Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the 197-acre El Camino Real Phase I Tract, A Proposed Subdivision Site in San Marcos, Hays County, Texas*. HJN 020123 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the Proposed 75-acre Greenshores Subdivision Tract Located in Northwest Austin, Travis County, Texas*. HJN 020145 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the 100-acre Wolf Tract, A Proposed Development Site in Georgetown, Williamson County, Texas*. HJN 020144 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of 9 Proposed Well Sites and Associated Flow Lines on the Freeman Ranch and Tucker Leases, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of the Proposed UNOCAL Keystone Gas Storage Project and 3.8 Miles of Associated Pipeline ROW, Winkler County, Texas*. HJN 000256 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey, Monitoring, and Geomorphological Investigations along the Proposed 2.5-Mile Northern Natural Interconnect, UNOCAL Keystone Gas Storage Project, Winkler County, Texas*. HJN 000256 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *Archeological Monitoring Conducted during Texas Eastern Transmission's Replacement of Approximately 1600 feet of Pipe via Horizontal Directional Drill under the San Antonio River, Goliad County, Texas*. HJN 020169 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *Backhoe Trench Investigations Conducted on the 3.8-acre Hunt TDC No. 1 Well Site and Access Road, Anderson County, Texas*. Texas Antiquities Committee Permit No. 2935. HJN 020181. Horizon Environmental Services, Inc. Austin, Texas.

2002 *Backhoe Trench Investigations Conducted along the 8-mile Pinnacle Gregory A-1 Pipeline Right-of-Way, Anderson County, Texas*. Texas Antiquities Committee Permit No. 2916. HJN 020149 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of a Proposed 8-mile EPGT Natural Gas Transmission Pipeline in Travis and Hays Counties, Texas*. HJN 020128 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of a Proposed 6-acre Village 7 Sewer Treatment Plant #1 Located in The Woodlands, Harris County, Texas*. HJN 020207 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Cultural Resources Survey of 13 Proposed Well Sites and Associated Flow Lines on the Freeman Ranch Lease, Texas County, Oklahoma*. HJN 010239 AR. Horizon Environmental Services, Inc. Austin, Texas

2002 *Cultural Resources Investigations Conducted along Sections of New Hope and Bagdad Roads for Proposed Widening Efforts, Cedar Park, Williamson County, Texas*. Texas Antiquities Committee Permit No. 2967. HJN 020185 AR. Horizon Environmental Services, Inc. Austin, Texas.

2002 *An Intensive Terrestrial Cultural Resources Survey of the Proposed Crude Oil Pipeline Right-of-Way for the Cameron Highway Pipeline Project's Texas City Extension, Chambers County, Texas*. HJN 020077 AR. Horizon Environmental Services, Inc. Austin, Texas.

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