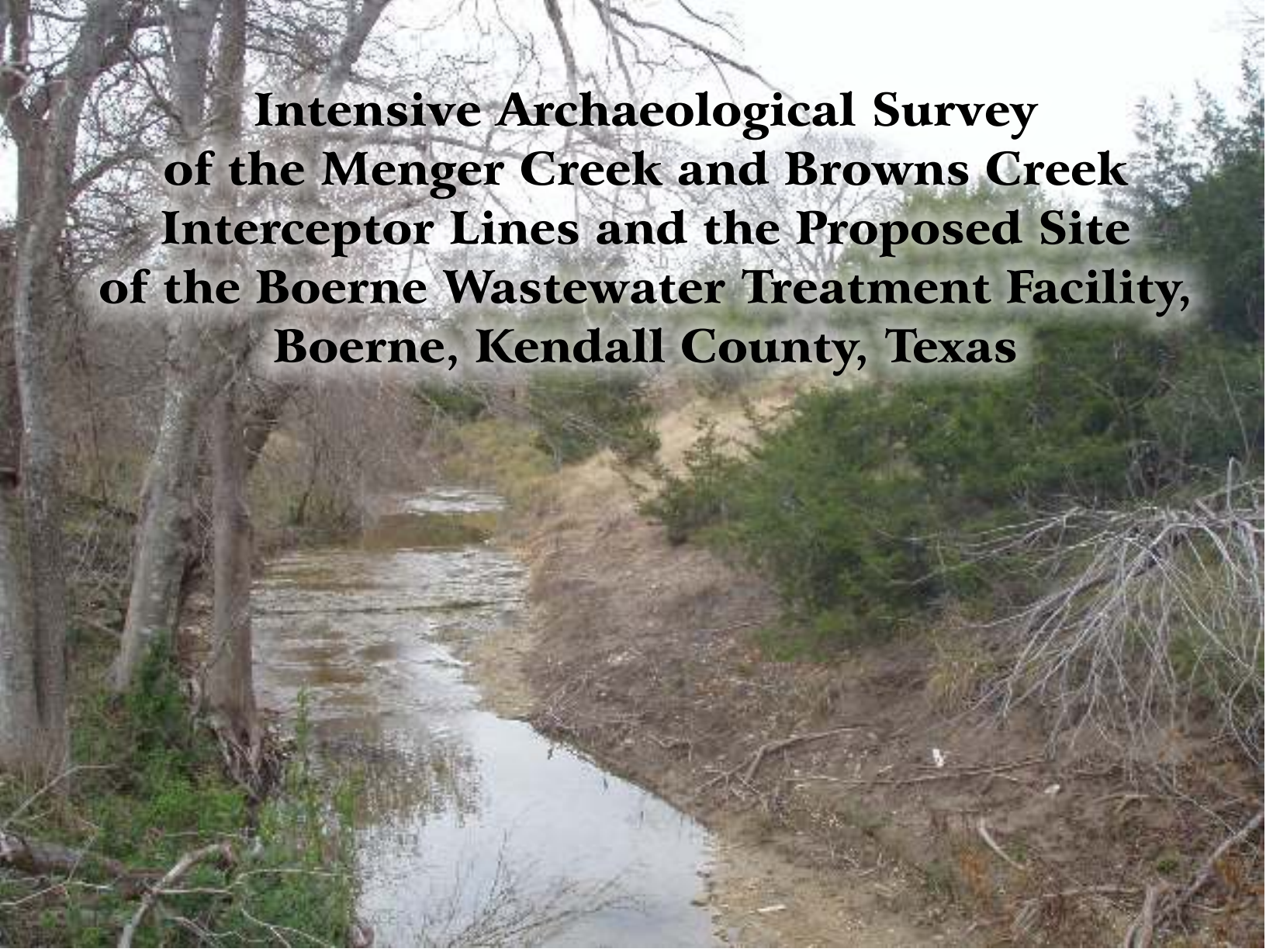

Intensive Archaeological Survey of the Menger Creek and Browns Creek Interceptor Lines and the Proposed Site of the Boerne Wastewater Treatment Facility, Boerne, Kendall County, Texas

by
Antonia L. Figueroa, Kristi Miller Ulrich,
Steve W. Ahr, and Cyndi Dickey

Antiquities Permit No. 5490

VOLUME 1

Restricted

Principal Investigator
Steve A. Tomka

Prepared for:
City of Boerne
Public Works Department
P.O. Box 1677
Boerne, Texas 78006-1677

Prepared by:
Center for Archaeological Research
The University of Texas at San Antonio
One UTSA Circle
San Antonio, Texas 78249
Archaeological Report, No. 412

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VOLUME I

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Management Summary:

The Center for Archaeological Research (CAR) at The University of Texas at San Antonio (UTSA) performed a pedestrian survey for the proposed City of Boerne, Public Works Department Menger and Browns interceptor lines in Boerne, Kendall County, Texas. The project area consists of city-owned and private property adjacent to Cibolo Creek. The work was conducted in five phases, under Texas Antiquities Permit No. 5490, with Dr. Steve Tomka serving as Principal Investigator, and Antonia L. Figueroa, Kristi M. Ulrich, and Steve Ahr serving as Project Archaeologists over the course of the project. The combined alternative interceptor lines totaled approximately 2.4 km (1.5 mi.) in length, and also included a 12.5-acre wastewater treatment plant (WTP). Investigations consisted of an intensive pedestrian survey, with the excavation of 52 total shovel tests, 13 backhoe trench excavations, construction monitoring, and a geomorphological and geoarchaeological assessment. Four previously unrecorded archaeological sites were documented during the project.

41KE215 is a multi-component site consisting of a house structure, associated outbuildings and trash deposits, and two pieces of debitage. The historic farmstead was constructed in approximately 1940. Bedrock exposed across the site indicates no depth to the cultural materials. The limited time depth of the historic component coupled with the small number of artifacts representative of the prehistoric component and it unknown age, dramatically limit the information potential of both components. Therefore, it is suggested that the site is not eligible for nomination to the NRHP, as specified under 36 CFR 60.4 – *Criteria of Eligibility*, and does not merit designation as a SAL, as outlined by the requirements in 13 TAC 26.8 – *Criteria for Evaluating Archeological Sites*.

Site 41KE217 was identified during construction monitoring as a large burned rock cluster. Backhoe trenching revealed two discrete occupation zones preserved in fine-grained overbank alluvial sediments. The upper component consists of an approximately 30-cm (11.8-in.) thick zone of late Middle Archaic to Late Archaic artifacts and burned rock midden deposits. The lower component, which appears to be limited to the south end of the site, contains a discrete zone of burned rocks, flakes, and tools, and diagnostic Angostura-like projectile points dating to the Early Archaic period. Based on the current level of survey work, site 41KE217 appears to exhibit excellent integrity and strong potential to contain stratified Early through Late Archaic cultural materials. National Register of Historic Places eligibility testing is recommended for 41KE217.

41KE218 consists of a small number of angular limestone rocks were noted during topsoil removal, followed by the discovery of six lithic debitage, two cores, a biface fragment, and a possible Late Archaic point fragment. Given the shallow topsoil over bedrock, a lack of intact features, and sparse cultural

materials, site 41KE218 is recommended as not eligible for listing on the National Register of Historic Places or designation as a State Archeological Landmark. No further work is recommended at this site.

41KE219 contained a cluster of burned rocks in shallow topsoil at the edge of the easement along with three pieces of lithic debitage. Given that it is difficult to link the lithic artifacts to the cluster of fire-cracked rock (FCR), and since it is possible that the feature may itself be recent in age, the research potential of the site is extremely limited. Thus, site 41KE219 is recommended as not eligible for listing on the National Register of Historic Places or designation as a State Archeological Landmark. No further work is recommended at this site.

All materials recovered during the survey and all project-related documentation are permanently curate at the Center for Archaeological Research at the University of Texas at San Antonio.

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As is the case with most lengthy and complex endeavors, this project could not have been completed without the help of a large number of dedicated and skillful individuals. We greatly appreciate the tremendous help we have received from Deputy Public Works Director Donald J. Burger P.E. of the City of Boerne during the project. He has been timely and accommodating with the archaeological fieldwork and a great facilitator to get the work done on time. We also express our thanks to Public Works Director Mr. Michae l G. Mann, P.E., for his understanding of the importance of archaeology on the project. Our appreciation also goes out to Senior Project Manager Mr. Gary Martin, P.E., with Civil Engineering Consultants. He has been great to work with and extremely helpful in providing access to the site and informing us about site conditions as rains and logistics prevented access to parts of the project area over time. Pat Mercado-Allinger and Mark Denton of the Texas Historical Commission have made several trips to Boerne to visit the project area and provided guidance and advice. Their time and energy is greatly appreciated especially when they are severely limited in both time and resources.

Of course, the hard working crews that assisted with the survey project is primarily responsible for the completion of the project and for the discovery of several sites in the project APE. They included Cyndi Dickey, Lindy Martinez, Cody Miller, Steve Smith, Kelley Denham, and Cathy Stacy and were led by Antonio Figueroa, Kristi Miller Ulrich, Cindy Dickey, and Steven Ahr during the various phases of the survey. Keeping track of the materials generated in the field was Marybeth S.F. Tomka, and it is due to her efforts that the project records will be available for future generations to study. The graphics gracing the pages of the report were prepared by Richard Young and the late Bruce Moses, and the editing of the various drafts of the report was ably performed by Kelly Harris.

Last, but not least, we would like to express our appreciation and thanks to Mr. Bill Lende of the Cibolo Preserve, for his interest and excitement about the archaeological discoveries made on the property and his desire to learn as much as possible about these resources. He is a genuine preservationist.

Chapter 1: Introduction

Between December 2009 and April 2010, the Center for Archaeological Research (CAR) of The University of Texas at San Antonio conducted 100% pedestrian surveys of three areas within the City of Boerne in southeast Kendall County (Figure 1-1).

Figure 1-1. *The location of the project area in southeast Kendall County, Texas, showing four project phases: Phase I is blue; Phase II is green; Phase III is orange; and Phases IV and V are purple.*

CAR was contracted by the City of Boerne to perform archaeological investigations prior to the installation of two sewer interceptor lines (Menger Creek and Browns Creek Lines) as well as the building of a new wastewater treatment plant. The archaeological investigations were conducted at three separate times over the course of five months. This report combines the investigation methods and results from each of the surveys.

Portions of the land used for the installation are owned by the Cibolo Preserve, Mr. Bill Lende, and the City of Boerne. Those portions of the project that are publicly owned come under the review of the Antiquities Code of Texas, which requires state agencies and political subdivisions of the state to notify the Texas Historical Commission (THC) of any action on public land involving five or more acres of ground disturbance. The project was performed under Texas Antiquities Permit No. 5490 with Dr. Steve Tomka acting as Principal Investigator. Antonia L. Figueroa, Kristi M. Ulrich, and Steven W. Ahr served as Project Archaeologists at various times over the course of the project.

The Area of Potential Effect

Phase I

The Area of Potential Effect (APE) of the first portion of the investigation is bound by City Park Road on the east and Herff and Old San Antonio roads on the west (Figure 1-2).

Figure 1-2. *Aerial photograph of the Area of Potential Effect: Phase I is blue; Phase II is green; Phase III is orange; and Phases IV and V are purple.*

Cibolo, Menger, and Browns Creeks cross the project area (Figure 1-3). The proposed Menger Creek interceptor line is located on the west descending bank of Cibolo Creek and begins near Old San Antonio Road (Figure 1-2). The Browns Creek interceptor line also begins on the west bank of Cibolo Creek but crosses north of the intersection of the two lines and continues to the east-northeast toward City Park Road (Figure 1-2). The total length of the proposed routes is estimated to be 1,829 m (6,000 ft). These sewer mains will be installed at a depth ranging between 3.7-10.7 m (12-35 ft.) below the surface. A 6.1 m (20 ft.) wide, permanent easement will be acquired by the City and a 9.1 m (30 ft.) wide construction easement will be employed during the construction. The trench that will be excavated will measure a minimum of 1.8 m (6 ft.) in width.

Approximately 25% of the length of the easement falls on City property. At the request of the City, the survey was limited to surface reconnaissance, accompanied by shovel testing.

Figure 1-3. *Cibolo Creek near the project area. Facing north.*

Phase II

The second segment of the investigation (wastewater treatment plant) measures 12.5 acres (Figure 1-2). A 4.1-acre area will be occupied by the plant footprint with a 47.5-m (150-ft.) buffer zone (8.4-acres) and construction easement surrounding the footprint.

Phase III

The third area is located in the vicinity of the first investigation (Figure 1-2). CAR was asked to survey an alternate route for one of the interceptor lines, an additional 600 m (1,969 ft.) route that would run north from the wastewater plant and then turn east to connect to the previously surveyed phase.

Phase IV

The fourth area investigated connected to the first route but rerouted the line in the eastern portion to hug a valley located to the south. A very small section, just under 100 m (328 ft.), was located in the western portion of the APE and connected a portion of Phase I to Phase III. The alternate route consisted of 1,100 m (3,609 ft.) that connected into the route surveyed during Phase I (Figure 1-2)

Phase V

From October 20-21, 2011, a total of 10 backhoe trenches were excavated for the Phase V part of the project along the northern valley margin of Cibolo Creek and on both sides of Browns Creek. This phase of work followed the same route alignment as the Phase IV shovel testing phase (Figure 1-2).

Chapter 2: Environmental Setting

Kendall County is located on the eastern edge of the Edward's Plateau. Cibolo Creek divides the project area. This creek begins 16 km (10 mi.) northwest of the community of Boerne in southwestern Kendall County and continues to the southeast, crosses Karnes City after forming the Bexar-Comal and the Bexar-Guadalupe County lines, and then empties into the San Antonio River in Karnes County. Elevations on the project area range from 421-427 m (1,380-1,400 ft.) above mean sea level (AMSL). The project area has a modified subtropical and subhumid climate with cool winters and hot summers (Norwine 1995). The hot weather is persistent from late May through September.

The cool season begins in early November and extends through March. Winters are typically short and mild with light precipitation. Rainfall reported for San Antonio International Airport averages about 83.62 cm (32.92 in.) a year (based on monthly averages from 1971 to 2000; Southern Regional Climate Center 2010). Monthly temperature averages range from 10°C (50°F) in January to 29°C (84°F) in August (Norwine 1995). Within the project area there are five soil units: Boerne fine sandy loam, Oakalla silty clay loam, Anhalt Clay with 1-3% slopes, Doss-Brackett association (undulating 69.5 to 56.9%), and Krum silty clay with 1-3% slopes (Web Soil Survey 2010).

Vegetation communities present in the project area include oak savannahs, grasslands, woodlands, and prairie grass/shrub lands (Web Soil Survey 2010). Savannah communities are typically composed of post oaks and tall grasses. Post oak species include Bigelow oak (*Quercus sinuata* var. *breviloba*), blackjack oak (*Quercus marilandica*), Texas oak (*Quercus buckleyi*) and live oak (*Quercus virginiana*). Grasslands (oak and oak juniper grasslands) include grass species such as bluestem (*Poa arachnifera*), indiangrass (*Sorghastrum nutans*), and sideoats grama (*Bouteloua curtipendula*). Major woody species in oak-juniper grasslands consist of honey mesquite (*Prosopis glandulosa*), Texas persimmon (*Diospyros texana*), and prickly pear (*Opuntia* spp). Other variants of these plant communities in the area consist of encroaching species such as Ashe juniper (*Juniperus ashei;* called "cedar" locally; Web Soil Survey 2010).

Prairie grasslands have less than 5% canopy. Bluestem (*Poa arachnifera)* and indiangrass (*Sorghastrum nutans*) are the dominant species in this community. In prairie shrublands settings, species such as Texas persimmon, mesquite, and live oak, become increasing present as well as prickly pear. Land west of the Cibolo Creek within the project area has been utilized for agricultural purposes and is sparsely vegetated. Figure 2-1 shows the vegetation that is typical in the project area.

All of the mentioned vegetation communities are a consequence of historic land use activity (Web Soil Survey 2010). For example, woodland (hardwood juniper) communities are typically are a shift from savannah to woodlands (Web Soil Survey 2010).

Faunal species in the area include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), ringtailed cat (*Bassariscus astutus*), striped skunk (*Mephitis mephitis*) and armadillo (*Dasypus novemcinctus*; Davis 1960).

Figure 2-1. *Vegetation communities of the project area: a) post oak savannah (top photograph); b) agricultural land (bottom photograph).*

Chapter 3: Cultural Setting

Cultural History

Kendall County is located in the Central Texas archaeological region. The culture chronology is divided into five culture periods: Paleoindian, Archaic, Late Prehistoric, Protohistoric, and Historic. This section provides a brief overview of each period.

Paleoindian Period (11,500-8800 BP*)*

This period, associated with the earliest documented presence of humans in Texas, is typically divided into early and late segments. Populations at this time consisted of mobile groups that hunted large, highly mobile megafauna coupled with the exploitation of a variety of small game. Evidence from the Wilson-Leonard Site in Williamson County also suggests the exploitation of riparian forest and grass species (Bousman et al. 2004)

The early segment of the Paleoindian Period is that represented by Clovis and Folsom adaptations. Meltzer and Bever (1995) have documented 406 Clovis sites in Texas. Clovis-age sites usually consist of kill localities, quarry/workshops, residential camps, and burial caches that are indicative of repeated return to the same locations (Collins 2004). The earliest documented Paleoindian site in Texas is the Aubrey site in Denton County, with radiocarbon assays of 11,542 ± 111 BP and 11,590 ± 93 BP (Bousman et al. 2004:48).

In the later portion of the period, there were stylistic changes in projectile point technology seen in Dalton, Scottsbluff, and Golondrina traditions. While widespread in geographic range, these types occurred in high densities in the High Plains and Central Texas (Meltzer and Bever 1995). As the climate warmed at the end of the Pleistocene, megafauna gradually died off, and subsistence patterns shifted.

Archaic Period (8800-1200 BP)

This period is subdivided into the Early, Middle and Late sub-periods. The subperiods are distinguished by differences in climate conditions, resource availability, subsistence practices, and diagnostic projectile points (Collins 2004). Plant gathering appears to have become an important part of subsistence strategies during this time and was probably even more important during xeric periods. This may explain the appearance of burned rock earth ovens. They were used to cook a variety of plant foods that were otherwise inedible, such as roots of sotol (*Dasylirion* spp.) and yucca (*Yucca* sp.; Collins 2004).

In the Early Archaic, 8800-6000 BP, there was a shift in subsistence from large game hunting to plant foods and medium and small species of game (Collins 2004). Projectile point styles include Angostura and Early

Split Stemmed forms. Task-specific tools include Clear Fork gouges and Guadalupe and Nueces bifaces (Turner and Hester 1993:246-256). Early Archaic sites were located along the eastern and southern portions of the Edwards Plateau in areas with reliable water sources (McKinney 1981). Population densities were relatively low during this sub-period and consisted of small highly mobile bands (Story 1985).

The Middle Archaic spans from 6000-4000 BP (Collins 2004). Diagnostic projectile points from this period include Bell, Andice, Calf-Creek, Taylor, Nolan, and Travis. Collins (2004) suggests that during the early portion of the Middle Archaic, corresponding to the presence of Bell, Andice, and Calf-Creek point styles (ca. 6000-5000 BP), there was a focus on the hunting of bison. He proposes that bison were absent at the later part of the Middle Archaic Period (5000-4000 BP). This position is a refinement of Dillehay's (1974) suggestions that bison are absent from 4950-3950 BC (ca. 6900-5900 BP) and present after 5900 BP. However, recent studies (e.g., Munoz et al. 2011) suggest that bison were present throughout the Middle Archaic. In addition to shifts in the resource base suggested by bison fluctuations, several other changes appear to have occurred during the Middle Archaic. Climate was gradually drying as the onset of the Altithermal drought began. Demographic and cultural change likely occurred in response to these hotter and drier conditions (see Collins 2004; Johnson and Goode 1994; Munoz et al. 2011).

The last sub-period of the Archaic is the Late Archaic, which spans 4000-1200 BP (Collins 2004). Dart point diagnostics of the Late Archaic are triangular points with corner notches that include Ensor and Ellis (Turner and Hester 1993:114-122). Other Late Archaic projectile points are Bulverde, Pedernales, Marshall, and Marcos types (Collins 2004). Evidence from the sinkhole cemetery suggests that territoriality may have been established during the Late Archaic, possibly as a result of an increase in population (Bement 1994). Some researchers state that the accumulation of burned rock middens ceased at this time though current research has challenged this notion (Black et al. 1997).

Late Prehistoric Period (1200-350 BP)

The Late Prehistoric Period is divided into the Austin and Toyah phases. During the Austin Phase, the bow and arrow was introduced. Nickels and Mauldin (2001) suggest that at the beginning of this period environmental conditions were warm and dry. More mesic conditions appear to accelerate after 1000 BP Subsistence practices remained relatively unchanged, especially during the Austin Phase. The Austin Phase may represent the most intensive use of the burned rock middens (Black et al. 1997; Mauldin et al. 2003) and includes diagnostic point types, Scallorn and Edwards (Collins 2004; Turner and Hester 1993).

The presence of bone tempered ceramics (Leon Plain) during the Toyah Phase suggests interaction between Central Texas and ceramic production traditions in East and North Texas (Perttula et al. 1995). Ceramics were in common use in East Texas by 2450 BP, but the first Central Texas wares did not appear until ca. 650-700 BP (Perttula et al. 1995). Other technological traits of this phase include the diagnostic Perdiz point and beveled bifaces. These specialized processing kits are thought to be an adaptation to flourishing bison populations by some (Ricklis 1992) and a sign of intensification the exploitation of declining bison populations by others (Mauldin et al. 2012).

Protohistoric Period (ca. 1528-1700)

The Protohistoric Period is a term typically used to describe the transition between the Late Prehistoric and the Colonial Period. This period is not well documented archaeologically in Texas. Some researchers (Wade 2003) argue that the Protohistoric Period may coincide with the end of the Late Prehistoric Toyah interval, spanning the period of A.D. 1250/1300 to A.D. 1600/1650 (Hester 1995). For the purposes of this report, CAR defines the period as beginning with the Early Spanish explorations in Texas (ca. 1528 A.D.) and ending with the establishment of a strong Spanish presence in the region in the late 1600s and early 1700s.

During this period, there was intermittent contact between the native groups and Spanish explorers. The significant impact of the Spanish upon the indigenous groups in the area was not immediate, with the possible exception of the spread of disease. A number of encounters between indigenous communities and Europeans were recorded during this period, including those of Cabeza de Vaca (1528-1536) and the French settlement established by Rene Robert Cavelier, Sieur de La Salle (1685-1689). The area of present-day San Antonio was first visited by Domingo de Teran.

Archaeologically, the time period is poorly documented but has been identified at several sites in south Texas counties (e.g. Hall et al. 1986; Inman et al. 1998; Mauldin et al. 2004). There is not a clear material culture associated with the period. Sites that have been deemed as "Protohistoric" may have Late Prehistoric and/or Historic artifacts associated with them, and in several cases, radiocarbon dates confirm their Protohistoric designation (Mauldin et al. 2004).

Historic Period and History of Boerne

The Historic period is characterized by systematic European contact with native cultures in the Americas. While the Spanish explorers had established their presence in Texas since the 1500s, European settlements, the Spanish in particular, became part of the Texas landscape beginning in the late 1600s. Mission settlements began to be established in Bexar County in 1718 with Mission San Antonio de Valero (Chapa 1997).

German immigrants began to arrive in Texas about 1830, and by 1850, 5% of the population of Texas consisted of German immigrants (Jordan 1977). Between 1844 and 1847, an estimated 7,000 German immigrants reached Texas, including the San Antonio area. A group of German colonists camped on the north side of Cibolo Creek in 1849, approximately 1.6 km (1 mi.) west of present-day Boerne. This new community was named Tusculum, but in 1852, Gustav Theissen and John James changed the name of the community to Boerne after Ludwig Boerne, a German author and publicist. The post office was established in 1857. The community continued to flourish with the building of a courthouse in 1870 and a rising population. The arrival of the San Antonio and Aransas Pass Railway in 1887 boosted the economy of the community. With the onset of the Great Depression in the 1930s, the economic and population growth declined. It was not until the 1950s that the community began to flourish again (Smyrl 2010).

Previous Archaeological Investigations

Although no previously recorded sites are located along the proposed interceptor route, seven known recorded sites (41KE67, 41KE68, 41KE126, 41KE188, 41KE189, 41KE201, and 41KE204) are within 0.8 km (0.5 mi.) of the project area. Sites 41KE67 and 41KE68 were recorded in May of 1976 (Kelly and Hester 1976). Site 41KE67 was a lithic scatter that consisted of a dart point and lithic debris. Site 41KE68 was defined by a scatter of chipped stone that included a dart point, biface, side scraper, and retouched flakes. The site also possessed burned rock and charcoal stains. Based on meager evidence, it was suggested that the sites were Archaic in age. It was recommended that further research be conducted prior to any future disturbance to the sites.

Site 41KE126 was recorded in 1988 by Mr. Bill Lende, the owner of the property. The site is a series of steps cut into a vertical bluff (THC 2010). 41KE188 was classified as an open campsite where a biface fragment, two choppers, burned rock, and lithic debitage were encountered on surface (THC 2010). According to the site form, the site is highly eroded (THC 2010). Site 41KE189 was located on the Cibolo Creek flood plain and consisted of charcoal and lithic flakes (THC 2010).

In 2004, site 41KE204 was recorded by Uecker (2004) along Browns Creek, northeast of the project area. The field investigations conducted by Uecker were performed for the Boerne Independent School District. Subsurface testing was not possible due to shallow soils, however, cultural material was noted on the surface. Artifacts included burned rock and chipped stone, including biface fragments, one core, an unidentified dart point fragment, and a Nolan dart point (Uecker 2004). The site was reported as severely deflated and eroded, and it was deemed not to have any research potential nor did it warrant further investigations. Site 41KE201, consisting of chipped stone artifacts, was recorded in 2008 (THC 2010).

In 2008, Shafer and Hester (2008) recorded site 41KE208 south of Cibolo Creek, on a bluff above Herff Falls. This site, along with several others recorded previously along Cibolo Creek, is just beyond 0.8 km (0.5 mi.) outside the APE.

Chapter 4: Methods

Archaeological Survey Methods

Between December 2009 and April 2010, CAR conducted a 100% pedestrian survey and shovel testing in three areas to be impacted by the building of a new wastewater treatment facility and associated interceptor lines in southeast Kendall County (Figure 1-2).

For the purposes of this survey, an archaeological site was defined when any of the following criteria were met:

- five or more surface artifacts within a 15-m (706.9 m^2) radius
- a single cultural feature, such as a hearth, observed on surface or exposed in shovel testing
- a positive shovel test containing at least three artifacts within any given 10-cm (3.9-in.) level
- a positive shovel test containing at least five total artifacts
- two positive shovel tests located within 30 m (98 ft.) of each other
- structures or historic deposits greater than 50 years old are present.

Historic structures, features, or artifacts less than 50 years old were not considered significant for this project. Cultural materials located outside a defined site were classified as isolated finds. Artifacts found on the surface were to be collected only if they were temporally diagnostic.

Shovel tests were excavated at rates intended to meet the minimum standards of the Texas Historical Commission (THC). Each shovel test was 30 cm (11.8 in.) in diameter, and unless prevented by obstacles, extended to a depth of 60 cm below the surface (cmbs; 23.6 in.). Shovel tests were excavated in 10-cm (3.9-in.) levels, and all soil from each level was screened through 1/4-inch hardware cloth.

All encountered artifacts were recovered with appropriate provenience information for laboratory processing and analysis. A shovel test form was completed for every excavated shovel test. Data collected from each shovel test included the final excavation depth, a tally of all materials recovered from each 10-cm (3.9-in.) level, and a brief soil description (texture, consistence, Munsell color, inclusions). The location of every shovel test was recorded with Trimble Geo XT GPS units. Shovel test locations also were sketched onto an aerial photograph as a backup to GPS information. Any additional observations considered pertinent also were included as comments on the standard shovel test form.

In addition to prospecting for deeply buried cultural materials, the backhoe trench excavations were critically informative of the local alluvial stratigraphy and pedology, which is essential for evaluating the archeological site visibility and preservation potential across the entire study area. A total of thirteen trenches were excavated, and the trenches ranged in depth from 57-200 cmbs (22.4-78.7 in.). A representative profile section within each trench was hand-cleared and plucked out, and standard field morphological attributes were recorded. The soil column was subdivided into genetic soil horizons based on observable variations in soil properties. Each horizon was described following the Natural Resources Conservation Service (NRCS) standards for soil profile descriptions (Schoenberger et al. 2002). These descriptions included horizon, color, texture, roots, structure, consistence, percentage of coarse fragments, carbonate abundance, type, and morphology (e.g., stage), the presence/absence of redoximorphic features, and any other salient pedogenic features. All trench walls were carefully scraped and closely inspected for cultural materials.

Geoarchaeological and Geomorphological Methods

Geoarchaeological and geomorphological methods and results are discussed in detail in Chapter 6 of this report. In general, the geoarchaeological assessment was initiated during the backhoe trench investigations for the Phase IV segment, as well as subsequent trench excavations at site 41KE217. Natural creek cutbank exposures along Menger and Cibolo Creeks, as well as exposed construction excavations in portions of the study area, provided further exposures of soils and sediments that aided in the refinement of the geomorphological interpretations presented.

Laboratory and Curation Methods

Artifacts and other material returned to the CAR laboratory were washed, air-dried, and stored in zip lock archival-quality bags with appropriate provenience information. The laboratory staff processed the materials recovered and detailed analyses were conducted. Field notes, forms, and hard copies of photographs were placed in labeled archival folders. All field forms were completed in pencil on acid-free paper. Any field forms that were soiled during use were placed in archival-quality page protectors. A copy of this report in Adobe Acrobat® format and all digital material pertaining to the project, including all photographs, were burned onto a CD and permanently curated with the field notes and other documents at the Center for Archaeological Research.

Chapter 5: Survey Results

The archaeological survey of the Boerne Wastewater Treatment Plant and interceptor lines occurred in five phases that included the Menger Creek and Browns Creek interceptor lines (Phase I), the proposed site for the new Boerne Wastewater Treatment Plant (Phase II), two alternate routes for the Menger Creek interceptor line (Phases III and IV), and geomorphological investigations along a terrace of Cibolo Creek (Phase V). Survey results for each phase of work are discussed below.

Phase I: The Menger and Browns Creek Interceptor Lines

During Phase I of the project in December 2009, a 100% pedestrian survey of the entire APE was conducted (Figure 5-1). Shovel tests were dug at the rate of one shovel test every 100 m (328 ft.) along the 1829 m (6,000 ft.) APE. When a positive shovel test was encountered, additional shovel tests were excavated at 10 m (32.8 ft.) intervals along the route of the linear survey. A total of 19 shovel tests (STs) were completed during this part of Phase I of the project (Table 5-1). No shovel tests were excavated along the proposed interceptor route along the west bank of Cibolo Creek due to the steep slope of the terrain that exceeded 20%.

Figure 5-1. *Map of Phase I project area showing shovel tests excavated along proposed interceptor lines.*

As noted in Table 5-1, several shovel tests were terminated prior to 60 cmbs (23.6 in.), due to bedrock or heavy gravels. Twelve shovel tests were excavated in this portion of the project area east of Cibolo Creek. Two unpaved, two-track roads intersect the proposed interceptor route in this area (Figures 5-2 and 5-3).

Table 5-1. Shovel Tests Excavated during Phase I

ST No.	Terminal Depth (cmbs)	Comments
1	60	max. depth
2	37	bedrock
3	50	bedrock
4	58	bedrock
5	60	max. depth
6	60	max. depth
7	50	bedrock
8	45	bedrock
9	39	bedrock
10	40	bedrock
11	60	max. depth
12	20	heavy gravel
13	60	max. depth
14	60	max. depth
15	60	max. depth
16	60	max. depth
17	60	max. depth
18	60	max. depth
19	60	max. depth

Shovel testing commenced west of the fence line due to impacts from the two-tract road and visible bedrock on the surface. ST 3 contained two pieces of lithic debitage (tertiary specimens) in Level 1. Four additional shovel tests (STs 5-8) were excavated at 10-m (32.8-ft.) intervals from ST 3, but all were negative. Soils in this portion of the project area ranged in depth from 20-60 cm (7.9-23.6 in.), situated atop eroding bedrock (Figure 5-4), and in cases, within close reach of the water table (Figure 5-5). Shovel tests in this portion of the project area revealed silty clay that was very dark gray (10YR 3/1) to dark grayish brown (10YR 3/2). Seven shovel tests (STs 13-19) were excavated to the west of Cibolo Creek; none were positive for cultural material. Soils along this portion of the proposed interceptor route contained less clay than soils encountered on the eastern side of the creek. Soils consisted of very dark grayish brown (10YR 3/2) silty loam. No archaeological sites were encountered during Phase I. The single positive shovel test did not qualify as a *site* as defined during this project.

Figure 5-2. *Two-track roads intersecting Phase I project area.*

Figure 5-3. *The northeastern segment at the beginning of the Phase I project area, defined by a two-track road and fence line.*

Figure 5-4. *ST 2 terminating at 37 cmbs (15 in.) due to bedrock.*

Figure 5-5. *Water seeping into ST 20 at 47 cmbs (18.5 in.).*

Phase II: The Wastewater Treatment Plant

On March 17, 2010, CAR-UTSA archaeologists conducted a 100% pedestrian survey of the 12.5-acre proposed location for the Boerne Wastewater Treatment Plant, which constitutes Phase II of the project. A total of eleven 30-m (98.4-ft) wide transects were walked during the Phase II survey (Figure 5-6). A total of seven shovel tests (STs 20-26) were excavated in areas in which ground surface visibility was less than 30% (Table 5-2). None of the shovel tests yielded cultural material. Field technicians excavated shovel tests at a rate of one ST for every two acres of land, thus meeting the minimum THC archaeological survey standards for Texas.

ST 20 was excavated in the southwest portion of the project area, and encountered compact clay. The shovel test was excavated to a depth of 47 cmbs (18.5 in.) before encountering the water table. The soil within the shovel test had a yellowish hue, and no cultural material was produced. ST 21 was located in the next transect, on the northern side of the road to the house. This shovel test was terminated at 10 cmbs (3.9 in.) when it encountered bedrock. No cultural material was recovered from ST 21.

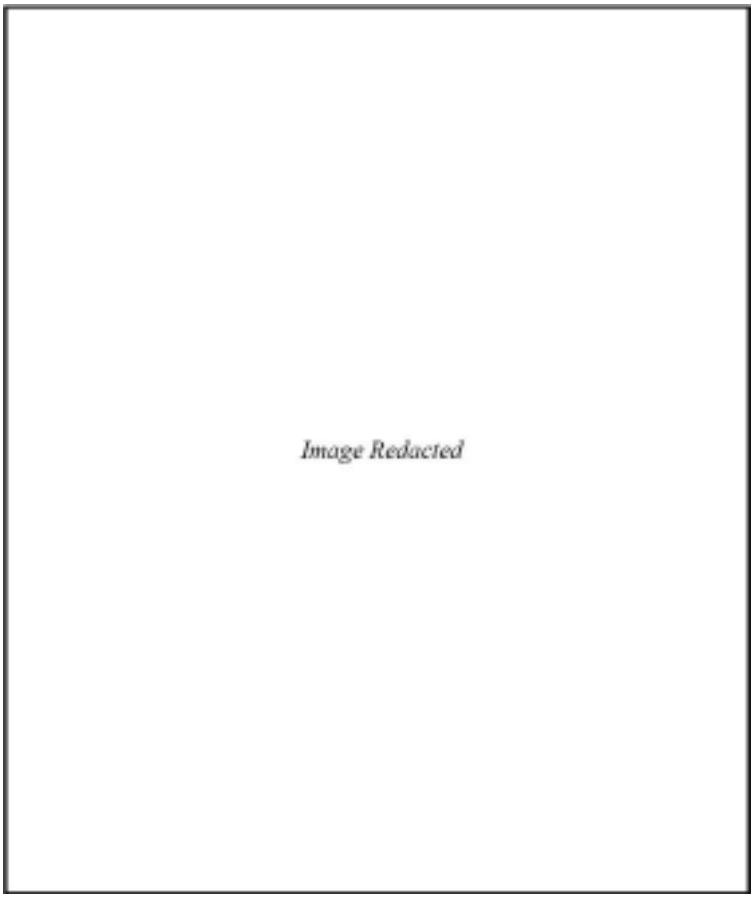

Figure 5-6. *Map of Phase II project area showing excavated shovel tests and site 41KE215.*

ST 22 was located just north of the road to the house. The shovel test was located on the edge of a small terrace overlooking drainage from Cibolo Creek. The soil was silty clay with no gravels. No cultural material was encountered during the excavation of this shovel test. ST 23 was located just north of the area, which had been occupied by a recently removed manufactured home, and placed next to a 70 cm (27.6 in.) long wooden plank with rivets. No cultural material was encountered.

ST 24 was excavated at the edge of a clearing, northwest of the house. The soil encountered was silty clay, and no cultural material was recovered. ST 25 was located in the northern portion of the project area, on a knoll overlooking the intermittent drainages in this portion of the property. No cultural material was recovered from the shovel test.

ST 26 was located in the far northeast portion of the project area. This shovel test was specifically placed, at the base of a steep incline in the flood plain of Cibolo Creek. The soils were dark loamy clay with plant material throughout. In the first level, a fragment of black PVC piping was recovered. No additional cultural material was recovered from ST 26. Since the PVC fragment was modern, no additional shovel tests were excavated in the area.

Table 5-2. Terminal Depths of Shovel Tests during Phase II

ST No.	Terminal Depth (cmbs)	Comments
20	47	water table
21	10	bedrock
22	60	max. depth
23	10	bedrock
24	12	bedrock
25	14	bedrock
26	60	max. depth
27	60	max. depth
28	60	max. depth
29	42	bedrock
30	60	max. depth
31	40	bedrock
32	19	bedrock
33	18	bedrock
34	35	bedrock

A house and associated structures within the APE, built in the 1940s, were defined as a historic site, 41KE215. The site was photographed and a sketch-map was drawn. An additional eight shovel tests (STs 37-34) were excavated to determine if there were subsurface cultural deposits. As part of the assessment to

determine if the site was eligible for inclusion on the Nation Register of Historic Places (NRHP) or listing as a State Archaeological Landmark (SAL), the ownership history of the site was researched using the Bexar County Deed Records (BCDR), the Kendall County Deed Records (KCDR), and the Kendall County Tax Records (KCTR), as well as other historic sources.

Site 41KE215

Located in the southeastern portion of the APE was a wood framed house, animal pens, and workshops. Examination of deed and tax records for the area surveyed during Phase II indicated that the house was likely built around 1940. The property was first granted to James McCullock by the Republic of Texas in April of 1845 (BCDR G1:352), though the deed was not filed until August 8, 1848. At that time the area was part of Bexar County. The property was described as Survey 184, located approximately 40 km (25 mi.) northwest of San Antonio, Texas. The property consisted of 120 acres located along the Cibolo Creek. McCullock, who is referred to as McCullough in some documents, conveyed the property to Ludovic Colguhoun in March of 1846, though the record was not filed until August of 1846 (BCDR D2:59). Colguhoun appears to have been active in procuring and selling properties within what was Bexar County during the Republic and early Statehood period of Texas. Colguhoun conveyed the property to Gustavus Cliemann (BCDR H1:37-38), and the deed was filed at the county office in January of 1849.

In 1856, Kerr County separated from Bexar County. The county seat at the time was Comfort, Texas. The residents of Boerne and Sisterdale petitioned in 1859 for the creation of a new county. The petition was granted in 1862. Kendall County was formed, and Boerne was named as the county seat (Smyrl 1996).

In October of 1869, Cliemann sold the property for a sum of $640 (KCDR A2:84) to Dr. Ferdinand Ludwig von Herff. The deed states that the entirety of Survey 184 (Patent #255, BCDR G1:352) was sold at this time. Herff was born to an aristocratic German family, which afforded him the ability to study medicine under some of the most prominent medical scientists at the time (Stembridge 1996). After finishing his studies, Herff moved from Germany to Texas to escape the political turmoil. The colony he helped to establish (Bettina) was short lived, and he returned to Germany within two years. Between 1849 and 1850, Herff returned to Texas with his wife and settled in San Antonio (Stembridge 1996). Herff is recognized as one of the most prominent surgeons in Texas during his time. He successfully conducted many procedures that were not typical during the era, with great attention paid to cleanliness at a time when such care was unusual. As a result, he was known to have a very low infection rate. People traveled from all over Texas to receive treatment from Dr. Herff (Stembridge 1996).

The property became known as Herff Ranch, and was passed down to the heirs. In 1917, a portion of the property was conveyed by Ferdinand Herff, August A. Herff, William L. Herff, and John B. Herff to Dr. Adolf Herff (KCDR 31:490). This transaction referred to the transfer of Herff Ranch from Ferdinand and Mathilde Herff to Ferdinand Herff in January of 1910. In April of 1932, William L. Herff conveyed another portion of Herff Ranch for a sum of $1 to Eleanor Herff Johnson (KCDR 53:295). This transaction appears to contain the area surveyed in Phase II. Property tax records indicate that some of the structures found on the property were likely built during Johnson's ownership of the property. The main house is listed as being constructed in 1940 (KCAD 2010).

Eleanor Herff Venable, formerly Eleanor Herff Johnson, sold the property for a sum of $10,000 to Ernest and Anna Reed in January of 1951 (KCDR 71:191-212). The property is found to have been sold by L. B. Fonarow and E. S. Markey to Jennie Lee McCullough. It seems that Fonarow and Markey were working on the behalf of the Reed's, likely as attorneys during the process of the transaction. McCullough, a widow, held on to the property until 1963, when she conveyed it to John and Kapitola Kirschke (KCDR 85:299). It appears that the Kirschke's later divided the property and sold it in two portions. The portion that contained the APE for this project was conveyed to Olin Barrett in August of 1996 (KCDR 491:483). Barrett owned the property for several years. He and his wife raised goats, and Olin often stored material from his contracting work on the premises (personal communication Donald Burger 2010). In 2008, the City of Boerne purchased the property from the Barretts (KCDR 1124:84) to convert it into a wastewater treatment plant.

Due to the age of the house and its associated outbuildings and other features, the area was designated a historic site and was given the trinomial 41KE215. Initially, the site boundaries were only to include the area contained in the fenced portion of the compound, which consisted of the house, a number of outbuildings, and pens (Figure 5-7). Prior to the pedestrian survey, archaeologists photo-documented the standing structures, created a sketch map of the compound, and recorded the location of each structure with a GPS unit.

The main house, likely built in the 1940s, is currently located in the southeastern portion of the APE (Figure 5-8). The structure is a two bedroom house with one bathroom, a kitchen, and a living space. An attached garage and screened in porch are additional parts of the overall structure.

Located to the northeast of the house is a workshop that appears to have been added at a later date (Figure 5-9). The workshop was 5-x-5-m (16-x-16-ft.) square, with a door-less entryway on the western face of the structure. The workshop is on a pier and beam foundation, and it is elevated from the ground surface which requires one step to gain entry. Miscellaneous objects remained in the structure at the time of recording,

including old books (medical journals and textbooks), a broken porcelain vase, and trash. Located to the northeast of the workshop is another structure which may be contemporaneous with the construction of the house (Figure 5-10).

The structure consists of a storage room, a chicken coop, a covered patio, and a roofed animal pen (Figure 5-11). The chicken coop was fairly small, and when the interior was inspected, peacock feathers as well as other unidentified feathers were noted. The structure is wood framed with a corrugated metal roof. The covered patio was located in the northern portion of the structure and contained many old tools, tool parts, cases, and other mechanical objects.

Adjacent to and east of the second structure described were what appears to be hog pens (Figure 5-12). Two pads for the pens were present, though only one pad had the pens in place. The pens consisted of a low fence, with a low roof over one portion of the cement pad.

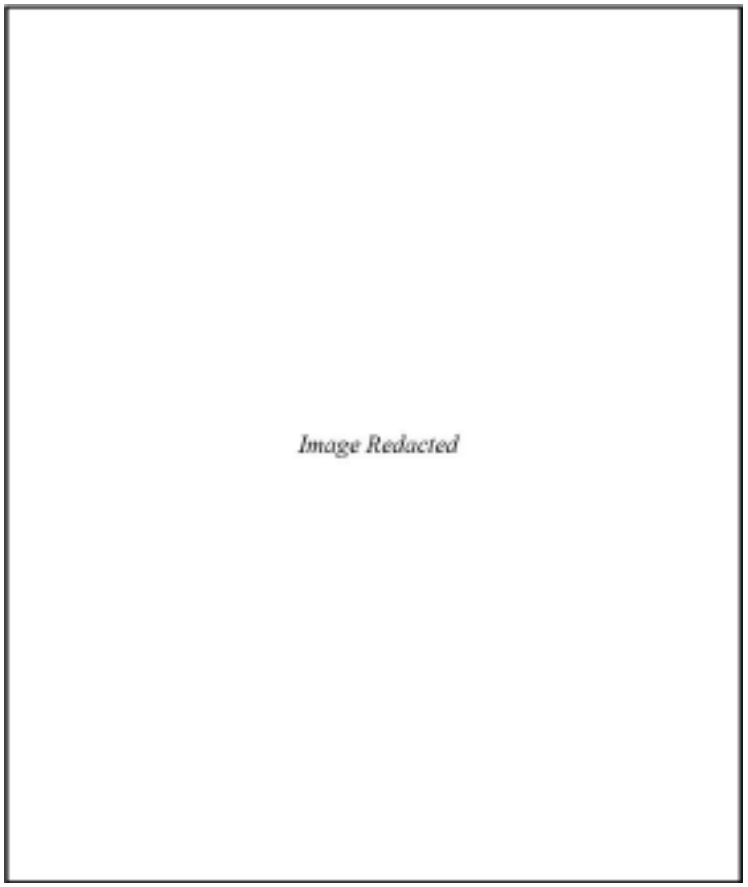

Figure 5-7. *Phase II project area showing shovel test locations, surface artifacts, house, and outbuildings at site 41KE215.*

Figure 5-8. *The wood-framed house within site 41KE215.*

Figure 5-9. *The workshop located to the northeast of the house. Facing east.*

Figure 5-10. *Photograph of the animal pen, chicken coop, and covered patio structure located to the northeast of the house. Facing east.*

Figure 5-11. *Photograph of the animal pen portion of the structure. Facing north.*

Figure 5-12. *Covered hog pens. Facing north.*

Located to the south of the second hog pen pad was a goat shack (Figure 5-13). The structure was three sided with a slanted roof and constructed of corrugated metal.

Several other cement pads were noted on the surface during the survey. Their purpose is unknown, but they may have acted as the footprint for other animal pens or structures. The locations of these pads were recorded using a Trimble GPS.

During the survey, several concentrations of trash were observed (Figures 5-14 and 5-15), and the locations were recorded with the Trimble GPS. Most of these concentrations were near the edge of the terrace that overlooked the drainages and the steep incline located in the northeast portion of the APE. Due to their location to the house complex, these were included in the outline of the archaeological site identified within the APE.

To sample the area within the site boundary, and to determine if there were subsurface cultural deposits, a total of eight shovel tests (STs 27-34) were excavated in the area. ST 27 was located to the west of the house. The soil consisted of dark brown silty clay in the upper two levels, and then it changed to caliche in the remaining levels. No cultural material was encountered during the excavation. ST 28 was excavated to the east of the house. The sediments proved to be similar to those seen in ST 27.

Figure 5-13. *Photograph of the goat shed. Facing north.*

Figure 5-14. *Trash dump located to the north of the hog pens, near the steep slope to the flood plain.*

Figure 5-15. *Trash scattered on the surface near the edge of the slope to the flood plain. Note the pocket watch, extract bottle, and candy dish lid.*

ST 29 was located farther to the east of the house and to the west of the dog house. Located near the edge of a shelf that had exposed bedrock, this shovel test had sediments similar to those in STs 27 and 28 though bedrock was reached before 60 cmbs (23.6 in.). No cultural material was recovered from ST 29.

ST 30 was excavated in the eastern portion of the open area (corral) just south of the animal pens. The whole area had scattered material on the surface, such as rusted nails, fencing staples, cutlery, ceramic fragments, and metal scrap. The soil of the shovel test appeared to be caliche throughout the levels. On the surface of the shovel test was one wire nail that was collected as part of Level 1 (0-10 cmbs; 0-3.9 in.). No cultural material was encountered subsurface.

ST 31 was located along the eastern fence-line just southeast of the goat shed. This shovel test encountered loose, rich loam with many earthworms in the first two levels. Level 3 (20-30 cmbs; 7.9-11.8 in.) encountered an increase in gravels, and a change in soil texture to that of clay. The soil in Level 4 (30-40 cmbs; 11.8-15.7 in.) was caliche, similar to the other shovel tests excavated within the area. No cultural material was present in the shovel test.

ST 32 was located north of the hog pens in an area with little tree cover. The sediment in this shovel test consisted of compact silty clay with a high percentage of gravels. Approximately 30 m (98 ft.) to the west, ST 33 was excavated, and similar sediments were encountered. Neither of the shovel tests produced cultural material.

ST 34 was excavated in an open area located to the northwest of a utility shed that housed a water heater. The soil in the shovel test was dark brown silty clay. No cultural material was observed in the shovel test.

Site 41KE215 has a prehistoric component consisting of two flakes observed on the surface. One chert flake was noted within the corral, immediately adjacent to ST 12. Another chert flake was noted on the surface to the west of the house. This second flake was located on a slope and with what appeared to be discarded oyster shells. No other evidence of prehistoric material was found within the APE. The limited time depth of the historic component coupled with the small number of artifacts representative of the prehistoric component and it unknown age, dramatically limit the information potential of both components of the site. Therefore, it is suggested that the site is not eligible for nomination to the NRHP, as specified under 36 CFR 60.4 – *Criteria of Eligibility*, and does not merit designation as a SAL, as outlined by the requirements in 13 TAC 26.8 – *Criteria for Evaluating Archeological Sites*.

Phase III: The Alternate Interceptor Line Route

Phase III of the project consisted of a 100% pedestrian survey and shovel testing of a 600 m (1,969 ft.) alternate route for the Menger Interceptor Line (Figure 5-16). Seven shovel tests were excavated during this phase (Table 5-3). Shovel tests (STs 35-41) were excavated every 100 m (328 ft.) along the route.

ST 35 was located along the alternate route just north of the area surveyed for the wastewater treatment facility. The soil consisted of dark brown silty clay with roots throughout. The last two levels of the shovel test exhibited some gravels but at a low density. No cultural material was encountered.

ST 36 was located north of ST 35. The soil in the shovel test consisted of a dark brown silty clay, though the lower levels appeared to have a higher clay content. Roots were noted in all levels. No cultural material was recovered from ST 36.

ST 37 was located at a low point in the floodplain to the northeast of ST 36. This shovel test was close to a cut-bank of the creek. The shovel test was placed at this location due to the presence of marked stakes in the ground. Although these stakes were the same as the ones used to delineate the alternate route, it was later found that the ones at this location were to outline the cut-bank, and thus were outside the proposed alternate route. The soil in this shovel test differed from the shovel tests located on the western side of the floodplain. The soil was brown silty clay. The first layer excavated was compacted. Snails were common throughout the shovel test. Species encountered included *Rabdotus* sp., *Oligyra orbiculata*, and *Rumina decollate*. No cultural material was encountered in ST 37. One D'Hanis brick and a fragment of ceramic sewer pipe were noted on the surface in the vicinity of ST 37.

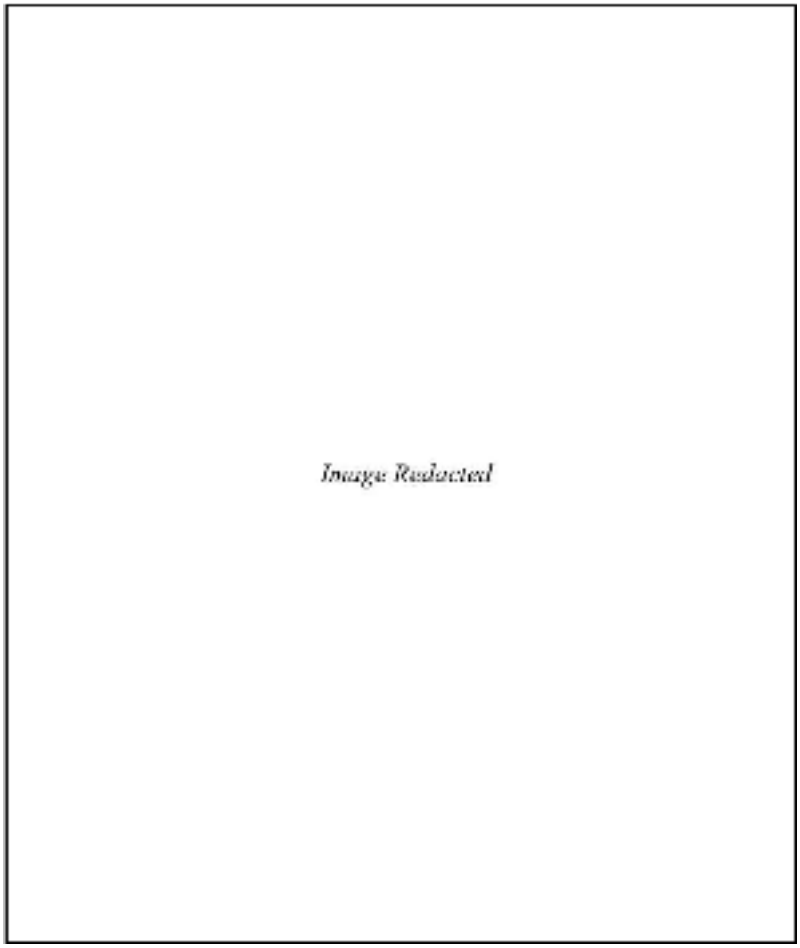

Figure 5-16. *Map of Phase III project area showing excavated shovel tests along the alternate interceptor line route.*

Table 5-3. Terminal Depths of Shovel Tests during Phase III

ST No.	Terminal Depth (cmbs)	Comments
35	60	max. depth
36	60	max. depth
37	60	max. depth
38	60	max. depth
39	60	max. depth
40	60	max. depth
41	60	max. depth

ST 38 was in line with the alternate route from ST 36. After this shovel test was excavated, it was realized that ST 37 was in the wrong location. Soil was very similar to that in ST 37, though the upper two levels were more compacted. Roots and snails were noted throughout. No cultural material was encountered in ST 38.

At the completion of these four shovel tests, CAR archaeologists were allowed access to the historic Herff Farm to test the area of the alternate interceptor line. Three shovel tests were excavated along the path of the route in an open field that had previously been plowed but has lain fallow for years.

ST 39 was located near the north bank of the Menger Creek, just before the route turns to the east. The first two levels were part of the plow zone. The shovel test exhibited organic materials in these first two levels. In Level 3 (20-30 cmbs; 7.9-11.8 in.), the soil color became darker indicating the end of the plow zone. The remainder of the levels exhibited soil that was more silt than clay and contained snails. No cultural material was recovered from ST 39.

ST 40 was located on the route to the northeast of ST 39. The sediments were very similar to those seen in ST 39. The shovel test produced no cultural material.

ST 41 was located northeast of ST 40, along the west bank of Browns Creek. The first level of the shovel test was fairly compact and took some effort to excavate. The soil consisted of brown silty clay that became fine once clumps were broken up. Grass roots were prominent in this level. As the remaining levels were excavated, the soil became less compact and less blocky. Snails were common throughout and included the same species as in ST 37. No cultural material was encountered during the excavation.

Phase IV: Alternate Interceptor Route

In June of 2011, CAR conducted a 100% pedestrian survey of the Phase IV alternate interceptor route, which is approximately 1100 m (3,609 ft.) in length. Shovel tests were excavated every 100 m (328 ft.), and a total of 11 STs were completed. Table 5-4 lists the terminal depth of the shovel tests (Figure 5-17).

ST 42 was located approximately 50 m (164 ft.) from the gate that allowed access to the property that needed to be surveyed. The soil consisted of a dark brown silty clay that became slightly lighter and increased limestone rock density at deeper levels. No cultural material was recovered from this shovel test, and excavation concluded at the terminal depth of 60 cmbs (23.6 in.).

ST 43 was located approximately 100 m (328 ft.) from ST 42 after the 90º turn in the route of the interceptor line. The soil consisted of a dark brown silty clay that was mixed with a high density of gravels. The excavation of the shovel test was terminated at 20 cm (7.9 in.) below surface due to bedrock. No cultural material was encountered.

ST 44 was located approximately 100 m (328 ft.) from ST 43 along the new route of the proposed interceptor line. The soil encountered in the test was dark brown silty clay with many limestone gravels.

At approximately 10 cmbs (3.9 in.), the density of soil decreases. Bedrock outcroppings were noted in the vicinity of the shovel test. ST 44 was excavated to 26 cmbs (10.2 in.) and could not be excavated further due to bedrock. No cultural material was encountered in the shovel test.

Table 5-4. Terminal Depths of Shovel Tests during Phase IV

ST No.	Terminal Depth (cmbs)	Comments
42	60	max. depth
43	20	bedrock
44	26	bedrock
45	55	bedrock
46	40	bedrock
47	60	max. depth
48	45	bedrock
49	60	max. depth
50	50	bedrock
51	20	bedrock
52	60	max. depth

ST 45 was located approximately 100 m (328 ft.) from ST 44 along the new route of the proposed interceptor line. The shovel test was located at the edge of a large grassy field. ST 45 contained the similar dark brown silty clay that had been encountered in the previous shovel tests but less gravels. The shovel test was excavated to 55 cmbs (21.7 in.), where bedrock was encountered. No cultural material was recovered from ST 45.

Located to the east of ST 45, approximately 100 m (328 ft.), was ST 46. ST 46 was also at the edge of a grassy field near a gravel road. The shovel test was excavated to a terminal depth of 40 cmbs (15.7 in.). A dark brown silty clay was the matrix encountered. At 40 cmbs (15.7 in.), bedrock was encountered that prevented further excavations. No cultural material was encountered during the course of the excavation of ST 46.

ST 47 was placed approximately 100 m (328 ft.) from ST 46. The location was on the edge of the grassy field, near a dry creek bed. The matrix in ST 47 was the same dark brown silty clay that had been encountered in the previous shovel tests. At about 30-40 cmbs (11.8-15.7 in.), small limestone gravels were encountered. Small snail shell was noted in the matrix in Level 5 (40-50 cmbs; 15.7-19.7 in.). ST 47 was excavated to a terminal depth of 60 cmbs (23.6 in.).

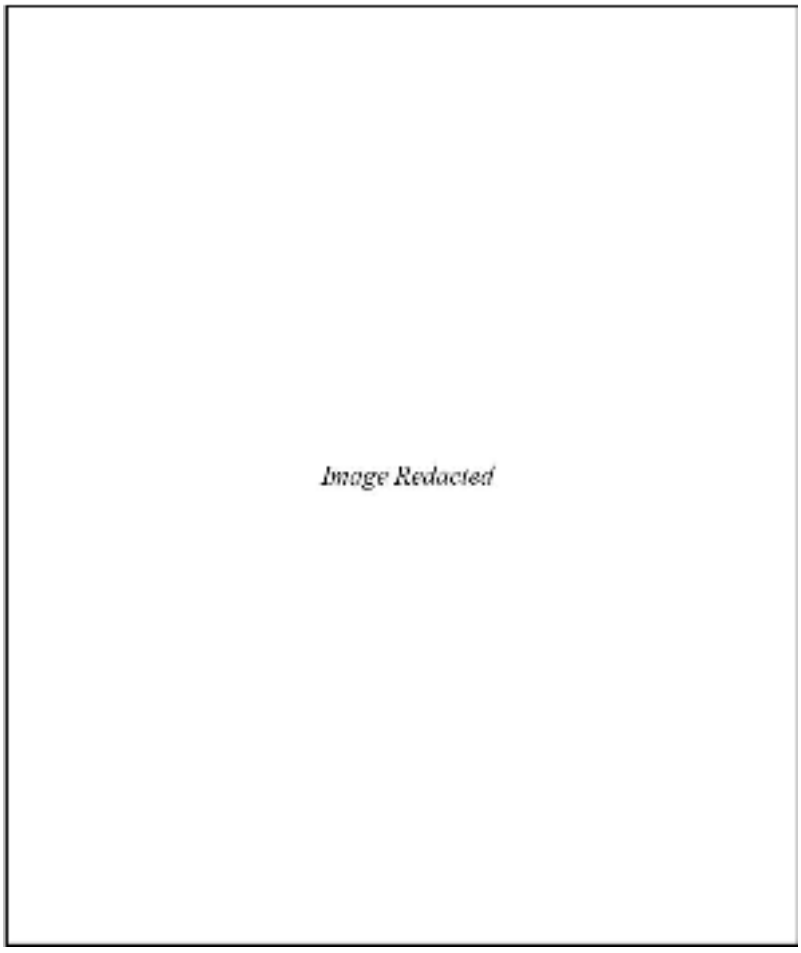

Figure 5-17. *Map of Phase IV and Phase V project area (purple) showing excavated shovel tests along the alternate interceptor line route.*

ST 48 was located in a treed area, just above the dry creek bed at approximately 100 m (328 ft.) from ST 47. The soil was very compact and consisted of the dark brown silty clay. No cultural material was encountered during the excavation of ST 48. The shovel test was excavated to a depth of 45 cmbs (17.7 in.) at which point bedrock was encountered.

ST 49 was located in a grassy field near a gravel road. The dark brown silty clay did not produce any cultural material. The shovel test was excavated to a terminal depth of 60 cmbs (23.6 in.).

ST 50 was located approximately 100 m (328 ft.) from ST 49 at the edge of a grassy field and wooded area. Bedrock was visible on the surface in the vicinity of the shovel test. The soil encountered continued to be the dark brown silty clay as seen in the previous shovel tests. Bedrock was encountered at approximately 50 cmbs (19.7 in.). No cultural material was noted in the shovel test.

ST 51 was located between ST 50 and the fence indicating the end of the APE. The shovel test was placed in a wooded area, where bedrock was visible on the surface in the surrounding area. The shovel test was excavated to a depth of 20 cm (7.9 in.) below the surface before encountering bedrock. No cultural material was recovered from the test.

ST 52 was located in a portion of the proposed new route located to the west of the main survey area. This portion of the route was just under 100 m (328 ft.) long. One shovel test was located between a large tree in the path and a fence line. The shovel test was extremely compact in the first two levels due to the dryness of the soil and compacting by cattle hooves. The soil consisted of a grayish silty clay. The shovel test was excavated to a terminal depth of 60 cmbs (23.6 in.). No cultural material was encountered.

Phase V: Alternate Interceptor Route

A total of 10 backhoe trenches were also excavated for the Phase V part of the project, which was carried out October 20-21, 2011, along the northern valley margin of Cibolo Creek and on both sides of Browns Creek (see Figure 5-17). This phase of work was conducted along the same route as the Phase IV shovel testing phase. Along this proposed route, the interceptor lines traverse numerous geomorphic landforms, including potentially deep alluvial deposits associated with Menger, Cibolo, and Browns creeks. Trenches ranged in depth from 57-200 cmbs (22.4-78.7 in.) and were excavated from 5-10 m (16.4-32.8 ft.) in length. No cultural materials or features were identified in any of the Phase V trenches.

BHT 1 was located at the base of a hill slope approximately 100 m (328 ft.) north of the Cibolo Creek channel and 350 m (1,148 ft.) west of Browns Creek (see Figure 5-18). The trench profile revealed a shallow A-Bw-C soil horizon sequence to an excavated depth of 57 cm (22.4 in.) at which depth bedrock was encountered. Soil texture ranged from silt loam to clay loam. Approximately 2% sub-rounded to sub-angular limestone fragments were present within the A horizon. This, coupled with the weak degree of soil development, suggests that the soils revealed in BHT 1 are derived mainly from the elevated toeslope to the immediate north. No cultural materials were observed within this trench.

Figure 5-18. *Overview of BHT 1 profile. Facing south.*

BHT 2 was located 70 m (229.7 ft.) east of BHT 1, at the base of the slope and at the floodplain margin, approximately 100 m (328 ft.) north of Cibolo Creek. The trench profile revealed an A-Bk-BC-2Bk soil horizon sequence to an excavated depth of 125 cm (49.2 in; Figure 5-19). Soil texture was silty clay loam that graded to gravelly silt in the lower 2Bk horizon, from 96-125 cmbs (37.9-49.2 in.). Coarse fragments ranged from 3-5% rounded and sub-rounded pebbles in the uppermost horizons and increased dramatically to approximately 15% gravels and pebbles in the 2Bk horizon. The 2Bk horizon also exhibits many secondary calcium carbonate threads, as well as very fine, 2-mm (0.08-in.) diameter carbonate nodules. Based on the degree of soil development and geomorphic position, the upper A-Bw-BC horizons are interpreted to represent recent overbank floodplain deposits, while the 2Bk horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace system that flanks Cibolo Creek. No cultural materials were observed within this trench.

Figure 5-19. *South wall profile in BHT 2.*

BHT 3 was located 195 m (639.8 ft.) west of Brown Creek on the Cibolo Creek floodplain. The trench profile revealed an A1-A2-BC-2Bk soil horizon sequence to an excavated depth of 125 cm (49.2 in.; Figure 5-20). Soil texture was mainly silty clay loam and silty clay in the A and BC horizons, grading into gravelly silt loam in the 2Bk horizon. The 2Bk horizon exhibited common secondary carbonate nodules ranging from 2-5 mm (0.08-0.2 in.) in diameter. Based on the field observations and the degree of soil development, the upper A and BC horizons are interpreted to represent overbank floodplain deposits, while the 2Bk horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed in this trench.

Figure 5-20. *BHT 3, south wall trench soil profile.*

BHT 4 was located 100 m (328 ft.) west of Browns Creek on the Cibolo Creek floodplain. The trench profile revealed an A-Bw-BkC-2Bk1-2Bk2 horizon sequence to an excavated depth of 130 cm (51.2 in.; Figure 5-21). Soil texture ranged from silty clay loam in the A and Bw horizons to silt loam in the lower horizons. Soil structure was weak fine subangular blocky in the A-Bw-BkC horizons, increasing to moderate medium subangular blocky within the 2Bk1 and 2Bk2 horizons. The BkC horizon exhibited few fine secondary calcium carbonate filaments, which increased dramatically in the 2Bk1 and 2Bk2 horizons. Based on the field observations and the degree of soil development, the upper A and BC horizons are interpreted to represent overbank floodplain deposits, while the 2Bk horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed within this trench.

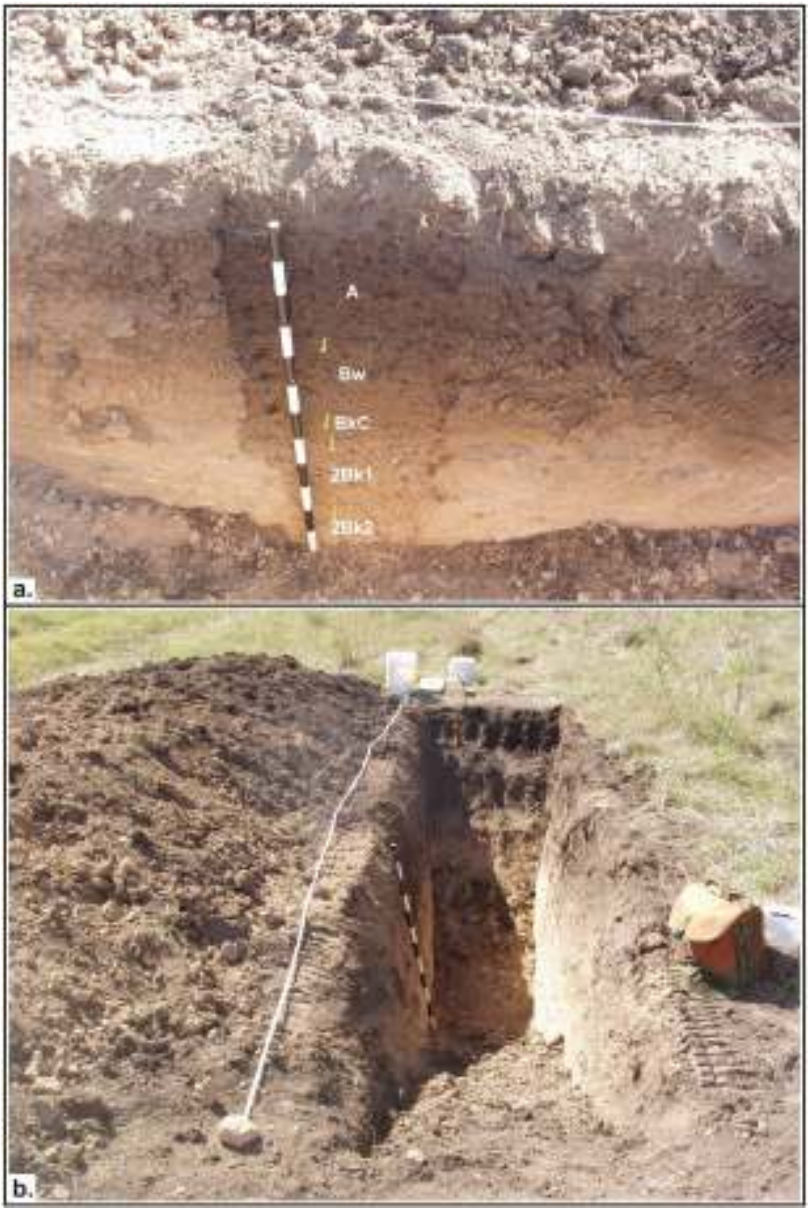

Figure 5-21. *BHT 4: a) south wall soil profile; b) overview facing west.*

BHT 5 was located 75 m (246.1 ft.) west of Browns Creek, on the Cibolo Creek floodplain. The trench profile revealed an A-Bw-2Bk horizon sequence to an excavated depth of 105 cm (41.3 in.; Figure 5-22). Soil texture was clay loam in the A horizon and silty clay loam in the Bw and 2Bk horizons. No pedogenic calcium carbonates were observed within the A and Bw horizons, but many fine threads and a few nodules, ~10 cm (3.9 in.) in diameter, were observed within the 2Bk horizon, beginning at 67 cmbs (26.4 in.). Coarse fragments ranged from <1% in the A horizon to approximately 3% in the Bw horizon and consisted of snail shells and snail shell fragments, as well as 1-5 mm (0.04-0.2 in.) in diameter, rounded pebbles. No cultural materials were observed within this trench.

Figure 5-22. *BHT 5 south wall profile.*

BHT 6 was located 45 m (147.6 ft.) west of Browns Creek. The trench profile revealed an A-Bk1-Bk2-2Bk3 soil horizon sequence to an excavated depth of 140 cm (55.1 in.; Figure 5-23). Soil texture consisted of fine sandy loam within the A, Bk1, and Bk2 horizons, to a depth of 100 cm (39.4 in.), and transitions into silty clay loam within the 2Bk3 horizon from 100-140 cmbs (39.4-55.1 in.). The Bk1 and Bk2 horizons exhibit few, very faint calcium carbonate filaments, though these concentrations increase abruptly within the 2Bk3 horizon. The 2Bk3 horizon contains many fine filaments as well as 10-cm (3.9-in.) diameter carbonate nodules. Soil colors within this trench are generally lighter (10YR 3/4 and 4/4) and consist of coarser sediments in the upper solum. Given this sediment texture and color change, and the proximity to Browns Creek (~45 m; 147.6 ft.), the upper A and Bk horizons soils are interpreted to be floodplain deposits from Browns Creek, which likely inter-finger with those associated with the Cibolo Creek drainage. The 2Bk3 horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed within this trench.

BHT 7 was located 15 m (49.2 ft.) east of Browns Creek. The trench profile revealed an A-Bw1-Bw2-2Bk soil horizon sequence to an excavated depth of 130 cm (51.2 in.; Figure 5-24). Soil texture consists of silty clay loam and sandy clay loam. The A and Bw horizons contain approximately <1% coarse fragments, including pebbles and snail shells and fragments. No secondary calcium carbonates were observed within

these horizons. The 2Bk horizon, beginning at 92 cmbs (36.2 in.), contains common carbonate filaments, approximately 10% small pebbles, and common snail shell fragments. Also present are angular limestone fragments 5% in abundance. Given the coarser sediment texture in close proximity to Browns Creek (~45 m; 147.6 ft.), the upper A and Bw horizons soils are interpreted to be floodplain deposits from Browns Creek, which likely inter-finger with those associated with the Cibolo Creek drainage. The 2Bk horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed within this trench.

Figure 5-23. *BHT 6: a) trench overview, facing south; b) south wall soil profile. Note the abrupt and wavy Bk2-2Bk3 horizon boundary.*

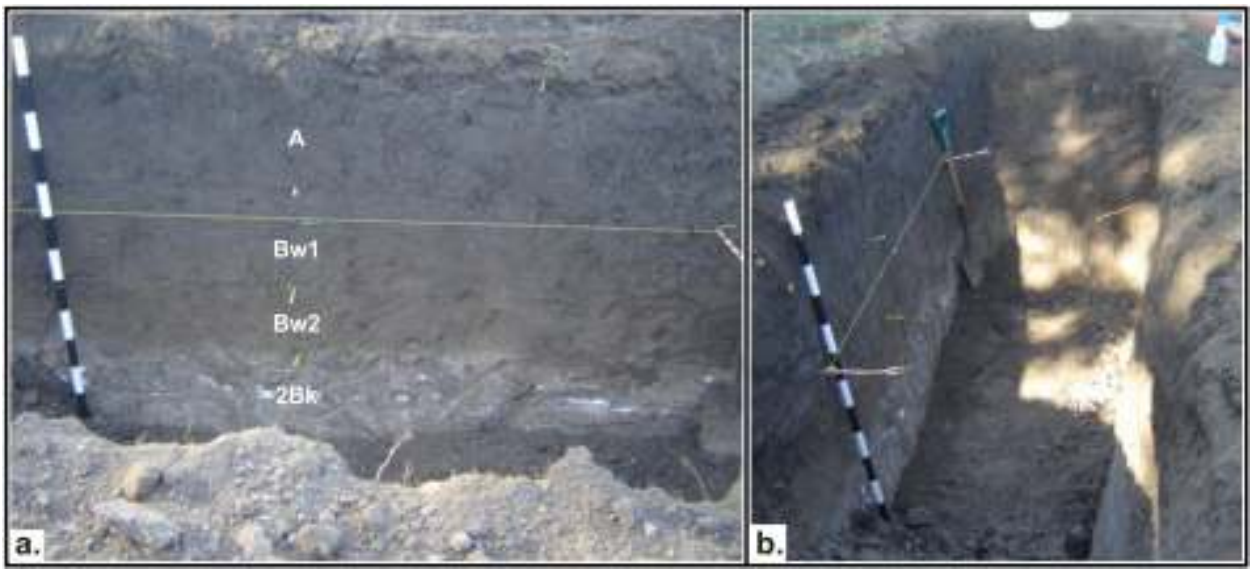

Figure 5-24. *BHT 7; a) south wall soil profile; b) overview facing west.*

BHT 8 was located 45 m (147.6 ft.) east of Browns Creek. The trench revealed an A-Bk1-2Bk2-2Btk soil horizon sequence to an excavated depth of 200 cm (78.7 in.; Figure 5-25). Soil textures within the A and Bk1 horizon consist of fine sandy loam with weak fine granular structure. Very few, faint secondary calcium carbonate filaments were observed in the Bk1 horizon. The 2Bk2 and 2Btk horizons contain approximately 15% fine calcium carbonate filaments, as well as angular limestone fragments, 2% rounded pebbles, and common snail shell fragments. These horizons also exhibit much more pronounced soil ped structure with moderate medium subangular blocky and angular blocky peds. Soil consistence is also slightly hard. The 2Btk horizon also exhibits prominent clay skins on ped faces, indicative of time-dependent illuviation of fine clay down the profile. Based on the field observations and the degree of soil development, the upper A and Bk horizons are interpreted to represent overbank floodplain deposits associated with Cibolo Creek, while the lower horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed within this trench.

BHT 9 was located 75 m (246.1 ft.) east of Browns Creek. The trench profile revealed an A-Bw-2Bk-2CBk soil horizon sequence to an excavated depth of 140 cm (55.2 in.; Figure 5-26). Soil textures range from clay loam in the upper horizons to silt loam in the lower horizons. The A and Bw horizons contain approximately 1% coarse fragments of rounded pebbles and snail shell fragments, which increase to 2% in the lower 2Bk and 2CBk horizons. The 2Bk and 2CBk horizons contain few to common fine filaments of secondary pedogenic calcium carbonate. Within the 2CBk horizon, between 15 and 20% small gravels are present, as well as a few angular limestone fragments. Based on the field observations and the degree of

soil development, the upper A and Bw horizons are interpreted to represent overbank floodplain deposits associated with Cibolo Creek, while the lower horizon appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed within this trench.

Figure 5-25. *BHT 8 overview. Facing east.*

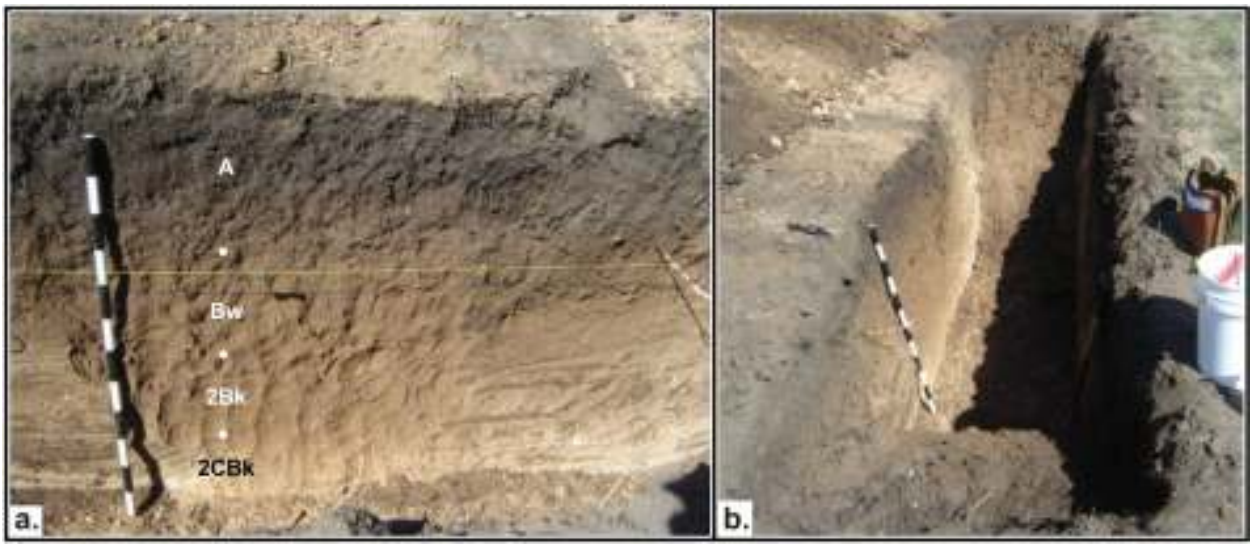

Figure 5-26. *BHT 9: a) north wall soil horizon profile; b) trench overview, facing east.*

BHT 10 was located 100 m (328 ft.) east of Browns Creek. The trench profile revealed an A-Bw-2CBk horizon to an excavated depth of 100 cm (39.4 in.; Figure 5-27). Soil textures within BHT 10 range from clay loam in the upper part to gravelly clay loam at the base of the trench. The A and Bw horizons contain approximately 1% coarse fragments of rounded pebbles and snail shell fragments, which increase to 20% in the lower 2CBk horizon, ranging from 20-40 cm (7.9-15.7 in.) in diameter. Secondary pedogenic calcium carbonates are only present within the 2CBk horizon and consist of 10% filaments and <5% nodules. Based on the field observations and the degree of soil development, the upper A and Bw horizons are interpreted to represent colluvial slope deposits derived from the adjacent hill slope to the northeast, while the lower horizons appears to be significantly older and likely represents the truncated upper portion of the Pleistocene terrace fill within this stream valley. No cultural materials were observed within this trench.

Figure 5-27. *BHT 10 overview. Facing east.*

Construction Monitoring

Because of the expedited construction schedule following selection of a final project easement, CAR staff initiated construction monitoring of the proposed easement. The construction activities consist of the initial removal of the topsoil and its temporary storage. Next, the remaining deposits are scraped down to bedrock which is buried between 4-7 m (13.1-23 ft.) below the surface. In areas where the pipe installations will

cross Menger, Cibolo, and Browns Creeks, the contractor will bore under the creek beds to install the desired conduits. Following the completion of the archaeological survey and THC clearance for construction to proceed, CAR monitored construction activities within the proposed easement. Recent exposures of the stratigraphy within the project APE suggest that Holocene deposits extend to a depth of 2-3 m (6.6-9.8 ft.) below surface at maximum. Therefore, monitoring has been limited to portions of the APE that extend from surface to roughly 3 m (9.8 ft.) below the surface. Construction monitoring occurred intermittently from October 3 to November 15, 2011. A total of three previously unrecorded archaeological sites were discovered during construction clearing within the proposed construction easement (Figure 5-28). These sites were assigned trinomials 41KE217, 41KE218, and 41KE219.

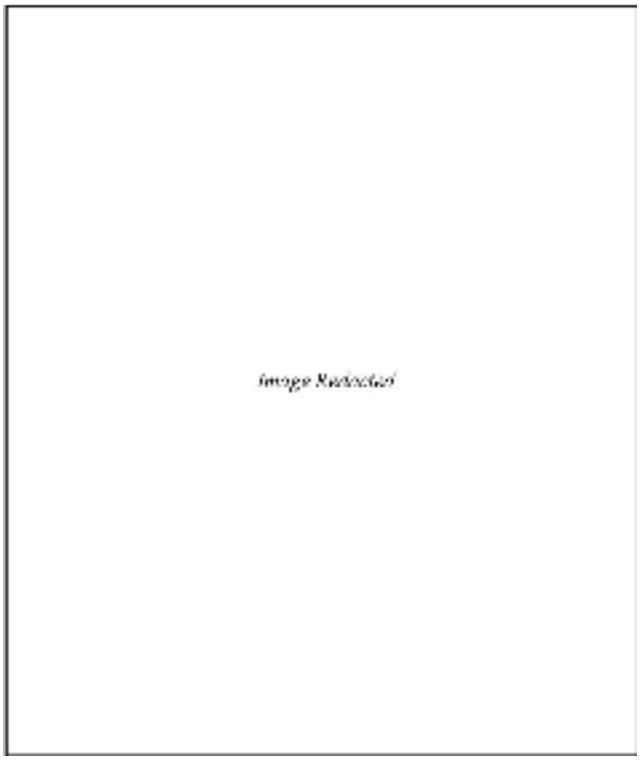

Figure 5-28. *Project APE and location of three new sites discovered during construction monitoring of the APE easement.*

Site 41KE217

During the monitoring of the grading of the portion of the easement found on private property and located immediately north of the planned water treatment plant, archaeological deposits were identified within the 15-m (49.2-ft.) easement. These deposits were buried roughly 70 cm (27.6 in.) below the ground surface at the base of a hill that is situated immediately west of the Menger Creek floodplain and the Menger Creek-Cibolo Creek confluence (Figure 5-29). This locality has been identified as 41KE217. Site 41KE217 is situated on Menger Creek floodplain margin, approximately 250 m (820.2 ft.) due west of the confluence

of Menger and Cibolo Creeks in Kendall County. The site is situated on a relatively level/stable floodplain of Menger Creek, along the upland valley wall margin. Site elevation is 424 m (1,390 ft.) and rises approximately 5 m (16.4 ft.) above the active channel level, though the site is periodically flooded by overbank flooding associated with Menger and Cibolo Creeks. The site rests at the base of a steep limestone hill, on the east side of a property line fence. The site area lacks trees and contains short, native grasses all the way to the creek bottoms.

In October 2011, CAR archaeologists observed portions of the site exposed during construction monitoring activities associated with the Boerne WTP construction (Figure 5-30). Site 41KE217 was initially identified when a dense concentration of burned limestone representing the remains of stone-lined cooking features, chipped stone debitage and tools, and projectile points were uncovered during construction scraping activities within the proposed construction easement. The extensive burned rock features are situated within near-surface floodplain deposits of Menger and Cibolo Creeks, which in turn are buried by a variably-thick wedge of younger colluvial sediments that originated from the steep hill immediately west of the site. Initial estimates of the site size were 35-x-10-m (114.8-x-32.8-ft.), based on the surface extent of cultural materials. This area was then cordoned off from further construction impacts so that it could be fully assessed for significance. In order to further explore the horizontal and vertical extent of these site deposits, three backhoe trenches were excavated in the vicinity of the finds.

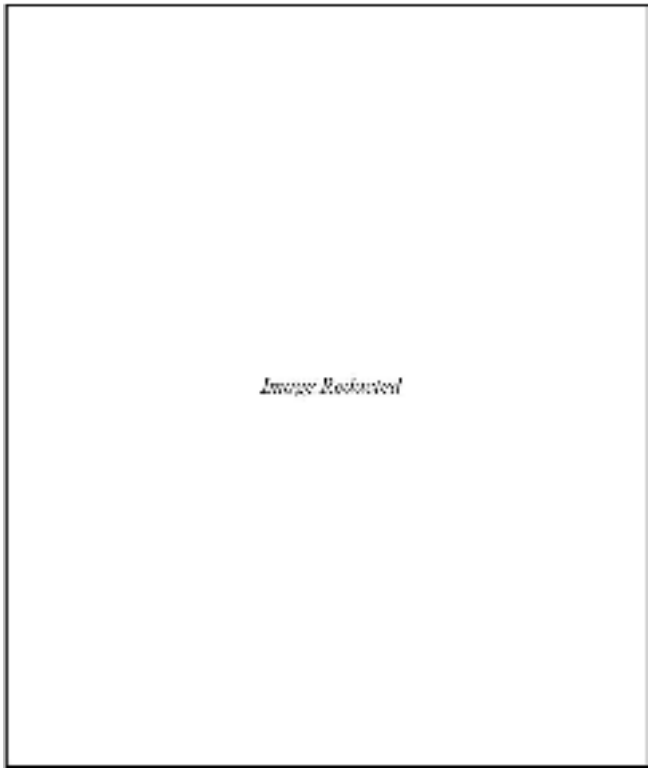

Figure 5-29. *Extent of 41KE217 as revealed from construction scraping.*

Figure 5-30. *Overview of site 41KE217 during the initial discovery of burned rock zone, during construction monitoring. Facing south.*

Backhoe Trenching at 41KE217

Three backhoe trenches (BHTs) were excavated in order to better define the horizontal and vertical extent of the archaeological deposits revealed at site 41KE217 and to investigate the alluvial stratigraphy at the site through geoarchaeological investigation (see Chapter 6). In order to avoid confusion with the previous 10 backhoe trenches excavated near Cibolo and Browns Creeks, the previous survey trench numbering was continued. Trenches at 41KE217 were thus designated as BHTs 11, 12, and 13. All trenches exposed the upper portion of an eroded/scoured, artifact-sterile Pleistocene terrace surface (designated as alluvial stratigraphic Unit 1B) that begins between 100 and 120 cmbs (39.4 and 47.2 in.). This ancient surface is overlain by more recent, Holocene-age floodplain alluvium (Unit 2B), which in turn is overlain by Holocene-age colluvium (Unit 3). Archaeological materials were identified within each of the trenches and are contained within fine-grained (e.g., silt loam to clay loam) floodplain deposits derived from Menger and Cibolo Creeks. No significant amount of cultural materials was identified within the Unit 3 colluvial deposits, which suggests that this may post-date the prehistoric period. A detailed geomorphic assessment of this site and the project area is covered in Chapter 6.

BHT 11 was oriented along the same alignment as the construction easement, which was northwest to southeast. The purpose of BHT 11 was to further explore the extent of the burned rock feature at 41KE217 that was initially exposed during construction grading and topsoil removal from the easement. BHT 11 was situated at the southern end of the site and measured 20 m (65.6 ft.) in length, 130 cm (51.2 in.) in width, and was excavated to an average depth of 150 cm (59.1 in.; Figure 5-31). The ground surface at the top of most of BHT 1 begins approximately 45 cm (17.7 in.) below the top of the colluvial toeslope deposits that covered the site and were mechanically removed during construction grading. However, the northernmost portion of BHT 11 remained intact at the original ground surface.

After hand-troweling the entire west wall of BHT 11, close examination revealed two stratigraphically-distinct cultural occupation zones designated as the *upper component* and the *lower component* (Figure 5-32). The upper component consists of a dense burned rock layer approximately 30-cm (11.8 in.) thick with abundant large limestone fire-cracked rock (FCR) fragments. This component was found to extend approximately 50 m (164 ft.) northeast-southwest, and at least 15 m (49.2 ft.) southeast-northwest, a much larger area than originally anticipated. It is not known how far on either side of the easement boundary the site might be. Dense concentrations of burned rock, lithic flakes, bifaces, utilized flakes, lithic cores, snail shells and fragments, scrapers, and projectile points were identified in the upper component and appear to be confined to the 2A horizon and upper part of the 2Bk1 horizon associated with the uppermost part of the Holocene-age floodplain. Projectile points identified in backhoe trench backdirt appear to include Early, Middle, and Later Archaic styles that include Bulverde, Pedernales, Langtry, Noland, and La Jita points. Based on projectile points presumed to have originated from the upper component, the upper component of the site contains a very compressed zone of cultural materials ranging from 6000-3000 yr. BP.

Located approximately 30 cm (11.8 in.) below the upper component is a second zone of burned rock features, designated as the lower component. Angostura and other temporally-contemporaneous tools dating to about 8000 yr. BP were identified as having originated from this lower occupation zone, along with dense quantities of large FCR feature rocks. The lower zone is approximately 30 cm (11.8 in.) in thickness or less and represents a much shorter time span than the upper zone. It is contained within fine-grained overbank silts and exhibits excellent preservation potential. Furthermore, the lower component appears to represent a fairly short period of occupation before it was buried. Thus, a higher degree of temporal resolution into the Earliest Archaic lifeways can be obtained at this site.

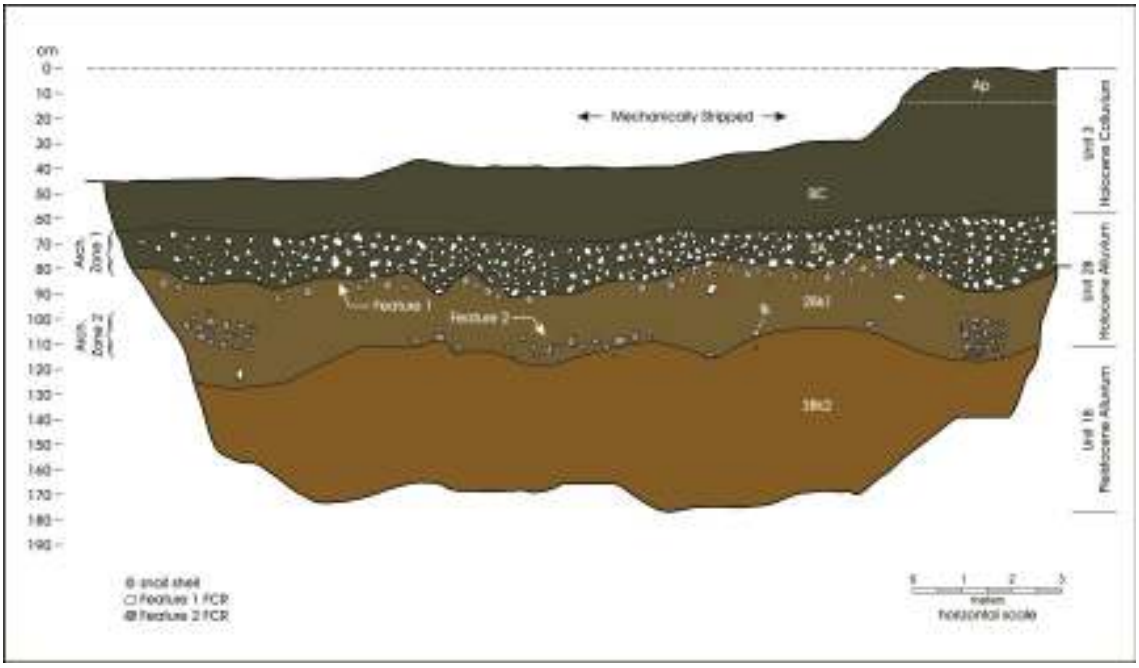

Figure 5-31. *Profile drawing of BHT 11, west wall profile. Note that image is vertically exaggerated.*

Figure 5-32. *BHT 11, facing southwest, showing the vertical separation of upper and lower components.*

BHT 12 was situated at the northwest end of the site and was oriented perpendicular to the easement, and thereby cross-cutting the colluvial apron. BHT 12 was located approximately 50 m (164 ft.) north of BHT 11. BHT 12 measured 11 m (36.1 ft.) in length and was 130 cm (51.2 in.) in depth at the west end of the trench, located near the top of the footslope, and 80 cm (31.5 in.) in depth at the east end of the trench, which was at the toeslope. No colluvial deposits had been removed in the BHT 12 area, which provided an uninterrupted, continuous soil sequence (Figure 5-33). Careful examination of the BHT 12 profile revealed that only the upper component of the site was present. This upper component consists of a 20-30 cm (7.9-11.8 in.) thick deposit of burned and cracked limestone rocks similar to those observed in BHT 11, though the FCR concentrations appear to be less dense. This upper component, which appears to correlate to the Middle Archaic occupation at this site, rests almost directly upon the eroded Pleistocene-age terrace surface, which was designated as alluvial stratigraphic Unit1B during the geomorphic investigations (see Chapter 6). The older, lower component was not observed, although the 2Bk1 horizon which contained both components in BHT 11 was present in BHT 12. However, this horizon was only about 10 cm (3.9 in.) thick in BHT 12.

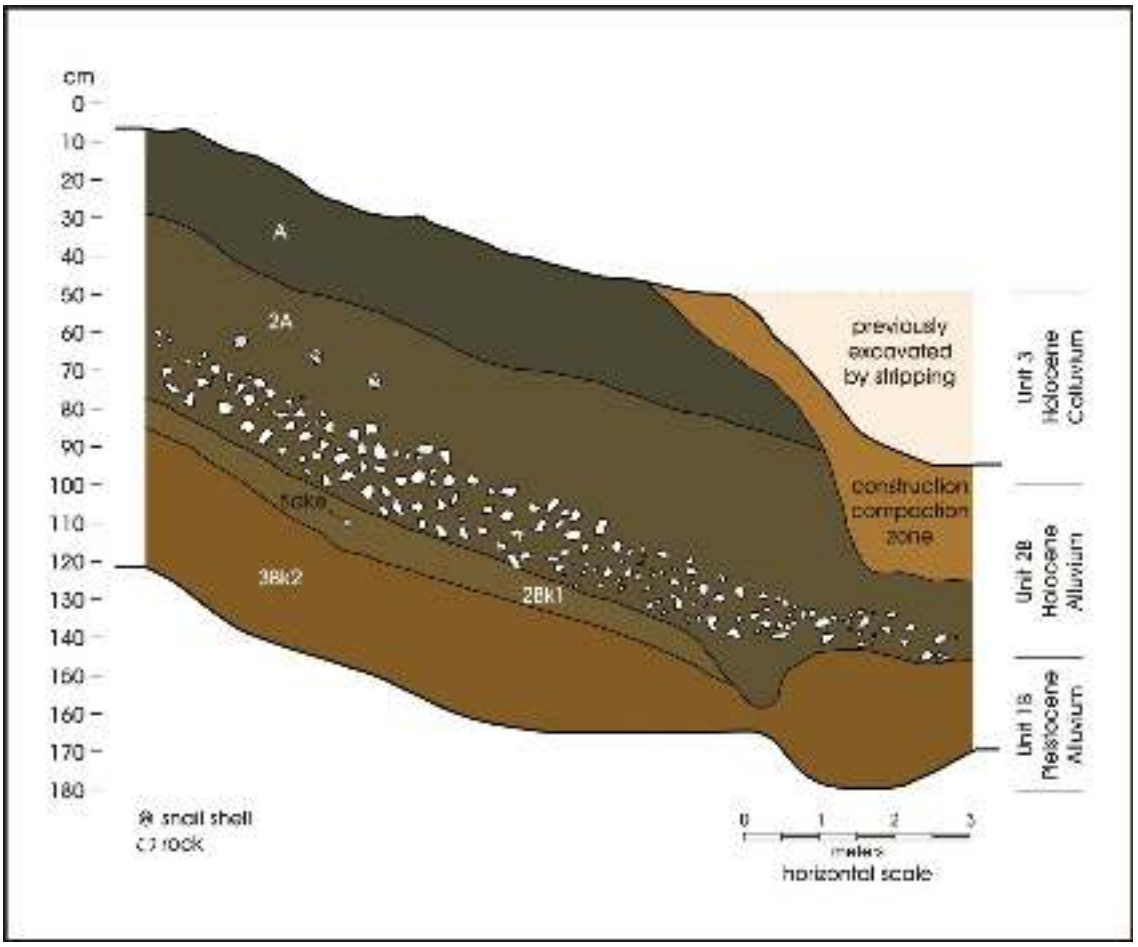

Figure 5-33. *Profile drawing of BHT 12, north wall profile. Note vertical exaggeration.*

From the east end of BHT 12, immediately below the upper component, a fairly large, prominent burned zone was identified and examined, and charcoal was collected for radiocarbon assay. As shown in Figure 5-34, ages that were returned date from 4762 ± 22 and 4910 ± 31 ^{14}C yr. BP. These ages are consistent with the central age of the upper component at this site as estimated from diagnostic projectile points. No lower component was identified within BHT 12.

Figure 5-34. *Overview of BHT 12, facing west. Note absence of lower component.*

BHT 13 was oriented the same as BHT 1, along the same alignment as the construction easement. BHT 13 measured 4.5 m (14.8 ft.) long, 130 cm (51.2 in.) wide, and 150 cm (59.1 in.) deep (Figure 5-35). BHT 13 was located midway between BHTs 11 and 12 in order to investigate the horizontal and vertical distribution of artifacts within the central part of the site. None of the colluvial deposits (e.g., Unit 3) had been removed in the BHT 13 area, which revealed an uninterrupted soil sequence. Close examination of the cleaned, west wall profile revealed that only the upper component was present at this location and consisted of a 20-30

cm (7.9-11.8 in.) thick zone of cultural materials. These materials were consistent with the Middle and Late Archaic age burned rock fragments already identified in BHTs 11 and 12 and, thus, likely date from 6000-3000 BP. The upper component identified in BHT 13 rests directly upon the Pleistocene terrace surface (Unit 1B). No significant lower component appears to be present.

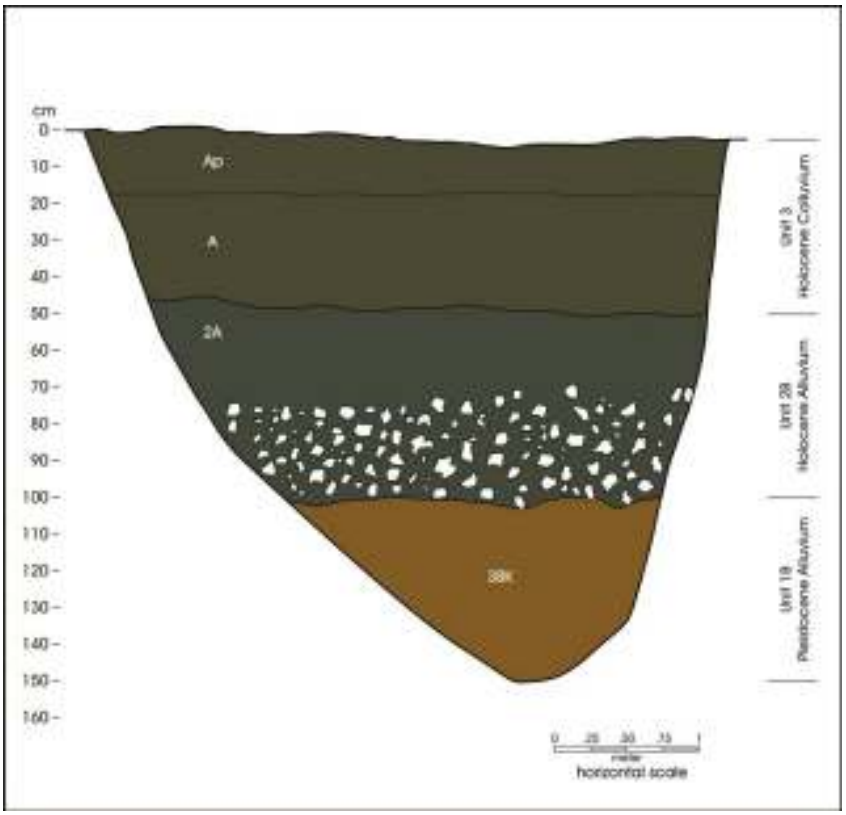

Figure 5-35. *Profile drawing of BHT 13, west wall profile, at 41KE217.*

Summary of Observations and Recommendations for Site 41KE217

Based on the aerial extent of cultural materials as observed throughout backhoe trenches and construction grading, site 41KE217 measures approximately 50 m (164 ft.) in length from north to south and ranges in depth from 60-140 cmbs (24-55 in.).

Two temporally distinct cultural components were identified during backhoe trenching. The upper component consists of an approximately 30-cm (11.8-in.) thick zone of late Middle Archaic to Late Archaic artifacts and burned rock midden deposits. This upper component is present across the entire site and appears to begin within the 2A horizon and extending into the uppermost portion of the 2Bk horizon of the floodplain surface. The top of the site is buried and preserved beneath approximately 60 cm (23.6 in.) of recent colluvial hill slope deposits that lack cultural remains.

The lower component, which appears to be limited to the south end of the site within BHT 11, contains a thin, discrete zone of burned rocks, flakes, and tools, and diagnostic Angostura-like projectile points dating to the Early Archaic period. These artifacts are found within the lowermost part of the 2Bk horizon, within Holocene floodplain deposits. In the BHT 11 part of the site, the 2Bk horizon is substantially thicker than in the northern parts of the site around BHTs 12 and 13. Thus, there is approximately 20-30 cm (7.9-11.8 in.) of vertical separation between the upper and lower components in the BHT 11 area. Within BHTs 12 and 13, the 2Bk horizon is typically less than 10 cm (3.9 in.) thick, and no lower components were identified.

Based on the current level of survey work, site 41KE217 appears to exhibit excellent integrity potential for Early through Late Archaic cultural materials. Coupled with the slowly aggraded fine-grained sediments at the site, laterally-extensive burned rock midden features, and vertical separation of cultural components, additional testing excavations are recommended at site 41KE217 in order to assess its eligibility for the NRHP and whether it merits designation as a SAL. It is recommended that at least four 1-x-1-m (3.28-x-3.28-ft.) test units be excavated to assess the site's eligibility potential. Because the BHT 11 area contains both upper and lower cultural components and because only the upper components appears to be present in the central and northern portions of the site, CAR recommends that the majority of the testing units be concentrated in the BHT 11 area.

Site 41KE218

Site 41KE218 was discovered during grading of topsoil on the edge of the uplands overlooking the Cibolo Creek drainage within property owned by the Cibolo Nature Center (Figure 5-36). The area is dominated by large and medium oak vegetation and scattered mesquite. Short grasses are present in the less shaded areas. Approximately 10-15 cm (3.9-5.9 in.) of topsoil had been removed by the initial pass of the grader when a small number of angular limestone rocks were noted on the fresh surface. A closer examination of the surface also lead to the recovery of a small number of unmodified lithic debitage (6 flakes), two cores (Figure 5-37), a biface fragment and a possible Late Archaic un-typable point fragment. The burned rock fragments did not form concentrations. They were scattered across the area, and no feature could be discerned from their arrangement. The total are of the deposits extended the width of the easement 15 m (49.2 ft.) and continued for approximately 23 m (75.5 ft.) along the freshly graded surface.

The total site area for 41KE218 is approximately 16-x-23-m (52.5-x-75.5-ft.), or 368 m^2 (3,963.8 sq. ft.). It is likely that the cultural deposits extend outside of the project easement along this upland margin that overlooks Cibolo Creek. The deposits are shallowly buried, and the grading has already exposed bedrock in several places within the site boundary (Figure 5-38). Given the shallow topsoil, no stratigraphic

separation exists between materials, and while an un-typable Late Archaic point was recovered on surface, it cannot be concluded that all of the cultural materials date to this time period. No animal bones were noted, and no intact features could be defined. Based on the foregoing observations, it is recommended that site 41KE218 lacks the necessary integrity and information potential to be eligible for the NRHP, as specified under 36 CFR 60.4 – *Criteria of Eligibility*, or to merit designation as a SAL, as outlined by the requirements in 13 TAC 26.8 – *Criteria for Evaluating Archeological Sites*. No additional archaeological investigations are recommended for site 41KE218.

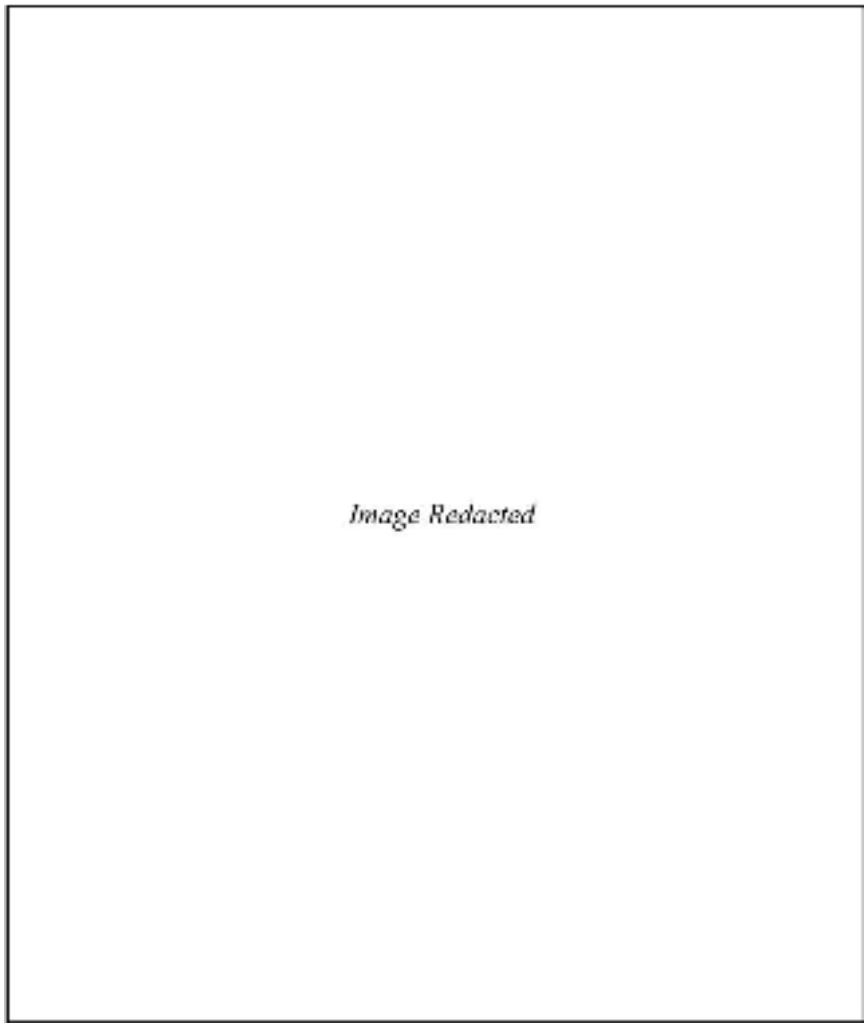

Figure 5-36. *Site map for 41KE218.*

Figure 5-37. *Cores found on the ground surface within the boundaries of 41KE218.*

Figure 5-38. *Bedrock exposed by the grading of topsoil across 41KE218. Edge of upland is at foreground where silt fencing is located.*

Site 41KE219

Site 41KE219 was discovered during grading of topsoil on the edge of the uplands at the point at which the project easement, upon reaching the apex of the upland zone, turns to the south-southwest as it descends toward the Cibolo Creek terrace (Figure 5-39). Scattered oak trees occupy the area. Archaeological deposits of a cluster of burned rock were discovered when the grader cut into the shallow topsoil and exposed a small cluster of angular limestone rocks at the edge of the easement (Figure 5-40). It is possible that the burnt rock represents a recent camp fire given its near-surface location and the fact that clearly prehistoric cultural debris was sparse in the vicinity. Only three pieces of lithic debitage were noted within the boundaries of the site. The topsoil is approximately 15-20 cm (5.9-7.9 in.) thick.

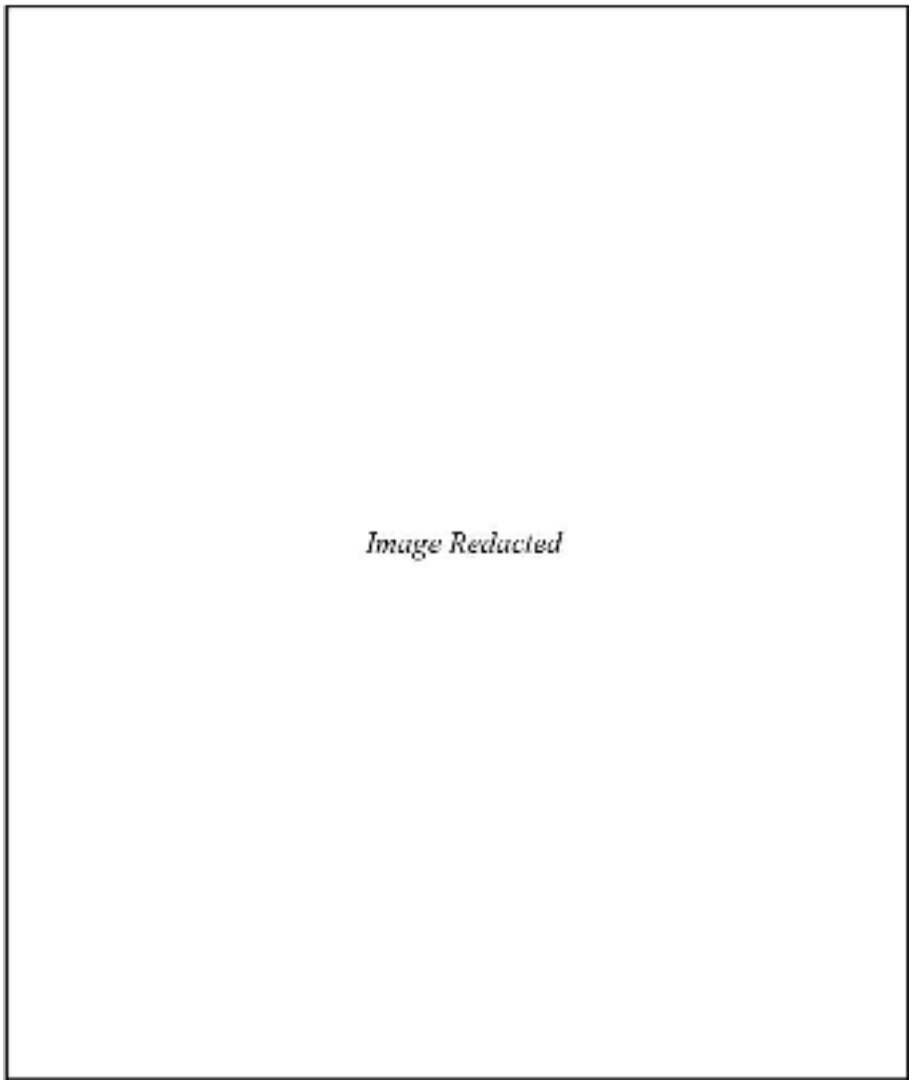

Figure 5-39. *Site map for 41KE219.*

Figure 5-40. *Site 41KE219 surrounded by flagging tape. Cluster of burnt rock is near blue backpack.*

Site 41KE219, encompassing the burnt rock concentration and the lithic debitage distributed down slope and within 7-8 m (23-26.2 ft.) from it, measures approximately 10-x-7-m (32.8-x-23-ft.), or 70 m^2 (754.4 sq. ft.). Given that it is difficult to link the lithic artifacts to the cluster of fire-cracked rock, and since it is possible that the feature may itself be recent in age, CAR suggests that the research potential of the site is extremely limited. Furthermore, the shallow deposits, lack of features, and absence of other cultural materials severely limits the research potential of this site. Based on the foregoing observations, it is recommended that site 41KE219 lacks the necessary integrity and information potential to be eligible for the NRHP, as specified under 36 CFR 60.4 – *Criteria of Eligibility*, or to merit designation as a SAL, as outlined by the requirements in 13 TAC 26.8 – *Criteria for Evaluating Archeological Sites*. No additional archaeological investigations are recommended for site 41KE519.

Chapter 6: Geomorphological and Geoarchaeological Investigations

Introduction and Objectives

This section documents the results of geomorphological and geoarchaeological studies that were conducted concurrently with an intensive pedestrian archaeological survey for the proposed construction of the Boerne Wastewater Treatment Plant and pipeline, located in Boerne, Kendall County, Texas. The project pipeline consists of numerous alternative interceptor lines, totaling approximately 2.4 km (1.5 mi.) in length, and a 12.5-acre wastewater treatment plant. The proposed interceptor lines traverse numerous geomorphic landforms across the study area, including potentially deep alluvial deposits associated with Menger, Cibolo, and Browns Creeks. The purpose of the geomorphological and geoarcheological investigations is to provide a stratigraphic and pedologic framework for evaluating archeological site visibility and preservation potential. Thus, the specific objectives include the following: 1) construct a geomorphic map of the study area, 2) conduct field morphological descriptions of soils and alluvial-stratigraphic units through the excavation and examination of backhoe trenches and natural creek cutbank exposures, and 3) relate the soil-geomorphic field observations to the development of a local-scale model for predicting the presence/absence and preservation potential of any cultural materials.

Physical Setting

Cibolo Creek originates northwest of San Antonio in western Kendall County. On the Edwards Plateau, this drainage is deeply incised and primarily drains Lower Cretaceous Glen Rose and faulted Edwards Formation limestones, as well as Upper Cretaceous Pecan Gap Chalk limestone (Dittemore and Hensell 1981). Several soils are mapped within the surrounding uplands of the project area and include soils of the Doss-Brackett association; Anhalt clay, 1-3% slopes; and Denton silty clay, 1-3% slopes. Each of these consists of shallow, well-drained residual clay soils that weathered in place from underlying Cretaceous limestones (Dittemore and Hensell 1981).

Quaternary terrace deposits (Qt) are mapped within the narrow stream valleys of the project area and are bordered by weathering-resistant limestone bedrock valley walls. The terraces are described on *Geologic Atlas of Texas* maps (Barnes 1974) as late Pleistocene deposits that occur mostly above flood levels, along entrenched streams. Fluvial morphological features, such as point bars, oxbows, and abandoned channel segments, are often preserved in these deposits (Barnes 1974). Remnants of these terraces exist on both sides of Cibolo Creek, indicating a maximum ancient valley width of 600 m (1,969 ft.). Terrace treads rise

approximately 5 m (16.4 ft.) above the low-water Cibolo Creek channel. Holocene-age floodplain deposits (Qal) are not mapped within the study area, though this is not surprising given the coarse scale (1:250,000) of current geologic maps. Local informants indicated that the alluvial surfaces above Cibolo, Menger, and Browns Creeks are periodically inundated by large floods.

Soils on the floodplain adjacent to the Menger Creek channel are mapped as Oakalla silty clay loam. These soils are deep, well-drained, nearly level deposits that are associated with floodplains and are frequently flooded. Alluvium is derived from the surrounding Cretaceous limestones. A typical profile consists of at least 1.5 m (4.9 ft.) of silty clay loam (Web Soil Survey 2011). The area above the confluence between Menger and Cibolo Creeks is comprised of Boerne fine sandy loam, frequently flooded. This soil occurs on treads of floodplains and stream terraces. Parent material for this soil is alluvium derived from surrounding Cretaceous limestones. A typical profile includes 0-20 cm (0-7.9 in.) of fine sandy loam over at least 1.3 m (4.3 ft.) of loam (Web Soil Survey 2011). Along the margins of Browns Creek soils consist of Krum silty clay, 1-3% slopes. These soils are mapped along stream terraces and consist of alluvium derived from limestone. A typical profile indicates 0-119 cm (47 in.) of silty clay over clay loam to at least a depth of 1.5 m (4.9 ft.; Web Soil Survey 2011).

Methods

The geomorphological and geoarchaeological studies were conducted by a reconnaissance of the overall project area, examination of natural stream cut-bank exposures, and detailed descriptions of the ten backhoe trenches that were excavated along the northern valley margin of Cibolo Creek, and on both sides of Browns Creek, as well as three additional trenches excavated within the boundaries of site 41KE217. Trenches ranged in depth from 57-200 cmbs (22.4-78.7 in.). A representative profile section within each trench was hand-cleared and plucked out, and standard field morphological attributes were recorded. The soil column was subdivided into genetic soil horizons based on observable variations in soil properties. Each horizon was described following the United State Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) standards for soil profile descriptions (Schoenberger et al. 2002). These descriptions included horizon, color, texture, roots, structure, consistence, percentage of coarse fragments, carbonate abundance, type, and morphology (e.g., stage), the presence/absence of redoximorphic features, and any other salient pedogenic features. Each profile was photographed, and all trenches were backfilled after field descriptions were completed.

Alluvial Stratigraphy and Geoarchaeological Potential

A geomorphic map of the study area is presented in Figure 6-1. Soil-geomorphic relationships were established by cross-comparisons of USGS topographic maps, aerial photographs, *Geologic Atlas of Texas* sheets from the Bureau of Economic Geology, and the USDA-NRCS soil survey for Kendall County, Texas. The geomorphic map illustrates the three major depositional landforms that were encountered and investigated during the project. These include a terrace designated as T-1, floodplain designated as T-0, and colluvial footslope designated as C-fs. The intervening uplands consist of Cretaceous bedrock.

The T-1 terrace extends across the Menger Creek and Cibolo Creek valley and is situated approximately 5 m (16.4 ft.) above the low water channel level (Figure 6-2). Examination of natural creek cutbank exposures and backhoe trench profiles revealed a succession of laterally accreted channel gravels (Unit 1A) that fine upward into vertical accretion deposits of sands, silts, and clay (Unit 1B). Most of these older fill deposits are buried beneath variably-thick wedges of more recent floodplain alluvium and colluvium (Unit 2), though portions of the older fill do outcrop upstream from the confluence of Menger and Cibolo Creeks. In some areas adjacent to steep hillsides, younger colluvial deposits (Unit 3) rest unconformably upon the Unit 2 deposits (Figure 6-3).

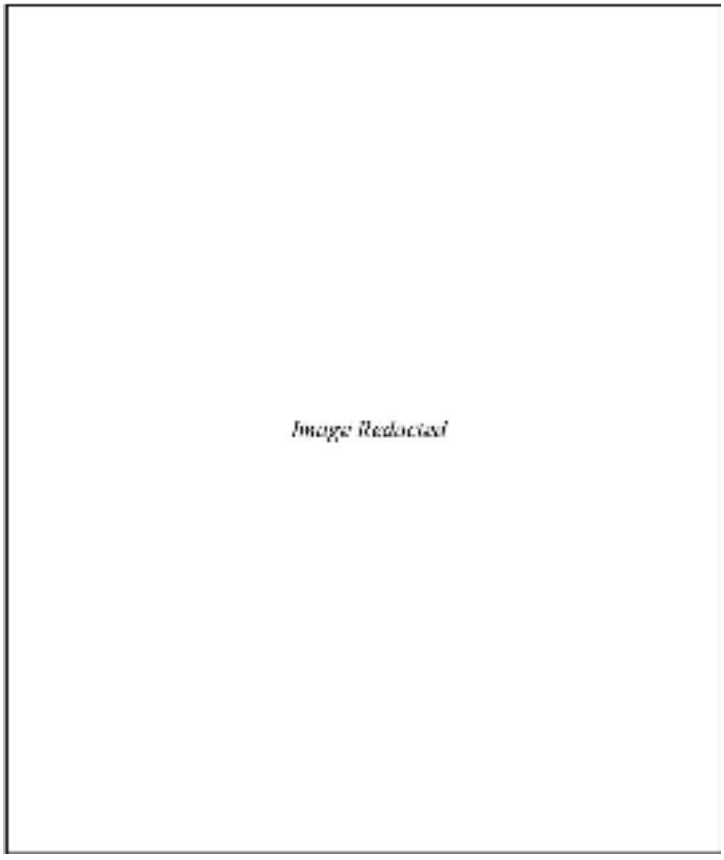

Figure 6-1. *Geomorphic map of the Boerne WTP study area.*

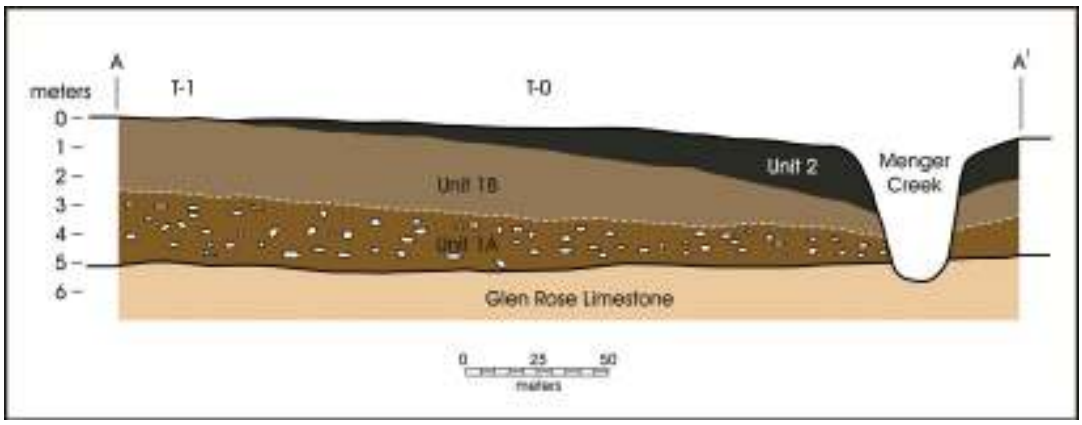

Figure 6-2. *Menger Creek valley cross section A-A', illustrating the major depositional units.*

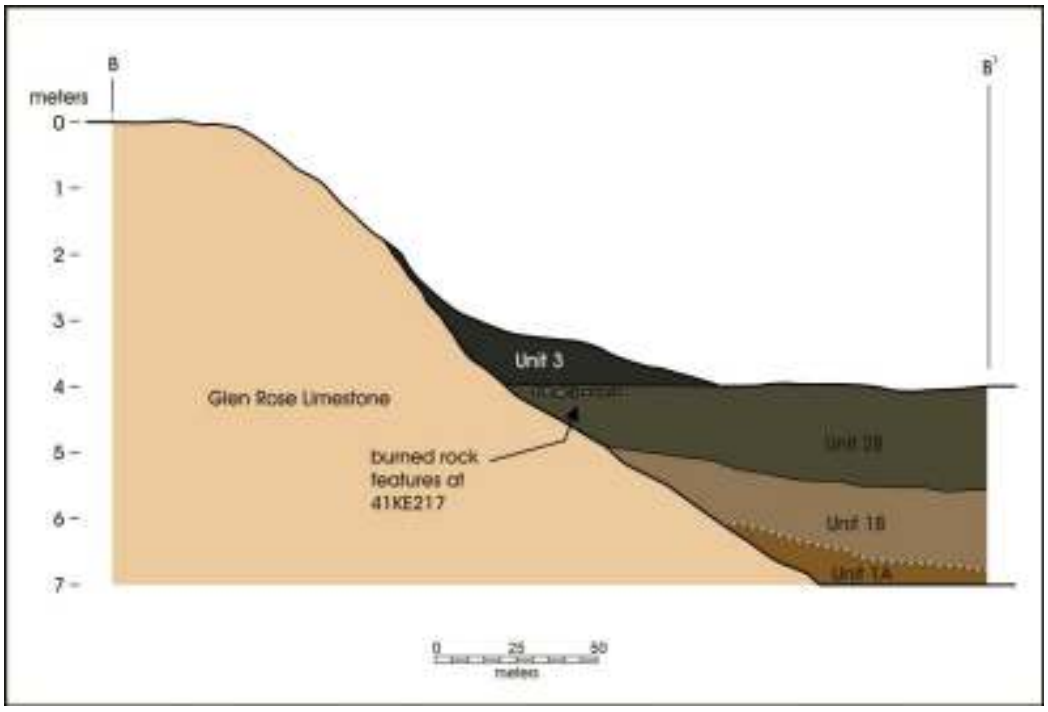

Figure 6-3. *Generalized stratigraphic cross section B-B', at site 41KE217, illustrating major depositional units, including Unit 3 colluvial deposits burying archaeological site components.*

Unit 1

Unit 1 is widely mapped across the Cibolo Creek and Menger Creek valley on *Geologic Atlas of Texas* maps as undifferentiated Pleistocene terrace deposits (Qt). However, because of the more recent alluvial fill that overlies Unit 1, the exact aerial extent of Unit 1 is currently unknown. Though unconfirmed presently, it is likely that Unit 1 extends across a significant portion of the valley floor. Unit 1 was subdivided into Units 1A and 1B on the basis of the two sedimentary facies observed within natural cutbank profiles.

Gravelly channel facies (1A) probably cover most of the valley floor in the study area. These deposits consist of crudely-stratified, laterally and vertically accreted upward-fining and down-dipping gravel clasts. These deposits were observed exhibiting moderate imbrication in cutbank exposures along the lower reaches of Menger Creek. These alluvial channel gravels rest unconformably upon Cretaceous-age Glen Rose limestone, at a depth of 5 m (16 ft.) below the terrace/floodplain surface. Unit 1A was identified near the base of BHTs 9 and 10 on the east side of Browns Creek, in an area that begins to slope up the adjacent valley wall to the uplands (Figure 6-4). Within these trenches Unit 1A is reported to consist of brown (7.5YR 4/4) to strong brown (7.5YR 4/6) gravelly silty clay loam, with moderate medium subangular blocky structure and hard (dry) and very firm (moist) consistence. These deposits also contained between 15-20% rounded channel gravels ranging from 20-40 cm (7.9–15.7 in.) in diameter. Secondary calcium carbonate accumulations are extensive within this unit and include common fine filaments and carbonate nodules <1 cm (0.4 in.) in diameter, and soft masses and coatings on gravel surfaces. These deposits are characterized pedologically as CBk horizons exhibiting stage II carbonate development (Figure 6-5).

Fine-grained floodplain facies (1B) comprise the upper part of vertical accretion deposits associated with construction of the T-1 terrace during the late Pleistocene. Unit 1B deposits were identified in BHTs 2 through 9 and in BHTs 11-13. Colors range from reddish brown (5YR 5/4), brown (7.5 YR 5/4) and dark yellowish brown (10YR 4/4), and the deposits are generally comprised of silty clay loam and silt loams exhibiting moderate medium subangular blocky structure parting to moderate coarse angular blocky and medium prismatic ped structures. Secondary calcium carbonate accumulations include common fine filaments and 1-2 mm (0.04-0.08 in.) diameter nodules. Coarse fragments include 2-10% small pebbles that are indicative of the fining upward sequence from the lower gravelly facies. Also commonly present within Unit 1B are *Rabdotus* sp. snail shells and shell fragments in 5-10% abundance. Occasional angular non-cultural limestone fragments were noted throughout this unit. Given the nature of the secondary calcium carbonate accumulations, these deposits are classified pedologically as Bk horizons, with estimated stage II carbonate development. No buried A horizons were found in association with the upper part of these fine-grained floodplain deposits. Most likely, any former A horizon would have been scoured and eroded away prior to the deposition of the overlying Unit 2 alluvium. This interpretation is supported by field observations of an abrupt and wavy contact between Units 1 and 2, as observed in the majority of backhoe trench profiles, which suggests high-energy flood scours have occurred in the past. No cultural materials were identified within Unit 1.

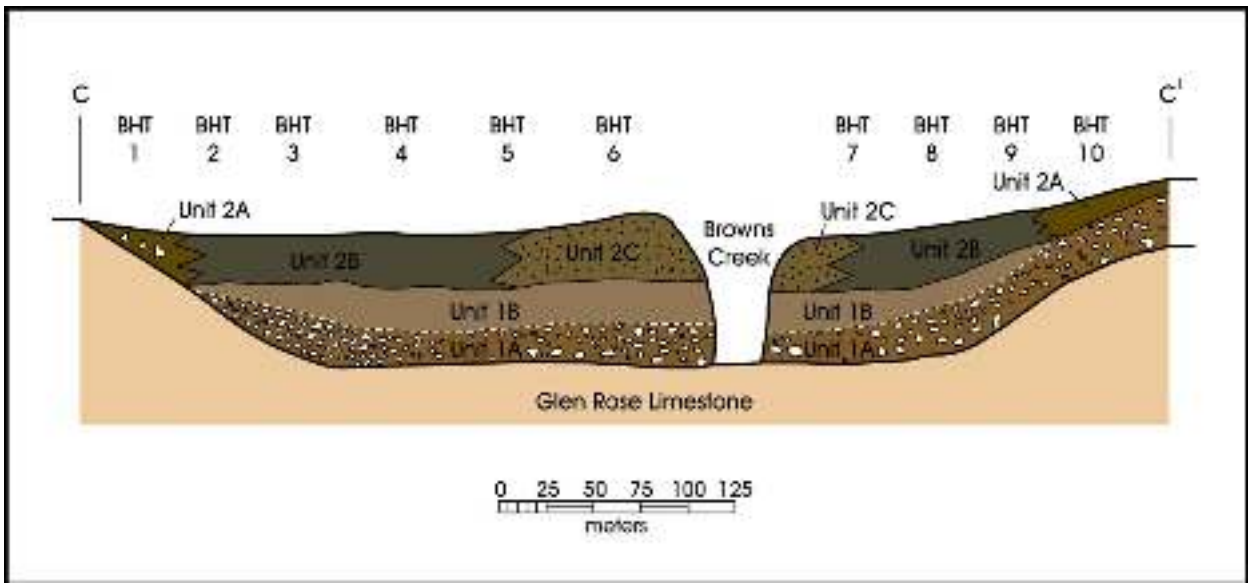

Figure 6-4. *Browns Creek stratigraphic cross section C-C'.*

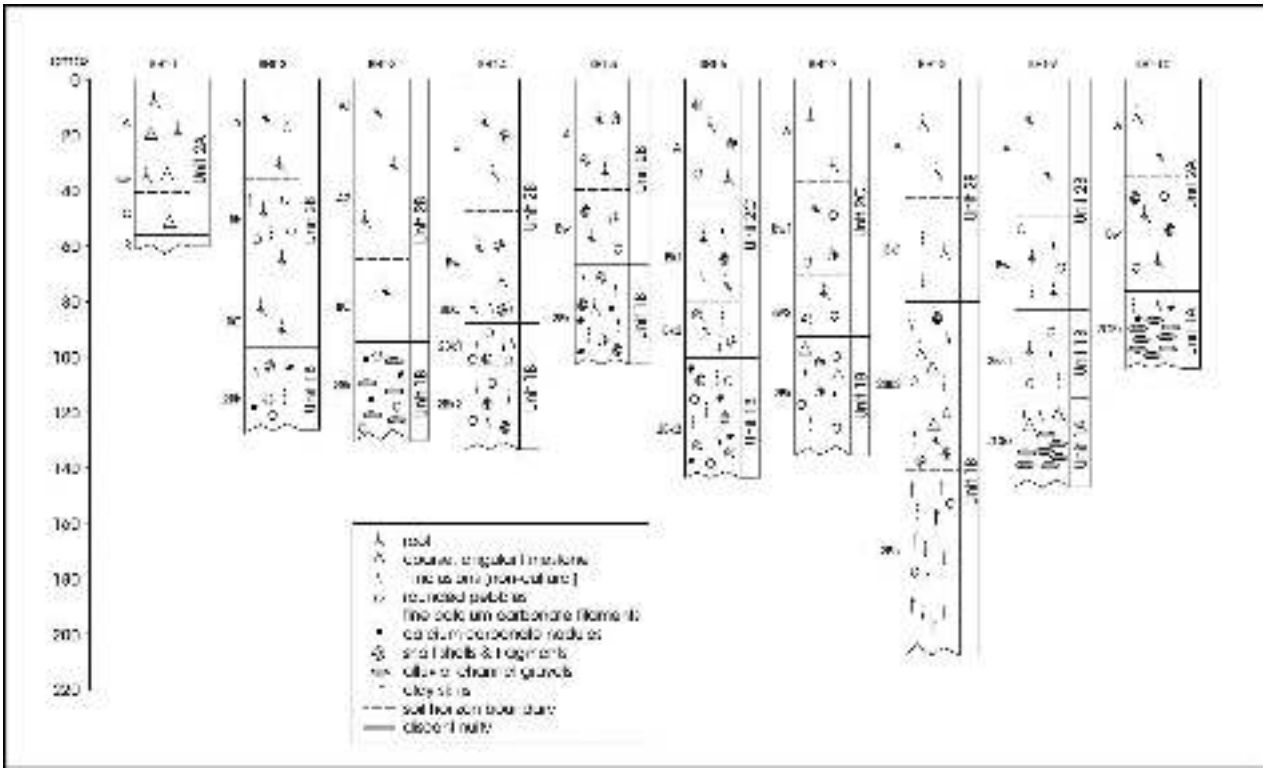

Figure 6-5. *Soil-stratigraphic columns for BHT profiles examined within the Cibolo Creek and Browns Creek Phase V APE.*

Intensive pedogenic weathering of Unit 1 is evidenced by very well developed ped structure and extremely firm consistence, rubification of the soil matrix, which is largely time-dependent, and abundant secondary calcium carbonate segregations that include numerous fine filaments, small rounded nodules, and soft carbonate masses. Given these observations, the lower Unit 1 fill deposits are likely Pleistocene in age. Cultural materials could be present on top of Unit 1. If such materials were subsequently buried after deposition, reasonable integrity is possible. However, cultural materials upon unburied or exhumed portions of Unit 1 would not likely retain integrity due to post-depositional impacts. No potential exists for archeological materials to be naturally buried within Unit 1 deposits themselves.

Unit 2

Unit 2 is present across the entire valley of the study area. Examination of backhoe trench profiles revealed this unit unconformably overlies an eroded/truncated upper section of Unit 1. Except in areas where Unit 1 outcrops onto the modern ground surface, the T-1 surface is underlain by Unit 2 deposits. Unit 2 contains three distinct facies, which are subdivided on the basis of lithology, pedology, and geomorphic position. These include gravelly clay loam toeslope facies (2A), fine-grained distal floodplain facies (2B), and coarse-grained channel margin facies (2C).

Gravelly clay loam toeslope facies (2A) include the colluvial deposits along the lower valley walls which intersect the outer floodplain margin. These deposits were observed within BHTs 1 and 10, which are located at the bottom edge of the footslope above Cibolo Creek and Browns Creek, respectively. BHT 1 revealed an A-Bw-C-R pedogenic horizon sequence to an excavated depth of 57 cm (22.4 in.). Soils colors in the upper sola range from black (10YR 2/1) to dark yellowish brown (10YR 3/4) and consist of weakly developed silty clay loams, silt loams, clay loams, and sandy clay loams exhibiting fine subangular blocky ped structure. In BHT 1, 2% coarse fragments consisting of non-cultural angular and subangular limestone fragments were observed in the A and Bw horizons, which suggest colluvial origins. Colluvial slope deposits in BHT 1 were found to directly and shallowly overlie limestone bedrock at 57 cmbs (22.4 in.). Similar colluvial deposits are reported for BHT 10, located on the outer valley margin east of Browns Creek. Soils examined in BHT 10 revealed a weakly-developed A-Bw soil horizon sequence to a depth of 75 cm (29.5 in.), which unconformably overlies Unit 1A. The potential of Unit 2A to contain intact archaeological materials is considered low to moderate. In areas where archaeological deposits may have been transported down-slope via graviturbation, little integrity is expected because of the secondary depositional context. However, any archaeological materials buried in place by slope deposits could be potentially preserved.

Fine-grained distal floodplain facies (2B) were observed in BHTs 2-5 and BHTs 8-13. In each of these trenches, Unit 2B deposits were found to unconformably overlie Unit 1B. The lower boundary and contact

between Unit 2B and Unit 1B is abrupt and wavy in most cases, which suggests that high-energy flood scours have truncated the upper portions of Unit 1B. Textures within Unit 2B generally range from silt loam to silty clay, and colors gradually transition from black (10YR 2/1) in the upper A horizons to dark yellowish brown (10YR 4/4) in the lower Bw and Bk horizons. Ped structures are generally weak fine granular to subangular blocky, parting to moderate medium subangular blocky in the upper A and B horizons. Soil horizons include fairly thickened A horizons (cumulic) over weakly expressed Bw horizons. Very faint carbonates were observed in the Bk horizon of BHT 2 and except for these secondary carbonate inclusions, they were virtually identical to other soil properties. Coarse fragments are relatively minor within Unit 2B, and are generally made up of <5% small pebbles <10 mm (<0.4 in.) in diameter, as well as snail shells and fragments. The low abundance and small sizes of these inclusions in BHTs 2-5 attest to the relatively low-energy depositional environment of the outer floodplain margin. The potential for Unit 2B to contain buried and intact archaeological materials is very high, given the fine-grained particle size and low-energy depositional setting.

During the monitoring phase of grading activities along the treatment plant pipeline, one previously unrecorded archaeological site (41KE217) was identified within Unit 2B (see Chapter 5). The site was initially exposed after the Unit 3 colluvial slope deposits were removed during scraping activities. The exposed portion of the site revealed a dense 3-x-1.5-m (9.8-x-4.9-ft.) concentration of burned limestone (designated Feature 1), chipped stone, two projectile points, and a low density scatter of burned rock outside the Feature 1 area. In order to further explore the depth and integrity of the cultural remains, additional test excavations are recommended.

Coarse-grained channel margin facies (2C) were recorded only in BHTs 6 and 7 along Browns Creek and unconformably overlie Unit 1B. Soil textures within Unit 2C consist of fine sandy loam, indicating higher-energy overbank deposits that would be expected with increased proximity to the active channel. Colors range from dark brown (10YR 3/3) in the upper A horizons to dark yellowish brown (10YR 4/4) in the lower Bw and Bk horizons. Ped structures are weak fine granular and part to weak fine subangular blocky. Secondary pedogenic carbonates are present within the Bk horizons in BHT 6, and consist of very faint and fine calcium carbonate threads. Coarse fragments consisting of snail shells and fragments and rounded pebbles were less than 2% for all Unit 2C horizons within each trench. The contact between Unit 2C and Unit 1B is abrupt and wavy, indicating that high-energy flood scours have likely truncated the upper portions of Unit 1B adjacent to Browns Creek. The potential for Unit 2C to contain buried and intact archaeological materials is moderate. Unit 2C deposits are coarser grained loams and sandy loams, which require higher-energy depositional environments. Thus, greater potential for flood scour exists in such settings, which could potentially disarticulate cultural features.

Unit 3

Unit 3 unconformably overlies Unit 2A and was only observed as a slope deposit covering site components at 41KE217. This unit, which was exposed in BHTs 11-13, is situated along the western slope wall of the adjacent hill is approximately 80 cm (31.5 in.) thick and tapers eastward onto the Menger Creek floodplain surface. At site 41KE217, Unit 3 exhibits an Ap-A/C horizon sequence and the soil is friable to very friable silty clay loam with granular to subangular blocky ped structure. Snail shells and fragments 1-2 mm (0.04-0.08 in.) diameter are in approximately 2% abundance in the upper A horizon. The contact between Unit 3 and Unit 2B is abrupt and smooth with Unit 3 directly overlying the burned rock concentration identified at 41KE217. The potential for Unit 3 to contain buried and intact archaeological materials ranges from low to moderate. In areas where archaeological deposits may have been transported down-slope, little integrity is expected since the cultural materials would be in a secondary depositional context. However, any archaeological materials on the floodplain that are buried by Unit 3 could potentially be preserved.

Summary

Geomorphological and geoarchaeological investigations revealed that the terraces in the study area are underlain by two major alluvial stratigraphic units, designated as Units 1 and 2. These units were further subdivided on the basis of geomorphic, lithologic, and pedologic attributes. An additional colluvial unit (Unit 3) covering a portion of the floodplain was identified only in the area of site 41KE217.

Unit 1 is comprised of Pleistocene alluvium. Cultural materials could be present on top of Unit 1. If such materials were subsequently buried after deposition, reasonable integrity is possible. However, cultural materials upon unburied or exhumed portions of Unit 1 would not likely retain integrity due to post-depositional impacts. No potential exists for archeological materials to be naturally buried within Unit 1 deposits.

Unit 2 is comprised of Holocene alluvium and colluvium and exhibits varying archaeological burial and preservation potential. The greatest potential is observed within the slowly aggrading, fine-grained distal floodplain setting (Unit 2B), which is a low-energy depositional environment capable of preserving the systemic context of site materials. One site, 41KE217, was found within Unit 2B deposits. Additional archaeological test excavations are currently underway in order to assess the overall site integrity and research potential. Lesser potential exists for Unit 2A, which consists of colluvial deposits, and Unit 2B, which consists of higher-energy channel margin deposits.

Unit 3 consists of a colluvial deposit lacking cultural materials. These colluvial deposits rest unconformably upon lower floodplain deposits. The geoarchaeological potential for Unit 3 ranges from low to moderate.

Chapter 7: Summary and Conclusions

Cultural resources investigations were carried out by CAR staff for the proposed construction of the Boerne Wastewater Treatment Plant and pipeline, located in Boerne, Kendall County, Texas. The project pipeline consists of numerous alternative interceptor lines, totaling approximately 2.4 km (1.5 mi.) in length, and a 12.5-acre wastewater treatment plant. These investigations included an intensive pedestrian survey with the excavation of 52 total shovel tests, 13 backhoe trench excavations, construction monitoring, and a geomorphological and geoarchaeological assessment. Five phases of archaeological survey (Phases I-V) were conducted, and a total of four previously unrecorded archaeological sites were identified and documented. Site 41KE215 was recorded during the Phase II survey of the 12.5-acre wastewater treatment plant. The site contained a wood framed house, animal pens, and workshops built sometime during the 1940s. As part of the assessment to determine if the site was eligible for inclusion on the Nation Register of Historic Places (NRHP) or listing as a State Archaeological Landmark (SAL), the ownership history of the site was researched using the Bexar County Deed Records (BCDR), the Kendall County Deed Records (KCDR), and the Kendall County Tax Records (KCTR), as well as other historic sources. The structure is a two bedroom house with one bathroom, a kitchen, and a living space. An attached garage and screened in porch are additional parts of the overall structure. A workshop that appears to have been added at a later date sits on a pier and beam foundation. Other structures on the property consist of a hog pen, a chicken coop, and a covered patio. The structures are wood framed and have corrugated metal roofs. Given the relatively short time-depth of farming activities represented at the complex, it is suggested that the site has only limited research potential to provide information important to the understanding of historic farming practices in this rural area (Criterion D). In addition, the property was not associated with events and/or persons significant to the history of the state and region (Criteria A and B). Finally, the structures present on site do not embody distinctive characteristics of a type, or period or method of construction or represent the work of a master and therefore have limited architectural significance (Criterion C). Taken together, these characteristic do not warrant the nomination of this historic complex and multi-component site to the National Register of Historic Places Due to the same limitations, the site also does not merit designation as a SAL, as outlined by the requirements in 13 TAC 26.8 – *Criteria for Evaluating Archeological Sites*.

Construction monitoring by CAR staff also resulted in the identification of three additional archaeological sites (41KE217, 41KE218, and 41KE219).

Site 41KE217 was identified during construction monitoring as a large burned rock cluster. Subsequent backhoe trenching (BHTs 11-13) revealed two vertically discrete cultural occupation zones that appear to be well preserved in fine-grained overbank alluvial sediments. The upper component consists of an

approximately 30-cm (11.8-in.) thick zone of late Middle Archaic to Late Archaic artifacts and burned rock midden deposits. The lower component, which appears to be limited to the south end of the site, within BHT 11 contains a thin, discrete zone of burned rocks, flakes, and tools, and diagnostic Angostura-like projectile points dating to the Early Archaic period. Based on the current level of survey work, site 41KE217 appears to exhibit excellent integrity potential and research potential for Early through Late Archaic cultural materials.

41KE218 consists of a small number of angular limestone rocks noted on surface during topsoil removal, followed by the discovery of six pieces of lithic debitage, two cores, a biface fragment, and a possible Late Archaic untypable point fragment. Given the shallow topsoil, and lack of depth to the deposits, it cannot be concluded that all of the cultural materials are part of a single behavioral episode. No animal bones were noted, and no intact features could be defined.

41KE219 contained a cluster of burned rocks in shallow topsoil at the edge of the easement along with three pieces of lithic debitage. Given that it is difficult to link the lithic artifacts to the cluster of fire-cracked rock, and since it is possible that the feature may itself be recent in age, the research potential of the site is extremely limited.

It is suggested that sites 41KE218 and 41KE219 lack the necessary integrity and information potential to be eligible for the NRHP, as specified under 36 CFR 60.4 – *Criteria of Eligibility*, or to merit designation as a SAL, as outlined by the requirements in 13 TAC 26.8 – *Criteria for Evaluating Archeological Sites*. No additional archaeological investigations are recommended for sites 41KE218 and 41KE219. However, because of the excellent preservation conditions and research potential, additional testing excavations are recommended at 41KE217 in order to assess its eligibility for the NRHP and whether it merits designation as a SAL.

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