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Joel Butler

Katherine Seikel

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AmaTerra ENVIRONMENTAL, INC.

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Principal Investigator

Prepared for:

**AECOM and The Department of Energy**

Antiquities Permit No. 8007

December 1, 2017

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Technical Report No. 226

Prepared by

AmaTerra® ENVIRONMENTAL, INC.

Austin, Texas

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Cover Photograph: *Feature 6 at site 41PC818.*



4009 Banister Lane, Suite 300
Austin, Texas 78704

AmaTerra Project No. 182-011B

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# Abstract

In May 2017, AmaTerra Environmental, Inc. (AmaTerra) conducted an archeological resource survey of a proposed deep borehole drill site in Pecos County, Texas. The project area was located on University of Texas land and included a 12,700-foot access road to be regraded, three potential powerline extensions measuring 6,000 to 6,500 feet each, and a 320-acre circular buffer zone surrounding the borehole, 20 rectangular acres of which were to be utilized as a lease area by the Department of Energy for the drill site. The total area surveyed for the project was 414 acres.

Following survey, the project was abandoned. This report is presented to the Texas Historical Commission to satisfy the requirements set forth in the Antiquities Code of Texas.

Archeological investigations, conducted under Texas Antiquities Permit No. 8007, consisted of a pedestrian survey and the manual excavation of three shovel tests within the Area of Potential Effect (APE). Field archeologists observed some landscape modifications resulting from construction of ranch roads, excavation of a small quarry, and a dam. Five new archeological sites (41PC817, 41PC818, 41PC819, 41PC820, and 41PC823) and one isolated find are located within the surveyed area. Sites 41PC820 and 41PC823 are recommended as not eligible for listing in the National Register of Historic Places (NRHP) or as State Antiquities Landmarks (SAL). Sites 41PC817, 41PC818, and 41PC819 are recommended as having unknown eligibility for listing in the NRHP or as SALs and requiring testing and further research to make a determination. Should impacts to these sites be proposed in the future, AmaTerra recommends testing and/or mitigation prior to construction. However, due to the cancellation of the proposed project, there is no APE, no undertaking, and no construction impacts are anticipated.

All collected artifacts, and documents and photographs generated during this survey will be permanently curated at the Texas Archeological Research Laboratory in Austin.

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# 1 INTRODUCTION AND PROJECT DESCRIPTION

In May 2017, AmaTerra Environmental, Inc. (AmaTerra) conducted a cultural resources survey of a proposed deep borehole drill site located 18 miles east of Fort Stockton in north-central Pecos County, Texas. The surveyed project area is located on approximately 414 acres currently owned by the University of Texas (**Figure 1-1**). Following archeological survey, the project was cancelled by the Department of Energy and no construction is currently planned for the project. The project is located in the northeastern Chihuahuan Desert in arid country with sparse ground cover as seen in **Figure 1-2**.

Although the undertaking was cancelled, the following project description provides context for the survey and the methodologies used during fieldwork.

The Area of Potential Effects (APE) for archeological resources was defined as the footprint of the proposed project to the maximum depth of proposed impacts, including all easements and project-specific staging locations. Thus, the APE for archeological resources consisted of a 320-acre circular area surrounding a 20-acre lease for the proposed deep borehole drill site, 2.4 miles of proposed access road improvements (with surveyed areas of 100 feet on each side) and 3.5 total miles of three proposed powerline access routes to the site, totaling 414 acres of surface APE. The vertical APE for this project was generally less than three feet except for the power pole locations and the area immediately surrounding the proposed drill site.

Because the undertaking was proposed by a federal agency on land owned by the University of Texas (a state-owned university), the archeological investigation was conducted pursuant to the Antiquities Code of Texas. In addition, although no federal lands were part of the undertaking, the project would have possibly required individual permits or preconstruction notifications under Section 106 of the National Historic Preservation Act. Therefore, the archeological resource survey was intended to provide compliance with both State and Federal regulations.

Archeological investigations consisted of a pedestrian survey, and selective shovel testing of the entire former APE. Field investigations took place May 1-4, 2017 under Texas Antiquities Permit No. 8007. Joel Butler acted as Principal Investigator and Katherine Seikel, Amy Goldstein, and Steven Schooler served as field archeologists. A total of 168 person hours were expended in the field in support of this project. Artifacts were recorded and/or collected during this survey, and all collected artifacts will be curated with field documentation and photographs at the Texas Archeological Research Laboratory (TARL).

This report is divided into five chapters. The project background and cultural overview are discussed in Chapter 2, and Chapter 3 includes the field methodology. The results of field investigations are discussed in Chapter 4 and Chapter 5 presents the summary and recommendations.

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cultural materials

**Figure 1-1**

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**Figure 1-2**

# 2 PROJECT BACKGROUND

## 2.1 Environmental Setting

The project area is located within the Chihuahuan Deserts ecoregion of the Trans-Pecos (Omernik and Griffith 2013; Stahl and McElvaney 2012). Typical Trans-Pecos landforms include mesa tops, talus slopes, valley flats, and canyon washes (Stahl and McElvaney 2012). The region of West Texas can be quite diverse, and contains north to south oriented mountain ranges separated by internal drainage basins, or bolsons. It is characterized by a semiarid climate with a dominance of stunted xerophytic vegetation. Pecos County exhibits a terrain consisting of tabletop mesas and wide-open prairies. Tributaries associated with the nearby Pecos River and scattered artesian springs have created erosional draws and featureless outwash plains. This vast landscape comprises an ecological transition zone at the junction of the high and rolling plains in the north, the Edwards Plateau in the east, the scrub-brush country in the south, and the Chihuahuan Desert's mountain basins in the west.

### 2.1.1 Vegetation, Hydrology, and Climate

Arid Chihuahuan Desert vegetation typically includes grassland and shrub-land, but can include conifer and hardwood forest flora at high elevations (Omernick and Griffith 2013). Vegetation common to the Chihuahuan Desert include creosotebush, tarbush, fourwing saltbush, blackbrush, gyp grama, alkali scaton, honey mesquite, red berry juniper, prickly pear cactus, ocotillo, stool, and other desert shrubs and cacti (Omernik and Griffith 2013; Stahl and McElvaney 2012). The majority of the precipitation in this area occurs in the summer months during brief thunderstorms (Omernik and Griffith 2013; Stahl and McElvaney 2012). The average annual rainfall is thirteen inches. Temperatures range from an average low of 31° F in January to an average high of 96° F in July.

### 2.1.2 Geology and Soils

An examination of USDA Natural Resources Conservation Service (USDA-NRCS; 2017) database soil maps for Pecos County reveals that soils within the APE consist of the Lozier, Reakor, and Upton associations (**Figure 2-1**). Lozier soils are typical of rocky uplands and have 10 centimeters or less of gravelly loam before encountering lithic bedrock. Upton (gravelly clay loam) and Reakor (silty clay loam) soils occur on gently sloping alluvial fans. Upton soils contain cemented caliche below 35 centimeters while Reakor soils generally extend below one meter. According to the Geologic Map Database of Texas, underlying geology consists of Lower Cretaceous limestone of the Fredericksburg group (corresponding to Lozier soils), Pleistocene-age gravelly fan alluvium (Upton soils), and Holocene-age silty fan alluvium (Reakor soils; USGS 2007).

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cultural materials

**Figure 2-1**

## 2.2 Regional Chronology and Cultural Background

The project area is situated within the Trans-Pecos archeological region, characterized by its numerous natural rock shelters formed in limestone canyons and cliffs, as well as its ubiquitous raw lithic outcrops and isolated micro-environments near artesian springs. Offering protection from the elements, rockshelter localities were consistently attractive to hunter-gatherers, and from an archeological standpoint, they create ideal conditions for the preservation of burned rock middens, organic materials, burials, and petroglyphic and pictographic rock art.

Three major intervals or periods are identified in the Prehistoric stage: the Paleoindian, the Archaic, and the Late Prehistoric. Once a culture chronology for this region of Texas has been summarized, a brief overview of archeological work in proximity to the project area will be provided.

### 2.2.1 Paleoindian Period

The arrival of humans in the New World occurred between 16,000 and 14,500 years before present (BP; Gilbert et al. 2008, Pitblado 2011), and until recently, it was generally thought that the Paleoindian Period in Texas did not begin until around 12,000 BP (Perttula 2004). However, new evidence from the Debra Friedkin and Gault sites in Central Texas have begun to push the date of earliest occupation back to around 15,000 BP (Swaminathan 2014; Gault School 2016). Generally, there is a lack of radiocarbon dates from unambiguous Paleoindian contexts in Trans-Pecos. Therefore, the Paleoindian Period in the Trans-Pecos Region is currently estimated to range from 12,000 to 8,000 BP (Miller and Kenmotsu 2004).

As the Pleistocene ended, diagnostic Paleoindian materials in the form of Clovis, Folsom, and Plainview projectile points began to enter the archeological record. These points were lanceolate-shaped and fluted for hafting to wooden spears. Using the launching momentum from atlatls (spear-throwers), large game such as mammoth, mastodons, bison, camel, and horse were frequently taken (Black 1989). In addition to large game, Paleoindian groups also harvested smaller prey including antelope, turtle, frogs, and other small to medium-sized game (Miller and Kenmotsu 2004). Stylistic changes in projectile point technology occurred during this later portion of the period, eventually shifting to Dalton, Scottsbluff, and Golondrina traditions. Environmental studies suggest that Late Pleistocene climates were wetter and cooler (Mauldin and Nickels 2001; Toomey et al. 1993), gradually shifting to drier and warmer conditions during the Early Holocene (Bousman 1998). The end of the Pleistocene was likely arid to semiarid, and prickly pear and agave populations were high (Bousman et al. 1990:94, 98). As megafauna gradually died off and the ranges of other large game changed during the shift to a warmer climate, subsistence patterns shifted toward smaller game and plant foraging. Intact Paleoindian occupations in the Trans-Pecos region are somewhat rare and consist mostly of kill sites found near rockshelters (Turpin 1995), or isolated projectile points within multicomponent scatters (Miller and Kenmotsu 2004, Seebach 2001).

### 2.2.2 Archaic Period

The Archaic Period exhibited a shift from more mobile hunting strategies to a heavier reliance on a broader spectrum of local plants and animals, and broadly dates to 8,000 to 1,800 BP (Miller and Kenmotsu 2004). During the Archaic the construction of pithouses and huts occurred in the western Trans-Pecos Region, and rockshelters were more intensively utilized everywhere, leading to an increase

in rock art (Miller and Kenmotsu 2004). The Late Archaic in the Trans-Pecos is the best understood sequence, and current data suggest that a population increase took place with a heavier reliance on specialized food processing and the introduction of small-scale agriculture in some locations (Miller and Kenmotsu 2004). Common site types of this period include large burned rock middens, which tend to be exposed on mesa tops overlooking canyons and water sources.

Mallouf (1985: Figure 14) has summarized chronologies unique to the Trans-Pecos, and it was refined further into ten prehistoric periods and a phase by Turpin (1995). Some overlap in projectile point technologies is shared between the Trans Pecos and Central Texas. Hester (1995:436–438) places the Early Archaic in neighboring Central Texas between 7,950 and 4,450 BP based on Early Corner Notched and Early Basal Notched projectile points. Collins' (1995:383) dating of the Early Archaic period to 8,800–6,000 BP is founded on unstemmed point types. Middle Archaic materials date from about 6,000 to 4,000 BP (Collins 1995:383). The last subperiod of the Archaic falls between 4,000 and 800 BP (Collins 1995:384).

### 2.2.3 Late Prehistoric Period

The commonly held date for the beginning of this period is 1,800 BP with the transition to the bow and arrow (Hester 1981:122). This technology enabled prehistoric hunters to harvest prey from greater distances with a lesser need for brushless, wide open spaces required for atlatl maneuverability. The use of arrows is indicated by smaller-sized, triangular projectile points. Another turning point in the Late Prehistoric period is the first substantial presence of pottery (Miller and Kenmotsu 2004). Trans-Pecos sites dating to the Late Prehistoric suggest a continued reliance on rockshelters, but also show up in the form of tipi rings, cairn burials, and pit houses built along water source terraces (Miller and Kenmotsu 2004). Perdiz arrow points, groundstone implements, beveled bifacial knives, end-notched sinker stones, and ornamental beads add more diversity to the archeological record during this interval.

It is also important to recognize temporal variation in the adoption of certain technologies and practices in the Late Prehistoric Period. Dates in the eastern Trans-Pecos show that the adoption of ceramics, small-scale agriculture, and architectural forms (e.g. pithouses, huts/wickiups) around 1,000 BP was significantly later than their development farther west (Miller and Kenmotsu 2004). Pueblo structures also developed earlier and were more common in the western Trans-Pecos. Ring middens, hearthfields, lithic scatters, and wickiup rings remained the most common site types in the eastern Trans-Pecos (Miller and Kenmotsu 2004).

### 2.2.4 Historic Period

Beginning in the late 1500s, Europeans entered Central Texas only sporadically, and did not settle there until around 1700 (Webb 1952). The first European contact comes with the arrival of Alva Nuñez Cabeza de Vaca and the remaining survivors of the Narvaez expedition in 1528. Between 1528 and the late 1600s, Spanish excursions into the Texas territory were limited, but Spanish records described a number of Native American tribes like the Coahuiltecans. They were described as family units of hunter gatherers that resided near streams and springs, whose camps were revisited on a seasonal basis (Campbell 1983:349–351). By the mid-1700s, the Comanche had begun entering the Pecos from the north, following the buffalo migrations. Efficiency on horseback allowed them to displace numerous native groups and control trade and prime hunting grounds. In 1821, Spain lost control of most of its North American

territories when it recognized the independence of Mexico. Anglo settlement in Texas soon followed in the 1830s when Stephen F. Austin's colonists were allotted impresario contracts by the newly formed Mexican government. After the fight for Texas Independence, independent Republic of Texas prospered for ten years, eventually joining the United States in 1845. The threat of Indian hostility was still present, particularly the feared Comanche Trail which crossed Pecos County from Horsehead Crossing to Comanche Springs. In order to safeguard travelers from Indian attack and to protect the San Antonio-El Paso Mail route, the United States Army established Fort Stockton in 1859. Named after the Pecos River, the county was formally organized on March 9, 1875, at St. Gall, which became the county seat. Ranching dominated the local economy for decades. The Kansas City, Mexico and Orient Railway Company of Texas was laid across Pecos County in 1913 and contributed greatly to the region's economy. After the hardships of the Great Depression, petroleum and natural gas production, coupled with popular tourist attractions in the region, enabled the county's economy to recover.

## 2.3 Land Modifications and Historical Land Use

The surveyed property passed from the ownership of the State of Texas directly to the University of Texas in 1876 (Ramos 1999). Land use at the survey area has primarily consisted of cattle ranching and the resulting land modifications have been largely limited to erosion from overgrazing. Additionally, quarrying for caliche road material has taken place adjacent to the surveyed access road, though on a small scale involving approximately 2.5 acres.

## 2.4 Previous Archeological Investigations

Background research for this project consisted of an online records search through the THC's Archeological Sites Atlas (Atlas). Research focused on the identification of archeological sites, Registered Texas Historic Landmarks (RTHLs), sites listed on the National Register of Historic Places (NRHP), sites listed as State Antiquities Landmarks (SALs), cemeteries, and previously conducted archeological surveys within one kilometer (0.62 mile) of the APE. According to the Atlas (2017), there are no previously recorded archeological sites or previously conducted archeological surveys conducted within one kilometer (0.62 mile) of the APE.

The closest survey was a 2010 Survey by TAS, Inc. for the Public Utilities Commission of Texas 7.5 kilometers west of the project area (Atlas 2017).

No archeological sites are on record within one kilometer of the project area. The closest documented sites are located approximately 3.6 kilometers to the west:

- Site 41PC681 is a prehistoric open campsite documented by Solveig Turpin in 2010. The site consists of an exposed one-meter wide hearth eroding from an arroyo with burned rock surrounding the feature in the arroyo bottom. No diagnostic tools were identified with the feature. No recommendations were made as to eligibility for listing in the National Register of Historic Places (NRHP) or as a State Antiquities Landmark (SAL), but the presence of buried datable materials presumes some potential.
- Site 41PC682 is another prehistoric open campsite recorded in 2010 by Solveig Turpin 300 meters south of 41PC681. The site consists of three one-meter wide hearths exposed in a 10-

meter stretch of road and fence line. Once again while no recommendations were made for NRHP or SAL eligibility, the presence of buried datable material suggests potential.

Both sites were in a similar setting to the project area. Sites of this type within the region are typically artifact poor and most likely represent single-use or short term occupations indicative of mobile hunter-foragers.

# 3 METHODOLOGY

Prior to the field investigations, archeologists conducted archival research to assess the potential for buried or near-surface historic archeological materials. This research involved examining historical maps and aerial photographs. Archeologists consulted soils and the *Atlas* to assess the potential for prehistoric archeological sites within the APE. Consulting these resources not only allowed investigators to determine the presence of previously recorded archeological sites within the APE, but also to gain a sense of site types (e.g., historic or prehistoric), artifact types, and average depth of cultural material below the surface, among other things.

The survey consisted of a pedestrian archeological survey involving careful examination of the ground surface and existing subsurface exposures. Surface inspection within the 320-acre circular area was carried out in 15-meter (50 foot) east-west transects. Along the access road and proposed powerline alternative routes, two transects were carried out, providing an effective survey area 60 meters (200 feet) in width and allowing for minor design changes within that area of coverage. All survey areas were preloaded onto handheld GPS units, which each member of the crew used to record isolated finds and other items of interest.

Sites were defined by the presence of more than one artifact type or features being present. Once sites were located, features were recorded and photographed. All site locations were recorded using a Trimble GeoXT submeter GPS unit. Isolated finds were recorded using a handheld GPS unit.

Because the project area had near 100-percent surface exposure, shovel testing was not implemented as an exploratory tactic, but was planned should a prehistoric archeological site show potential for buried deposits. In that instance, archeologists were to excavate up to six shovel tests within the site to assist in delineation and assessment for NRHP or SAL eligibility.

All site tests were manually excavated in 20-centimeter levels up to 80 centimeters below the surface, or to the pre-cultural deposits, whichever was higher. Tests were 30 centimeters in diameter and all excavated sediments were screened through ¼-inch mesh; artifacts were field inventoried and collected. The locations of all shovel tests were recorded using a hand-held GPS receiver.

All collected materials and field generated notes produced during the investigation will be permanently housed at the Texas Archeological Research Laboratory (TARL) in Austin.

# 4 RESULTS

AmaTerra archeologists Joel Butler (Principal Investigator), Katherine Seikel, Amy Goldstein, and Steven Schooler surveyed the Project Area through visual inspection and selective shovel testing May 1-4, 2017. No difficulties were encountered during fieldwork. Conditions were excellent with mild weather and clear skies.

Vegetation within the project area was found to contain scattered creosote bushes (**Figure 4-1)**, isolated thickets of mesquite (along washes and in low areas), Texas persimmon (along escarpment edges), Spanish dagger, soap tree yucca, ocotillo, prickly pear, cholla, and various barrel-type cactuses. Wildlife observed in the project area included a variety of songbirds and birds of prey, jackrabbits, cotton tails, mule deer, greater short horned lizard, Texas horned lizard (**Figure 4-2**), diamond back rattlesnake (**Figure 4-3**), and desert millipede. Because the land is leased by the University of Texas to ranchers, a small herd of cattle was observed frequently moving throughout the project area.

The following archeological survey results are divided into three sections: the 320-acre circular Borehole APE, the three alternative powerline route APEs, and the access road APE.

FIGURE 4-1. Typical view of the project area with scattered creosote, south end of 320-acre borehole APE facing south.

FIGURE 4-2. Texas horned lizard observed in 320-acre borehole APE.

FIGURE 4-3. Diamondback rattlesnake sheltering under a limestone ledge adjacent to proposed powerline routes.

## 4.1 Borehole 320-Acre APE Survey Area Results

The 320-acre circular borehole APE (**Figure 4-4**) was surveyed in 15-meter East-West transects, including the portions of access road and powerline alternatives inside that area. This area was generally featureless and flat to gently sloping with mostly open areas and several small thickets of mesquite brush. Surface visibility within the 320-acre area was approximately 90 percent. Disturbances observed were limited to erosion from roads and cattle-grazing. The entire landform is in the process of actively deflating by wind and water erosion, thus exposing archeological features at the surface.

*Site 41PC823*

One site, 41PC823, was encountered over about one-third of the 320-acre area (**Figure 4-5**). Site 41PC823 is a 93-acre scatter of hearths in varying stages of deflation. Twenty features were documented, including 15 fire-cracked rock (FCR) scatters and five mostly intact hearths (**Figure 4-6; Table 1**). None of the hearths or FCR concentrations contained charcoal staining or observable flecks, most likely due to the erosion of lighter materials away from the features during deflation. The FCR concentrations are most likely the deflated and scattered remains of previously intact hearths. Within the site, two tertiary chert flakes were the only non-FCR artifacts encountered. Isolated hearths and their scattered remains are numerous across the regional Trans-Pecos landscape, though rarely containing anything more than burned rock fragments. Due to the isolated nature and limited to non-existent assemblage associated with these sites, Turpin (2010:12) suggests that this type of site represents "…short-term camping episodes during forays to harvest plant foods." While the site contains numerous relatively intact hearths, it is unlikely that subsurface deposits are present due to erosion and deflation of the surface. Based upon the lack of datable materials or intact deposits, site 41PC823 is recommended as not eligible for listing in the NRHP or as an SAL.

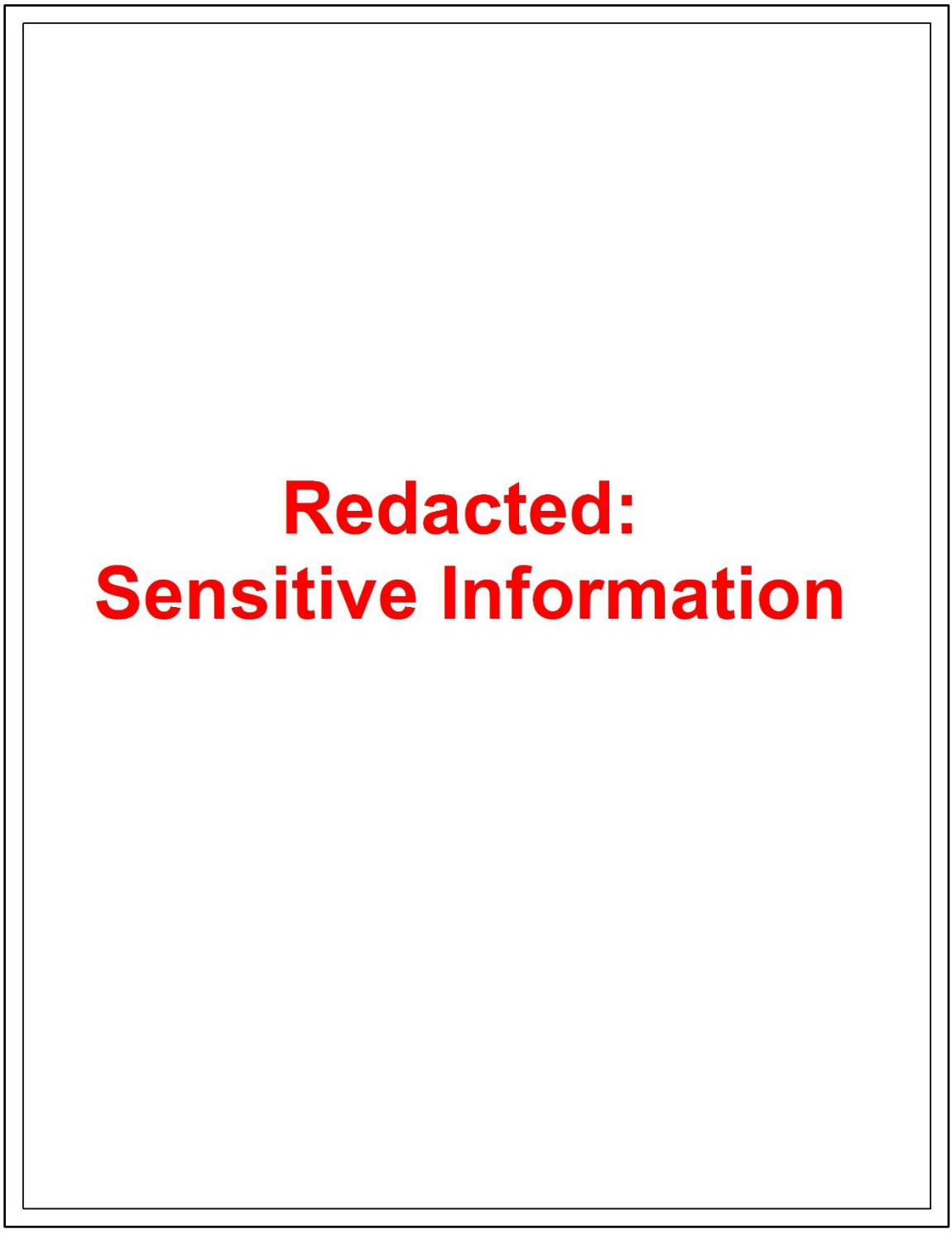


FIGURE 4-4. Survey results, 320-acre borehole APE.

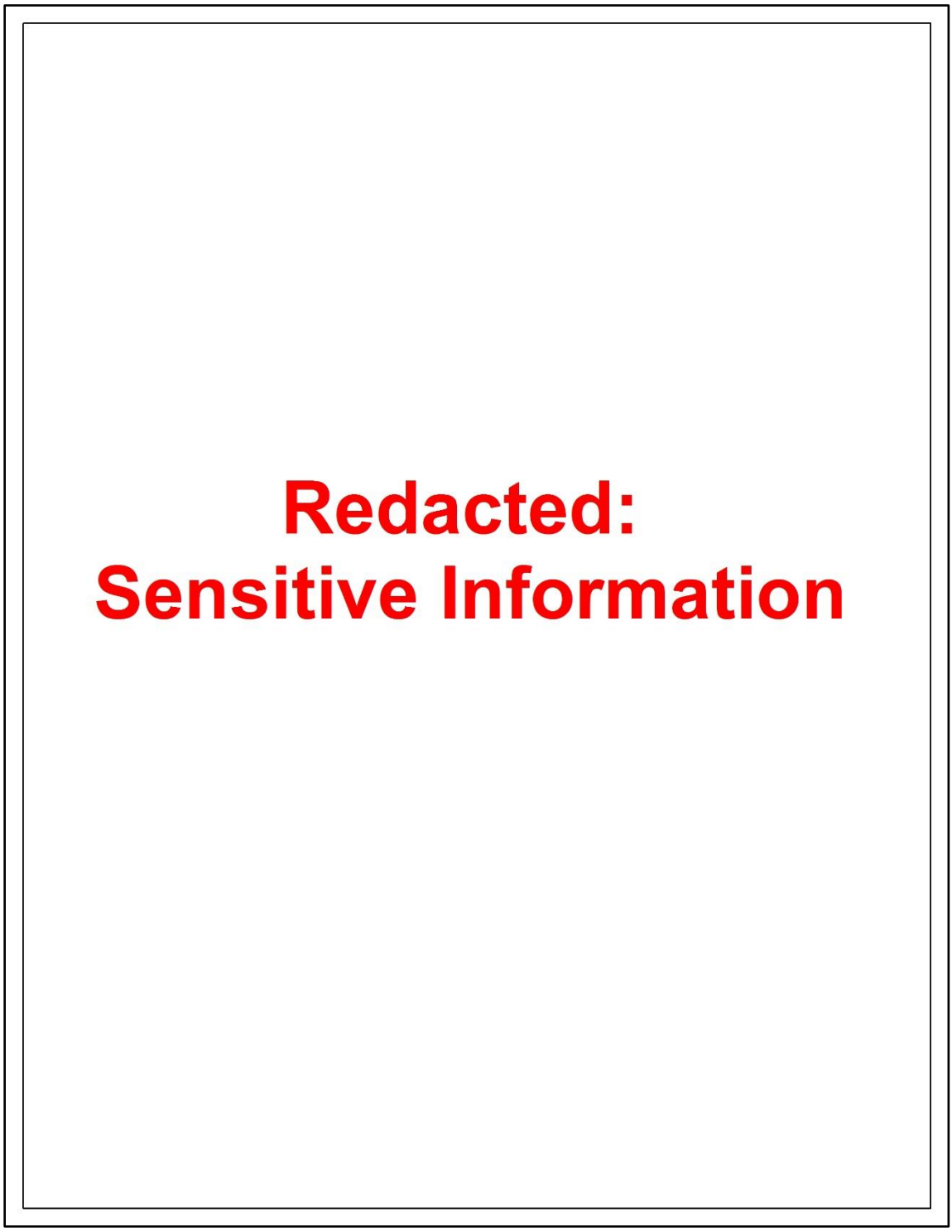


FIGURE 4-5. 41PC823 site map.

FIGURE 4-6. Typical hearth feature (Feature 2) from site 41PC823.

**TABLE 4-1. Site 41PC823 Features.**

| Feature | Type | Dimension | FCR Count (Approx.) | FCR range (cm) | Description |
|---|---|---|---|---|---|
| 1 | FCR Concentration/ Dispersed Hearth | 50 centimeters | 10 | 5 to 15 | |
| 2 | Hearth | 1.3 meters | 50 | 5 to 25 | Tightly clustered. |
| 3 | Hearth | 70 by 130 centimeters | 25 | 5 to 20 | Small cluster with few FCR. |
| 4 | Hearth | 1 meter | 30 | 10 to 15 | |
| 5 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 6 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 7 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 8 | Hearth | 1 meter | 30 | 5 to 15 | Eroded and sitting atop gravel. |
| 9 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparse scatter of less than 50 limestone FCR |
| 10 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 11 | FCR Concentration/ Dispersed Hearth | >10 meters | 100 | 5 to 25 | Two dispersed clusters FCR. |
| 12 | Hearth | 12 meters | 50 | 5 to 20 | Cluster in 2x3-meter area, sparsely scattered beyond. |
| 13 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 14 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 15 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 16 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 17 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 18 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 19 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |
| 20 | FCR Scatter/ Dispersed Hearth | >10 meters | less than 50 | 5 to 15 | Sparsely scattered. |

## 4.2 Borehole Powerline Alternatives Survey Area Results

Several alternative powerline routes were surveyed for the proposed borehole project, all of which were around 1,800 to 2,000 meters (6,000 to 6,500 feet) in total length (**Figure 4-7**). Portions outside the 320-acre circular APE (1,280 to 1,430 meters or 4,200 to 4,700 feet in length) were surveyed in two 15-meter transects, one on each side of the centerline for a 60-meter wide (200 feet) APE, while portions within the circular area were covered as part of the 320-acre area survey. The alternatives begin at the terminus of an existing powerline in historic site 41PC817 (discussed below) in the head of a wash that flows northward between two moderately steep-sided limestone hills. The linear-surveyed area begins at an elevation of

2,760 feet and drops 100 feet before entering the circular survey area. Most of the powerline APE was rugged and brush-covered for approximately 500 meters before the wash channel widened and the topography opened up, after which patchy mesquite and creosote brush dominated the survey area. The staked powerline alternative route (shaded in green in Figure 4-7) roughly paralleled an existing unimproved two-track road. Two sites and one isolated find were identified during the powerline alternatives survey. The isolated find, a chert core, was found on the edge of the two-track road with no other artifacts identified in the vicinity.

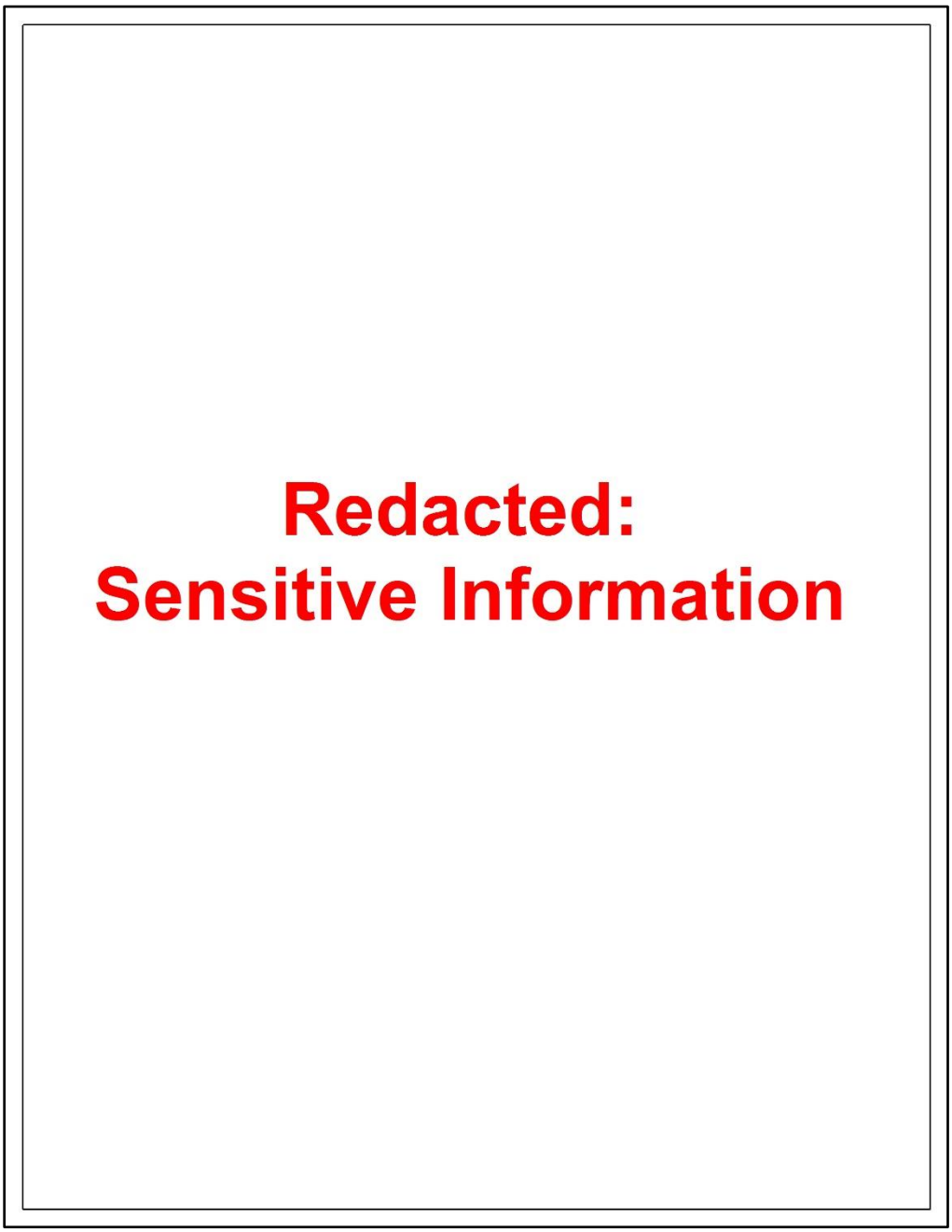


FIGURE 4-7. Survey results, powerline alternatives.

*Site 41PC817*

Site 41PC817 (**Figure 4-8**) is a historic-age stock watering site located at the southern end of the powerline alternatives. A tie-in was planned at this location with an existing powerline, which provides electricity for a water pump that fills a concrete tank and trough.

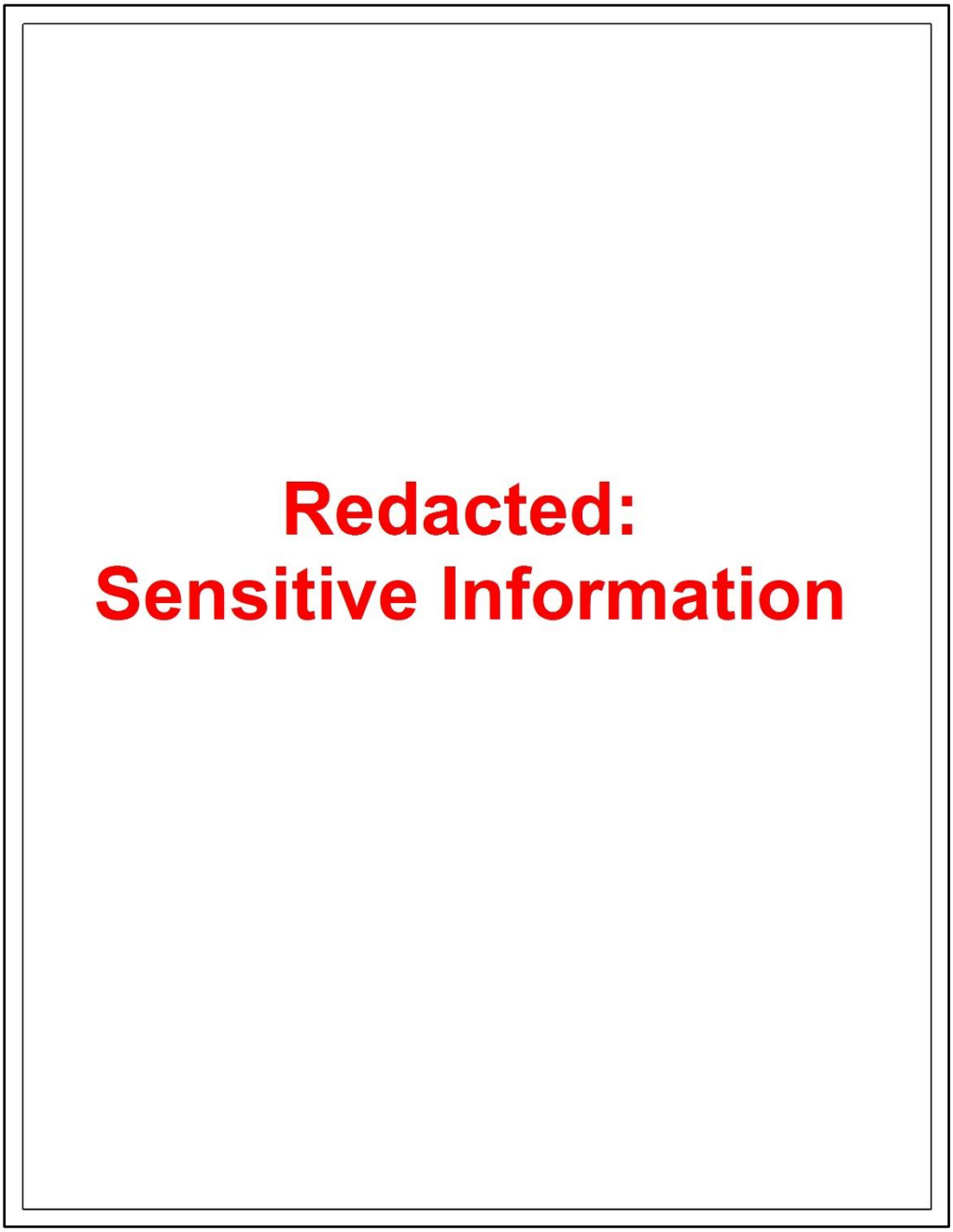


FIGURE 4-8. Site 41PC817 site map.

Feature 1 consists of a wooden windmill derrick and a large square concrete tank (**Figure 4-9**). The derrick measures 10 feet wide on all sides, stands 24 feet tall, and is made of full 6-by-6 inch beams for the legs and full 2-by-8 inch boards for the framework. A spliced steel pipe ladder is wired to the frame and the windmill head has been removed and was not present on-site. An electric pump has been placed

within the original wellhead and the footings for the windmill were improved in 1964, based upon a date written in the cement (**Figure 4-10**). The concrete tank measures roughly 30 by 30 feet and stands 5 ½ feet tall at its highest point with eight-inch thick walls. The concrete has been stressed to the cracking point and a steel braided cable and turnbuckle have been tightened around it to provide support. A small mortared stone box attached to the southeastern corner of the tank contains a spigot and valve. No dates or other markings were observed on the tank or spigot box.

FIGURE 4-9. Site 41PC817 Feature 1 (windmill derrick and concrete tank), facing west.

FIGURE 4-10. Site 41PC817 Feature 1, windmill footing improvement dated "7/2/64."

Feature 2 consists of a concrete trough located 20 feet east of the Feature 1 water tank (**Figure 4-11**). The trough measures five by 21 feet by two feet tall with four-inch thick walls and a float valve at the west end to automatically refill it. No dates or other marking were observed on the trough.

FIGURE 4-11. Site 41PC817 Feature 2 (concrete trough), facing north.

Feature 3 at site 41PC817 is an earthen dam with a 30-meter mortared stone retaining wall wrapping around the east end at the spillway (**Figure 4-12**). The stonework is roughly fitted with little or no shaping and is made from native limestone gathered in the immediate vicinity. Voids between larger cobbles have been filled with unshaped chinking and mortared in place using cement with large aggregate. Seven courses of limestone cobbles rest upon a concrete footing, which is set onto an exposed slab of bedrock where high-energy flow occurs during flooding. The remainder of the dam is earthen and varies from 12 to 20 feet in thickness and is six to eight feet in height. Flood waters have overtopped the dam near its center and cut the downstream side of the dam inward, which will eventually compromise it. While the dam may hold water for a brief period after a rain, it has most likely always held an ephemeral stock pond, as suggested by a 1954 aerial photograph showing dense vegetation in the center of the impounded area (**Figure 4-13**). Grass and denser foliage on the upstream side of the dam indicate that some moisture still gathers there.

FIGURE 4-12. Site 41PC817 Feature 3 (stone retaining wall and limestone bedrock spillway), facing southeast.

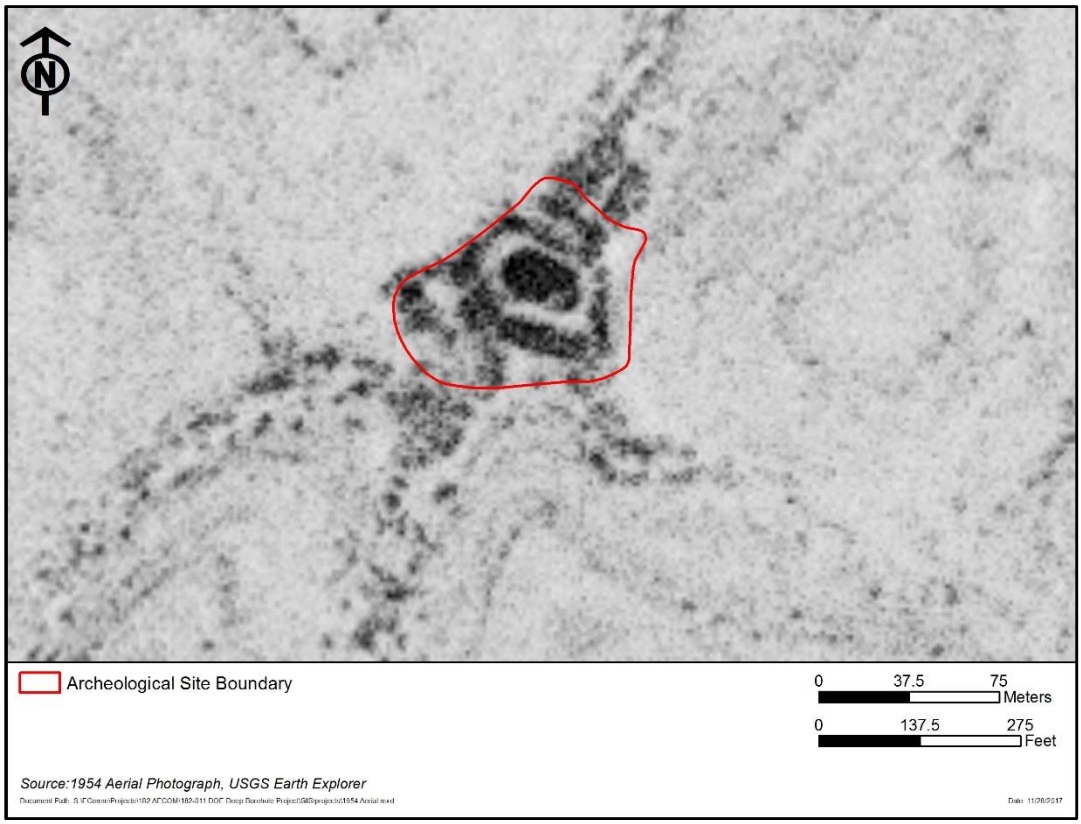


FIGURE 4-13. Site 41PC817 overlaid on 1954 USGS imagery.

Site 41PC817 appears on Block 26, Section 2 as a windmill location denoted "WM" on a University of Texas Land Survey map as early as 1939 (**Figure 4-14**). However, given the wooden construction of the windmill, it is likely that the site dates back at least to the 1920s. Because the property was deeded by the State of Texas directly to the University of Texas at the school's formation in 1881, the site was constructed by or for lease ranching. Similar windmills are still found in the region, including one on University Land near Big Lake, Texas, 60 miles east of the project area (**Figure 4-15**). It is possible that the wooden derricks were contracted by the University to provide water for cattle leases in the Trans Pecos.

Because site 41PC817 has potential for future research and has intact features dating to the early 1900s that are potentially of a regionally unique manufacture, it is recommended as having unknown eligibility for listing in the NRHP or as an SAL and should receive testing and/or further archival research prior to any future impacts to the site.

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Sensitive Information

FIGURE 4-14. Site 41PC817 location on 1939 University Lands map.

FIGURE 4-15. Google Streetview screen capture. Windmill of similar construction to 41PC817 on University Land near Big Lake, Texas.

*Site 41PC820*

Site 41PC820 (**Figure 4-16**) is a small prehistoric limestone hearth feature with a closely associated chert biface. The hearth is located on the west side of the wash that begins at site 41PC817 on a gravelly flat area with frequent overwashing. As a result, the feature has become eroded and is becoming disarticulated, spread over an area of two square meters surrounding the central rock cluster. Limestone FCR associated with the feature (n=40) measured five to 20 centimeters in size (**Figure 4-17**). A chert biface was found on the surface within one meter of the hearth (**Figure 4-18**). Because site 41PC820 has eroded, has no observed datable material, and has one non-diagnostic chert artifact, it is recommended as ineligible for listing in the NRHP or as an SAL.

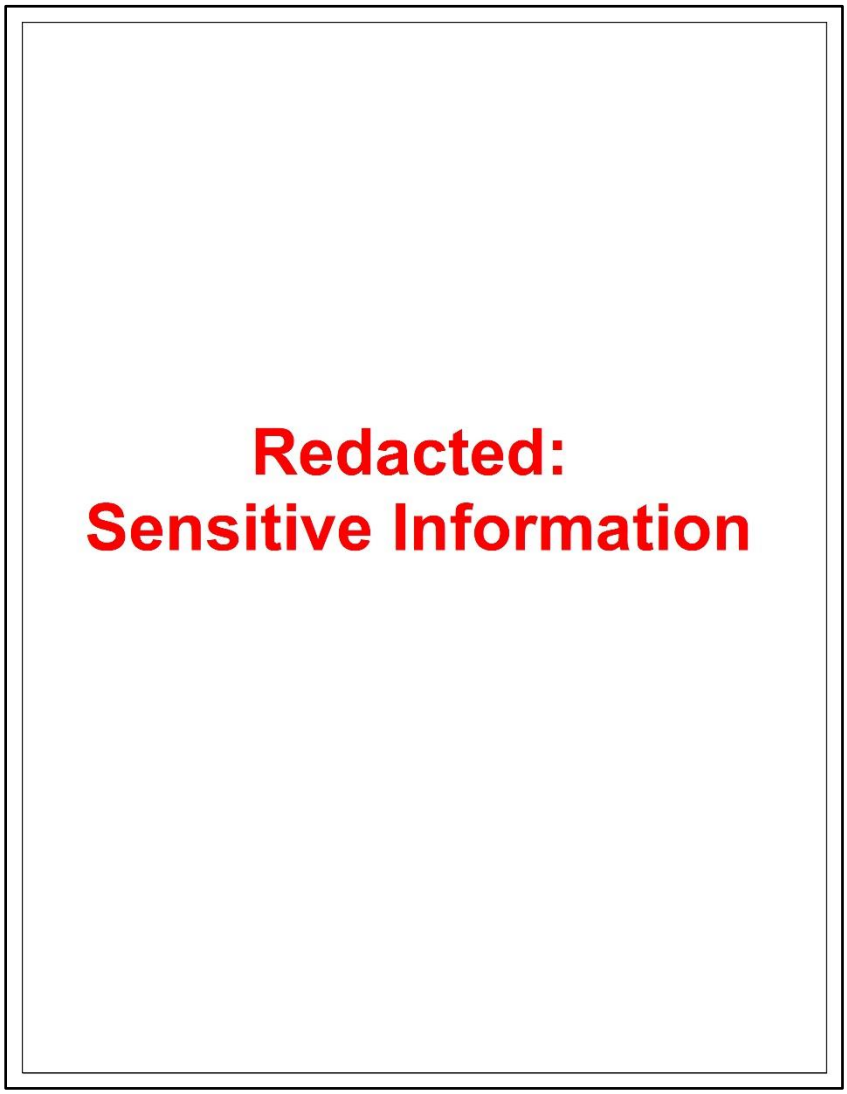


FIGURE 4-16. Site 41PC820 site map.

FIGURE 4-17. Feature 1 at site 41PC820, facing northwest.


FIGURE 4-18. Chert biface from site 41PC820.

## 4.3 Borehole Access Road Survey Area Results

The proposed Borehole access road followed an existing graded road, which was to be widened and straightened to allow access for large equipment associated with the Borehole project. The portion of the road within the project area measures a total of 3,900 meters (12,700 feet) from US 67 to the proposed 20-acre lease area. Three thousand meters (9,800 feet) were surveyed by two linear transects from the southern terminus, at US 67, to the southeastern portion of the 320-acre Borehole APE with the remainder being surveyed as part of the circular area survey (**Figure 4-19**). The southernmost 550 meters of the access road are in a flat upland setting at 2,800 feet in elevation. North of that point, the access road drops in elevation as it parallels a dry wash between large moderately steep-sided limestone hills before the topography opens onto the featureless outwash plain at 1,700 meters and gently slopes to the 320-acre circular survey area at an elevation of 2,660 feet. Vegetation along the access road was primarily creosote brush throughout with pockets of mesquite in low areas. No archeological materials were noted in the southern upland area, but while the road parallels the dry wash, many archeological features were observed, and then quickly tapered off after entering the plain. One site (41PC818) was encountered along the drainage and one site (41PC819) was discovered while checking for rock shelters above the access road APE.

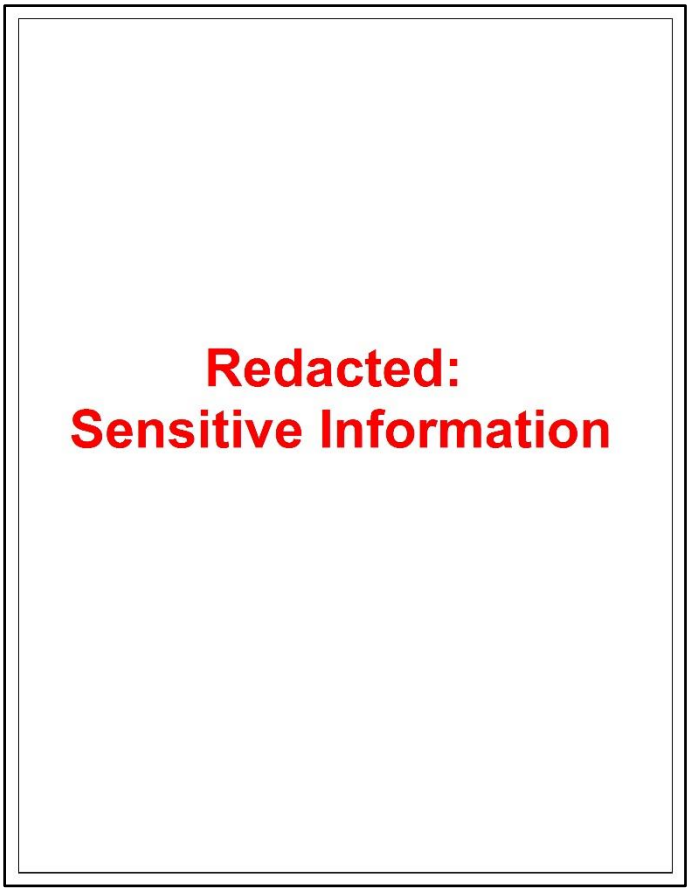


FIGURE 4-19. Survey results for the Borehole Access Road APE.

*Site 41PC818*

Site 41PC818 (**Figures 4-20 and 4-21**) is 15.6-acre Late Archaic multiple-use open campsite site that parallels the dry wash (and access road) for 1,600 meters from the outwash plain to the edge of the uplands at the head of the drainage. While most of the site is actively eroding, several pockets of apparently intact deposits (depicted in **Figure 4-21**) were observed during survey.

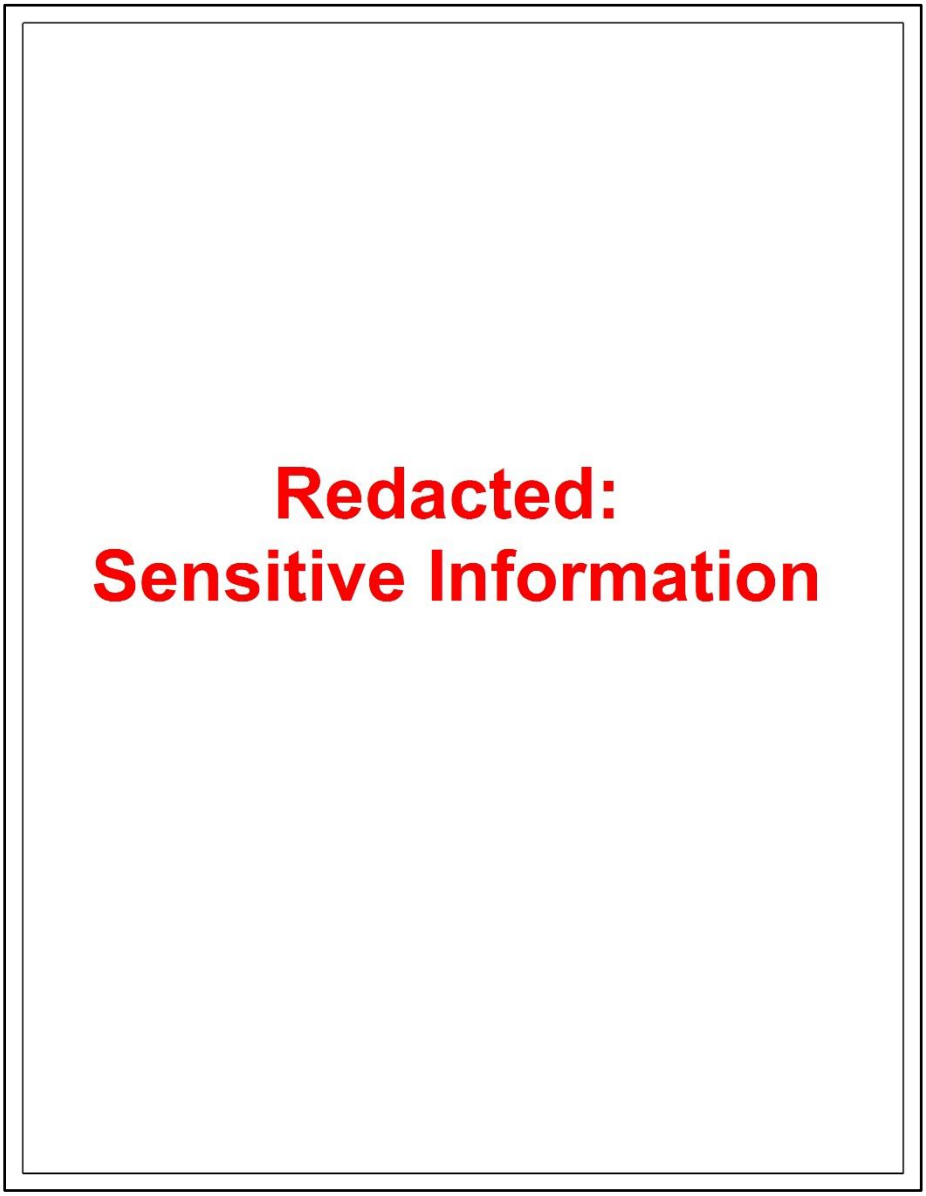


FIGURE 4-20. 41PC818 site map, northern portion.

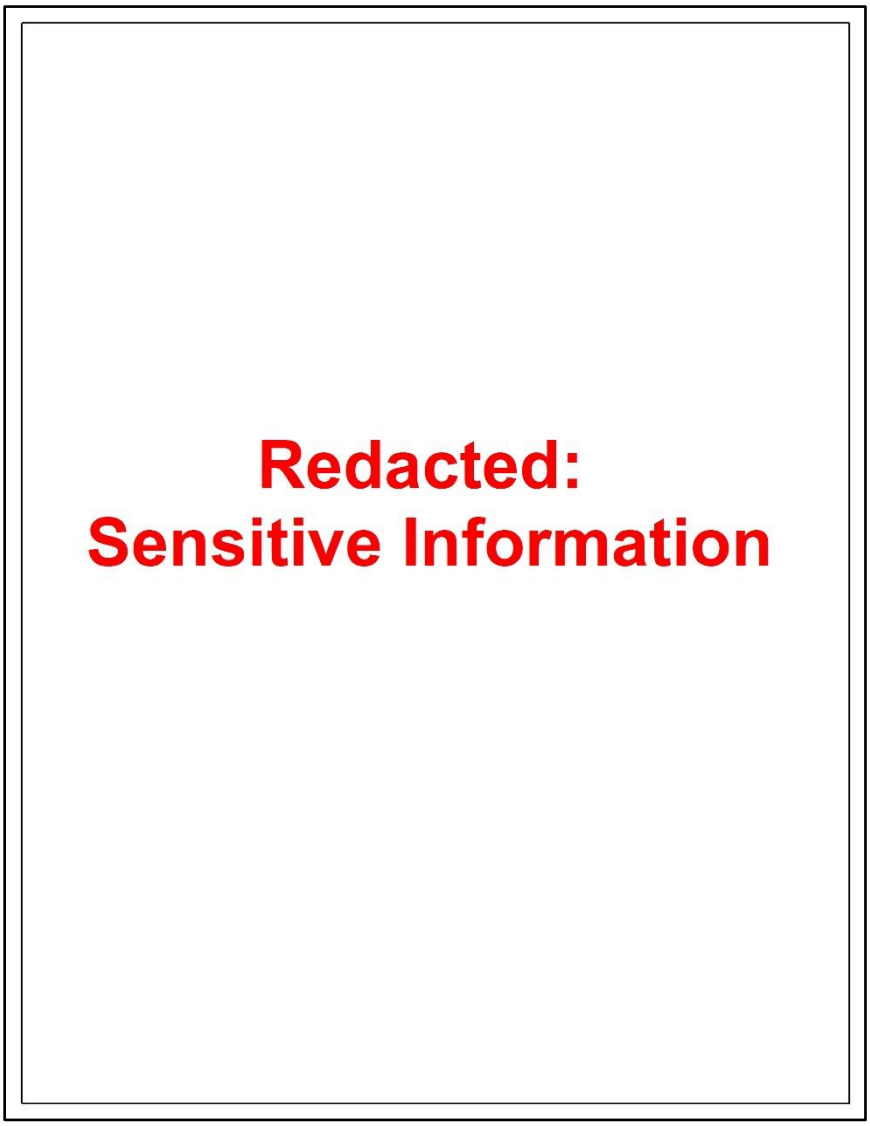


FIGURE 4-21. 41PC818 site map, southern portion.

The site contains 35 features (summarized in **Table 4-2**), including 28 hearths and seven FCR concentrations (most likely dispersed hearths). A diffuse scatter of FCR is present throughout the southern half of the site. The majority of hearths are two meters or less in diameter, roughly circular, and contained FCR less than 20 centimeters in diameter. Many features were observed in the act of eroding, as in Feature 19, which is also associated with ash-colored soil (**Figures 21 and 22**). A shovel test (JB1), one meter west of the feature location, encountered FCR to 25 centimeters below the surface (cmbs), beneath which the soil lightened and became sterile.

Seventeen hearths are concentrated at the southern portion of the site in a hearthfield that appears to have a buried component. A 15-centimeter high unconformity (Figure 4-21) is present between an erosional surface to the north and an apparently intact surface from which FCR was observed eroding. Two shovel tests (JB2 and SRS01) encountered silty loam deposits to 60 cmbs, where caliche nodules thickened; one piece of FCR was found at 40 cmbs in SRS01.

**TABLE 4-2. Site 41PC818 Features.**

| Feature | Type | Description | Dimension | FCR Count (Approx.) | FCR range (cm) |
|---|---|---|---|---|---|
| 1 | Hearth | Slightly dispersed. One distal biface found in feature. | 1.5 meters | 60 | 1 to 15 |
| 2 | Hearth | Actively eroding. | 1 meter | 50 | 3 to 10 |
| 3 | Hearth | Semi-intact with large FCR, spread over 4 meters. | 4 meters | 100 | 5 to 30 |
| 4 | Hearth | Directly adjacent to f3. Deflated. | 2.5 by 3.5 meters | 80 | 10 to 20 |
| 5 | FCR Concentration/ Dispersed Hearth | Deflating over 4 by 6-meter area. | 4 by 6 meters | 80 | 8 to 15 |
| 6 | Hearth | Very intact annular hearth with 50-cm depression/hole in center. | 2.5 meters | 300 | 8 to 25 |
| 7 | Hearth | Compact hearth. Metate fragment directly adjacent. | 1 meter | 150 | 10 to 25 |
| 8 | Hearth | Directly adjacent to f7. Compact (1-meter) cluster of FCR with dispersed scatter over several meters. | 1 meter | 50 | 5 to 15 |
| 9 | Hearth | Small and compact. | 50 centimeters | 14 | 10 to 15 |
| 10 | Hearth | Eroding. | 75 by 250 centimeters | 100 | 5 to 25 |
| 11 | Hearth | Partially buried. | 1 meter | 20 | 5 to 15 |
| 12 | Hearth | Compact hearth surrounded by dense FCR scatter. | 75 centimeters | 40 | 5 to 15 |
| 13 | Hearth | Eroding from side of wash. | 75 by 150 centimeters | 40 | 10 to 30 |
| 14 | Hearth | | 50 by 75 centimeters | 24 | 5 to 15 |
| 15 | FCR Concentration/ Dispersed Hearth | Small linear remnant of hearth. | 1 meter | 40 | 1 to 10 |
| 16 | Hearth | Eroded in wash, but clustered to 1 meter in diameter. | 1 meter | 30 | 2 to 15 |
| 17 | Hearth | Eroding in braided wash. | 2 meters | 40 | 5 to 20 |
| 18 | Hearth | Central 1.5-meter cluster has dispersed to 4 by 7 meter-area. | 4 by 7 meters | 100 | 8 to 20 |
| 19 | Hearth | Eroding between wash channels, seen in profile within apparently intact, ash-colored soil. | 1 meter | 12 | 2 to 10 |
| 20 | Hearth | Compact hearth. | 1 meter | 36 | 5 to 15 |
| 21 | FCR Concentration/ Dispersed Hearth | | 3 meters | 50 | 5 to 20 |

**TABLE 4-2. Site 41PC818 features continued.**

| Feature | Type | Description | Dimension | FCR Count (Approx.) | FCR range (cm) |
|---|---|---|---|---|---|
| 22 | FCR Concentration/ Dispersed Hearth | Directly adjacent to f21, containing several small clusters of FCR. | 2 meters | 50 | 5 to 15 |
| 23 | Hearth | Compact hearth eroding in road. | 75 centimeters | 40 | 5 to 15 |
| 24 | Hearth | Compact hearth eroding in road. | 1 meter | 80 | 10 to 20 |
| 25 | Hearth | Eroding. | 4 by 5 meters | 200 | 5 to 30 |
| 26 | FCR Concentration/ Dispersed Hearth | Directly adjacent to f25. | 3 meters | 200 | 3 to 8 |
| 27 | Hearth | Compact hearth eroding in road. | 1 meter | 75 | 2 to 10 |
| 28 | Hearth | Compact hearth eroding in road. | 50 by 75 centimeters | 24 | 5 to 25 |
| 29 | Hearth | Directly adjacent to f28, compact hearth eroding in road. | 3 meters | 40 | 10 to 15 |
| 30 | Hearth | Three small clusters of ~15 FCR 50 to 75 cm each. | 2 meters | 15 | 5 to 25 |
| 31 | Hearth | Small crescent-shaped hearth. | 50 by 75 centimeters | 24 | 10 to 15 |
| 32 | Hearth | Intact, tightly clustered hearth. | 1 by 1.25 meters | 80 | 5 to 25 |
| 33 | Hearth | FCR scattered over 25-meter area with hearth near center. | 25 meters | 100 | 5 to 25 |
| 34 | FCR Concentration/ Dispersed Hearth | Displaced by road. | 10 by 30 meters | 200 | 1 to 20 |
| 35 | FCR Concentration/ Dispersed Hearth | Sparse scatter. | 3 meters | 50 | 5 to 20 |

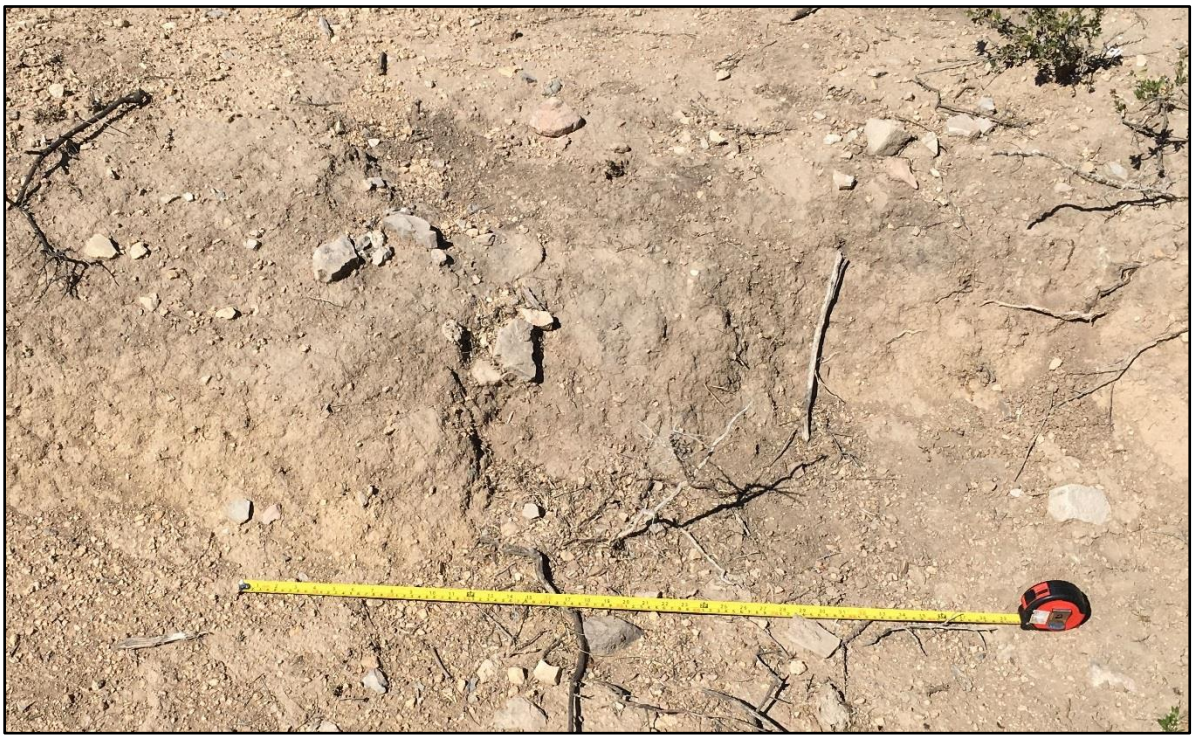

FIGURE 4-22. Feature 19 at site 41PC818 showing actively eroding hearth and associated ash-colored soil, southern portion.

One noteworthy hearth at 41PC818 is Feature 6 (**Figure 4-23**), an annular-shaped hearth located in the southern hearthfield. Feature 6 measures 2.5 meters in diameter retaining a 50-centimeter depression in the center devoid of FCR.

Artifacts other than burned rock are sparse across the site and are represented by less than 20 chert flakes, one Ensor-type projectile point (**Figure 4-24**), a proximal biface found inside Feature 1, three pieces of groundstone, including one found in association with Feature 7 (**Figure 4-25**) and one made of layered rhyolite (**Figure 4-26**). While the assemblage is small, the presence of the Ensor point allows the assignment of Late Archaic age to at least part of the occupation history of the site (Turner et al 2011).

Site 41PC818 has 35 features and has the potential to contain datable organic materials within still-buried deposits. Therefore, it is recommended that the site's eligibility for NRHP and SAL listing is unknown and would require testing to make a determination.

FIGURE 4-23. Archeologist Steven Schooler inspects Feature 6, an intact annular hearth at site 41PC818, southern portion, facing west.


FIGURE 4-24. Ensor point from roadside in site 41PC818, southern portion.

FIGURE 4-25. 41PC818 Feature 7, note metate slab fragment to right of hearth, facing southeast.

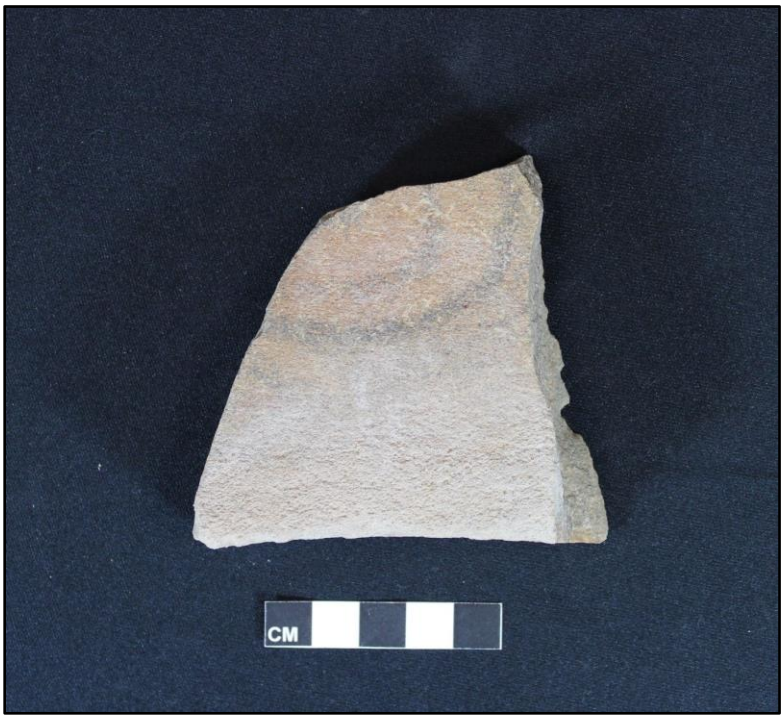


FIGURE 4-26. Layered rhyolite metate fragment from 41PC818, near center of site.

### *Site 41PC819*

Site 41PC819 (**Figures 4-20, 4-27, and 4-28**) is a 115-square meter prehistoric rockshelter site that overlooks a dry wash and site 41PC818. The sheltered portion of the site measures 2.9 meters deep by 4.7 meters in length with a maximum height of one meter at the front (**Figure 4-29**).

The site, discovered while checking the approximately two-meter high upper caprock edge of the overlooking hill above the proposed access road, contains a large, thin, and finely-chipped bifacial chert tool found on the floor in the center of the shelter (**Figure 4-30**), a propped limestone slab (possibly a wind or sun break, visible in **Figure 4-28**), and a sparse scatter of FCR downslope from the shelter. While a sparse scatter of FCR is located downslope from the shelter, no soot or staining is observed on the roof. However, considerable spalling may have removed any soot that was previously present. No signs of looting or animal digging were observed within the rockshelter.

Site 41PC819 is recommended as being of unknown eligibility for listing in the NRHP or as an SAL due to the possible presence of intact, albeit thin, archeological deposits, as indicated by the presence of the chert biface within the rockshelter. Deposits from this type of setting have been known to contain otherwise perishable materials and therefore have great potential for future research when found in undisturbed condition.

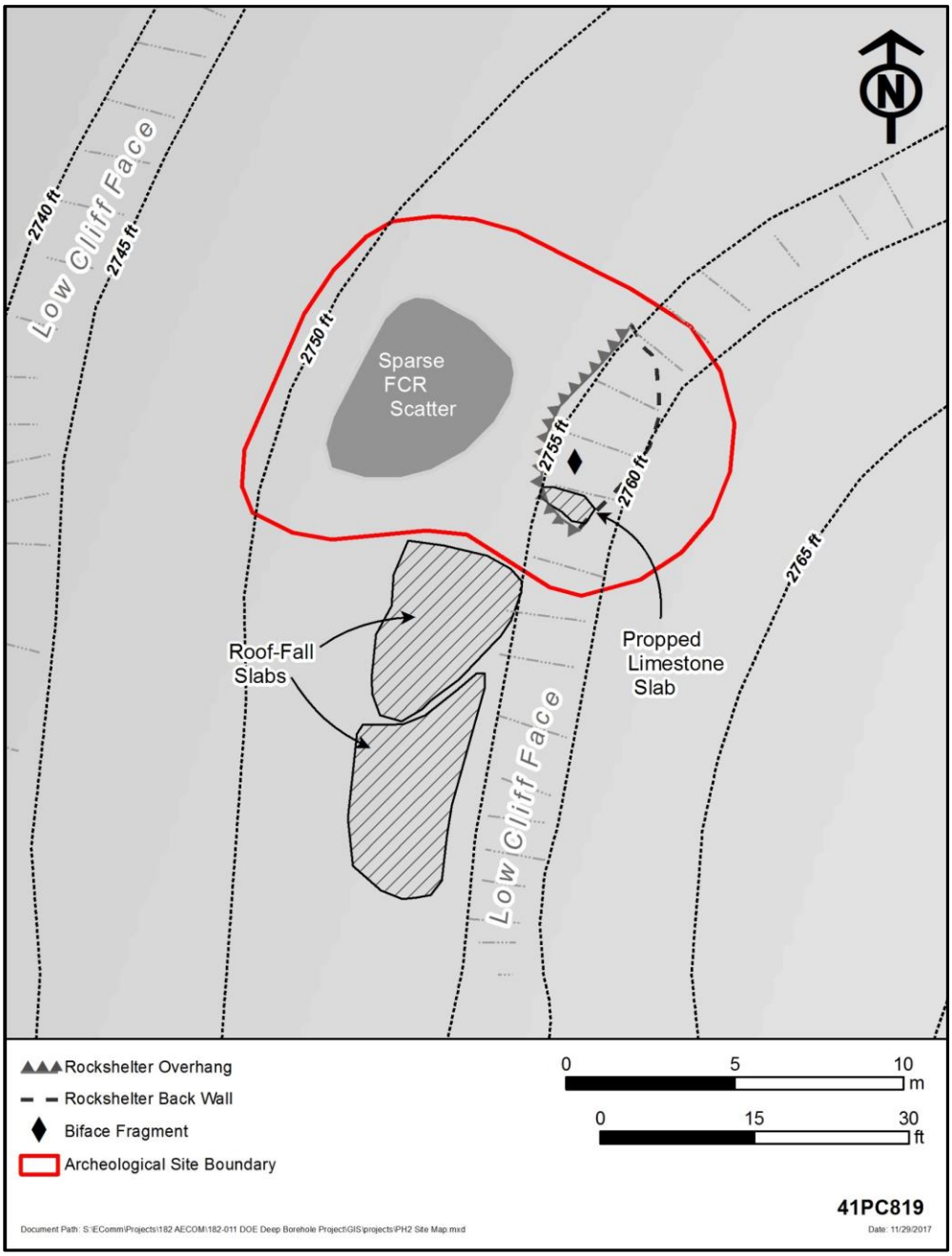


FIGURE 4-27. 41PC819 site map.

FIGURE 4-28. Archeologists Amy Goldstein (right) and Steven Schooler (left) inspect site 41PC819, facing north.

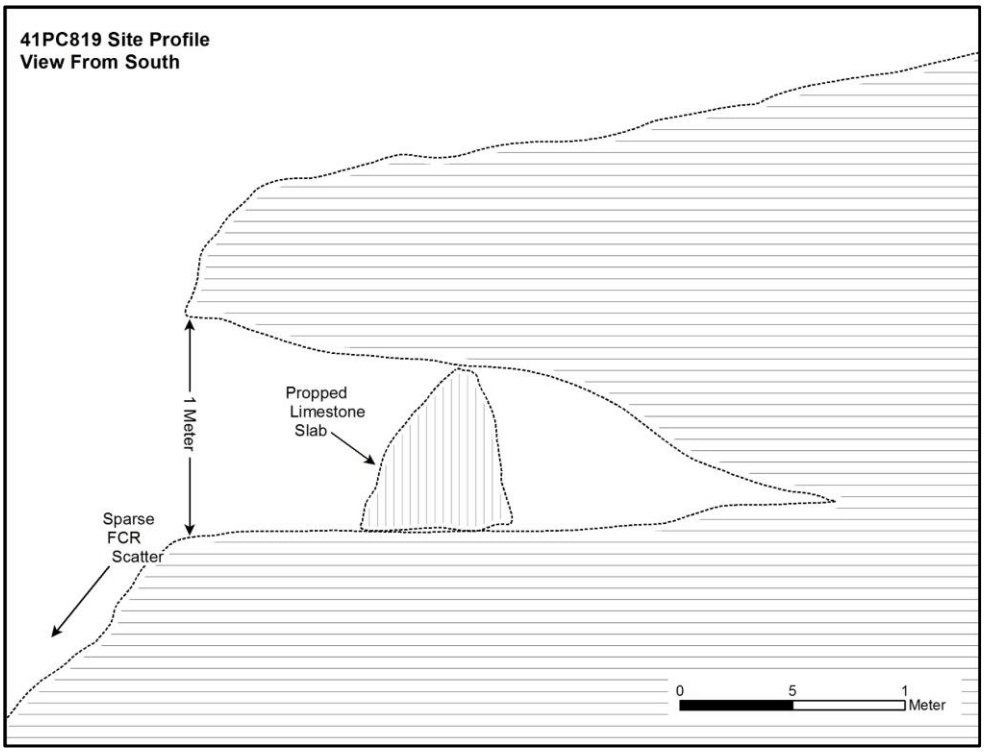


FIGURE 4-29. Site 41PC819 profile, facing north.


FIGURE 4-30. Chert biface from site 41PC819.

# 5 CONCLUSIONS AND RECOMMENDATIONS

On May 1-4, 2017, AmaTerra surveyed a proposed deep borehole drill site location in Pecos County, Texas. The project was conducted under the ACT and Section 106 of the NHPA and all work conformed to the guidelines for implementation of these regulations under 13 TAC Chapter 26 as well as 36 CFR 800. Because the proposed project would have potentially required individual permits or preconstruction notifications under Section 404 of the Clean Water Act and Section 106 of the National Historic Preservation Act, all work was compliant with Section 106 review standards. However, following archeological survey fieldwork, the project was cancelled and no undertaking will occur.

As a result of the survey, 414 acres were surveyed and five archeological sites and one isolated find were discovered.

Site 41PC817 is a historic-age ranching site consisting of a wooden windmill derrick and concrete water tank, a concrete trough, and a dam with a stone-lined retaining wall at the spillway. This site is recommended as having unknown eligibility for listing in the NRHP or as an SAL and would require testing and/or further research to arrive at a determination prior to any activities that may have an impact on the resource.

Site 41PC818 is Late Archaic-age multiple occupation open campsite lining a dry wash and containing 35 hearth and dispersed hearth features. There is evidence of intact deposits and the potential for dated material on the site. Therefore, site 41PC818 is recommended as having unknown eligibility for NRHP listing or for designation as an SAL and would require testing to arrive at a determination prior to any construction or road improvement activities that may impact it.

Site 41PC819 is a rockshelter of unknown prehistoric age containing one observed chert biface and a small FCR scatter downslope. Because the shelter has apparently not been looted or burrowed in, there is a possibility of datable and/or perishable artifacts being present. Therefore, site 41PC818 is recommended as having unknown eligibility for NRHP listing or for designation as an SAL and would require testing to arrive at a determination prior to any activities that would impact the resource.

Site 41PC820 is a single isolated hearth feature with a chert bifacial tool in association. No diagnostic materials are present, and the hearth appears to be deflated and spreading outward. Because there is no potential for datable material associated with this site it is recommended as not eligible for listing in the NRHP or as an SAL.

Site 41PC823 is a large scattered series of single or limited-use open campsites consisting of 20 isolated hearths, FCR concentrations, and FCR scatters. This site is located on a deflated landform (a featureless outwash plain) and no diagnostic artifacts or potentially intact deposits were observed. Therefore, site 41PC823 is recommended as not eligible for listing in the NRHP or as an SAL.

This report is submitted in fulfillment of Antiquities Permit No. 8007. All collected artifacts, field documentation, and photographs for this project will be curated at TARL.

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