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An Intensive Cultural Resources Survey of Anadarko Petroleum Corporation's Proposed University Lands 19-7 B 2H Well Pad Project in Loving County, Texas

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HJN 160006 AR 75
Texas Antiquities Committee Permit No. 8326

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April 2018

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MANAGEMENT SUMMARY

On 19 January 2016, Horizon Environmental Services, Inc. (Horizon) conducted an intensive cultural resources survey of Anadarko Petroleum Corporation's (Anadarko) proposed University Lands 19-7 B 2H Well Pad Project located in south-central Loving County, Texas (Project Area). The development of the Project Area will be privately funded and will not require any federal permitting or coordination. However, it is located on property owned by the University of Texas (UT). As UT is considered to be a political subdivision of the state, the undertaking falls under the regulations of the Antiquities Code of Texas (ACT). At the request of Whitenton Group, Inc. (Whitenton), Horizon conducted the cultural resources survey of the Project Area on behalf of Anadarko in compliance with the ACT. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites considered eligible for formal designation as State Antiquities Landmarks (SALs). The cultural resources survey was conducted under Texas Antiquities Committee (TAC) permit number 8326.

The Project Area consists of: 1) a drill pad measuring 3.4 acres in size; 2) an attached production pad measuring 1.4 acres in size; 3) an attached reserve pit measuring 0.4 acres in size; and 4) an access road totaling 1657.0 feet (505.2 meters [m]) in length and 30.0 feet (9.1 m) wide (1.1 acres). Overall, the Project Area totals approximately 6.3 acres situated entirely on UT Land.

The cultural resources survey of the Project Area resulted in entirely negative findings. No cultural materials were observed on the surface of the Project Area or within any of the 17 excavated shovel tests.

Based on the negative survey results, it is Horizon's opinion that the construction of the University Lands 19-7 B 2H Well Pad Project will have no adverse effect on significant cultural resources designated as or considered eligible for designation as SALs. Horizon therefore recommends that Anadarko be allowed to proceed with the construction of the proposed well pad project relative to the jurisdiction of the ACT.

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ACKNOWLEDGEMENTS

Horizon Environmental Services, Inc. (Horizon) conducted the intensive cultural resources survey of Anadarko Petroleum Corporation's (Anadarko) proposed University Lands 19-7 B 2H Well Pad Project reported herein in compliance with the Antiquities Code of Texas (ACT). Russell Brownlow served as the principal investigator for the project and lead author on this report. Jacob Lyons conducted the field investigations and was also responsible for drafting the figures.

1.0 INTRODUCTION

This document reports the results of an intensive cultural resources survey of Anadarko Petroleum Corporation's (Anadarko) proposed University Lands 19-7 B 2H Well Pad Project located in south-central Loving County, Texas (Project Area; Figures 1-1 and 1-2). The development of the Project Area will be privately funded and will not require any federal permitting or coordination. However, it is located on property owned by the University of Texas (UT). As UT is considered to be a political subdivision of the state, the undertaking falls under the regulations of the Antiquities Code of Texas (ACT). At the request of Whitenton Group, Inc. (Whitenton), Horizon Environmental Services, Inc. (Horizon) conducted the cultural resources survey of the Project Area on behalf of Anadarko in compliance with the ACT. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites considered eligible for formal designation as State Antiquities Landmarks (SALs).

The Project Area consists of: 1) a drill pad measuring 3.4 acres in size; 2) an attached production pad measuring 1.4 acres in size; 3) an attached reserve pit measuring 0.4 acres in size; and 4) an access road totaling 1657.0 feet (505.2 meters [m]) in length and 30.0 feet (9.1 m) wide (1.1 acres). Overall, the Project Area totals approximately 6.3 acres situated entirely on UT Land.

The cultural resources investigations consisted of an archival review, an intensive cultural resources survey of the Project Area, and the production of a report suitable for review by the State Historic Preservation Officer (SHPO) in accordance with the Texas Historical Commission's (THC) *Rules of Practice and Procedure*, Chapter 26, Section 27, and the Council of Texas Archeologists (CTA) *Guidelines for Cultural Resources Management Reports*. Russell Brownlow (Horizon's cultural resources director) served as the project's principal investigator, while Jacob Lyons (Horizon staff archeologist) conducted the field investigations. The cultural resources investigations were conducted under Texas Antiquities Committee (TAC) permit number 8326.

Horizon conducted the survey of the Project Area on 15 February 2018. This entailed intensive surface inspection and subsurface shovel testing across the surface of the Project Area. The Texas State Minimum Archeological Survey Standards (TSMASS) require a minimum of 2 shovel tests per acre for projects totaling between 3.0 and 10.0 acres in size.

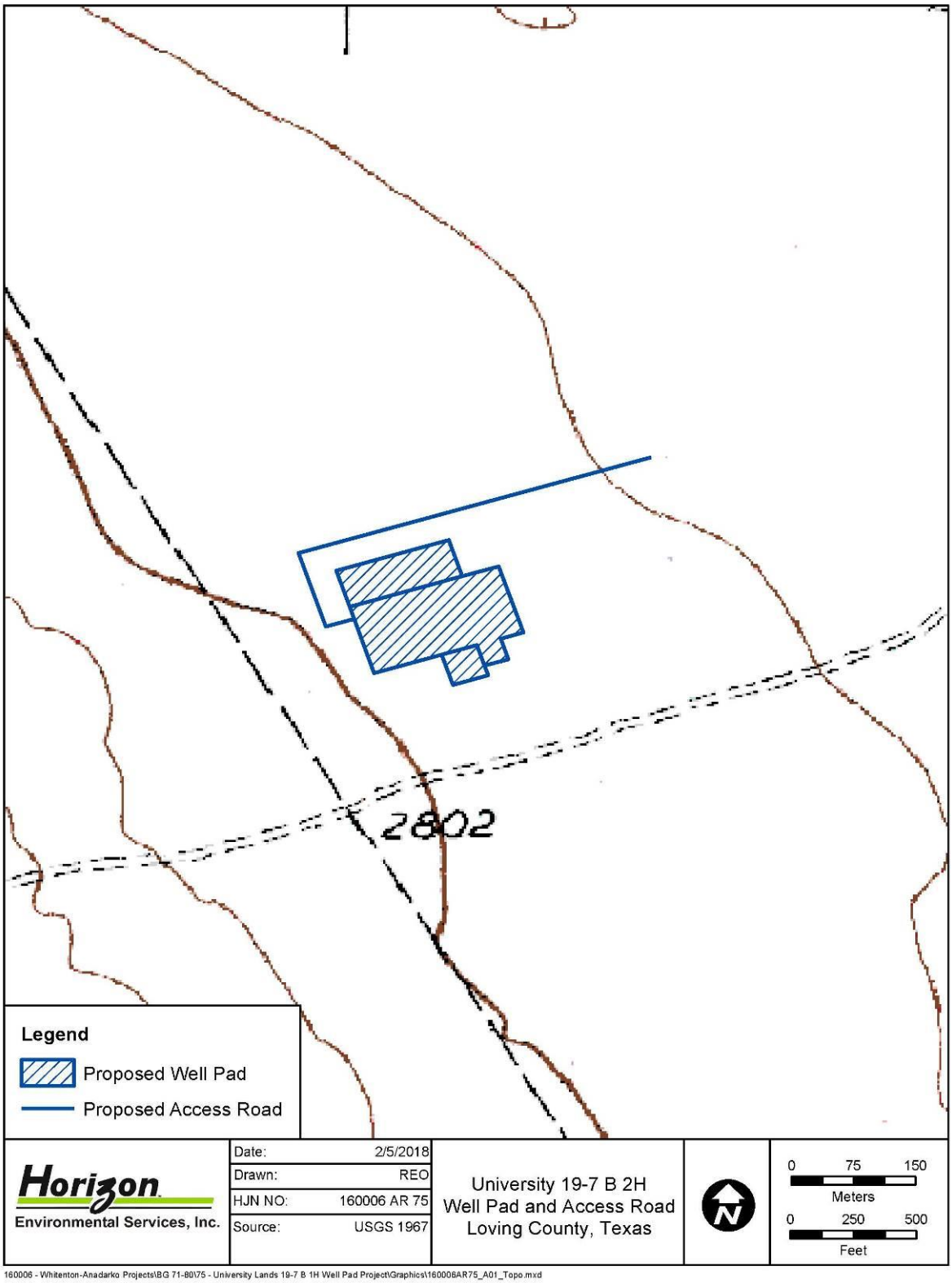

Figure 1-1. Topographic map with the location of the Project Area

Figure 1-2. Aerial photograph with the location of the Project Area

As the Project Area totals 6.3 acres, a minimum of 13 shovel tests were necessary within the Project Area in order to comply with the TSMASS. Horizon exceeded the TSMASS by excavating a total of 17 shovel tests across the Project Area.

The cultural resources survey of the Project Area resulted in entirely negative findings. No cultural materials were observed on the surface of the Project Area or within any of the 17 excavated shovel tests.

Based on the negative survey results, it is Horizon's opinion that the construction of the University Lands 19-7 B 2H Well Pad Project will have no adverse effect on significant cultural resources designated as or considered eligible for designation as SALs. Horizon therefore recommends that Anadarko be allowed to proceed with the construction of the proposed well pad project relative to the jurisdiction of the ACT. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during construction, use, or ongoing maintenance within the proposed well pad and access road, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the THC and UT should be notified of the discovery.

2.0 ENVIRONMENTAL SETTING

2.1 GENERAL PROJECT AREA DESCRIPTION

Anadarko's proposed University Lands 19-7 B 2H Well Pad Project is located in south-central Loving County, on the south side of County Road (CR) 247, approximately 8.3 miles (13.4 kilometers [km]) east of Mentone, Texas. It can be found on the US Geological Survey (USGS) 7.5-minute Soda Lake NW, Texas, topographic quadrangle map (see Figure 1-1). The Project Area consists of: 1) a drill pad measuring 3.4 acres in size; 2) an attached production pad measuring 1.4 acres in size; 3) an attached reserve pit measuring 0.4 acres in size; and 4) an access road totaling 1657.0 feet (505.2 m) in length and 30.0 feet (9.1 m) wide (1.1 acres). Overall, the Project Area totals approximately 6.3 acres situated entirely on UT Land. Representative images of the Project Area at the time of the cultural resources survey are presented in Figures 2-1 and 2-2.

2.2 PHYSIOGRAPHY AND HYDROLOGY

The Project Area is located in south-central Loving County in far West Texas. It is situated within an area of undulating desert hills dotted with numerous playa basins and unnamed drainages that are linked to Soda Lake and the Pecos River (see Figure 1-1). Elevations within the Project Area range between 2790.0 and 2800.0 feet (850.4 and 853.4 m) above mean sea level.

Hydrologically, the Project Area is situated within the Pecos River basin. It is drained to the east by overland sheet flow into a nearby playa basin.

2.3 CLIMATE

Winters in Loving County are generally cool, with an average temperature of 49.0 degrees Fahrenheit (°F). The summer months are hot, with an average temperature of 79.0°F. The average annual total precipitation is about 12.4 inches (31.5 centimeters [cm]), with roughly 70% of it falling between May and October (NRCS 1999).

Figure 2-1. View of well pad portion of Project Area, facing south

Figure 2-2. View of access road portion of Project Area, facing north

2.4 FLORA AND FAUNA

The Project Area is located in the Chihuahuan Biotic Province, which includes all of Trans-Pecos Texas except the Guadalupe Mountains (Blair 1950). Blair notes that portions of Culberson and the surrounding counties were once part of an old bolson now drained by the Pecos River. Also located within the Chihuahuan Basins and Playas of the Chihuahuan Deserts ecoregion, the Project Area is situated within geologic formations composed of sand sheet and caliche deposits (Griffith et al. 2007). Three native plant communities dominate the Chihuahuan Basins and Playas: saline flats and alkaline playa margins, gypsum land, and desert shrubland. The dominant species associated with the saline flats and alkaline playa margins plant community include *Atriplex canescens* (fourwing saltbush), *Suaeda* spp. (seepweed), *Salicornia* spp. (pickleweed), and *Sporobolus airoides* (alkali sacaton). The dominant species associated with the gypsum land plant community include *Bouteloua breviseta* (gypsum grama), *Mentzelia* spp. (blazingstar), and *Ephedra torreyana* (Torrey's jointfir). The dominant species associated with the desert shrubland plant community include *Larrea tridentata* (creosote bush), *Flourensia cernua* (American tarwort), *Yucca* spp. (yucca), *Artemisia filifolia* (sand sagebrush), *Acacia rigidula* (blackbrush), *Cylindropuntia leptocaulis* (Christmas cactus), *Agave lechuguilla* (lechuguilla), and *Leucophyllum frutescens* (cenizo) (Griffith et al. 2007).

2.5 SOILS

One soil type is mapped within the boundaries of the Project Area. This soil is presented in Table 2-1 (NRCS 1999) and in Figure 2-3.

Table 2-1. Soils mapped within the Project Area

Soil Name	Soil Type	Soil Depth (inches)	Setting
Sharvana fine sandy loam, nearly level (SHA)	Fine sandy loam	0 to 6: Fine sandy loam 6 to 16: Sandy clay loam 16 to 36: Indurated caliche 36 to 80: Extremely gravelly sandy loam	Level to gently sloping plains

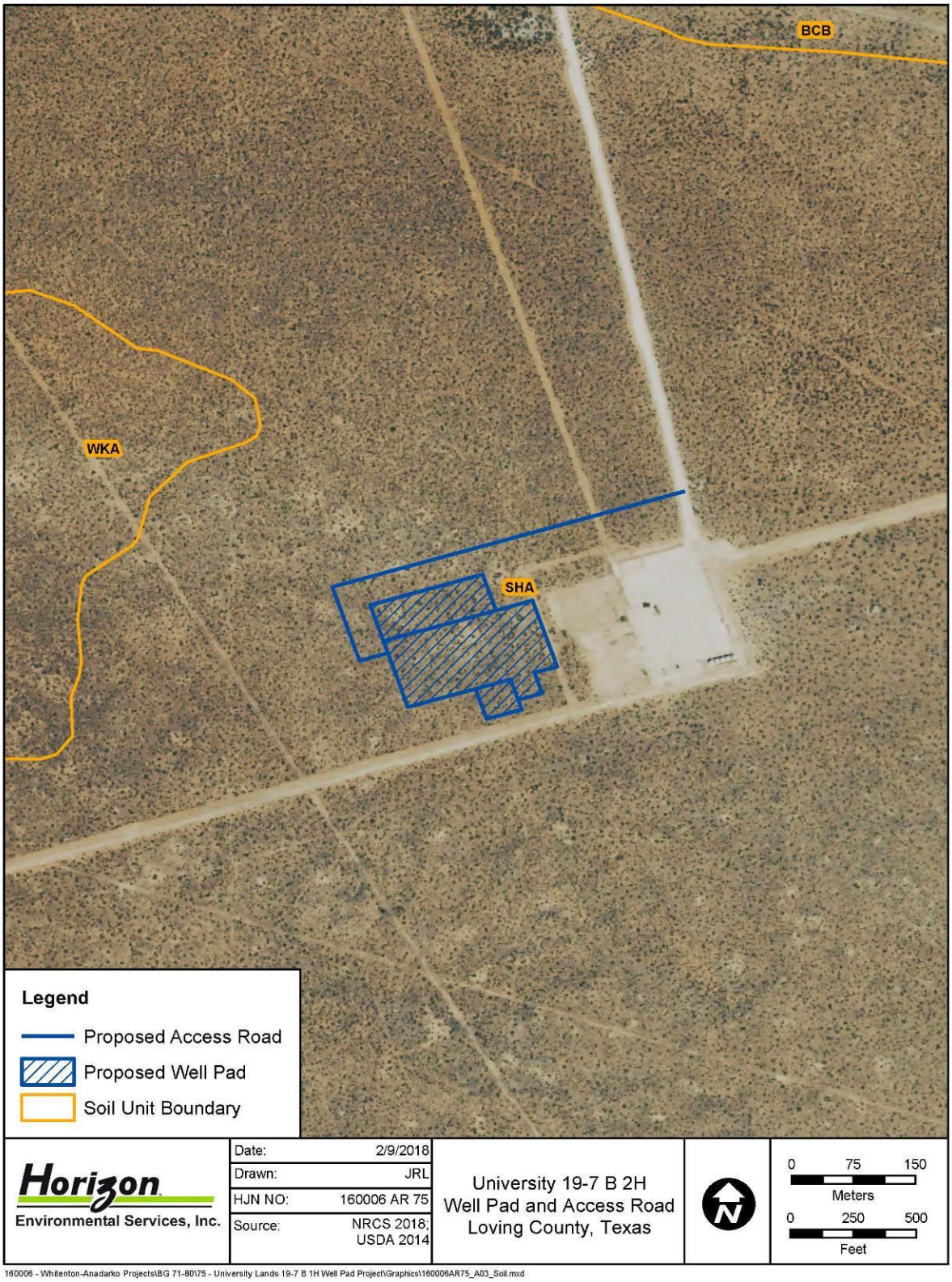

Figure 2-3. Soils mapped within the Project Area

3.0 CULTURAL BACKGROUND

The general temporal framework for most prehistoric archeological sites in Texas is based on the seriation of projectile point types originally established by Suhm et al. (1954) and later revised by Suhm and Jelks (1962), Prewitt (1981, 1985), and Turner and Hester (1999). This temporal framework, consisting of a tri-partite system based on technological changes in diagnostic artifacts that occurred as a result of indigenous adaptation to changing environments and subsistence strategies, is broken down into 3 main periods: the Paleoindian (pre-8500 B.P.), the Archaic (8500 to 1250 B.P.), and the Late Prehistoric (1250 to 250 B.P.). The Archaic period is further subdivided into the Early Archaic (8500 to 6000 B.P.), the Middle Archaic (6000 B.P. to 3500 B.P.), and the Late Archaic (3500 to 1250 B.P.).

3.1 PALEOINDIAN (PRE-8500 B.P.)

The Paleoindian period is characterized by highly mobile groups hunting over large areas. Although now-extinct megafauna such as mammoth and bison are often found associated with sites of this time period, smaller game, such as deer and turtles, were also likely utilized as food items. Undoubtedly, plant foods made up a portion of the diet as well. Based upon the low number of diagnostic artifacts recovered from sites of this period, as well as the low frequency of sites, population densities are considered low and probably consisted of small family groups. An increase in projectile point frequency toward the end of the period may suggest an increased population density or, perhaps, an increase in macro-band aggregation for the purpose of communal hunts. Sites from this time period are found mostly in upland tributary and spring settings, as well as deeply buried in floodplain alluvium. Clovis and Folsom points are indicative of Early Paleoindian occupations, while Plainview, Golondrina, Scottsbluff, Meserve, Eden, Dalton, San Patrice, and Angostura points are characteristic of the later span of the period.

3.2 EARLY ARCHAIC (8500 TO 6000 B.P.)

Like the Paleoindian period, Early Archaic population densities remained low, still consisting of small, mobile bands. However, a more generalized hunting-and-gathering strategy is evidenced by the use of river mussels. Early Archaic sites are typically located on terraces along tributary watercourses, but are also often found deeply buried in floodplain alluvium. Site locale and an increased use of river mussels possibly indicate a shift in subsistence strategies in order to exploit the bottomlands of major waterways during this period of wetter climates.

Split-stemmed points such as Gower, Martindale, and Uvalde, as well as Big Sandy, Hardin, and Hoxie, are diagnostic of Early Archaic occupations.

3.3 MIDDLE ARCHAIC (6000 TO 3500 B.P.)

During the Middle Archaic, the trend to bottomland exploitation increased, with fewer sites found along minor tributaries. Population density remained relatively low, but obviously increased over prior periods, with broad-spectrum hunting and gathering represented at larger sites where food sources were more abundant.

3.4 LATE ARCHAIC (3500 TO 1250 B.P.)

In contrast to earlier time periods, the Late Archaic represents a period of increased population and site density. Subsistence was focused on hunting and gathering within the bottomlands of major creeks and rivers. Deer remains are quite common at Late Archaic sites, and the exploitation of plant foods (nuts) seems to have increased during this period, based upon an increase in plant-processing tools. Late Archaic sites are typically found on sandy terraces along tributaries, as well as on clayey floodplains.

3.5 LATE PREHISTORIC I (1250 TO 250 B.P.)

The Late Prehistoric, in general, is characterized by the advent of the bow and arrow, as well as ceramics, in Texas. Hunting and gathering continued with an emphasis on deer and other small game. Horticulture also became evident in some areas. As in the Late Archaic, sites continue to be located on sandy terraces along major creeks and rivers. In fact, the majority of Late Prehistoric sites contain some traces of Late Archaic occupations. A marked population increase is highly evident, and increased territorial conflicts possibly explain the recovery of burials with indications of violent deaths. Furthermore, differentiated burial practices also suggest the development of non-egalitarian societies.

4.0 ARCHIVAL RESEARCH

4.1 DATABASE AND MAP REVIEW

Archival research conducted via the Internet at the THC's *Texas Archeological Sites Atlas* (Atlas) website indicated the presence of no previously recorded archeological sites or cemeteries within a 1.0-mile (1.6-km) perimeter of the Project Area (THC 2018). Similarly, a review of the National Park Service's (NPS) Nation Register of Historic Places (NRHP) Google Earth map layer indicated the presence of no historic properties listed on the NRHP within the review perimeter (NPS 2018). No documented cultural resources, including any listed on the NRHP or formally designated as SALs, are located within or immediately adjacent to the boundaries of the Project Area. Based on the Atlas database, no previous cultural resources surveys have been undertaken within the boundaries of the current Project Area.

The closest documented cultural resources to the Project Area is a prehistoric campsite. This site, 41WR1, is located approximately 5.7 miles (9.2 km) southeast of the Project Area in Winkler County, Texas.

4.2 PROBABILITY ASSESSMENT

Prehistoric archeological sites are commonly found in upland areas and on alluvial terraces near stream/river channels or drainages. Additionally, in this part of the state, they are often found in proximity to playa lake beds and dune blowouts. Based on the location of the Project Area on an elevated landform to the west of a playa basin, it was Horizon's opinion, prior to the field efforts, that there existed a moderate potential for undocumented prehistoric cultural deposits within the Project Area.

In regard to historic-era resources, the lack of visible structures in immediate proximity to the Project Area on the relevant topographic quadrangle maps suggested a decreased potential for historic-era standing structures or associated cultural deposits within the boundaries of the Project Area.

5.0 SURVEY METHODOLOGY

A Horizon archeologist completed the intensive pedestrian survey of the Project Area on 15 February 2018. This entailed intensive surface inspection and subsurface shovel testing across the surface of the Project Area. The TSMASS require a minimum 2 shovel tests per acre for projects totaling between 3.0 and 10.0 acres in size. As the Project Area totals 6.3 acres, a minimum of 13 shovel tests were necessary within the Project Area in order to comply with the TSMASS. Horizon exceeded the TSMASS by excavating a total of 17 shovel tests across the Project Area. All excavated matrices were screened through 0.25-inch (6.3-millimeter [mm]) hardware mesh or were trowel-sorted if the dense clay soils prohibited successful screening.

Field notes were maintained on terrain, vegetation, soils, landforms, shovel tests, cultural material observed (if any), etc. Standardized shovel test forms were completed for every shovel test. These forms included location data, depth, soil type, and notations on any artifacts encountered. For any new archeological sites recorded, standard site forms were completed and filed at the Texas Archeological Research Laboratory (TARL) for permanent housing. Similarly, for any previously recorded archeological sites that were assessed, updated site forms were completed and filed at the TARL.

A selective collection strategy was utilized during the survey efforts wherein only diagnostic cultural materials were to be collected for eventual curation at an approved facility. Non-diagnostic artifacts were to be tabulated and assessed in the field and placed back where they were found. Digital photographs with a photo log were completed as appropriate. The locations of all shovel tests were recorded via handheld GPS units utilizing the Universal Transverse Mercator (UTM) coordinate system and the North American Datum of 1983 (NAD 83). Shovel test locations are presented in Figure 5-1. Shovel test data are presented in Appendix A.

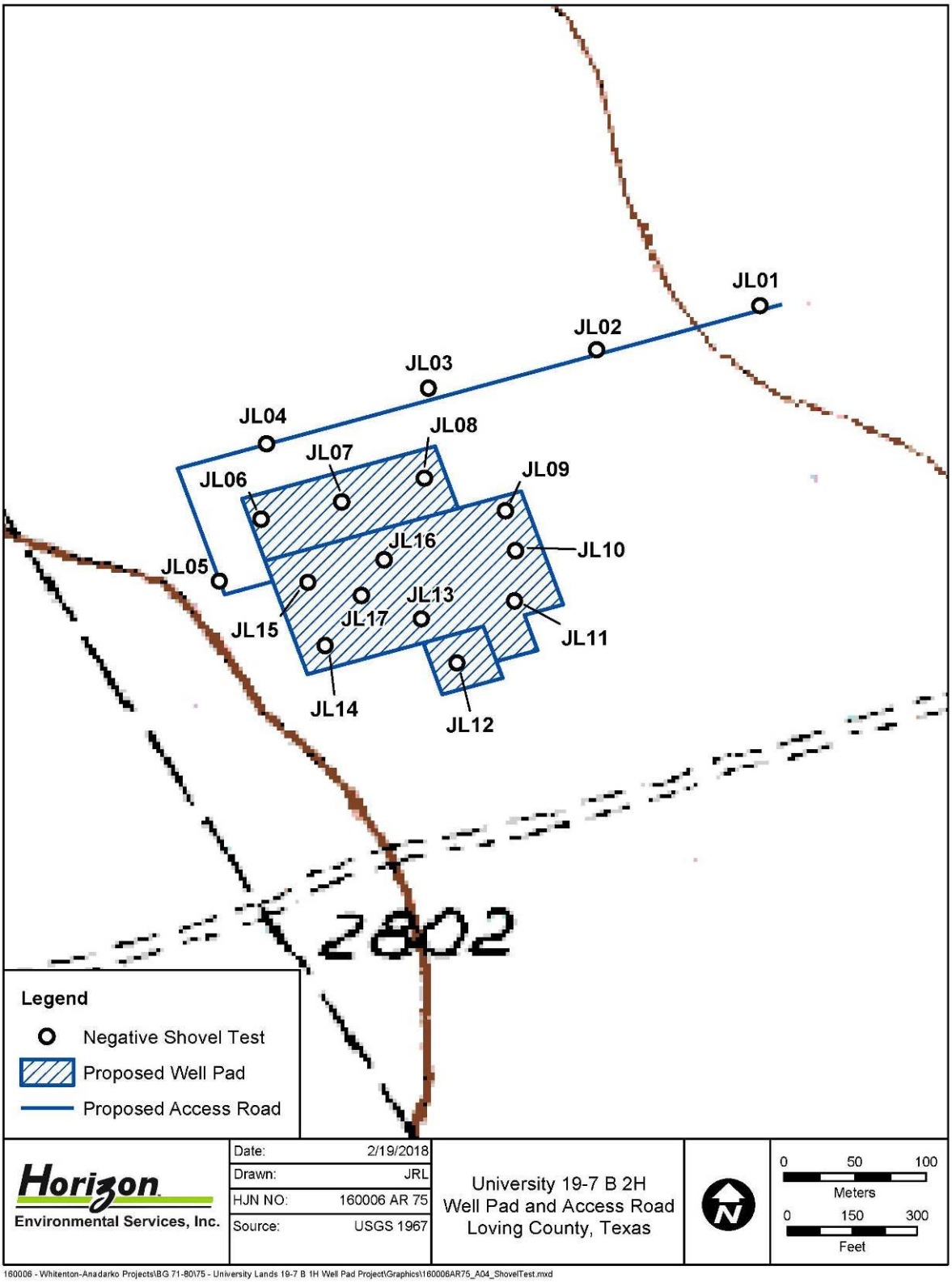

Figure 5-1. Shovel test locations within Project Area

6.0 RESULTS AND RECOMMENDATIONS

6.1 RESULTS

On 19 January 2016, Horizon conducted an intensive cultural resources survey of Anadarko's proposed University Lands 19-7 B 2H Well Pad Project located in south-central Loving County, Texas. The development of the Project Area will be privately funded and will not require any federal permitting or coordination. However, it is located on property owned by UT. As UT is considered to be a political subdivision of the state, the undertaking falls under the regulations of the ACT. At the request of Whitenton, Horizon conducted the cultural resources survey of the Project Area on behalf of Anadarko in compliance with the ACT. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites considered eligible for formal designation as SALs. The cultural resources survey was conducted under TAC permit number 8326.

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The cultural resources survey of the Project Area resulted in entirely negative findings. No cultural materials were observed on the surface of the Project Area or within any of the 17 excavated shovel tests.

6.2 RECOMMENDATIONS

Based on the negative survey results, it is Horizon's opinion that the construction of the University Lands 19-7 B 2H Well Pad Project will have no adverse effect on significant cultural resources designated as or considered eligible for designation as SALs. Horizon therefore recommends that Anadarko be allowed to proceed with the construction of the proposed well pad project relative to the jurisdiction of the ACT. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during construction, use, or ongoing maintenance within the proposed well pad project, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the THC and UT should be notified of the discovery.

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(USGS) US Geological Survey

1967 7.5-minute series topographic map, Soda Lake NW, Texas, quadrangle.

APPENDIX A:

SHOVEL TEST DATA

Table A-1. Shovel Test Summary Data

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JL01	646399	3508591	0-20	Reddish-brown fine gravelly silt	None
			20+	Limestone bedrock	None
JL02	646302	3508559	0-25	Pale reddish-brown fine gravelly silt	None
			25+	Limestone bedrock	None
JL03	646201	3508531	0-35	Pale reddish-brown fine gravelly silt	None
			35+	Limestone bedrock	None
JL04	646104	3508490	0-100+	Pale reddish-brown fine gravelly silt	None
JL05	646077	3508393	0-20	Pale reddish-brown fine gravelly silt	None
			20+	Decaying limestone bedrock	None
JL06	646101	3508437	0-60	Pale reddish-brown fine gravelly silt	None
			60+	Decaying limestone bedrock	None
JL07	646150	3508450	0-85	Reddish-brown gravelly loamy silt	None
			85+	Decaying limestone bedrock	None
JL08	646199	3508467	0-35	Reddish-brown gravelly loamy silt	None
			35+	Decaying limestone bedrock	None
JL09	646248	3508445	0-90	Pale reddish-brown fine gravelly silt	None
			90+	Decaying limestone bedrock	None
JL10	646255	3508417	0-60	Pale reddish-brown fine gravelly silt	None
			60+	Decaying limestone bedrock	None
JL11	646255	3508382	0-70	Pale reddish-brown fine gravelly silt	None
			70+	Decaying limestone bedrock	None
JL12	646221	3508337	0-30	Reddish-brown fine gravelly silt	None
			30+	Decaying limestone bedrock	None
JL13	646199	3508368	0-30	Reddish-brown fine gravelly silt	None
			30+	Decaying limestone bedrock	None
JL14	646141	3508349	0-100+	Reddish-brown fine gravelly loamy silt	None
JL15	646130	3508393	0-50	Pale reddish-brown fine gravelly silt	None
			50+	Decaying limestone bedrock	None
JL16	646176	3508409	0-50	Pale reddish-brown fine gravelly silt	None
			50+	Decaying limestone bedrock	None
JL17	646163	3508384	0-60	Pale reddish-brown fine gravelly silt	None
			60+	Decaying limestone bedrock	None

[1] All UTM coordinates are located in Zone 14 and utilize the North American Datum of 1983 (NAD 83)

cmbs = Centimeters below surface

ST = Shovel test

UTM = Universal Transverse Mercator