Volume 2015 Article 157

2015

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Prepared for

Canyon Regional Water Authority

Prepared by

SWCA Environmental Consultants

Texas Antiquities Permit 6678

SWCA Cultural Resources Report No. 14-599

January 2015

CULTURAL RESOURCE INVESTIGATIONS OF THE CANYON REGIONAL WATER AUTHORITY WELLS RANCH CRYSTAL CLEAR TRANSMISSION LINE PROJECT, GUADALUPE COUNTY, TEXAS

Prepared for

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Texas Antiquities Permit Number 6678

SWCA Project Number 25825.02.02-SAN

SWCA Cultural Resources Report No. 14-599

January 5, 2015

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ABSTRACT

On behalf of River City Engineering and Canyon Regional Water Authority (CRWA), SWCA Environmental Consultants (SWCA) conducted an intensive cultural resources survey for the Wells Ranch Crystal Clear Transmission Line in Guadalupe County, Texas. The work was conducted as part of the sponsor's compliance with the Antiquities Code of Texas (Permit Number 6678) and the National Historic Preservation Act in anticipation of a permit from the U.S. Army Corps of Engineers-Fort Worth District under Nationwide Permit 12 and Section 404 of the Clean Water Act. The project area is located 3.5 miles northwest of Geronimo, Texas, between State Highway 46 and Farm-to-Market Road 758.

The CRWA proposes to replace and install a new 16-inch-diameter water main line within existing CRWA easements, other utility easements, and private property. Installation of the pipeline will require trenching and boring within a 50-foot-wide construction easement. Typically, trenching impacts would be 6 to 7 feet deep, while bore pits would be 8 to 10 feet deep. The area of potential effects (APE) is a 4.3-mile alignment. During the course of the project, approximately 2.7 miles of the alignment was rerouted after the original route was surveyed. The 2.7-mile alternative route was ultimately abandoned. This report includes the results of the investigations of both the abandoned alternative route and the final Crystal Clear Alignment. The total APE for the Crystal Clear project area is 26 acres.

The investigations included a background review and an intensive pedestrian survey with shovel testing of the project area boundaries. The background review determined that two small portions of the project area have been previously surveyed by the Lower Colorado River Authority, the Texas Department of Transportation, and the Farmers Home Administration. Additionally, two previously recorded sites (41GU43 and 41GU87) are adjacent to the southwest portion of the project area. Two previously conducted surveys and seven previously recorded archaeological sites are located within a 1-mile radius of the project area. A review of historic maps dating from 1921 and 1958 indicate there were several historic-age resources within or adjacent to the proposed alignment.

Overall, the intensive pedestrian survey revealed that the proposed project area is within a rural setting intersected by fence lines, overhead utility lines, existing underground utilities, and road ways. Almost the entire APE consisted of plowed field affording 90 to 100 percent ground visibility. A total of 50 shovel tests were excavated within the available APE. Shovel tests were excavated to depths ranging from 30 to 60 centimeters below ground surface and consisted of clay and clay loam. The Texas Historical Commission's survey standards for projects of this size recommend 16 shovel tests per linear mile when the right-of-way measures less than 100 feet wide, or 69 shovel tests for the current project area. Due to high ground surface visibility and previous disturbances within the APE, SWCA reduced the number of shovel tests as subsurface exploration was not warranted in certain areas. One isolated find was encountered within the northeastern end of the project area. No evidence of previously recorded sites 41GU43 and 41GU87 were documented within the project area. One archaeological site, 41GU167, was documented during survey investigations of the abandoned alternative route, but does not extend into the final Crystal Clear Alignment.

In accordance with 36 CFR 800.4, SWCA has made a reasonable and good faith effort to identify cultural resources properties within the APE. As no properties were identified that meet the criteria for listing on the NRHP according to 36 CFR 60.4 or for designation as a State Antiquities Landmark, according to 13 TAC 26.8, SWCA recommends no further cultural resources work within the project area..

ACKNOWLEDGEMENTS

Laura I. Acuña served as Principal Investigator and Project Archaeologist for the duration of the project, ably overseeing overall logistics and organization, conducting field work, and performing agency consultation. Chris Collins served as Project Manager, while Laura I. Acuña, Kathryn A. Sloan, Sophia Salgado, Matthew Stotts, and Daniel Rodriguez conducted field work on October 17–18, 2013, October 2 and October 16, 2014. Carole Carpenter expertly produced all field and report maps for the project, while Rhiana D. Ward completed all technical reporting.

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INTRODUCTION

SWCA Environmental Consultants (SWCA) conducted an intensive cultural resources survey for the Canyon Regional Water Authority (CRWA) Wells Ranch Crystal Clear Transmission Line (Crystal Clear) in Guadalupe County, Texas. The project area is located 3.5 miles northwest of Geronimo, Texas, between State Highway (SH) 46 (also known as Old Seguin Road) and Farm-to-Market (FM) 758 (Figure 1).

The work was conducted on behalf of the River City Engineering and CRWA, a political subdivision of the State of Texas, as part of their compliance with the Antiquities Code of Texas under Permit Number 6678. Additionally, the project is subject to permitting requirements through the U.S. Army Corps of Engineers (USACE) Fort Worth District under Section 404 of the Clean Water Act, Nationwide Permit 12. As such, the investigations are designed to comply with Section 106 of the National Historic Preservation Act (NHPA), as amended, and its implementing regulations (36 Code of Federal Regulations [CFR] Part 800).

The CRWA proposes to replace and install a new 16-inch-diameter water main line within existing CRWA easements, other utility easements, and private property. Installation of the pipeline will require trenching and boring within a 50-foot-wide construction easement. Typically, trenching impacts would be 6–7 feet deep, while bore pits would be 8–10 feet deep. The area of potential effects (APE) is a 4.3-mile alignment. During the course of the project, approximately 2.7 miles of the alignment was rerouted after the original route was surveyed. The 2.7-mile alternative route was ultimately abandoned. This report includes the results of the investigation of both the abandoned alternative route and the final Crystal Clear Alignment. The total APE for the Crystal Clear project area is 26 acres in size, with depths ranging from 8 to 10 feet deep.

Investigations consisted of an intensive archaeological survey with shovel testing of the proposed APE. All investigations were conducted in accordance with Texas Historical Commission (THC) and Council of Texas Archeologists (CTA) standards, as well as the guidelines provided in Section 106 of the NHPA. Laura I. Acuña served as Principal Investigator. Laura I. Acuña, Katie Sloan, Sophia Salgado, Matthew Stotts, and Daniel Rodriguez conducted field work on October 29–30, 2013, and October 2 and 16, 2014.

PROJECT AREA DESCRIPTION

The proposed Crystal Clear Alignment begins just southwest of SH 46, approximately 0.2 mile northwest of the SH 46 and Avery Parkway 78 intersection. From this boundary, the project area extends northeast for 4.3 miles across agricultural fields, undeveloped property, Dauer Ranch Road (FM 129), and FM 758 before terminating south of the FM 758 and Barbarosa Road (FM 107A) intersection. The abandoned 2.7-mile alternative route begins at Dauer Ranch Road and directs northeast, terminating south of the Barbarosa Road and FM 758 intersection.

Located in western Guadalupe County, the project area is within the Guadalupe-San Antonio River Basin and is intersected by Alligator Creek, an unnamed tributary of Geronimo Creek, and an unnamed tributary of the Guadalupe River. The Guadalupe River is located 0.78 mile west from the project area and the historic Lake Dunlap Dam is approximately 1 mile southwest. A review of aerial photography illustrates disturbances consisting primarily of residential construction, two-track roads, vegetation clearing, and agricultural fields (Figure 2). The surrounding area is gradually transitioning from a rural ranch and agricultural setting to a residential and commercial development, with two subdivided residential neighborhoods bordering the southwest end of the project line. The project area is situated in the New Braunfels East (2998-414) U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps.

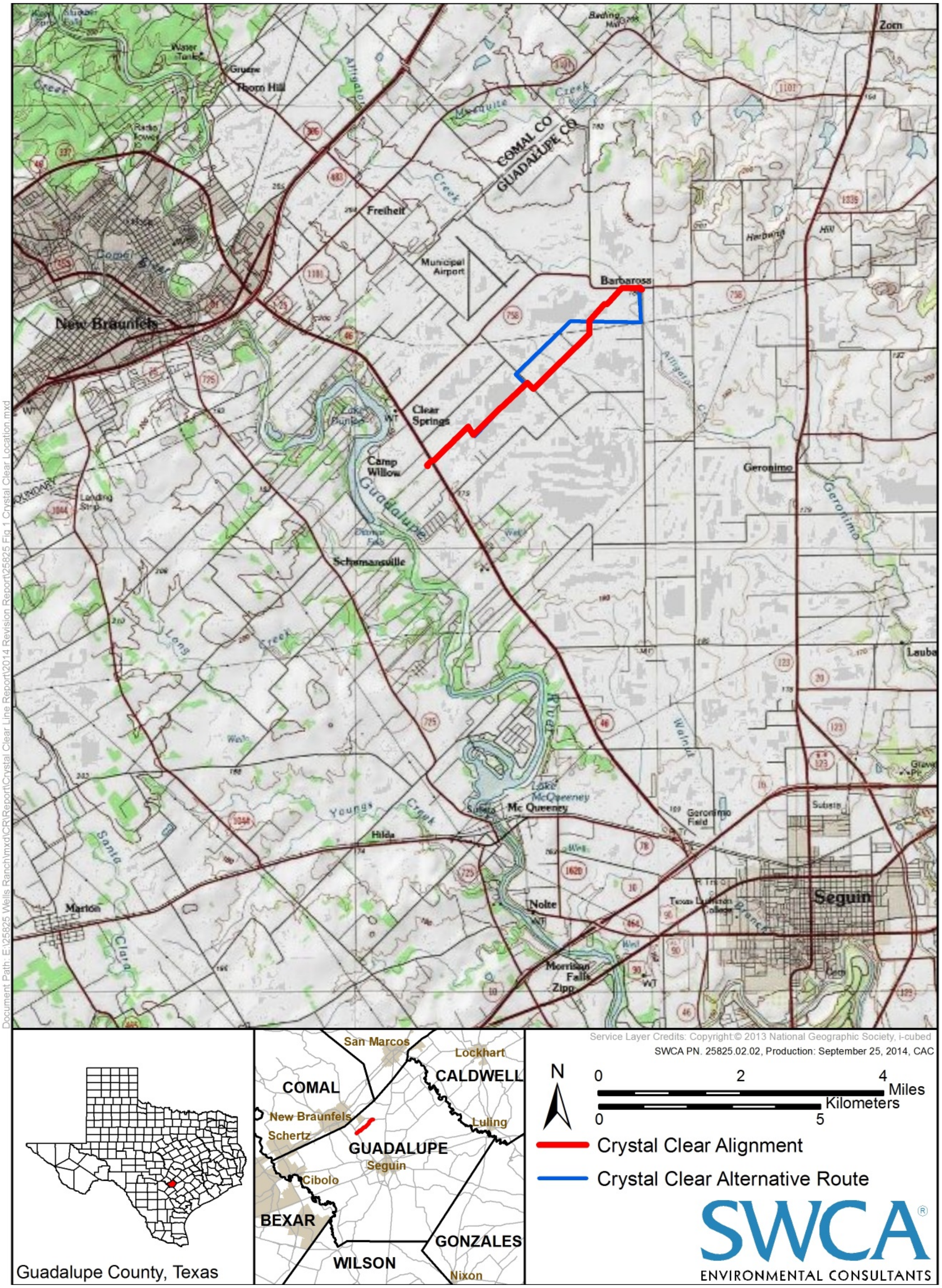

Figure 1. Project area location.

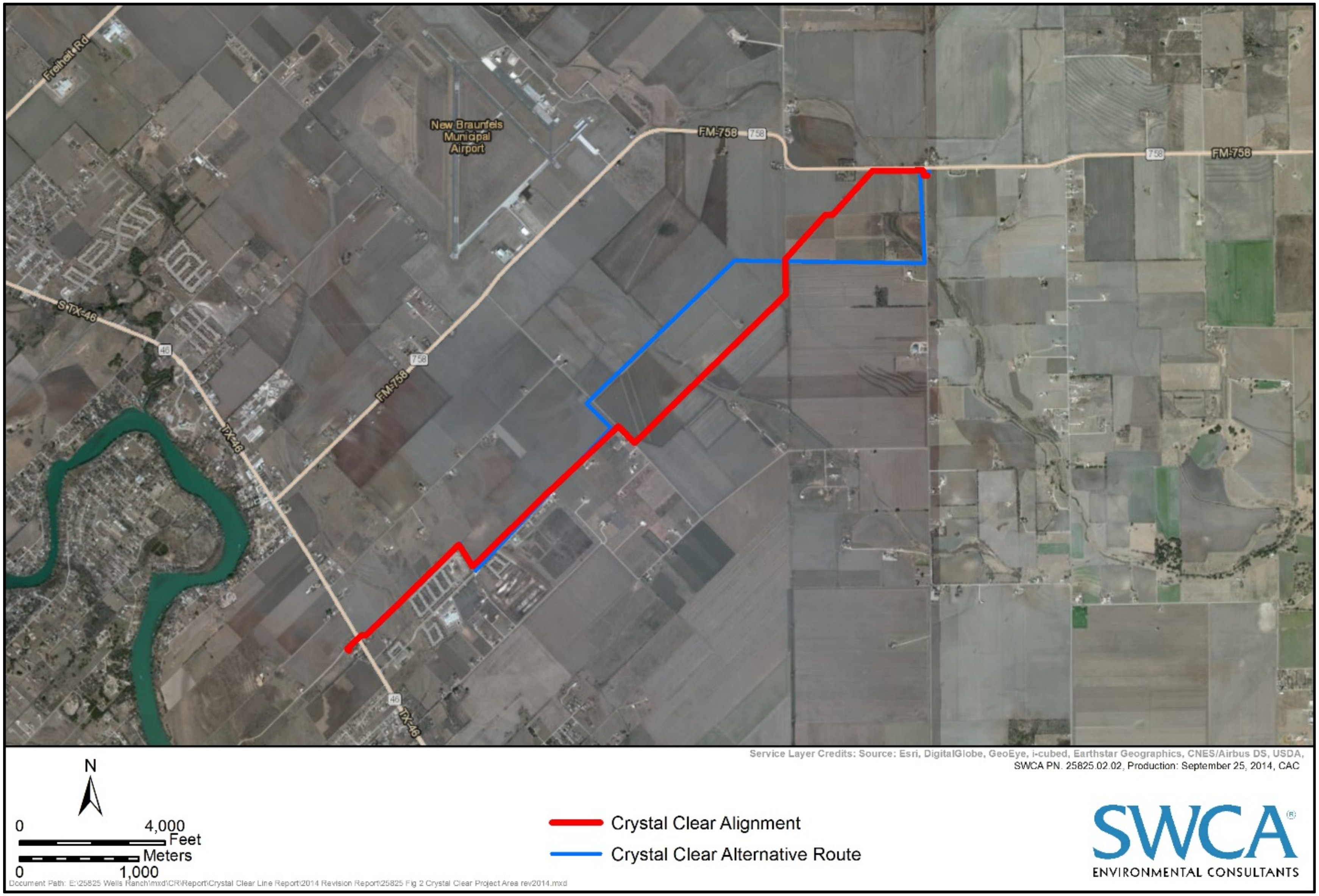

Figure 2. Project area aerial map.

Geology

The geology of the project area is mapped as Leona Formation, and Navarro Group and Marlbrook Marl undivided (Barnes 1983). The Leona formation consists of fluviatile terrace deposits of gravel, sand, silt and clay on the first wide terrace of the Nueces and Leona Rivers and below the level of Uvalde formation. Leona may correlate with Onion Creek marl of Austin Sheet (Barnes 1983). Navarro Group and Marlbrook Marl undivided are comprised of clay, calcareous, with variable amounts of silt, glauconite and limestone beds (Barnes 1983).

Soils

The soils of the project area consist of several soil series. Seventy-five percent of the project area consists of Branyon Clay with 0 to 1 percent slopes (Natural Resources Conservation Service [NRCS] 2014). These are very deep, moderately well-drained, very slowly permeable soils that formed in calcareous clayey sediments. These soils are on nearly level to very gently sloping Pleistocene terraces (NRCS 2014). Fifteen percent of the project area consists of Houston black clay with 1 to 3 percent slopes (NRCS 2014). These are very deep, moderately well-drained, very slowly permeable soils that formed from weakly consolidated calcareous clays and marls of Cretaceous Age. They are located on nearly level to moderately sloping uplands (NRCS 2014). Five percent of the project area consists of Barbarosa silty clay with 1 to 3 percent slopes. These soils consist of deep, well drained, slowly permeable soils that formed in clayey sediments. They are located on nearly level to gently sloping uplands (NRCS 2014). Finally, the remaining 5 percent of the project area consists of Tinn Clay with 0 to 2 percent slopes (NRCS 2014). These are very deep, well-drained, very slowly permeable soils that formed in calcareous clayey alluvium. These soils are located on floodplains of streams that drain the Blackland Prairies (NRCS 2014).

Cultural History

The project area is located within the northern limits of the South Texas archaeological region and adjacent to the western limits of the Central Texas archaeological region as defined by Perttula (2004). Given its proximity to the Central Texas archaeological region, the following prehistoric cultural history derives its information from several central Texas regional chronologies: Black (1989), Collins (1995, 2004), and Johnson and Goode (1994), which build upon the seminal efforts of Suhm (1960) and Prewitt (1981, 1985). Significant archaeological sites within the Central Texas archaeological region and the Edwards Plateau have contributed important information to understanding prehistory.

The following prehistoric cultural sequence is divided into three periods: Paleoindian, Archaic, and Late Prehistoric. The Archaic period is subdivided into four subperiods: Early, Middle, Late, and Transitional. The Historic period follows the Late Prehistoric, announcing the arrival of Europeans to central Texas.

Prehistoric Cultural Setting

Paleoindian Period

Human occupation of the Central Texas archaeological region is thought to have begun approximately 11,000 years ago. This period correlates with the end of the Late Pleistocene, the last ice age in North America. These early Texans are characterized by small but highly mobile bands of foragers who were specialized hunters of Pleistocene megafauna; however, Paleoindians probably used a much wider array of resources, including small fauna and plant foods (Bever and Meltzer 2007; Bousman et al. 2002; Bousman et al. 2004; Dering 2007; Meltzer and Bever 1995). Faunal remains from Kincaid Rockshelter and the Wilson-Leonard site (41WM235) support this view (Collins 1998; Collins et al. 1989).

Surficial and deeply buried sites, rockshelter sites, and isolated artifacts represent Paleoindian occupations in the central Texas region. Although Paleoindian site types are not well documented in the region, they can be generally classified according to broad site type categories extrapolated from nearby regions. Both open and protected (rockshelter) types are known. Usually, these sites are near permanent sources of water such as tributary creeks or springs. Bison kill sites, open and protected campsites, and non-occupation lithic sites are known from the Paleoindian period in Texas. Intra-site features include hearths and isolated burials. The Wilson-Leonard site (41WM235), 41BX52, and 41BX229 contain stratified Paleoindian deposits (Hester 1980). The lower component at the Wilson-Leonard site contained a Paleoindian burial (Collins et al. 1998).

ARCHAIC PERIOD

The Archaic period for the Central Texas archaeological region dates from ca. 8800 to 1300–1200 B.P. (Collins 2004) and generally is believed to represent a shift toward hunting and gathering of a wider array of animal and plant resources and a decrease in group mobility (Willey and Phillips 1958:107–108). For central Texas, this notion of the Archaic is somewhat problematic. An increasing amount of evidence suggests that Archaic-like adaptations were in place before the Archaic period (Bousman et al. 2002; Collins 2004:117–118, 1998; Collins et al. 1989) and that these practices continued into the succeeding Late Prehistoric period (Collins 2004:118–119; Prewitt 1981:74). In a real sense, the Archaic period of central Texas is not a developmental stage, but an arbitrary, chronological construct and projectile point style sequence. Establishment of this sequence is based on several decades of archaeological investigations at stratified Archaic sites along the eastern and southern margins of the Edwards Plateau. Collins (2004) and Johnson and Goode (1994) have divided this sequence into three parts—early, middle, and late—based on perceived (though not fully agreed upon by all scholars) technological, environmental, and adaptive changes. However, Turner and Hester (1999) and Black (1989) have designated another period at the end of the Archaic, referred to as Transitional Archaic or Terminal Archaic.

EARLY ARCHAIC

The Early Archaic period (8800–6000 B.P.) is better documented than the Paleoindian period; however, a complete understanding of cultural patterns does not yet exist. Early Archaic sites are small, and their tool assemblages are diverse (Weir 1976:115–122), suggesting that populations were highly mobile and densities low (Prewitt 1985:217). A variety of choppers and gouges, such as the triangular, concave-based bifaces known as Guadalupe tools and the distally beveled Clear Fork unifaces are present in the archaeological record. A variety of expediency tools, often nothing more than utilized flakes, are increasingly present in the Early Archaic (Black 1989). It has been noted that Early Archaic sites are concentrated along the eastern and southern margins of the Edwards Plateau (Johnson and Goode 1994; McKinney 1981). This distribution may indicate climatic conditions at the time, given that these environments have more reliable water sources and a more diverse resource base than other parts of the region.

The construction and use of rock hearths and ovens, which had been limited during the Paleoindian period, become commonplace in the Early Archaic. The use of rock features suggests that retaining heat and releasing it slowly over an extended period was important in food processing and cooking and reflects a specialized subsistence strategy. Such a practice probably was related to cooking plant foods, particularly roots and bulbs, many of which must be subjected to prolonged periods of cooking to render them consumable and digestible (Black et al. 1997:257; Wandsnider 1997; Wilson 1930). Botanical remains, as well as other organic materials, are often poorly preserved in Early Archaic sites, so the range of plant foods exploited and their level of importance in the overall subsistence strategy are poorly understood. But recovery of charred wild hyacinth (*Camassia scilloides*) bulbs from an Early Archaic feature at the Wilson-Leonard site provides some insights into the types of plant foods used and their importance in the Early Archaic diet (Collins 1998).

MIDDLE ARCHAIC

Cultural patterns during the Middle Archaic period (6000–4000 B.P.) point toward an increased sedentary population intensively harvesting acorns, prickly pear, and pecans and hunting small and medium-size game such as deer and turkey. The increase in the number of Middle Archaic sites and burials supports the concept of a larger, more sedentary population (Black and McGraw 1985; Prewitt 1981:73; Weir 1976:124, 135). Large bands may have formed at least seasonally to occupy a single area or small groups may have used the same sites for longer periods (Weir 1976:130–131).

Sites of the Middle Archaic are numerous and often large in size. Burned rock middens are found at many sites with Middle and Late Archaic components in the Central Texas archaeological region. The development of burned rock middens toward the end of the Middle Archaic suggests a greater reliance on plant foods, although tool kits still imply a considerable dependence on hunting (Prewitt 1985:222–226). Middle Archaic projectile point styles include Bell, Andice, Calf Creek, Taylor, Nolan, and Travis. Other artifacts from the Middle Archaic are choppers, gouges, and expediency tools such as the small, bifacial and unifacial Clear Fork tools. Grinding stones and bases, referred to as manos and metates, show up in Middle Archaic artifact assemblages as well as a number of perforators, drills, and awls. Chipped, polished, and ground stone artifacts are common in central Texas and surrounding regions. Less frequently encountered artifacts include tools and ornaments of bone, antler, and marine shell (Turner and Hester 1999).

Bison populations decreased as more xeric conditions returned during the latter part of the Middle Archaic. Later Middle Archaic projectile point styles (Nolan and Travis) represent another shift in lithic technology (Collins 2004:120–121; Johnson and Goode 1994:27). At the same time, this shift to drier conditions saw the burned rock middens develop, probably because intensified use of geophytic or xerophytic plants meant the debris from multiple rock ovens and hearths accumulated as middens on stable to slowly aggrading surfaces, as Kelley and Campbell (1942) suggested many years ago. Johnson and Goode (1994:26) believe that the dry conditions promoted the spread of yuccas and sotols, and that it was these plants that Middle Archaic peoples collected and cooked in large rock ovens.

LATE ARCHAIC

During the succeeding Late Archaic period (4000 to 1300–1200 B.P.), populations continued to increase (Prewitt 1985:217). As evidenced by stratified Archaic sites such as Loeve-Fox, Cibolo Crossing, and Panther Springs Creek, the Late Archaic components contain the densest concentrations of cultural materials of all the Archaic periods. Establishment of large cemeteries along drainages also suggests certain groups had strong territorial ties (Story 1985:40).

Middle Archaic subsistence technology, including the use of rock and earth ovens, continues into the Late Archaic period. Collins (2004:121) states that at the beginning of the Late Archaic period, the use of rock ovens and the resultant formation of burned rock middens reached its zenith and that the use of rock and earth ovens declined during the latter half of the Late Archaic. There is, however, mounting chronological data that midden formation culminated much later and that this high level of rock and earth oven use continued into the early Late Prehistoric period (Black et al. 1997:270–284; Kleinbach et al. 1995:795). A picture of prevalent burned rock midden development in the eastern part of the Central Texas archaeological region after 2000 B.P. is gradually becoming clear. This scenario parallels the widely recognized occurrence of post-2000 B.P. middens in the western reaches of the Edwards Plateau (Goode 1991).

The use of rock and earth ovens (and the formation of burned rock middens) for processing and cooking plant foods suggests that this technology was part of a generalized foraging strategy. Considering the amount of energy involved in collecting plants, constructing hot rock cooking appliances, and gathering fuel, the caloric return of most plant foods is relatively low (Dering 1999). This suggests that plant foods were part of a broad-based diet (Kibler and Scott 2000:134) or part of a generalized foraging strategy—an idea Prewitt (1981) put forth earlier. At times during the Late Archaic, this generalized foraging strategy appears to have been marked by shifts to a specialized economy focused on bison hunting (Kibler and Scott 2000:125–137). Castroville, Montell, and Marcos dart points are elements of tool kits often associated with bison hunting (Collins 1968). Archaeological evidence of this association is seen at Bonfire Shelter in Val Verde County (Dibble and Lorrain 1968), Jonas Terrace in Medina County (Johnson 1995), Oblate Rockshelter in Comal County (Johnson et al. 1962:116), John Ischy in Williamson County (Sorrow 1969), and Panther

Springs Creek in Bexar County (Black and McGraw 1985).

TRANSITIONAL ARCHAIC

As Collins (2004:122–123) notes, diverse and comparatively complex archaeological manifestations toward the end of the Late Archaic attest to the emergence of kinds of human conduct without precedent in the area. This period (2250–1250 B.P.), referred to as the Transitional Archaic (Turner and Hester 1999) or Terminal Archaic (Black 1989), is not recognized by all researchers. Other chronologies terminate the Late Archaic at around 1200–1250 B.P. (Collins 2004; Johnson and Goode 1994) to encompass this later subperiod. Johnson et al. (1962) originally designated the Transitional Archaic as a subperiod of the Archaic because of the similarities between the latest dart point types and the earliest arrow point types. Since then, however, the designation has failed to be universally accepted by researchers. In two recent chronologies for central Texas, Collins (2004) does not include the Transitional as a subperiod of the Archaic, and Johnson and Goode (1994) separate the Late Archaic into two subperiods designated Late Archaic I and Late Archaic II. The Transitional Archaic, as it is used here, closely corresponds to Johnson and Goode's (1994) Late Archaic II, but begins after the appearance of Marcos points, not with it. In this scheme, the Transitional Archaic coincides with the last two style intervals recognized by Collins (2004) for the Late Archaic subperiod.

During the Transitional Archaic, smaller dart point forms such as Darl, Ensor, Fairland, and Frio were developed (Turner and Hester 1999). These points were probably ancestral to the first Late Prehistoric arrow point types and may have overlapped temporally with them (Carpenter et al. 2006; Hester 1995; Houk and Lohse 1993).

Several researchers believe that the increased interaction between groups at the end of the Late Archaic was an important catalyst for cultural change (Collins 2004; Johnson and Goode 1994). This change may have included increased regional stress and conflict between groups as interaction became more frequent (Houk et al. 1997). In Bexar County, for instance, researchers noted a distinct shift in settlement patterns during this period (Houk et al. 1997). Groups began to use hilltops as camps rather than just lithic procurement locations. These elevated locations would have provided points from which to observe game and other groups of humans as they moved through the surrounding creek valleys and upland prairies (Houk et al. 1997).

Overall, the Archaic period represents a hunting and gathering way of life that was successful and remained virtually unchanged for more than 7,500 years. This notion is based in part on fairly consistent artifact and tool assemblages through time and place and on resource patches that were used continually for several millennia, as the formation of burned rock middens show. This pattern of generalized foraging, though marked by brief shifts to a heavy reliance on bison, continued almost unchanged into the succeeding Late Prehistoric period.

LATE PREHISTORIC PERIOD

Introduction of the bow and arrow and later, ceramics into the Central Texas archaeological region marks the Late Prehistoric period (1250–350 B.P.). Population densities dropped considerably from their Late Archaic peak (Prewitt 1985:217). Subsistence strategies did not differ greatly from the preceding period, although bison again became an important economic resource during the latter part of the Late Prehistoric period (Prewitt 1981:74). Rock and earth ovens were utilized for plant food processing (Black et al. 1997; Kleinbach et al. 1995:795). Horticulture came into play very late in the region but was of seemingly minor importance to overall subsistence strategies (Collins 1995:385).

Artifact assemblages include Scallorn, Perdiz, and Edwards projectile points, worked stone, thermally altered stone, hematite, bone, and shell. The points are associated with the use of the bow and arrow in the region, probably introduced sometime around 1350–1150 B.P.

The earlier Austin phase (identified by Scallorn and Edwards points) and the later Toyah phase (defined through Perdiz points) divide the Late Prehistoric period throughout central Texas (Black 1989; Story 1990). These divisions were originally recognized by Suhm (1960) and Jelks (1962) and remain an accepted separation of the period. Although a distinct change in the material culture between the two phases can be seen in the archaeological record, there is some debate over the cultural underpinnings that prompted the change. The different arrow point styles (and other associated artifacts in the assemblage) may represent distinct cultural groups (Johnson 1994), but others challenge this view (e.g., Black and Creel 1997) and attribute the change to a spread of new technological ideas in response to the increase of a different economic resource in bison populations (Ricklis 1992). Nevertheless, prehistoric groups traced through cultural remains assigned to the Austin phase (1250–650 B.P.), as many of the Archaic period cultures before them, relied on a hunting and gathering subsistence with more of an emphasis on gathering (Prewitt 1981:83). Groups attributed to the Toyah phase (650–200 B.P.) relied more on bison procurement (Prewitt 1981:84).

Around 1000–750 B.P., slightly more xeric or drought-prone climatic conditions returned to the region and bison populations increased (Huebner 1991; Toomey 1993). Using this vast resource, Toyah peoples were equipped with Perdiz point-tipped arrows, end scrapers, four-beveled-edge knives, and plain bone-tempered ceramics. Toyah technology and subsistence strategies represent a completely different tradition from the preceding Austin phase. Collins (1995:388) states that formation of burned rock middens ceased as bison hunting and group mobility reached a level not witnessed since Folsom times. Although the importance of bison hunting and high group mobility hardly can be disputed, the argument that burned rock midden development ceased during the Toyah phase is tenuous. A recent examination of Toyah-age radiocarbon assays and assemblages by Black et al. (1997) suggests that their association with burned rock middens represents more than a "thin veneer" capping Archaic-age features. Black et al. (1997) claim that burned rock midden formations, although not as prevalent as in earlier periods, was part of the adaptive strategies of Toyah peoples.

HISTORIC CULTURAL SETTING

Landscape features have dictated human movement and subsistence patterns for thousands of years. Specifically, geographical influences during the Historic Period confined settlements to riparian zones and limited farming to these areas. The larger, rugged landscape was used for sheep, goat, and cattle ranching. These practices were introduced and promoted by the Spanish as part of their colonial agenda and many were carried through to the twentieth century, giving Texas a strong agricultural history dominating economic, social and cultural patterns over the years (Freeman 1994).

The Historic period in this region (A.D. 1630 to present) in Texas roughly begins when Europeans first enter the region. However, several sixteenth century expeditions have been reported to the area. Most notably Alvar Nuñez Cabeza de Vaca's travels, stemming from the failed 1527 Panfilo de Narvaez expedition. Cabeza de Vaca reportedly lived and traveled with various aboriginal groups across coastal and interior Texas around A.D. 1528 (Chipman 2011; Foster 2012; Krieger 2002). Although Cabeza de Vaca's exact path is not clear, some sources suggest his journey came through this part of central Texas in 1534, but others indicate it was farther south (Smryl 2013). Alonso de León, whose expeditions were south of the project area, named the Guadalupe River in 1689 in honor of the Lady of Guadalupe from which Guadalupe County was later named after (Foster 1995; Smryl 2013).

SPANISH COLONIAL PERIOD (A.D. 1630–1820)

Motivated more by a fear of French expansion than anything else, the Spanish explored and established missions in eastern and central Texas during the latter part of the seventeenth century (Foster 1995). The first Europeans to pass near the project area were probably Spanish explorers and missionaries with "sword and cross" coming northward from Mexico City (Foster 1995; Weddle 1968). With the exception of these Spanish expeditions or *entradas* during the early Historic Period, although claimed by Spain, Texas lacked an established Spanish presence until around A.D. 1700 (Foster 1995). These entrada routes followed established Indian trade routes and were the genesis of the Spanish road system throughout Texas. These Spanish roads have been incorporated into the Texas highway network that is in use today (Foster 1995:1). Subsequent overland entradas into the eighteenth century generally followed de Léon's early route, which became the Upper Presidio Road from 1795–1850 (McGraw et al. 1991). This route generally follows the IH 35 roadway, located northeast of the project area.

Spanish expeditions throughout the seventeenth and eighteenth centuries established not only the mission system but also introduced livestock and ranching practices that would influence generations of Texans. Sheep, goats, cattle, and hogs were shipped in to create mission and private ranches. These ranches were developed as a means to create an autonomous settlement system in a relatively hostile environment prone to attacks by the Comanche, Apache, and Norteños.

By the end of the eighteenth century, ranching practices were on the rise. Spurred on by demands from eastern markets, Texas ranches flourished. In addition, east Texas missions were secularized in 1794, creating a greater need for meat and other goods (Freeman 1994). As a result of the changing economic and political environment, the proliferation of private ranches increased over time. One of the first land grants issued by the Spanish government in the Guadalupe County area was to Jose de la Baume in 1806, in Capote Hills (Smryl 2013). Eighteenth century Spanish ranching practices were carried into the nineteenth century, having an influence on European and American settlers moving into Texas from both Europe and the older states of the southeast.

MEXICO AND THE REPUBLIC OF TEXAS (1821–1845)

The beginning of the nineteenth century proved difficult for Spain. The Napoleonic wars left the country in an economic and political crisis, which was greatly felt in the territories of New Spain. After years of struggle, threats from the United States to the north and east, and the breakdown of government organization, Mexico finally gained its independence in 1821 (de la Teja 2011).

Ranching practices began to shift even more during this time with an influx of new settlers from the southern United States and Europe. Under Spanish law, foreigners were initially forbidden to settle in Spanish lands. However, due to a dearth of settlers willing to travel into the dangerous northern regions of New Spain, the government made allowances. By 1820, Texas was opened and settlers arrived in waves under the authority of men like Stephen F. Austin, taking advantage of cheap land and liberal laws under Spain and then Mexico (Henson 2011). The settlers' influences added to methods of breeding and herding practices in the area, building on established Spanish colonial traditions. The colonists also brought new crops and farming practices with them. In fact, the anti-slavery ideals of Mexico were set aside by Mexican officials in Texas to lure Anglo settlers with the much-desired agricultural practices from southern states. Settlers also moved to Texas with the idea that the area would soon be annexed by the United States and would be a worthy investment as more people moved west. Further, Texas functioned as a safe haven from debt, granting debt-laden families and individuals a clean start (Henson 2011).

By 1835, Texans were growing unhappy and restless. The Mexican government had failed to provide the liberal and democratic environment that many European and American settlers had envisioned. The republican ideals established in the Constitution of 1824 were pushed aside and replaced by a growing dictatorship lead by Antonio López de Santa Anna. Texans decided to handle the crisis swiftly by creating a series of assemblies and a provisional government. Wrought with internal strife, the Texans did not fully organize until a convention meeting was held at Washington-on-the-Brazos on March 1, 1836. The convention appointed Sam Houston as commander-in-chief of the new Revolutionary Army and made rapid decisions about a new government, a new constitution, and the possibility of war (Nance 2011).

The next several months would prove challenging to the new government and Texas settlers. News of the fall of the Alamo in early March 1836, reached settlers quickly. South Central Texas was one of the first areas affected by the news due to close proximity to San Antonio. As Sam Houston retreated in late March, settlers followed, creating a large scale exodus out of Texas. Known as the Runaway Scrape, the flight out of Texas continued at a steady pace until the decisive Battle of San Jacinto in late April. After Houston's victory at San Jacinto, settlers began to slowly make their way back to their farms and ranches only to find missing cattle and damaged property (Covington 2011).

By late 1836, Texas had defeated Mexico, created a new constitution, and elected a new executive, judicial, and legislative staff. Sam Houston led the new Republic of Texas as president and Stephen F. Austin acted as secretary of state. The new government worked quickly to create the Texas postal system, create an organized militia, and establish the Republic of Texas boundaries. Sam Houston also worked with land grant issues and settlers rights. By the end of the Texas Revolution, Texas had more than 251,000,000 acres of land as public domain. This land was not only used to support public works in the new Republic of Texas, but also to encourage further settlement. Generous grants were provided to veterans of the war. Land grants of 1,280 acres for heads of families and 640 acres for single men were offered to settlers arriving in Texas in 1836–1837. New settlers were required to live in Texas at least 3 years to receive their land title (Nance 2011). Texas also attempted to sell land to new settlers well below the going rate at the time. Running into organizational trouble with grants and sales, the first homestead laws went into effect in 1839. This law granted 50 acres or one town lot to every citizen or head of family (Nance 2011). Texas veterans of the revolution were given land within Guadalupe County for their service in the war. The community of Walnut Springs, which later became Seguin in honor of Juan N. Seguin in 1839, was founded by a group of former Texas Rangers in 1838, along the northeast bank of the Guadalupe River (Smyrl 2013) and 10 miles west of the project area.

The Republic of Texas also encouraged larger settlements of new immigrants through land grants and colonization contracts. These efforts garnered varying levels of success, but at a minimum, opened the door to a wave of German immigrants into the region that would last throughout the years of the nineteenth century and create important cultural and social contributions to development of the Texas Hill Country. Much of the northern and western parts of the Guadalupe County were settled by German immigrants in the 1840s due to colonization efforts by Prince Carl of Solms-Braunfels at New Braunfels (Smyrl 2013).

ANTEBELLUM TEXAS AND THE UNITED STATES (1845–1861)

In December 1845, Texas became part of the United States. Texas would become a slave state instead of a territory and also retain the ability to keep public lands and debts. Texas would also have the capability to divide into four additional states if needed and the United States Navy would offer protection along the Gulf coast. New statehood created a flurry of activity and settlement. Guadalupe County was initially organized as a judicial county in 1842 by the Republic of Texas, but was discontinued by the Texas Supreme Court a year later. After annexation, the present county was established from parts of Bexar and Guadalupe counties in March 1846 (Smyrl 2013).

German and Anglo-American settlers adapted quickly to the new landscape. Breeding experiments with native and imported goats and sheep produced hybrid animals suited to the Hill Country environment. Capitalizing on their successful breeding experiments, German families often built mills to produce cloth. This effort was timed perfectly to meet an increased demand for wool cloth over cotton within the larger context of the United States. Wool manufacturing techniques were also becoming more streamlined, enabling faster production. Further, low land prices and a favorable climate lured ranchers from other parts of the United States. These factors, in conjunction with George Wilkins Kendall's wool promotion campaign activities, created the first *sheep boom* in Texas. Cattle numbers were also on the rise and by the onset of the Civil War; Texas had more than 3.5 million head, outnumbering all other states (Freeman 1994). In Guadalupe County, livestock and harvests increased as well as a shipping business, which improved the overall economy (Smryl 2013).

Until the early twentieth century, transportation and circulation routes in Texas remained rudimentary and fairly disconnected. Spanish Colonial roads took advantage of existing Native American trails initially to access interior portions of the territory. Later, settlers from the United States and other European countries continued to use established trails and created new ones as they entered the region. By the early to mid-nineteenth century, most of the roads in Texas were created by sustained use and ease of access rather than by design (Wallace 2008).

Efforts to create a coherent transportation system began in the first years of the Republic of Texas. The young Republic of Texas created a Commissioner of Roads and Revenue along with the Texas Rail Road Navigation and Banking Company (Wallace 2008; Werner 2011). Lack of funds plagued both, leaving existing roads in poor condition with no hope for the establishment of new circulation systems. Road development and maintenance responsibility primarily fell to the counties, which appointed a local overseer and crew. This group of selected men, usually comprised of local land owners, rotated every few months. Therefore, road building in the early years of the Republic of Texas and through the rest of the nineteenth century was primarily a local endeavor, shared by the community.

The Civil War (1861–1865)

Texas was a divided state as the Civil War began in 1861. The new state had fought hard to be granted admission to the Union, however, ties to the older states of the south, including slavery and agricultural practices, were strong. In fact, the majority of the established and growing Anglo-American population came from southern states. This group saw the Civil War and the election of President Abraham Lincoln as a threat to the State of Texas and its southern heritage and institutions (Campbell 2011).

Texas Hill Country counties were even more divided with narrow margins winning in favor of secession. At the Secession Convention held in Austin in January 1861, Guadalupe County approved the secession ordinance by a 314 to 22 margin. Nathanial Benton organized the first Guadalupe County company to fight for the Confederacy in 1861 (Smyrl 2013). However, the vote against secession was led by the large number of German settlers in the Hill Country west of Guadalupe County. By 1861, Germans in Kerr, Gillespie, and Kendall counties created the Union League to organize groups to fight against local native raids and Confederate threats. Seen as an act of rebellion against the State of Texas and the Confederacy, troops were called in to quell the group. Finding themselves in a dangerous situation, the Unionists decided to flee to Mexico. They were intercepted and attacked by Confederate troops on the Nueces River in Kinney County in what is now known as the Battle of the Nueces. While the division over succession and the outcome of the Battle of Nueces (seen by many German settlers as a massacre) created tensions between Anglo and Germans even after the Civil War was over, the counties in the Hill Country recovered from the war quickly with successful agriculture and ranching practices in place for future growth (Odintz 2011).

Reconstruction and Growth (1865–1899)

The Hill Country counties and settlements recovered quickly from the Civil War. As mentioned above, throughout the United States, George Wilkins Kendall promoted goat and sheep ranching in Texas. As a result, the industries survived the war and went on to create a second wool or sheep boom through the mid-1880s. Key factors influencing the success of sheep ranching at this time included the influx of both northern and southern ranchers to the area, the removal and destruction of the bison herds along with native populations to the west (allowing for new, open pastureland), and higher wool prices (Freeman 1994).

However, in Guadalupe County there was an economic decline right after the Civil War due to the loss of taxable property, including slaves, followed by declines in total farm acreage, farm value, and livestock value. The construction of the Galveston, Harrisburg and San Antonio Railway in the mid-1870s gave the county an economic boost supplying residents much needed access to markets. The towns of Marion, Cibolo, and Schertz grew up along the railroad (Smyrl 2013). Farmers could sell livestock without the risks of cattle drives and they could also import fencing supplies and heavy ginning machinery for the cotton industry (Smyrl 2013).

The development of ranching infrastructure also helped establish the sheep, goat, and cattle industries in the adjacent Hill Country. Railway systems further aided ranching activities farther west, creating access to the Edwards Plateau (Freeman 1994). In fact, railroads would eventually eclipse roads in focus and importance as they pulled in funding from both the state and outside resources. The Texas Railroad commission was established in 1891 to regulate the powerful railroad companies. By 1900, Texas had more miles of track than any other state in the United States; however, these lines still left much of the expansive western half of Texas with little or no rail access despite railroad growth (Werner 2011; Wallace 2008).

By the mid-1880s to early-1890s, the wool boom and the cattle industry were in decline, brought on by over-grazed grasslands; extreme weather conditions, including drought and harsh winters; and the introduction of barbed wire. In addition, the Texas economy was heavily affected by the Panic of 1893, which was a severe economic depression brought on by bank failures and over speculation in railroad construction. Sheep and cattle ranchers generally pulled through, reorganizing ranching practices and creating support systems and organizations for protection and promotion (Freeman 1994). Diversification of ranching and farming also became more popular. Ranchers focused their attention specifically on mohair production and Angora goats, setting the stage for the growth and boom of that industry into the twentieth century (Freeman 1994).

THE EARLY TWENTIETH CENTURY—THE ADVANCEMENT OF RANCHING AND INFRASTRUCTURE (1900–1940)

Smaller, adept, diversified farms and ranches dominated the landscape of the Edwards Plateau by 1900. The "ranching triumvirate" of cattle, sheep, and Angora goats set Texas at the national forefront of ranching production (Freeman 1994: 18). Agricultural crops, such as cotton, corn, wheat, oats, and various grasses for hay production, further diversified output, strengthening independent farms and ranches (Freeman 1994).

As railways continued to be built well into the twentieth century, new roads followed, creating a linked network. Rails functioned as the "main arteries of travel" and roads as "the veins" (Pratt 1910:106). Railroad companies soon realized that a good road system could greatly aid their business and they became one of the most ardent supporters of the good roads movement (Wallace 2008). Road systems also benefitted from the arrival of post offices. The Rural Free Delivery (RFD) mail system brought mail to isolated ranches and farms. Postmen refused to use roads in poor conditions and consistently reported conditions to the proper authorities when they could not make their deliveries. This system united rural roads and post routes, engaging federal and state government interests. This new level of involvement with roads and their development stretched significantly beyond the previous scope of county court control (Wallace 2008).

The fate of road improvement and system expansion was sealed with the introduction of the automobile and the Federal Aid Road Act of 1916 and Act 99 of 1917. The new acts provided matching funding to states and a regulatory partnership to assist with building plans (location, design, and cost estimates). In response to these acts, the Texas Highway Department was established in 1917. Soon after, the Highway Department would become the largest agency in the state (Wallace 2008). By 1917, Texas was well on its way to creating a new and complete highway system. The system included several national marked highway routes including the nascent Old Spanish Trail Transcontinental Highway (American Highway Association 1917; Luther 2010).

Despite advancements made in infrastructure technology and funding, ranching, and the nascent tourism industry, the Great Depression took its toll on the towns, farms, and ranches of the Texas Hill Country. Because the area was primarily rural, the effects of the depression were not felt initially. However, by the early 1930s, changes occurred in local economies. The Texas legislature responded and in 1931, all state agencies were required to use only American-made materials and machinery in all new construction projects. The Texas Highway Department worked together with the legislature to ensure Texas firms and material suppliers received all of the contracts for road and bridge work. As the depression advanced, the state legislature and the Texas Highway Department looked for other ways to increase the number of jobs for out-of-work Texans. In 1932, the Texas Highway Department mandated that machines should be used as a last result and all construction should be conducted by hand when at all possible. In that same year, Texas began to receive federal aid under the Emergency Relief and Construction Act. Funding continued under Roosevelt's New Deal Programs, which covered 100 percent of the costs and aided in economic recovery throughout the state (Wallace 2008).

Farms and ranches also suffered during the depression. A severe drought in the early 1930s left many farms and ranches in decline. The number of unemployed residents in the area also increased, more than doubling between 1930 and 1936 (Thompson 2011). Smaller towns and less populated counties also saw a dramatic population decrease and people moved to larger towns to look for work (Smyrl 2011). In Guadalupe County, farmers had to devote more land to corn and livestock due to low yields of cotton combined with the Great Depression (Smyrl 2013). Many farmers and tenants were forced out during this period, with farms losing nearly 50 percent of their value (Smyrl 2013). Despite the difficulties of the depression, many ranches and farms survived with lands and livestock intact. This is partly due to the push for smaller, more diversified practices which began in the early years of the twentieth century.

THE MID-TWENTIETH CENTURY (1940S–1960S)

Goat, sheep, and cattle ranching remained in the forefront of Texas Hill Country and Guadalupe County commerce well into the mid-twentieth century. Agricultural crop production of wheat, sorghum, cotton, pecans, and oats continued on farms and ranches. Schleicher County gained prominence in the mohair industry with the establishment of the West Texas Woolen Mills in Eldorado during this time and became one of the State's most important wool processing centers (Smyrl 2011).

New commercial opportunities rose in the oil and gas industry throughout the region while road and electrical infrastructure steadily improved. The years of 1941 and early 1942 saw a boom period for highway construction. World War II later hampered efforts due to a decrease in supplies, man power, and revenue from automobile registration, but plans were made for the future. As a result, delegates from the Texas Good Road Association asked Washington for $768 million for road repair due to neglect during the years of the war. Congress responded with a $1.5 billion dollar post-war highway bill. Texas received the largest percentage of these funds. Due to this, by the late 1940s, most of the roads in the Texas Hill Country were paved and new construction projects were completed in record time (Wallace 2008).

The smaller towns along the western edge of the Hill Country attracted hunters and fishermen along with other types of tourism. Tourism also greatly influenced the steady population growth in the region through the twentieth century (Thompson 2011; Smyrl 2011; Lich 2011). The Guadalupe River was a source of hydroelectric power developed in the 1920s and early 1930s and privately owned dams channeled water to generating plants, which provided electricity for the surrounding area. Formed by dams, Lakes Dunlap and McQueeny in Guadalupe County became popular recreational sites and remain so today (Smyrl 2013).

METHODS

BACKGROUND REVIEW

SWCA performed a cultural resources file records review to determine if the proposed APE has been previously surveyed for cultural resources or if any archaeological sites have been recorded within or adjacent to the APE. To conduct this review, an SWCA archaeologist reviewed portions of the New Braunfels East USGS 7.5-minute topographic quadrangle maps on the THC Texas Archeological Sites Atlas (Atlas). This resource provided information on the nature and location of previously conducted archaeological surveys, previously recorded cultural resources, locations of National Register of Historic Places (NRHP) properties, sites designated as State Antiquities Landmarks (SALs), Official Texas Historical Markers, Recorded Texas Historic Landmarks, cemeteries, and local neighborhood surveys. Aerial photographs, Bureau of Economic Geology Maps, and the NRCS Web Soil Survey were also examined. The Texas Department of Transportation (TxDOT) Historic Overlay was also reviewed to identify the presence of potential historic-age structures.

ARCHAEOLOGICAL SURVEY

SWCA's investigations consisted of an intensive pedestrian survey with subsurface investigations within the project area. Archaeologists examined the ground surface and erosional profiles and exposures for cultural resources. Subsurface investigations involved shovel testing in settings with the potential to contain buried cultural materials. Shovel tests were excavated at systematic intervals determined by ground surface visibility and soil deposition. Typically, a linear project area would require 16 shovel tests per mile. The 4.3-mile project area, therefore, would require 69 shovel tests total. However, due to the high ground surface visibility and extreme soil disturbance from agricultural activity, shovel testing frequency was reduced accordingly. A shovel test measured roughly 30×30 centimeters (cm) and was excavated in 20-cm arbitrary levels to 1 meter (m) in depth or to archaeologically sterile subsoil. The matrix was screened through ¼-inch mesh. The location of each shovel test was plotted using a global positioning system (GPS) receiver, or on an aerial map, and each test was recorded on appropriate project field forms. As this was a non-collection survey, artifacts were tabulated, analyzed, and documented in the field, but not collected.

SITE EVALUATIONS

All newly documented archaeological sites were evaluated according to the National Register Criteria for Evaluation (Criteria) as codified in 36 Code of Federal Regulations, Chapter 60.4, which states:

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

RESULTS

BACKGROUND REVIEW

The results of the background review determined that two small portions of the project area have been previously surveyed by the Lower Colorado River Authority (LCRA), and for TxDOT and the Farmers Home Administration (FMHA). Additionally, two previously recorded sites are adjacent to the southwest portion of the project area. Two previously conducted surveys and seven previously recorded archaeological sites are located within a 1-mile radius of the project area.

In 1989, a 5.75-mile linear survey on the southwest end of the project area was conducted on behalf of TxDOT along a portion of SH 46. Additionally, a 1991 survey was completed on behalf of the FMHA along the unnamed road associated with the Lake Dunlap Dam. No further information is available on Atlas for the 1989 or 1991 surveys (Atlas 2014).

In 2005, LCRA conducted a survey for the Clear Springs Auto Transformer Project near the southwestern end of the current project area. The survey was reported in an annual report that is not available on Atlas (2014). However, site 41BX87, located adjacent to the current project area, was first documented during the 2005 survey (Atlas 2014).

In 2008 and 2009, LCRA conducted a cultural resources survey for the proposed Clear Springs to Hutto Transmission Line. The survey extended 85 miles across portions of Williamson, Travis, Hays, Caldwell, and Guadalupe Counties, and included an additional 3.75 miles of rerouted corridor segments. Sixty-two prehistoric and historic cultural resource sites were identified during the survey, four of which were prehistoric campsites recommended as potentially eligible for listing as an SAL (Prikryl et al. 2010).

Archaeological sites 41GU43 and 41GU87 are located immediately adjacent to the southwestern portion of the project area. Site 41GU43 was recorded in 2000 during a survey for the Guadalupe-Blanco River Authority's (GBRA's) San Marcos Raw Water pipeline (Atlas 2014). Recorded as an early-twentieth-century farmstead, the barn is located on the private property on the south side of SH 46. The barn was recommended as ineligible for listing on the NRHP (Atlas 2014). Site 41GU87 was recorded during the pedestrian survey for the Clear Springs Auto Transformer Project in 2005 by LCRA (Prikryl et al. 2010). The site was delineated as a lithic scatter and possible open camp site, and is located 0.86 mile northeast of SH 46. Artifacts encountered within the site include cores, flakes, and burned limestone. The site was determined ineligible for listing on the NRHP (Prikryl et al. 2010).

There are seven previously recorded sites (41GU41, 41GU42, 41GU44, 41GU47, 41GU51, 41GU57, and 41GU150) within a 1-mile radius of the project area (Atlas 2014). Five of the previously recorded sites (41GU41, 41GU47, 41GU51, 41GU57, and 41GU150) are listed as historic sites and include a cemetery (41GU41) and Lake Dunlap Dam (41GU47). Lake Dunlap was completed in 1928 and had a capacity of 5,900 acre-feet, a surface area of 406 acres and sits at 575 feet above sea level (Atlas 2014). Sites 41GU42 and 41GU44 consist of a prehistoric campsite and a multicomponent site, respectively (Atlas 2014).

There are two previously conducted surveys within 1 mile of the project area. A 1998 survey completed by GBRA was conducted north-northwest of the project area and a 2012 survey, completed for New Braunfels Utilities, was conducted southwest of the project area (Atlas 2014).

HISTORIC MAP REVIEW

A review of historic maps dating from 1921, 1927, and 1958 indicate 13 to 19 historic-age resources within or adjacent to the project area (Foster et al. 2006). A 1921 USACE map (Figure 3) depicts 15 structures and three wells within or adjacent to the alignment, as well as three undeveloped roads and numerous property fence lines that transect or parallel the project line. Five structures are illustrated within or adjacent to the alternative route. A 1927 USGS map (Figure 4) depicts seven structures within or adjacent to the 4.3-mile alignment and two structures on the alternative route. No property fence lines are illustrated on the 1927 map, but multiple developed and undeveloped roads are depicted as transecting the project area. A 1958 Army Map Services (AMS) map (Figure 5) depicts seven residential buildings and five outbuildings within or adjacent to the

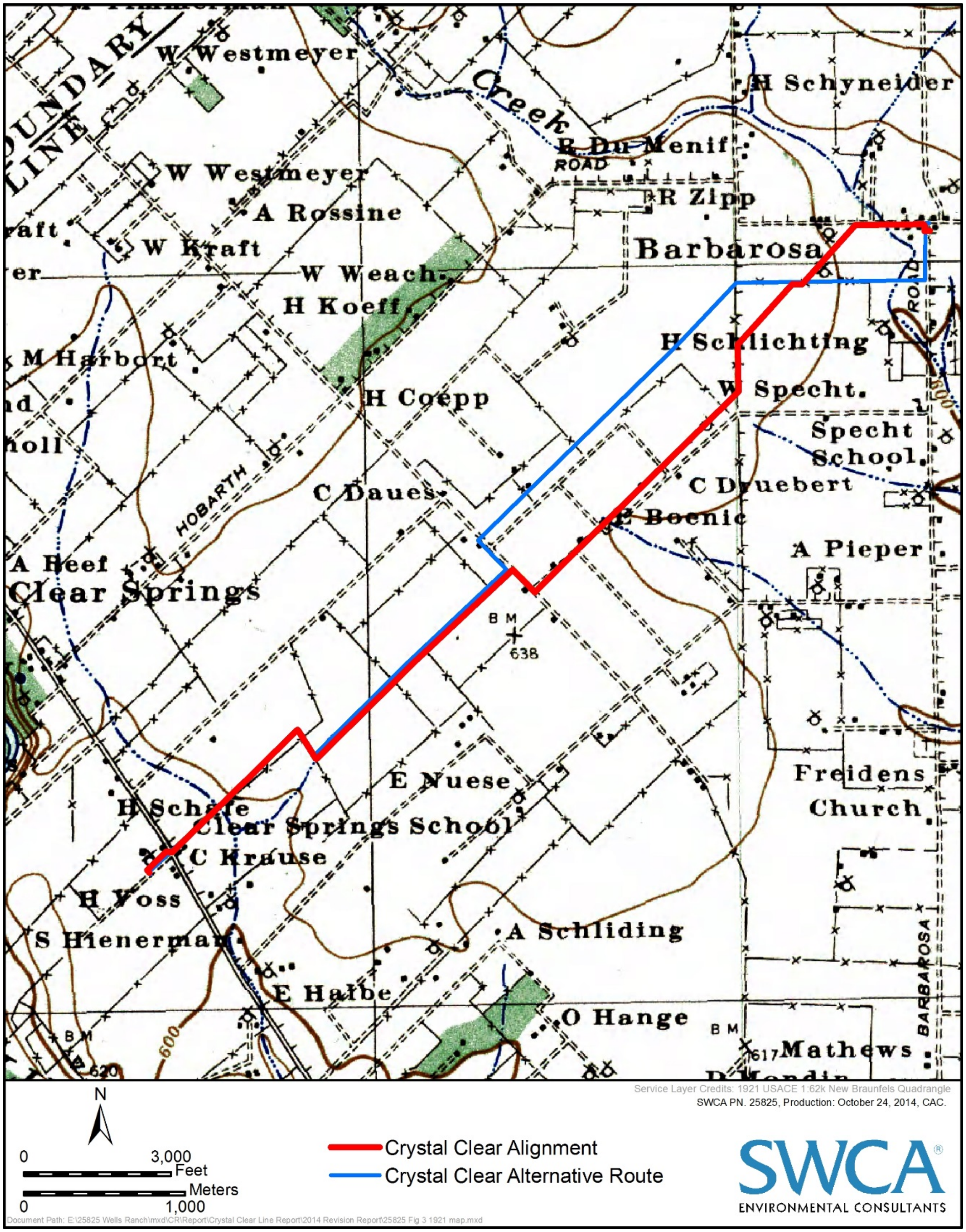

Figure 3. Project area on 1921 U.S. Army Corps of Engineers Map.

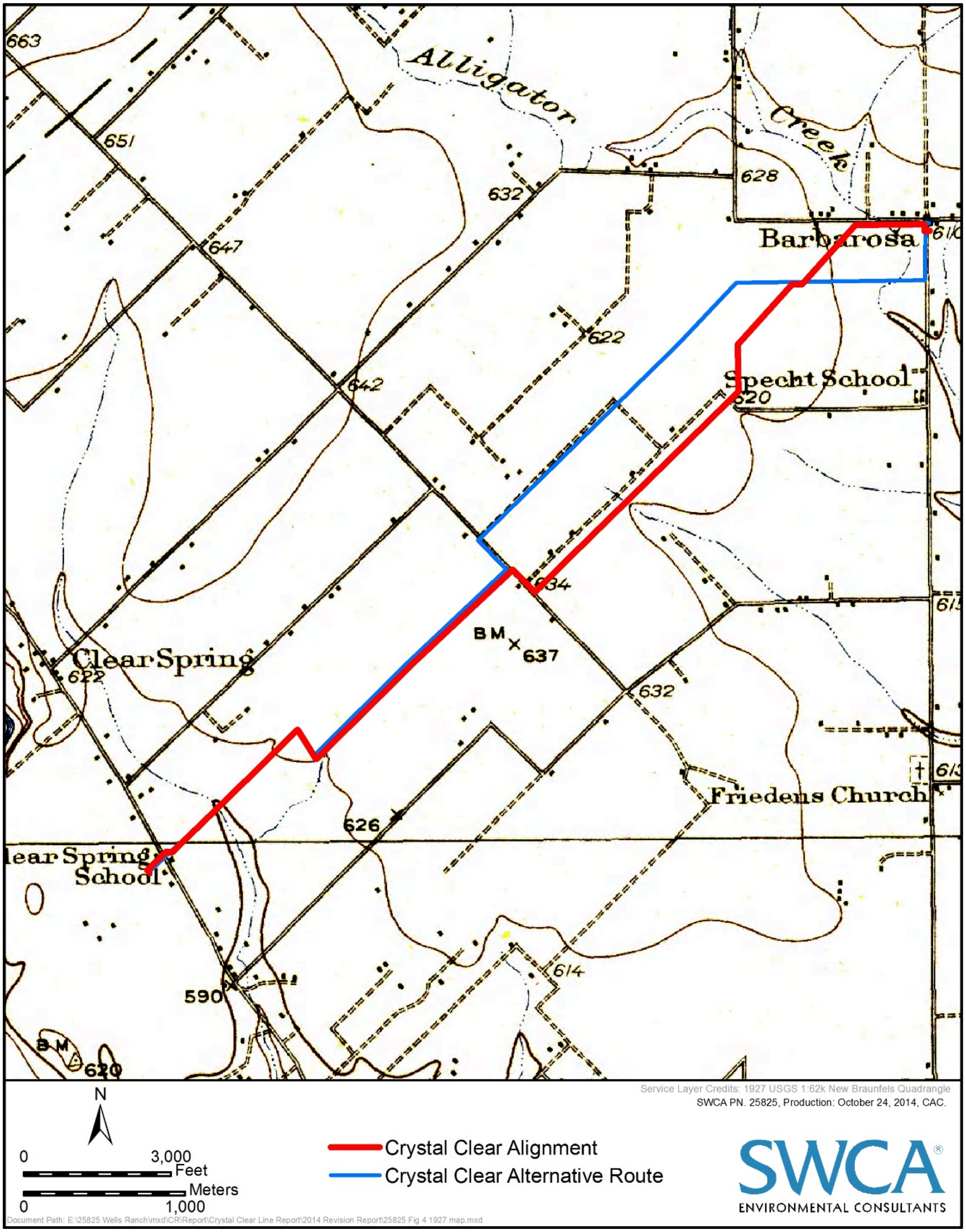

Figure 4. Project area on 1927 U.S. Geological Survey Map.

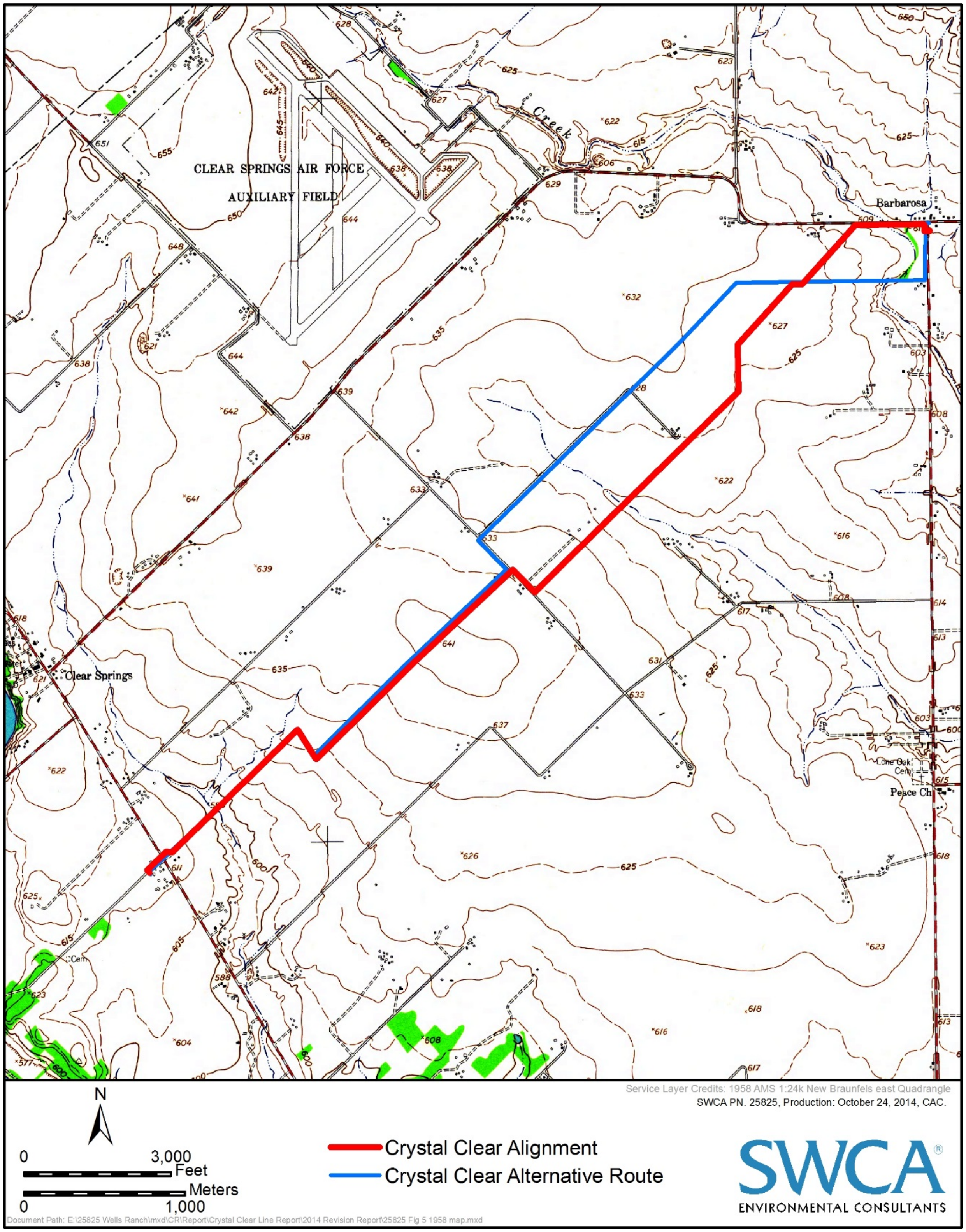

Figure 5. Project area on 1958 Army Map Services map.

alignment and two residential buildings and three outbuildings along the alternative route. Only a partial undeveloped road is illustrated on the 1958 map, along with multiple developed roads paralleling or transecting the project line. Given the known history of the New Braunfels area, the project area has a high potential to contain historic resources, either as standing structures or as archaeological remains.

ARCHAEOLOGICAL SURVEY

On October 31, 2013, and October 2 and 16, 2014, SWCA archaeologists conducted an intensive archaeological survey with shovel testing of the proposed 4.3-mile Crystal Clear Alignment. Investigations for the 2.7-mile original alternative route were conducted on October 29, 2013, but the alternative route was abandoned after the initial investigation. The survey determined that a majority of the project area is located within highly disturbed agricultural land. One isolated find was recorded on the northeast end of the project area. Additionally, one archaeological site, 41GU167, was recorded on the northeast end of the abandoned alternative route but was not found to extend into the final alignment. No evidence of previously recorded sites 41GU43 and 41GU87 were documented within the project area.

CRYSTAL CLEAR ALIGNMENT

Field investigations of the Crystal Clear Alignment encountered a mostly rural environment consisting of large agricultural fields and undeveloped parcels along much of the APE (Figure 6 and 7). Vegetation was limited to agricultural crops, such as corn and sorghum (Figure 8), as well as sporadic clusters of grasses and low shrubs along the borders of agricultural fields and drainage channels. The topography of the project area consists of relatively flat upland formations gently carved by Alligator Creek, an unnamed tributary of Geronimo Creek, and an unnamed tributary of the Guadalupe River.

Alligator Creek is a 3-foot-wide, 6-foot-deep stream channel located on the northeast end of the project area. The bed channel is flanked by a light vegetation of sporadic hardwood trees and light scrub (Figure 9). The unnamed tributary of Geronimo Creek (Figure 10) is a shallow swale with no well-defined bed channel located near the medial portion of the project area. The unnamed tributary of the Guadalupe River, located on the southwest end of the project area (Figure 11), is characterized by an artificially channelized swale with no well-defined bed channel.

The soils of the alignment consist mainly of very dark gray, dark grayish brown, and black clay loams mixed with 5–20 percent chert gravels. Clay loam deposits range from 30 to 60 cm below ground surface (cmbs) before terminating at compact basal clay subsoils. Chert cobble and gravel outcrops were observed on the ground surface throughout the project area. Due to recent plowing and planting activity, ground surface visibility was 100 percent. Recent storm activity left semi-moist soils in the upland portions of the project area and super-saturated soils (Figure 12) within and adjacent to the swale drainages.

Major disturbances throughout the alignment are the result of agricultural activity, such as plowing and planting. Other disturbances consist of a network of property fence lines (Figure 13), existing transmission lines, graded ditches along field boundaries for flood control, and undeveloped dirt roads (Figure 14) for field access. Barbarosa Road (Figure 15), Dauer Ranch Road, Old Seguin Road and Avery Parkway all transect or parallel small segments of the project area and consists of asphalt paved roads with graded rights-of-way (ROWs).

Restricted Information

Not for Public Disclosure

Figure 6. Crystal Clear Alignment Survey Results, southwest end.

Restricted Information

Not for Public Disclosure

Figure 7. Crystal Clear Alignment Survey Results, northeast end.

Figure 8. Example of plowed and planted agricultural fields, facing northeast.

Figure 9. Alligator Creek, facing north.

Figure 10. Unnamed tributary of Geronimo Creek, facing northwest.

Figure 11. Unnamed tributary of Guadalupe River, facing southwest.

Figure 12. Saturated soils on southwest end of project area, facing east.

Figure 13. Example of property fence lines and transmission lines that transect the project area, facing northeast.

Figure 14. Example of undeveloped dirt road for field access, facing northeast.

Figure 15. Road right-of-way (left) paralleling project area, facing south.

Figure 16. IF01, chert uniface tool.

A total of 50 shovel tests were conducted along the Crystal Clear Alignment. The THC standards required a total of 69 shovel tests for the 4.3-mile alignment; however, 90 to 100 percent ground surface visibility greatly reduced the number of shovel tests warranted. Shovel tests were conducted in 120- and 200-m intervals determined by the level of ground surface visibility, with the exception of one area. A 900-m segment of the southwest portion of the line, parallel to an existing subdivided residential development, was not shovel tested due to super-saturated soils. This area was instead thoroughly inspected for cultural material on the ground surface though visual examination. Shovel tests ranged from 15 to 60 cmbs, and consisted of clay loam soils with gravel and calcium carbonate inclusions over basal clay subsoils.

One isolated find (IF), IF01, was identified though ground surface inspection to the south of a dense chert cobble outcrop. IF01 is a unifacial tool modified from a primary chert flake (Figure 16). No other cultural materials were observed within the vicinity of IF01, thus the find was not recorded as an archaeological site.

The background review determined that two previously recorded archaeological sites were located within or immediately adjacent to the alignment: 41GU43 and 41GU87. However, investigations determined that both previously recorded sites are located outside of the project area boundaries. Shovel testing and ground surface inspection confirmed that no cultural materials or features associated with sites 41GU43 and 41GU87 extended into the project area. Two historic structures (labeled HSS01 and HSS02 on Figure 6) associated with 41GU43 were visible across SH 46 from the project area (Figure 17).

Overall, the Crystal Clear Alignment was found to be highly disturbed from agricultural activity, as well as the construction of property fence lines, transmission lines, graded drainage ditches, undeveloped dirt access roads, and paved road ROWs. One archaeological site, 41GU167, was recorded during the 4.3-mile alignment survey.

Figure 17. View of site 41GU43 from edge of project area boundary, facing southwest.

CRYSTAL CLEAR ALTERNATIVE ROUTE

Survey investigations of the 2.7-mile abandoned Crystal Clear Alternative Route (Figure 18) also encountered a mostly rural environment consisting of large agricultural fields and undeveloped parcels. The topography of the project area consists of fairly level, featureless landscapes with Alligator Creek to the northeast and an unnamed tributary of Geronimo Creek to the southwest. Vegetation was limited to plowed and planted corn and hay fields (Figure 19).

The soils of the alternative route consist mainly of very dark gray and black clays mixed with 2 to 10 percent gravels. Clay deposits range from 10 to 60 cmbs before terminating at compact basal clay subsoils. Chert cobble and gravel outcrops were also observed on the ground surface throughout the project area and are likely the result of consistent agricultural plowing. Due to recent plowing and planting activity, ground surface visibility was 90 to 100 percent (Figure 20).

Major disturbances throughout the project area are the result of agricultural activity, such as plowing and planting. Other disturbances consisted of a network of property fence lines, existing transmission lines, and undeveloped dirt roads for field access. Small segments of Dauer Ranch Road (Figure 21) and Barbarosa Road parallel the northeastern end of the reroute project area and consist of asphalt paved roads with graded ROWs.

A total of 32 shovel tests were conducted along the alternative route in 200-m intervals due to high ground surface visibility. Areas of 100 percent visibility did not warrant shovel testing. Shovel tests ranged from 25 to 60 cmbs, and consisted of clay soils with gravel inclusions over compact basal clay subsoils. One shovel test was positive for cultural material, resulting in the recording of archaeological site 41GU167.

Restricted Information

Not for Public Disclosure

Figure 18. Abandoned Crystal Clear Alternative Route Survey Results.

Figure 19. Example of hay field vegetation and ground surface visibility, facing northeast.

Figure 20. Example of corn crop vegetation and ground surface visibility, facing north.

Figure 21. Example of road right-of-way paralleling project area, facing northwest.

SITE 41GU167

Site 41GU167 is a historic refuse scatter located on the northeast end of the abandoned alternative route (Figure 22). The site is located within a plowed agricultural field overlooking Alligator Creek 0.14 mile to the east. The topography of the site is generally level with a less than 5 percent slope to the east towards the drainage. The surrounding agricultural field had been recently plowed, affording 100 percent ground surface visibility (Figure 23). Soils consisted of clay loams that ranged from 40 to 55 cm in depth, mixed with chert cobbles and gravels. Abundant chert cobbles were also observed on the ground surface.

Site 41GU167 measures 15 m north to south by 250 to 300 m east to west. The north to south site boundaries were determined by the project area ROW, as well as a private fence line to the south. The east to west site boundaries were determined by the extent of the surficial scatter. A total of four shovel tests were excavated within the site, only one of which (SS04) was positive for cultural material. Subsurface deposits within SS04 consisted of one metal fragment observed at 0 to 10 cmbs. Additional investigations within the Crystal Clear Alignment APE 150 m to the north and west determined that site 41GU167 does not extend into the project area.

Cultural material for site 41GU167 consists of predominately historic materials, although a few prehistoric materials were documented. Materials include: one ceramic marble (Figure 24); 18-plus plain whiteware sherds; one decorative whiteware sherd; one stoneware sherd; 18+ clear glass shards; seven clear window glass shards; abundant solarized (amethyst), brown, and aqua vessel glass shards (Figure 25); and metal fragments (Figure 26). Artifacts were observed to be evenly dispersed and no concentration or features were documented. One biface (Figure 27) and two fragments of burned rock were also documented within the site boundaries of 41GU167, but no additional prehistoric materials or features were observed.

Restricted Information

Not for Public Disclosure

Figure 22. Site 41GU167 map.

Figure 23. Overview of site 41GU167, facing northeast.

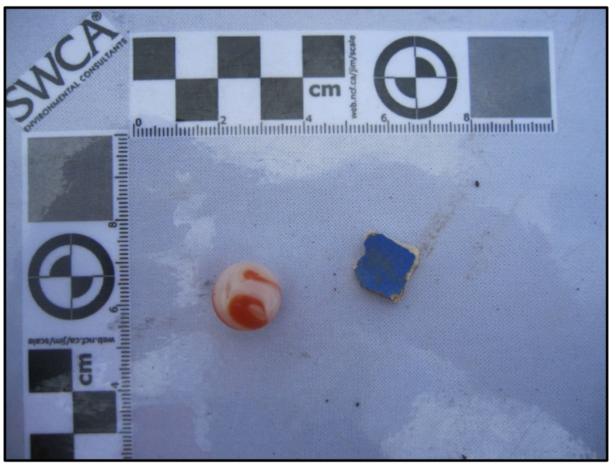

Figure 24. Ceramic marble and blue painted stoneware from 41GU167.

Figure 25. Example of glass and ceramic materials from 41GU167.

Figure 26. Metal fragment from SS04, 41GU167.

Figure 27. Biface from 41GU167.

Site 41GU167 does not meet Criteria A, B, or C of 36CFR60.4, but SWCA evaluated the site for eligibility under Criterion D, which considers its ability to yield information important in prehistory or history. Site 41GU167 is a surficial historic refuse scatter of an unknown temporal affiliation. No diagnostic artifacts were recovered during investigations and only one positive shovel test produced shallow subsurface materials at 0 to 10 cmbs. The land use for the project area has been agricultural cultivation for an extended period of time, indicating that extensive disturbances have heavily impacted the site. No cultural features are clearly indicated.

Overall, site 41GU167 does not have the potential to yield information important to the history of the region following potential research avenues and outlines of the cultural context. The site lacks substantial intact subsurface deposits, a substantial artifact assemblage, and isolable activity areas. Due to its lack of potential research value, 41GU167 is not eligible for listing in the NRHP. No further work or avoidance strategy is recommended for the site. The site will be avoided by the final Crystal Clear Alignment.

CONCLUSIONS AND RECOMMENDATIONS

On behalf of River City Engineering and CRWA, SWCA conducted an intensive cultural resources survey for the Wells Ranch Crystal Clear Transmission Line in Guadalupe County, Texas. The work was conducted as part of the sponsor's compliance with the Antiquities Code of Texas (Permit Number 6678) and the NHPA in anticipation of a permit from the USACE-Fort Worth District under Nationwide Permit 12 and Section 404 of the Clean Water Act. The project area is located 3.5 miles northwest of Geronimo, Texas, between SH 46 and FM 758.

The CRWA proposes to replace and install a new 16-inch-diameter water main line within existing CRWA easements, other utility easements, and private property. Installation of the pipeline will require trenching and boring within a 50-foot-wide construction easement. Typically, trenching impacts would be 6 to 7 feet deep, while bore pits would be 8 to 10 feet deep. The area of potential effects (APE) is a 4.3-mile alignment. During the course of the project, approximately 2.7 miles of the alignment was rerouted after the original route was surveyed. The 2.7-mile alternative route was ultimately abandoned. The total APE for the Crystal Clear project area is 26 acres.

The investigations included a background review and an intensive pedestrian survey with shovel testing of the project area boundaries. The background review determined that two small portions of the project area have been previously surveyed by LCRA, TxDOT, and FMHA. Additionally, two previously recorded sites (41GU43 and 41GU87) are adjacent to the southwest portion of the project area. Two previously conducted surveys and seven previously recorded archaeological sites are located within a 1-mile radius of the project area. A review of historic maps dating from 1921 and 1958 indicate there were several historic-age resources within or adjacent to the proposed alignment.

Overall, the intensive pedestrian survey revealed that the proposed project area is within a rural setting intersected by fence lines, overhead utility lines, existing underground utilities, and road ways. Almost the entire APE consisted of plowed field affording 90 to 100 percent ground visibility. A total of 50 shovel tests were excavated within the available APE. Shovel tests were excavated to depths ranging from 30 to 60 cmbs and consisted of clay and clay loam. The THC's survey standards for projects of this size recommend 16 shovel tests per linear mile when the ROW measures less than 100 feet wide, or 69 shovel tests for the current project area. Due to high ground surface visibility and previous disturbances within the APE, SWCA reduced the number of shovel tests as subsurface exploration was not warranted in certain areas. One isolated find was encountered within the northeast portion of the project area. No evidence of previously recorded sites 41GU43 and 41GU87 were documented within the project area. One archaeological site, 41GU167, was documented during survey investigations of the abandoned alternative route, but does not extend into the final Crystal Clear Alignment.

In accordance with 36 CFR 800.4, SWCA has made a reasonable and good faith effort to identify cultural resources properties within the APE. As no properties were identified that may meet the criteria for listing in the NRHP according to 36 CFR 60.4 or for designation as an SAL, according to 13 TAC 26.8, SWCA recommends no further cultural resources work within the project area.

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APPENDIX A
SHOVEL TEST DATA

ST #	Site #	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Inclusions	Positive/Negative	Comments/Reason For Termination
Crystal Clear Alignment Shovel Test Data								
DR01	N/A	0-60	10YR2/1	Black	Clay Loam	5-10% Gravels	Negative	Termination due to compact clay.
DR02	N/A	0-50	10YR2/1	Black	Clay Loam	5-10% Gravels	Negative	Termination due to compact clay.
DR03	N/A	0-50	7.5YR3/2	Dark Brown	Loamy Clay	5% Gravels	Negative	Termination due to compact clay.
DR04	N/A	0-50	10YR2/2	Very Dark Brown	Loamy Clay	5% Gravels	Negative	Termination due to compact clay.
DR05	N/A	0-30	10YR2/1	Black	Clay Loam	1% Small Gravels	Negative	Termination due to compact clay.
DR06	N/A	0-40	10YR2/1	Black	Clay Loam	1% Small Gravels	Negative	Termination due to compact clay.
DR07	N/A	0-40	10YR2/1	Black	Clay Loam	Less than 1% Gravels	Negative	Termination due to compact clay.
DR07	N/A	40-50	10YR2/2	Very Dark Brown	Loamy Clay	N/A	Negative	Termination due to compact clay.
DR08	N/A	0-50	10YR2/1	Black	Loamy Clay	Less than 1% Gravels	Negative	Termination due to compact clay.
DR09	N/A	0-50	10YR3/1	Very Dark Gray	Clay Loam	Less than 1% Gravels	Negative	Termination due to compact clay.
DR10	N/A	0-50	10YR3/1	Very Dark Gray	Clay Loam	2% 1-3cm Gravels	Negative	Termination due to compact clay.
DR11	N/A	0-50	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Termination due to compact clay.
DR12	N/A	0-35	10YR2/1	Black	Clay Loam	20% Medium to Large Chert Cobbles	Negative	Termination due to compact clay and chert gravels.
DR13	N/A	0-35	10YR3/1	Very Dark Gray	Clay Loam	10% Gravels	Negative	Termination due to compact clay.
DR13	N/A	35-45	5YR3/1	Very Dark Gray	Clay Loam	5% Gravels	Negative	Termination due to compact clay.
DR13	N/A	45-50	5YR4/1	Dark Gray	Clay Loam	N/A	Negative	Termination due to compact clay.
DR14	N/A	0-50	10YR2/2	Very Dark Brown	Loamy Clay	2% Small Gravels	Negative	Termination due to compact clay.
DR15	N/A	0-40	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Termination due to compact clay.
DR16	N/A	0-50	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Termination due to compact clay.
MS01	N/A	0-50	10YR3/1	Very Dark Gray	Clay	N/A	Negative	Termination due to clay subsoil and gravels.
MS02	N/A	0-50	10YR3/1	Very Dark Gray	Clay	N/A	Negative	Termination due to clay.
MS03	N/A	0-50	10YR3/1	Very Dark Gray	Clay	2% Gravels	Negative	Termination due to clay.
MS04	N/A	0-40	10YR3/1	Very Dark Gray	Clay	2% Gravels	Negative	Termination due to clay.
MS05	N/A	0-60	10YR3/1	Very Dark Gray	Clay	Few Gravels	Negative	Termination due to clay.
MS06	N/A	0-40	10YR3/1	Very Dark Gray	Clay	Few Gravels	Negative	Termination due to clay.
MS07	N/A	0-50	10YR3/1	Very Dark Gray	Clay	N/A	Negative	Termination due to thick clay.
MS08	N/A	0-50	7.5YR 3/1	Very Dark Gray	Clay	N/A	Negative	Termination due to thick clay.
MS09	N/A	0-40	10YR3/1	Very Dark Gray	Clay	Few Gravels	Negative	Termination due to thick clay.
MS10	N/A	0-50	10YR3/1	Very Dark Gray	Clay	Few Gravels	Negative	Termination due to thick clay.
MS11	N/A	0-50	10YR3/1	Very Dark Gray	Clay	1% Chert Cobbles	Negative	Termination due to thick clay.
MS12	N/A	0-50	10YR3/1	Very Dark Gray	Clay	Few Cobbles	Negative	Termination due to thick clay.
MS13	N/A	0-45	10YR2/2	Very Dark Brown	Corse Sandy Clay	N/A	Negative	Termination due to mottled subsoil.
MS13	N/A	45-50	10YR4/2	Dark Grayish Brown	Sandy Clay	N/A	Negative	Termination due to mottled subsoil.
MS14	N/A	0-40	10YR3/1	Very Dark Gray	Clay	N/A	Negative	Termination due to compact clay.
MS15	N/A	0-40	10YR3/1	Very Dark Gray	Clay	Few Gravels	Negative	Termination due to very compact clay.
LA12	N/A	0-30	2.5Y4/3	Olive Brown	Silt Clay Loam	N/A	Negative	Terminated at very compact clay.
LA13	N/A	0-25	2.5Y4/3	Olive Brown	Clay	N/A	Negative	Terminated at compact clay.

LA14	N/A	0-30	10YR3/2	Very Dark Grayish Brown	Clay	20% Cobbles	Negative	Terminated at basal clay.
LA15	N/A	0-30	2.5YR4/2	Dark Grayish Brown	Clay	N/A	Negative	Terminated at basal clay.
LA101	N/A	0-5	10YR3/1	Very Dark Gray	Clay Loam	Roots	Negative	Termination due to compact basal clay.
LA101	N/A	5-30	10YR3/1	Very Dark Gray	Clay	N/A	Negative	Termination due to compact basal clay.
LA102	N/A	0-10	10YR3/1	Very Dark Gray	Clay Loam	Roots	Negative	Termination due to basal clay.
LA102	N/A	10-30	10YR3/1	Very Dark Gray	Clay	Roots	Negative	Termination due to basal clay.
LA103	N/A	0-25	10YR3/1 with 10YR4/3 mottle	Very Dark Gray with Brown mottle	Clay Loam with Silty Clay Loam mottle	Roots and 2% Calcium Carbonates	Negative	Termination due to mottled clay and gravels.
LA103	N/A	20-30	10YR4/3 and 10YR3/1	Brown with Very Dark Gray mottle	Silty Clay Loam	20% Gravels and 2% Calcium Carbonates	Negative	Termination due to mottled clay and gravels.
LA104	N/A	0-10	10YR3/1	Very Dark Gray	Clay Loam	N/A	Negative	Termination due to disturbed soils with cobbles and gravels on surface.
LA104	N/A	10-30	10YR3/1	Very Dark Gray	Clay	2% Calcium Carbonates	Negative	Termination due to disturbed soils with cobbles and gravels on surface.
SS13	N/A	0-15	2.5Y4/2	Dark Grayish Brown	Clay Loam	N/A	Negative	Terminated at compact clay.
SS13	N/A	15-30	2.5Y4/2	Dark Grayish Brown	Clay Loam	N/A	Negative	Terminated at compact clay.
SS14	N/A	0-15	2.5Y4/2	Very Dark Grayish Brown	Clay Loam	10% Decaying organic material.	Negative	Terminated at compact clay.
SS15	N/A	0-30	10YR4/1	Dark Brown	Clay Loam	5% Gravels	Negative	N/A
SS15	N/A	30-40	10YR4/1 10YR5/4	Dark Gray mottled with Yellowish Brown	Clay Loam	1% Caco3 and 5% snail shell.	Negative	Terminated at basal clay.
SS16	N/A	0-40	10YR3/3	Dark Brown	Silt Clay Loam	5% Rots and gravels.	Negative	Terminated at basal clay.
KS13	N/A	0-25	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at compact clay.
KS14	N/A	0-30	10YR3/1	Very Dark Gray	Clay Loam	5% Gravels	Negative	Terminated at compact clay.
KS15	N/A	0-40	10YR2/2 7.5YR4/6	Very Dark Brown mottled with Strong Brown	Clay Loam	10% Gravels	Negative	Terminated at basal clay.
KS16	N/A	0-25	2.5Y2.5/1	Black	Clay Loam	20% Gravels	Negative	Terminated at basal clay.
KS17	N/A	0-40	10YR2/2 10YR4/4	Very Dark Gray Brown mottled with Dark Yellowish Brown	Clay Loam	10% Gravels	Negative	Terminated at compact clay.
Crystal Clear Alternative Route								
LA01	N/A	0-45	2.5Y3/1	Very Dark Gray	Clay Loam	2% Pebbles	Negative	Terminated at basal clay.
LA02	N/A	0-30	2.5Y3/1	Very Dark Gray	Clay Loam	2% Pebbles	Negative	Terminated at basal clay.
LA03	N/A	0-35	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	2% Pebbles	Negative	N/A
LA03	N/A	35-50	2.5Y5/3	Light Olive Brown	Clay Loam	50% Gravels	Negative	Terminated at basal clay.

LA04	CC01	0-30	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	2% Pebbles	Negative	N/A
LA04	CC01	30-40	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	20% Gravels	Negative	Terminated at basal clay.
LA05	N/A	0-30	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	N/A	Negative	Terminated at basal clay.
LA06	N/A	0-30	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	2% Pebbles	Negative	Terminated at basal clay.
LA07	N/A	0-30	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	N/A	Negative	N/A
LA07	N/A	30-35	2.5Y5/4	Light Olive Brown	Clay Loam	N/A	Negative	Terminated at basal clay.
LA08	N/A	0-30	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	5% Gravels	Negative	Terminated at basal clay.
LA09	N/A	0-20	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	2% Pebbles	Negative	N/A
LA09	N/A	20-30	10YR4/3	Brown	Clay Loam	N/A	Negative	Terminated at basal clay.
LA10	N/A	0-30	2.5Y4/3	Olive Brown	Clay Loam	N/A	Negative	Terminated at very compact clay.
LA11	N/A	0-30	2.5Y4/3	Olive Brown	Clay Loam	N/A	Negative	Terminated at very compact clay.
SS01	N/A	0-40	2.5Y4/2	Dark Grayish Brown	Clay Loam	5% Gravels	Negative	Terminated at basal clay.
SS02	N/A	0-60	2.5Y4/2	Dark Grayish Brown	Clay Loam	10% Gravels	Negative	Termination at basal clay.
SS03	CC01	0-55	2.5Y4/2	Dark Grayish Brown	Clay Loam	1% CaCo3 5% Snail shell and gravels	Positive-1 metal fragment 0-10 cm bs	Terminated at basal clay.
SS04	CC01	0-40	2.5Y4/2	Dark Grayish Brown	Clay Loam	5% Gravels and snail shells.	Negative	Termination at basal clay.
SS05	N/A	0-45	2.5Y4/2	Dark Grayish Brown	Clay Loam	5% Gravels	Negative	Terminated at basal clay.
SS06	N/A	0-50	2.5Y4/2	Dark Grayish Brown	Clay Loam	5% Gravels	Negative	Terminated at basal clay.
SS07	N/A	0-30	2.5Y4/2	Dark Grayish Brown	Clay Loam	20% Gravels	Negative	Termination at basal clay.
SS08	N/A	0-40	2.5Y4/3	Dark Olive Brown	Clay Loam	15% Gravels	Negative	Termination at basal clay.
SS09	N/A	0-40	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	5% Gravels	Negative	Terminated at basal clay.
SS10	N/A	0-35	2.5Y3/2	Very Dark Grayish Brown	Clay Loam	Some rootlets	Negative	Terminated at compact clay.
SS11	N/A	0-15	10YR3/3	Dark Brown	Clay Loam	5% Gravels	Negative	N/A
SS11	N/A	15-40	10YR4/2	Dark Gray Brown	Clay Loam	N/A	Negative	Terminated at basal clay.
SS12	N/A	0-35	10YR4/1	Dark Gray	Clay Loam	N/A	Negative	Terminated at basal clay.
KS01	N/A	0-35	2.5Y3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at compact clay.
KS02	N/A	0-30	2.5Y3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at compact clay.
KS03	N/A	0-35	2.5Y5/1	Gray	Clay Loam	30% Gravels	Negative	Terminated at bedrock.
KS04	CC01	0-20	10YR3/2	Very Dark Grayish Brown	Clay Loam	5% Gravel	Negative	N/A

KS04	CC01	20-40	7.5YR2.5/1	Black	Clay Loam	10% Gravels and pebbles	Negative	Terminated at basal clay.
KS05	N/A	0-50	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at compact clay.
KS06	N/A	0-30	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at basal clay.
KS07	N/A	0-35	10YR3/2 10YR3/3 10YR3/1	Very Dark Grayish Brown mottled with Dark Brown and Very Dark Gray	Clay Loam	10% Gravels	Negative	Terminated at basal clay.
KS08	N/A	0-35	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at compact clay.
KS09	N/A	0-45	10YR3/1	Very Dark Gray	Clay Loam	2% Gravels	Negative	Terminated at compact clay.
KS10	N/A	0-10	10YR3/2	Very Dark Grayish Brown	Clay Loam	2% Grass roots	Negative	Terminated at compact clay.
KS11	N/A	0-25	10YR3/1	Very Dark Gray	Clay Loam	N/A	Negative	Terminated at compact clay.
KS12	N/A	0-25	10YR3/1	Very Dark Gray	Clay Loam	N/A	Negative	Terminated at compact clay.