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CULTURAL RESOURCES INVESTIGATION REPORT OF THE PROPOSED BEAR CREEK SUD WATER SYSTEM IMPROVEMENTS PROJECT IN LAVON, COLLIN COUNTY, TEXAS

Texas Antiquities Permit Number 8745

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ABSTRACT

Sphere 3 Environmental, Inc. (Sphere 3) conducted an intensive pedestrian cultural resources survey of approximately 5.1 hectares (12.7 acres) of land designated as the Area of Potential Effects (APE) on January 31 through February 1, 2019, in response to water system improvements proposed by Bear Creek Special Utility District (SUD). The project area is located on the east side of Lake Road, the north side of Moore Lane, and both sides of Texas State Highway 78. The facilities tracts and waterline are owned by Bear Creek SUD. The waterline will be owned by Bear Creek SUD. The cultural resources survey was conducted under Texas Antiquities Permit #8745 to identify properties eligible for inclusion in the National Register of Historic Places (NRHP) or listing as a State Antiquities Landmark (SAL). A total of 64 shovel tests were excavated across the project area. Two archaeological localities were identified, Site 41COL316 and Isolated Find #1. Site 41COL316 was identified as a multi-component indeterminate prehistoric and indeterminate historic low-density artifact scatter in a highly disturbed cultivated upland flat terrace. Prehistoric artifacts recovered from the site consisted of five lithic fragments exhibiting minimal cultural modification. Historic artifacts, likely scattered from domestic activities at a nearby residence, consist of two chronologically diagnostic amethyst bottle glass shards. Additional cultural objects collected included: a clam shell fragment, several amber, aqua, and colorless bottle glass fragments evaluated as likely greater than 50 years old, and several iron objects. Recent cultural objects (less than 50 years old) within this scatter include amber bottle fragments with paper beer labels attached thereunto, contemporary store label affixed to lighter, and amber glass shards exhibiting no patina, wear, of other signs of aging and are attributed as discarded materials from the occupants of vehicles traversing the road forming the site's east boundary. The site's integrity has been destroyed by many years of use for cultivating row crops since prior to the 1960s. Isolated Find #1 consists of a buried single translucent colorless bottle glass shard, for which site delineation revealed no additional historic cultural association. Project records and artifacts were curated at the Texas Archeological Research Laboratory (TARL) in Austin, Texas. The site and Isolated Find #1 have been evaluated as not eligible for inclusion in the NRHP or for listing as a SAL. Sphere 3 therefore recommends that construction of water system improvements proceed as planned without further cultural resource investigations.

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INTRODUCTION

Bear Creek Special Utility District (SUD) plans to develop an approximately 5.1-hectare (ha) (12.7-acre [ac]) area of land for water system improvements in the City of Lavon, Texas (Appendix A: Figures 1 and 2). Proposed development includes a pump station facilities area consisting of two adjoining rectangular tracts totaling approximately 3.2 ha (7.8 ac) and two discontiguous linear waterline segments of right-of-way (ROW) cumulatively comprising approximately 2.0 ha (4.9 ac) (Appendix A: Figures 3a, 3b, 3c). The cultural resources survey was conducted under Texas Antiquities Permit #8745 on behalf of the Bear Creek SUD as project sponsor and owner.

Sphere 3 Environmental, Inc. (Sphere 3) was retained by Bear Creek SUD to determine whether any cultural resources determined to be adversely impacted by proposed construction activities are eligible for inclusion in the National Register of Historic Places (NRHP) or worthy of being listed as a State Antiquities Landmark (SAL). Fieldwork was conducted on January 31 through February 1, 2019 by James S, Belew, RPA (Principal Investigator) with the assistance of Michael Ryan and Adam Bennett.

A total of 64 shovel tests were excavated across the project area. One multi-component artifact scatter (Site 41COL316) and one historic isolated find (Isolated Find #1) were identified during the survey. Several shovel test units were found to be "positive" for cultural objects but are not reflective of conventional site formation. The ground surface supporting these positive units are demonstrated to have been highly disturbed and/or recently brought in as fill.

Site 41COL316 consists of a low-density surface and buried scatter of indeterminate prehistoric cultural objects and indeterminate historic-era cultural objects. The prehistoric component comprises five lithic fragments exhibiting minimal cultural modification. The historic component contains two historic-era diagnostic artifacts pointing to certain chronological benchmarks (two amethyst bottle fragments). The remaining historic artifacts consist of non-diagnostic cultural objects, including ceramic semi-porcelain and whiteware, bottle glass, iron objects, and a clam shell fragment, all evaluated as likely greater than 50 years old. The southern extension of Lake Road in connecting with State Highway 78 forms the western limits of Site 41COL316. Interpretation of United States Geological Survey (USGS) topographic maps and historic aerial photographs reveals that this road segment was built during the 1960s. Thus, occupants of vehicles traversing this road began littering adjacent fields with beverage bottles and other unwelcomed garbage only during the past 50 years. Cultural objects assessed as likely less than 50 years old are regarded as not contributing to the understanding of the historic component and thus are excluded from permanent curation. Several such objects as found in the project area include amber bottle fragments with paper beer labels still preserved as adhering to these external surfaces, a lighter with "Corner Store" identification on its exterior, and amber glass fragments exhibiting near-perfect transparent clarity. Little of the site's integrity remains after several decades of cultivation of agricultural crops. This site has been determined to be ineligible for inclusion in the NRHP or for listing as a SAL.

Isolated Find #1 consists of a single translucent colorless bottle glass fragment discovered 0 to 10.0 centimeters below ground surface (cmbs) (0 to 3.9 inches below surface [inbs]). A potential site was delineated along the axis of the linear ROW by excavating shovel tests in 10-m intervals. This resulted in two units negative for historic-era cultural objects on either side of positive

Shovel Test A15. This cultural resource is ineligible for inclusion in the NRHP or for listing as a SAL.

DEFINITION OF STUDY AREA

The Bear Creek SUD Water System Improvements project area and APE consists of the ROW easement within which a new or replacement waterline shall be installed to 1.52 meters (m) (5 feet [ft]). The project area is located in gently sloping uplands in the town of Lavon, Collin County, TX (Appendix A: Figures 1 and 2). The project area consists of two discontinuous linear sections referred to as the Southwest Waterline Segment and the Northeast Waterline Segment and a pump station facilities area consisting of an adjoined pair of rectangular tracts (Appendix A: Figure 2). The western rectangle is an existing pump station facility and the eastern is a large tract for a planned eastward expansion. The facilities area totals an approximately 3.2 ha (7.8 ac) located approximately 457.2 m (1,500.0 ft) south of Highway 78 and just north of Farm-to-Market (FM) 484. The two segments of waterline total approximately 2,667 m (8,750 ft) long with ROWs approximately 3.0 to 13.7 m (0 to 45 ft) wide (Appendix A: Figures 3a, 3b, and 3c). Maximum depth of impacts for pipeline installation is approximately six feet. In the facilities grounds, the ground storage tank will be buried approximately 7.62 m (25 ft). The yard piping will be deep where it ties in to the ground storage tank and will have 1.52 meters (5 feet) of cover everywhere else.

The existing pump station measures approximately 0.9 ha (2.1 ac). The ground surface of the existing facility has been artificially raised above the surrounding area and planted with grass. The proposed expansion area consists of an overgrown field and measures approximately 2.3 ha (5.7 ac).

The southwest waterline segment begins at the existing pump facility and extends approximately 422.1 m (1,385.0 ft) generally northward through a fallow agricultural field. The waterline travels 48.5 m (158 ft) crossing under Highway 78 and enters a manicured residential subdivision entryway. On the north side of Highway 78 the waterline tees into the next section of the pipeline segment. A small section of waterline extends approximately 8.2 m (27.0 ft) southwest of this point while the rest of the section extends approximately 387.4 m (1,271.0 ft) to the east at which point it terminates.

The northeast waterline segment begins on the northwest side of Highway 78 and extends northward along the east side of Lake Road for approximately 244.7 m (803.0 ft) through an agricultural field. At this point the waterline crosses under Moore Lane and turns northeast along the north side of the road. The waterline extends approximately 321.3 m (1,054.0 ft) through a road ditch alongside a large artificial berm. The line then makes five sharp turns in a generally northeastward fashion for approximately 119.8 m (393.0 ft). The waterline then straightens out and extends approximately 1,001.2 m (3,285.0 ft) northeastward between agricultural fields and road ditches/berms associated with Highway 78 and buried utilities. The agricultural fields give way to manicured residential lawns as the waterline nears Bois D Arc Creek, an ephemeral headwater of Bear Creek. Once the waterline reaches Bois D Arc Creek it turns southeastward and extends approximately 48.5 m (159 ft), crossing under Highway 78, before it reaches the terminus.

The project area is located in the Texan biotic province, one of seven recognized by Blair (1950) and Dice (1943) for the state of Texas based on ecological associations of a relatively stable

assemblage of plants and animals. This ecotone describes a region characterized by tall grass prairies supported by clay soils or sandy soils and oak hickory forests; the dominating species being post and blackjack oaks, and hickory. Vegetation observed around the project area consisted of winged elm, eastern redcedar, oak, and various grasses.

The NRCS Web Soil Survey illustrates the proposed waterline as extending through two discrete soil units of the Houston Black Clay series; 0 to 1 percent slopes (HoA) and 1 to 3 percent slopes (HoB). Houston black soils are moderately well drained soils formed from clayey residuum weathered from calcareous mudstone of upper cretaceous age (NRCS Web Soil Survey 2017). The upper 25 cm (10 in) of Houston Black soils contain 10 to 30 percent kind-quartzite and chert gravels (USDA 2019). These soils are described as clay down to 203.2 cm (80.0 in). The proposed pump station extends through HoA and HoB soils as well as Lewisville Silty Clay, 3 to 5 percent slopes, eroded (LeC2). The Lewisville Silty Clay series consist of well drained silty clay down to 162.3 cm (64.0 in). These soils are formed from calcareous clayey alluvium derived from mudstone (NRCS Web Soil Survey 2017).

RESEARCH DESIGN

Sphere 3 performed all necessary cultural resources investigations in connection with the Bear Creek SUD Water Systems Improvements Project. These investigations were conducted to locate prehistoric and historic cultural resources sites within the property, delineate the vertical and horizontal extent of each site, and make preliminary evaluations of each site's integrity and potential for SAL designation and/or NRHP eligibility.

Prior to initiating the fieldwork, Sphere 3 acquired a Texas Antiquities Permit. Sphere 3 conducted a records search for State Archeological Landmarks, Historic Markers, properties listed on or eligible to the NRHP, previously recorded sites documented at the Texas Archeological Research Laboratory (TARL), previous survey reports housed at the Texas Historical Commission (THC), and available online through the Texas Archeological Site Atlas. Topographic maps, aerial images, and Google Earth imagery for the past eighty-nine years was analyzed for modern and historic impacts to the property.

The pedestrian cultural resources survey relied on both visual examination and shovel testing. The visual examination focused on areas with exposed soil surfaces (e.g., cut banks, animal disturbances, etc.) as well as the location of buildings illustrated on topographic maps, and aerial images. Shovel testing was conducted in accordance with the THC guidelines with tests spaced at 100.0 m (328.1 ft) intervals along the proposed waterline. Shovel testing was tightened to 30.0 m (98.4 ft) intervals in areas deemed to have a high chance for containing cultural resources by the field crew (based on field conditions, streams, and structures mapped less than 30.0 m (98.4 ft) from the project area on topographic maps). As per the THC's standards, project areas between 1.2 – 4.0 ha (3.0 – 10.0 ac) require a minimum of two shovel tests per acre. The facilities area measures 3.2 ha (7.8 ac); however, it was determined that more than 80 percent of the 2.1-ac existing pump station has been covered with a thick clay cap, causing disturbed matrix to exist for more than 100 cm below ground surface (cmbs). Fifteen shovel tests were excavated within the approximately 2.5 ha (6.2 ac) of less-disturbed pump station facilities area (existing facility and proposed expansion area combined). All shovel tests were excavated in 10 cm (3.9 in) levels down to the clay substrate or to 100+ cm (39.4+ in) below the ground surface. The excavated matrix was screened through a 0.635-cm (0.25-in) wire mesh screen. Shovel test

locations were recorded with a GPS capable of one-meter (3 ft) accuracy. Notes were made of soil color, texture, and the depth of the shovel test.

Upon finding an artifact, shovel tests were excavated solely within the project area boundaries at approximately 20.0 m (65.6 ft) intervals or less until the site limits could be determined using surface features/artifacts or two consecutive negative shovel tests. Surface features were mapped with a GPS. Photos were taken of the site area. A soil profile was described from a positive shovel test on the site, and a State of Texas Archeological Site Data Form was completed for each new site discovered. Sub-surface artifacts were collected by shovel test number and 10 cm (3.9 in) level. Surface artifacts were collected by contiguous 10 m by 10 m (32.8 ft by 32.8 ft) surface collection areas placed with the site boundary.

After the survey was complete, the artifacts were washed, cataloged and analyzed to determine cultural affiliation. Site forms, artifacts, maps and photos along with other data were curated at TARL in Austin, Texas. Any collected cultural objects assessed as likely less than 50 years old are regarded as not contributing to the understanding of the historic period archaeological sites and were excluded from permanent curation.

RESULTS

This cultural resource investigation was conducted in compliance with State of Texas antiquities permitting regulations and of Section 106 of the National Historic Preservation Act (NHPA) 1966, as amended. One prehistoric and historic, surface and buried scatter, site, 41COL316, and one historic buried isolate, Isolated Find #1 were documented during the survey.

PREVIOUS INVESTIGATIONS

Based on a site file search of the Texas Archeological Sites Atlas (TASA) database at http://nueces.thc.state.tx.us/index.html and literature search and records review, the proposed project area will not impact any previously recorded archaeological sites or other recorded cultural resources. There are three archaeological sites (41COL7, 41COL229, and 41COL258) and five previously conducted cultural resources surveys within an approximate one-mile radius of the project area (Appendix A: Figure 4). There are no historic properties listed on the NRHP recorded within a one-mile radius of the project.

- Site 41COL7 – Archaic open camp site, 137.2 m by 91.4 m (150 yards by 100 yards), located on a toeslope off high terrace on east side of Pilot Creek, containing a midden feature, broken dart points, knives, flakes. Determined to be “ineligible” for the NRHP.
- Site 41COL229 – Indeterminate historic site. The site was evaluated as not eligible for inclusion on the NRHP. The site is comprised of four small site areas. One of these areas, measuring 11.6 m by 0.8 m (38.0 ft by 2.5 ft), is located north of Moore Lane; approximately 9.1 m (30.0 ft) north of the Northeast Waterline ROW Segment of the project area. Two of the other areas are mapped over 1.6-kilometer (1.0-mile) west of the Southwest Waterline ROW Segment. The fourth location is mapped approximately 1.3-kilometer (0.8-mile) east of the Northeast Waterline ROW Segment on Bear Creek. No additional data was available in the TASA database.

- Site 41COL258 “Lavon Cache” – Late Archaic to general Late Prehistoric small cache measuring 8 cm by 8 cm (3.1 in by 3.1 in) with no associated additional artifacts or features, located on east side of Lake Lavon, on gentle terrace 50 m (164 ft) south of perennial Price Creek, which empties into East Fork of Trinity River, consisting of 1 zoomorphic artifact, 4 bifaces, 1 circular scraper. NRHP eligibility was not evaluated. The recorder’s responses to “Research Value” is “None” and to “Basis for Determining Components” is “no associated site” with the cache.

Five previously conducted archaeological surveys are mapped within one mile of the project area. No information was found for four of the surveys except the survey sponsor and date. Of these four surveys, three were sponsored by the Army Corps of Engineers Fort Worth District (1983, 1994, and 1998), and the fourth survey was sponsored by the National Park Service in 1963.

The remaining survey (THC Permit 6146) was conducted by AR Consultants Inc. in 2012. The survey report was authored by Cody S. Davis, Nick Coleman, S. Alan Skinner, and Deborah Anglin. The survey was conducted in support of a 52-mile long pipeline to be constructed within a 120-ft wide ROW in Collin, Fannin, and Grayson Counties, Texas. The survey identified eighteen archaeological sites; sixteen of which were recommended as ineligible for inclusion on the NRHP. Recommendations as to the NRHP eligibility of the remaining two sites, Lovell Cemetery (41COL219) and the Redwine House (41COL228) were not made (Davis et al 2012).

IMAGERY AND TOPOGRAPHIC ANALYSIS

Aerial imagery and topographic maps from 1930 to 2016 (Appendix A: Figures 5-7) illustrate the modern use of the project area. The area of southeastern Collin County encompassing the Lavon waterline project is drained by the Elm (or East) Fork of the Trinity River. Predominant trees growing along these streams include bois d’arc, oak, elm, ash, and pecan.

In general, the project area appears to extend primarily through rural agricultural fields or pastures from 1930 to the present. Google Earth aerial imagery revealed several residential housing areas constructed near the project area in recent times. Housing was constructed on the west side of Lake Road between 1996 and 2001. A residential subdivision was constructed north of the Southwestern Section of the waterline as it extends along the north side of Highway 78 between 2005 and 2008. Another subdivision was constructed on the west bank of Bois D Arc Creek alongside a portion of the Northeastern Section of the waterline between 1996 and 2005. Appendix A: Figure 5 presents a 2016 aerial image to help illustrate the current uses of the project area.

The 1930 USGS topographic map (Appendix A: Figure 6) illustrates two structures in close proximity to the project area on the Northeast Section of the proposed waterline ROW and one structure approximately 150 feet east of the Southwest Section of the project area. The USGS topographic map published in 1963 and photorevised in 1968 (Appendix A: Figure 7) revealed a cluster of three structures approximately 100 feet outside the project area near the Southwest Section (one of which appears on the 1930 map as well), one structure west of Lake Road, and a cluster of structures in the same location as one structure mapped on the 1930 map in close proximity to the Northeastern Section of the project area.

INTENSIVE PEDESTRIAN SURVEY SUPPORTED BY SHOVEL TESTING

Visual inspection was supported by shovel testing at set intervals, in accordance with guidelines issued by the THC, as originally offered by the Council of Texas Archeologists (CTA). The project area, as viewed in general from southwest to northeast, is discussed in this section as four distinct areas: (1) Large Facilities Tract (area of proposed pump station expansion), (2) Small Fenced Facilities Tract (existing pump station), (3) Southwest Waterline ROW segment, and (4) Northeast Waterline ROW segment. The majority of the project area is sufficiently removed from perennial waters and associated landforms typically preferred for habitation or food exploitation by indigenous people mostly in the prehistoric era or by Euro-American settlers, farmers, and town dwellers of the historic era. These lands are of "low probability" for finding archaeological sites or noteworthy architectural buildings and structures. Within the two facility tracts, shovel testing was conducted at two tests per acre of minimally disturbed ground surface. Within the two linear ROW segments, shovel testing was executed every 100.0 m (328.0 ft) in low probability areas. Portions of the project area approaching a perennial or intermittent stream or the remnants of a structure built more than 50 years ago (standing, demolished, or moved) as demonstrated by topographic and aerial imagery background research were assessed as "high probability." For a high probability area, the interval between standard program units is 30 m (98.4 ft) (Appendix A: Figures 3a, 3b, and 3c).

Large Facilities Tract

This approximately 2.3 ha (5.7 ac) rectangular area (Appendix C: Photograph # 1) lies on a flat upland terrace. The west side has more slope than the east side. Twelve shovel tests were excavated within this tract. These units, as depicted in Appendix A: Figure 3a, occurred along four north-south (N-S) transects of three units each. The distance east-west between transects and thus between shovel tests is approximately 45.0 m (147.6 ft), with the N-S interval approximately 50.0 m (164.0 ft).

For most of the 12 shovel test units, thick Blackland Prairie dark gray clays predominated in this tract. Visibility of the ground surface ranged from less than 5 percent to 30 percent in a few isolated locations. Ultra-compact clays difficult to penetrate with a hand shovel below 20 cmbs (7.9 inbs) were encountered in most units (as depicted in profile of shovel test M1, Appendix C: Photograph # 2). No cultural objects were found in any of these shovel tests, nor were any objects likely older than 50 years found on the ground surface. Further details are found in Appendix B: Table 1.

Small Fenced Facilities Tract

This approximately 0.9 ha (2.1 ac) rectangular area (Appendix C: Photograph # 3) is situated on top of a swale, which forms into an ephemeral drainage flowing to the west-southwest. The USGS topographic map shows a slope toward the southwest corner. However, the vast majority of this entire tract is covered by a clearly artificial earthen pad constructed of fill material (Appendix C: Photograph # 4). A Bear Creek SUD engineer stated that several years ago a water storage tank was installed. This tank, associated machinery, and other supporting equipment are protected from trespassers and vandals by a chain-link fence. The ground surface is covered in

dense lawn turf. Visibility of ground surface ranges from 0 percent to less than 5 percent, except in a very few isolated locations along the fenced perimeter where it is 20 percent.

As depicted in Appendix A: Figure 3a and tabulated in Appendix B: Table 2, the first unit excavated was shovel test A7 in the tract's northeast corner, near the point from which the proposed new water pipeline is proposed to begin and extend northward. Thick manicured lawn grass was found to be rooted in a distinctively compact clay horizon that differed from than the Blackland Prairie clays found to the east and north of this tract by being brown, with less gray, and much more mottled. In excavating with a hand shovel and then a post hole digger, progress was slow in each of the four clay horizons (as depicted in profile of shovel test A7, Appendix C: Photograph # 5). Extra time was spent in extracting from the quarter-inch screen more than 30 tiny fragments of brick and slag. Only one brick fragment was found in the gray Soil Layer 2 at 14.0 to 25.0 cmbs (5.5 to 9.8 inbs), thus demonstrating that these cultural objects were restricted to the uppermost soil horizon. The two further underlying gray clay layers were sterile and became increasingly similar to terminal soil horizon layers encountered in shovel tests in the adjacent Large Facilities Tract and Southwest Waterline ROW Segment. No brick or slag was found in any shovel tests or on the ground surface beyond unit A7. The highly mottled brown clay containing numerous tiny cultural objects was interpreted as being associated with imported fill material used to cover the water storage tank and associated pipes and instrumentation. Accordingly, no effort was made to delineate this cultural resource. The numerous tiny brick and slag fragments were not collected and thus not catalogued in the Recent Anomalies Field Specimen Catalogue (Appendix B: Table 7).

Furthermore, the middle of this recently constructed facility area was not shovel tested. The two additional shovel tests within the fenced tract were excavated along the south edge and in the northwestern corner (Appendix A: Figure 3a; Appendix B: Table 2). Both had a highly mottled brown clay horizon at the top and succeeding soil horizons indicating intentional modification of the landscape. All such soils are interpreted as associated with the recent facility construction. The construction of this underground water storage facility occurred less than 50 years ago. Consequently, this cultural resource was not recorded as an archaeological site or as a historic structure.

Southwest Waterline ROW Segment

This approximately 865.9 m (2,841.0 ft) segment is situated on a large flat upland terrace. The area south of Highway 78 is an actively cultivated field with no vegetation except dead remnants of last year's soybean crop. Visibility of the ground surface thus approached 100 percent. The only cultural resources observed on this highly exposed surface were occasional occurrences of concrete fragments. Most were observed within 20.0 m (65.6 ft) either side of a recently constructed water spigot in this open cultivated field. These were not collected, as they were interpreted to be associated with construction activities having taken place less than 50 years ago.

Immediately south of the highway is an area not in cultivation. The vegetation in this area consists of hackberry and other trees growing amid short grasses. Visibility of the ground surface ranged from less than 5 percent to 20 percent. The 1963 topographic map (Photorevised 1968) (Appendix A: Figure 7) shows a cluster of three structures (one of which appears on the 1930 topographic map as well [Appendix A: Figure 6]) approximately 30 m (100 ft) east of the project area. The project area was intensely inspected for any surficial remains or indications of these

structures however the shovel testing interval was not reduced to 30.0 m (98.4 ft). No cultural resources were observed on the surface within the ROW.

The entirety of this Southwest Waterline segment north of Highway 78 extends along the north edge of the highway, just beyond the Atmos Energy utility line. This open land, not having been plowed for agricultural purposes for many years, is associated with the large subdivision of tract homes located more than a hundred meters to the north. Manicured lawn in varying degrees of thickness characterizes the surface vegetation within the APE. Visibility of ground surface ranges from less than 5 percent to 20 percent.

As depicted in Appendix A: Figure 3a and tabulated in Appendix B: Table 3, shovel testing comprised 14 units within the Southwest Waterline ROW segment. For most of the units, Blackland Prairie gray clays predominated in this tract. Grays are generally lighter shade than those encountered in the Large Facilities Tract. Soils become more loamy in the cultivated field south of Highway 78. In most units were encountered ultra-compact clays difficult to penetrate with a hand shovel between 18 and 22 cmbs (7.1 and 8.7 inbs), with several shallower units in the south end of that cultivated field. Except for A15 containing Isolated Find #1, no cultural objects were found in any of these shovel tests, nor were any objects likely older than 50 years found on the ground surface.

Isolated Find #1

Isolated Find #1 consists of a single colorless, translucent bottle glass shard, exhibiting an aquamarine tinge, located in shovel test A15, from 0 to 9 cmbs (0 to 3.4 inbs) (Appendix C: Photograph # 27). It is located along the north side of Highway 78, midway along the southwest waterline ROW segment. It is found on a flat upland terrace. This area is currently an open field situated just east of the main entrance into a large subdivision of recently constructed tract homes (Appendix C: Photograph # 6). This field likely had been extensively plowed and cultivated for agricultural purposes but has not been adversely impacted in this manner for many years. This positive shovel test was delineated only within the APE within the southwest segment of ROW easement. (Appendix A: Figure 3a).

Four additional shovel tests were excavated in successive 10 m (32.8 ft) intervals to delineate the isolated find from shovel test A15. From one of these units was collected a thin wire, which broke into two fragments. This cultural object was interpreted as being pin flagging, a popular method of marking sub-surface utilities found within the APE. Since no additional cultural objects were observed in any of the delineation shovel tests on respective sides of A15, this historic-era bottle glass fragment was identified as an "isolated find."

No cultural objects were visually observed on the ground surface, as intensively inspected on either side of A15. Thick lawn grass rendered visibility as less than 5 percent throughout this 40.0 m (131.2 ft) long interval of the ROW. Soils throughout these five shovel tests consisted of clay loam to thick clay underlying layer. The upper soil horizon passed through the ¼-inch mesh screen more completely than did most of the soils encountered in the project. The especially compact underlying horizon was especially difficult to pass through the screen.

Northeast Waterline ROW Segment

This approximately 1,735.5 m (5,694 ft) segment traverses several landforms (Appendix A: Figures 3b and 3c). From southwest to northeast, it begins on a large flat upland terrace. The first 244.8 m (803.0 ft) section is in a cultivated field and is where Site 41COL316 was discovered and partially delineated (Appendix C: Photograph # 7). Limited vegetation has recently grown in the field since it was last plowed several months ago, rendering surface visibility between 70 and 95 percent. Archaeological results for the entirety of this 244.8 m (803.0 ft) section of ROW are provided under "Site 41COL316."

The line crosses under Moore Lane and extends more than 321.3 m (1054.0 ft) through a road ditch alongside a large artificial berm along Moore Lane's north side. No cultivation occurred within the APE. Ground surface visibility in this area was under 5 percent. The first three shovel tests (M13, M14, and M15) located across Moore Lane from Site 41COL316 were excavated along the edge of the berm in an effort to avoid a buried utility pipe installed in the road ditch (Appendix A: Figure 3b; Appendix C: Photograph # 9). These units contained pulverized brick fragments from 0 to 10.0 cmbs (0 to 3.9 inbs), as illustrated in the profile of positive shovel test M15, Appendix C: Photograph 12. According to USGS topographic maps and aerial imagery, Moore Lane has been an established public thoroughfare for more than 80 years. Thus, these positives are not likely associated with either previously recorded site 41COL229 located 9.3 m (30.0 ft) to the north (Appendix A: Figure 4) or newly recorded 41COL316 (Appendix A: Figure 8). As charted in Appendix B: Table 4, two of the three positive shovel tests contain predominantly 10YR6/3 (i.e. "pale brown") clay with 10YR5/6 (higher "chroma, yellowish brown") mottles. This matrix contrasts with 10YR4/1 ("dark gray") to 10YR3/1 ("very dark gray") "Blackland Prairie" clays that characterize virtually all other soils in the Bear Creek SUD project, including that found to the north and within the ROW in the central and eastern parts of this 321.3 m (1,054,0 ft) section of waterline (Appendix B: Table 4; Appendix C: Photograph # 11). No brick was found in such "natural" clays in any other shovel tests in this section. A neighbor passing Sphere 3's survey activities told Crew Chief Michael Ryan that the berm containing those bricks was used as cover for burying a utility pipeline several years ago. Furthermore, older topographic maps and aerial imagery reveals that a railroad line was mapped along this north side of Moore Lane. This unusual-looking matrix thus is interpreted as material imported for originally forming the rail track berm and subsequently for covering the utility pipe within the past 50 years. The assumption further asserts that these brick fragments are contained within this matrix having been transported from a distant location. Therefore, these cultural objects were manufactured, utilized, and discarded at another location and unintentionally included in forming this recent cultural anomaly. Therefore, this location is not recorded as an archaeological site.

The line turns northeastward along the northwest side of Highway 78 for approximately 1,121.1 m (3,678.0 ft). The line transitions off the western edge of the large terrace onto a gradual down-slope. The first 304.8 m (1,000.0) ft consists of overgrown fallow field (Appendix C: Photograph # 13). Ground surface visibility ranges between 10 and 95 percent. Within shovel tests, most of the soils comprising the middle and underlying horizons are 10YR3/1 ("very dark gray") clay, as illustrated in the profile of negative shovel test M27, Appendix C: Photograph # 14. There is greater soil diversity in this section than is found in other sections, as a few horizons are sandy clay loam with divergent colors, such as 10YR3/1 ("very dark gray") and 10YR4/2 ("dark grayish brown") (Appendix B: Table 4).

One-third of the way to the northwest a complex of structures is depicted on several USGS topographic maps. This likely historic farmstead today has a number of trees and underbrush located more than 30.0 m (98.4 ft) from the ROW (Appendix A: Figure 3c; Appendix C: Photograph # 15). From that point to a recently built subdivision is a cultivated field with surface visibility between 80 and 95 percent. Shovel testing was conducted at 30-m intervals in this high-probability area. No cultural resources were found in these five shovel tests. However, in the cultivated field just to the northwest of the APE (Appendix C: Photograph # 16) were observed three contemporary terracotta undecorated orange earthenware potsherds in a small drainage channel running alongside a buried utility berm. Two shovel tests (M29 and M30) were excavated on both sides of the drainage. Both shovel tests were devoid of cultural materials. These terracotta fragments likely represent discarded flower pots from a passing motorist on Highway 78. This assemblage of flower pot fragments, likely less than 50 years of age, was interpreted as being a recent cultural anomaly and not worthy of designation as a recorded archaeological site. The shovel tests excavated to the northeast of this farmstead revealed sandy clay loam topsoil overlying the typical gray clays of the area.

In the subdivision (Appendix C: Photograph # 17), the ROW passes through uncultivated open land with occasional planted shrubbery. Thick manicured lawn grass covers these several hundred feet of ROW, rendering surface visibility from less than 5 percent to 20 percent. The two shovel test units excavated at a 100.0 m (328.1 ft) interval reveal 10YR3/1 ("very dark gray") clays with some mottling, possibly indicating disturbance in recent years from nearby construction activities.

This section then passes across the north bank of Bois D Arc Creek, an ephemeral headwater of Bear Creek (Appendix C: Photographs # 18 and # 19). This shoulder landform has incrementally less-dense manicured turf, with up to 50 percent ground visibility in places. A patch of bulb ornamental plants was observed along the bank's edge to the northwest of the project area (Appendix C: Photograph # 21). Ornamental flowers grown for fulfilling aesthetic cultural needs often are indicators of a nearby historic-era residence. In an isolated bare patch of soil situated approximately 5 m northwest of the project area were observed two sherds of historic whiteware. Also observed on the ground surface in association with the bulbs were a pile of Terra Cotta potsherds (Appendix C: Photograph # 23) and a sprinkler manufactured by Gilmour (established in 1949 and continues to operate today) (Appendix C: Photograph # 22). This appearance suggests the existence of a historic archaeological site located to the northwest of the project area. Shovel test A21, excavated in as close proximity as possible to these above-ground historic-era cultural resources, is a highly disturbed series of four soil horizons to 40.0 cmbs (15.7 inbs) (Appendix C: Photograph # 20). The uppermost layer contained several fragments of concrete. Layer 3 (20.0-30.0 cmbs [7.9-11.8 inbs]) contained a red plastic fragment, likely less than 50 years old. A colorless bottle glass shard, potentially representing the extended surface expression of the nearby archaeological site (Appendix C: Photographs # 28), was located less than a meter from the unit. However, no additional surface cultural objects were observed within or for several meters beyond the northwest boundary of the APE. Because of this very low density and the absence of any historic-era artifacts in shovel test A21, the interpretation is that the southeast limits of the observed potential historic site lie beyond the project area and thus is not being recorded in this project. Materials collected from shovel test A21 can be found in the Recent Anomalies Field Specimen Catalogue (Appendix B: Table 7)

The waterline crosses underneath this drainage into the floodplain forming the north bank. It is considerably lower elevation than is the opposite bank of Bois D Arc Creek. The line turns under Highway 78, terminating in the lower north bank floodplain on the southeast side of the four-lane

boulevard. In both areas, tall grass and various species often associated with wetlands are found growing from these often-inundated soils.

Site 41COL316

Site 41COL316 is a low-density historic and prehistoric scatter within a recently plowed and cultivated agricultural field. The site is delineated strictly within the APE within the northeast segment of ROW. The site's area, as restricted to the project area, measures approximately [Removed]. Investigation of the site was restricted to the project right-of-way and exiting utility easements between the project area and Lake Road (Appendix A: Figure 8).

This field and nearby lands to the east of Lake Road comprise an expansive, relatively flat upland terrace, with a slight increase in downward slope as the landform approaches the intermittent streams more than 200 m (656.1 ft) to the southwest and west, respectively. Vegetation found within the surveyed portion of Site 41COL316 consisted of remnant crops with weeds growing along the perimeter of the field and bar ditches of Lake Road and Moore Lane (Appendix C: Photograph # 24). Soils throughout the site consisted of clay loam to thick clay underlying layer (as depicted in profile of the original unit positive for prehistoric cultural objects, shovel test [Removed], Appendix C: Photograph # 8). The latter was especially difficult to pass through the quarter-inch mesh screen.

Since most of Site 41COL316 remains outside the APE, most of the actual limits remain unknown. Since the project area is bounded on the west by Lake Road (built sometime after 1968), one surmises that the actual western boundary exists under this recently-constructed roadbed or into the fields and manicured yards of recently built suburban tract homes lying just west of this road. The location of the actual western boundary of the site thus remains undetermined. The site boundary is bordered on the north by Moore Lane. The area north of Moore Lane did not exhibit any surface artifacts and was heavily disturbed by a bar ditch, buried pipelines, and a large artificial berm. The south edge of Moore Lane therefore most likely represents the actual north limits of Site 41COL316.

The surface scatter was observed to extend eastward toward an unnamed ephemeral drainage located approximately 47.0 m (154.1 ft) east of the project area (Appendix A: Figure 8). With permission of the property owner, the east limits of the site's surface expression likely should be able to be delineated by extending the method of surface collection areas of field specimens toward the ephemeral stream and linear grove of hardwood trees that collectively form the east boundary of the cultivated field in which this site was discovered.

The only limits of Site 41COL316 to have been delineated using field archaeological methods in this project were those falling within the 3.0 m (10.0 ft) ROW along its south margins. Regarding the sub-surface element of this site, its actual southern boundary was established by negative shovel testing in successive 10.0 m (32.8 ft) intervals. Regarding these limits, the surface expression and subsurface manifestation were delineated as depicted in Appendix A: Figure 8.

The vast majority of artifacts were recovered from the surface. Site delineation shovel tests were conducted at 10 m (32.8 ft) intervals from the initial positive ([Removed]). Nine shovel tests were excavated within the site; including four positive shovel tests ([Removed]). Artifacts recovered from shovel testing ranged from between 10.0 and 30.0 cm (3.9 and 11.8 in) deep. All artifacts were recovered from highly disturbed context.

In total, 196 field specimens were recovered from the site (Appendix B: Table 5). Prehistoric artifacts include: tertiary flake, tertiary flake fragment, and three prehistoric shatter. Historic-era artifacts likely exceeding 50 years old include: one iron nail (indeterminate type), crushed brick (numerous impurities), plain whiteware fragments, plain semi-porcelain fragment, vessel/bottle glass shards (solarized, colorless, aqua, amber, and lime green), milk glass, iron nut (Appendix C: Photograph # 25), ocean clam shell fragment, several likely cultural objects of unidentified function, and concentration of likely naturally occurring chalk (found in unusual concentration, as possibly associated with cultural activity, in one shovel test). Cultural objects likely less than 50 years old and probably associated with garbage deposited as litter from passing motorists on the segment of Lake Road constructed in c. 1968 include: plastic fragment, plastic and metal "Country Store" lighter, a piece of a car muffler (manufactured by Super Trapp), amber bottle glass shards with paper Bud Light and other beer labels attached by glue (Appendix C: Photograph # 26), and amber glass shards exhibiting no signs of patina or impact wear through frequent plowing.

Historic artifacts recovered suggest a late 19th to mid-20th century occupation. Solarized glass, as well as aqua glass and milk glass shards, support this interpretation, however only the solarized glass was considered diagnostic. The brick fragments recovered exhibit many impurities and rough construction unlike more modern uniform brick. The high level of rust makes identification of the iron objects, including the nail, problematic.

Regarding the prehistoric component, the presence of one tertiary flake (shovel test [Removed], 20.0 to 30.0 cmbs [7.9 to 11.8 inbs]), one tertiary flake fragment (shovel test [Removed], 0 to 10.0 cmbs [0 to 3.9 inbs]), and three chert shatter fragments (multiple surface collection areas) indicate an unknown temporal prehistoric affiliation/component. The tertiary chert flake fragment appears to have been broken from larger flake.

Topographic analysis of the overall area, as encompassing the actual extent of, and extending well beyond Site 41COL316, identified the location of two structures over 50 years old nearby the site. The historic component of the site may be associated with either or both of these likely residential locations. One structure is mapped on a 1930 USGS topographic map approximately 22.0 m (72.2 ft) west of the site boundary (Appendix A: Figure 6). The other structure is mapped on a USGS topographic map, published 1963 and photorevised 1968, approximately 66.0 m (216.5 ft) to the west (Appendix A: Figure 7). Neither structure is still standing. The structure mapped in 1930s is not present on the 1963 topographic map. The general area around the mapped structures was built into residential housing after 1996, which likely obliterated all intact elements of the historic structures.

In summary, topographic and artifact analysis strongly indicate Site 41COL316 to be a late 19th to mid-20th century rural occupation. Site delineation was conducted solely within the defined APE and existing utility easements between the project area and Lake Road. The surface scatter expression extends beyond the project area to the east and possibly to the west as well. The subsurface element likely also extends to the east and west. Modern disturbances including plowing, road construction, buried pipelines/utilities, and trash dumping have destroyed the sites integrity within the investigated area and very likely in all areas of the site beyond to the east and west. Based upon low artifact density, absence of prehistoric diagnostic materials, absence of features or other indications of intact soils directly associated with cultural behavior, and recent disturbance, this site is recommended as not eligible for inclusion in the NRHP or for listing as a SAL.

RELEVANT CULTURE HISTORY (1845 TO PRESENT)

The United States granted statehood to Texas on April 21, 1845, causing Mexico to sever diplomatic relations and declare war. By 1847, the Americans had won the Mexican-American war. Mexico signed the terms of peace with the United States in the Treaty of Guadalupe Hidalgo in 1848. With Comanches and their allies raiding settlers and otherwise ignoring concessions made in recent treaties, the 1850s continued to be a violent period. The United States Army installed several forts in the Southern Plains (Hoig 1993:171). The Second Regiment, under Colonel Robert E. Lee and several other future Civil War generals, launched several punitive strikes against the Comanches, providing them invaluable training (Ibid:184).

Texas Indians, starting in the late 1840s, gathered in growing numbers in the area west of Collin County to escape persecution and extermination in their original homelands. In 1854, the Brazos Indian Reservation was established by U. S. Army General Randolph B. Marcy as a refuge for groups of a variety of tribes that had been removed from their homelands in Texas, many of whom had been encamped in this area since before 1850. U. S. Army Colonel Samuel Cooper in that year determined that number to be more than one thousand Indians. They were refugees from two areas of Texas whose newly arrived Anglo settlers no longer tolerated them in their former Indian homelands. From Central Texas came the Waco and Tawakoni. From eastern Texas arrived the Caddo, Anadarko, Keechi, and Ioni, which were encamped in eastern part of the County, just southwest of the future Mineral Wells. Keechi chief Acaquash guided U.S. Army personnel on the southwest-northeast-running Comanche Trail (Schmidt 2008:11-12).

The Brazos Reserve consisted of 18,576 acres (slightly more than 4 Leagues), forming a squarish-shaped territory. The reservation began 12 miles south of Fort Belknap and extended downstream along the Brazos River, encompassing three large loops of the Brazos. The southeast corner of the reservation extended just inside the limits of Palo Pinto County. The federal government controlled the reservation and a ten-mile perimeter surrounding it to prevent the selling of liquor to the residents. The Indian agency main building was located three miles east of Graham, where traces are found today. Major Robert F. Neighbors, the general supervisor of Indians in Texas, coordinated the residence of about 2,000 Indians (Crouch 2012), including: Wichitas, Shawnees, Delawares (Leffler 2012), Caddos, Anadarko, Wacos, and Tonkawas, the latter four who had organized into separate villages. Contracts with local ranchers called for about 34 cattle to be delivered each week (Crouch 2012).

In 1858, the U.S. Army's Second Regiment and the Texas Rangers began attacking the villages of the Comanche, killing and deporting to reservations in Indian Territory numerous women, children, and the aged of these Comanche communities. Warriors in residence in the Texas Reservations assisted in these campaigns deep into Indian Territory. Tribes involved in alliance with U.S. forces included: Caddo, Tonkawa Waco, Delaware, and Shawnee (Walsh 1998:74-75). Hoig (1993:184) assessed, "The attacks of 1858 and 1859 severely punished the Comanches, but by no means…[were] the tribe's fighting forces destroyed." With raids throughout north-central Texas still occurring regularly, travelers along the Santa Fe trail running from Missouri through southern Kansas to Bent's Fort, Colorado, and then southwest to Santa Fe, remained unsafe (Walsh 1998:75-76). Most of the Comanche and Kiowa bands continued living in Oklahoma's southeast corner and Texas' Panhandle of Rolling Plains and Llano Estacado raiding frontier homesteads in western north-central Texas and robbing wagon trains along the Santa Fe Trail.

A regiment of Texas Rangers in 1860 killed Peta and captured Cynthia Ann and daughter Topasannah but son Quanah escaped to join the Quahadi band. This raid and similar depredations against Anglo settlers led to the "Comanche-Texas War" (Hoig 2009:68). Through numerous triumphs against U.S. troops on the Llano Estacado, Quanah emerged as an accomplished horseman and became the chief of the Quahadi (Byers 2003:4). Following the end of the wars, Quanah Parker was the last chief to voluntarily depart Texas as a free Comanche.

The Harrell site, Young County, is the largest and best documented historic-era Native American archaeological site in north-central Texas for which block excavations (i.e. a Phase III investigation) have been carried out. One blue glass trade bead was recovered, possibly associated with a Kickapoo village site known to have existed here in ca. 1850. This remnant of the Kickapoo chose to settle at this confluence in 1850 just upstream from the Brazos Indian Reservation, in Palo Pinto County, where the Caddo, Tonkawa, Kichai, and Waco tribes resided from 1854 to 1859 (Dial and Black 2002a:2).

Fertile soils, the Peters Colony's readily available land grants, and relatively peaceful relations with indigenous populations combined to have attracted about 150 Euro-American settlers concentrated in this portion of Fannin County. On April 3, 1846, they organized Collin County, with Buckner as the county seat. Two years later, courthouse and government functions were relocated to McKinney, located within three miles of the county's geographic center (Minor 2019) and 27 km (16.7 mi) to the northwest of the project area. Both the county and the permanent seat were named for area settler Collin McKinney, a signer of the Texas Declaration of Independence.

With Caddos having relocated westward in joining with Wichita-speaking tribes and other Texas indigenous peoples in eventually occupying Brazos Reserve, settlers to Collin County by the 1850s were experiencing "no extended period of conflict." The area's first Euro-American settlers established farmsteads "near streams, where water and wood were easily obtained." These family-owned farms "produced mostly wheat and corn." With an absence of mechanized farm equipment, farmers largely avoided the thick clays of the Blackland Prairie. Thus, most of the county's rural land remained out of production throughout the 1840s through 1860s.

The nearest market town with regional transportation into the rest of the United States was Jefferson, Texas, located more than 150 miles east of Collin County. This was the closest location served by freight steamboats which would sail to major American manufacturing and redistribution centers. Neither the Trinity River, its perennial branches, nor the Red River, forming the border between Texas and Indian Territory to the north of the project area, were navigable. The nearest points at which steamboats could serve were far removed from north-central Texas. Consequently, the shipping of cash crops such as cotton, representing the agricultural and slave-based economy that characterized most of the American South, was not feasible from such a remote area. Thus, farming families with relatively little experience in slaveholding and cotton production were attracted to settle this frontier area of north-central Texas. Many of these people migrated from the Upper South, where most farmers had little experience with the cotton plantation economy, as dependent upon the labor of enslaved African Americans (Minor 2019).

The census of 1860 recorded 9,264 inhabitants, of which 1,047 were African-American. This relatively low percentage of black population combined with especially low cotton harvests to reveal how insignificant the cotton-slave economy in Collin County was. The area's State Senator, James W. Throckmorton, advocated that Texas remain in the Union. With such low presence of the cotton plantation industry, Collin County citizens in 1861 voted against secession,

948 to 405. The pro-secession position, however, prevailed statewide, leading Texas to join the Confederacy. Senator Throckmorton and more than 1,500 Collin County men enlisted in the Confederate Army. Throckmorton eventually rose to rank of brigadier general. With no battles or skirmishes having occurred anywhere in north-central Texas, the only warlike activities in the region were "isolated incidents of violence…between Union sympathizers and Confederates." Some Collin County residents participated in actions leading to the "Great Hanging at Gainesville," Cooke County, some 60 miles northwest of the project area. Resulting from the Lee-Peacock feud was death of Collin County participants and victims in Farmersville, 5 miles north of the project area. During Reconstruction, a few Republicans were appointed by the occupying Federal Army to public offices. Otherwise, the county remained staunchly Democratic throughout these years into the late 19th century (Minor 2019).

The arrival of the railroad at last brought to Collin County economic transportation connecting with the rest of Texas and the United States. In 1872, the Houston and Texas Central Railroad established depots in McKinney and Plano, permitting rapid delivery of product southward to major population centers, most important of which was Houston. The Missouri, Kansas and Texas (MK&T, or Katy) railroad established services in 1875. A decade later the Gulf, Colorado and Santa Fe (eventually shortened to Santa Fe Railroad) became the county's third railway. Three additional rail lines had been built through the county by the 1890s (Minor 2019).

With such diverse markets suddenly made available and by economic delivery of modern mechanical equipment, farmers began cultivating the challenging but extremely fertile Blackland clays. Census records document dramatic increases of population, from 9,264 in 1860 to 49,609 in 1920. Agricultural data documented by the Census points to notable increases in production between 1870 and 1920. The number of farms skyrocketed from 903 to 6,001. Cumulative value of the county's farms, evaluated in 1870 to just over $3 million, exploded to over $84 million in 1920. Corn increased from 42,827 to 956,412 bushels, and cotton grew from 4,371 to 49,311 bales. With the two diagnostic artifacts of Site 41COL316 dating to the turn of the 20th century, one might infer that this surface and buried scatter is directly associated with a farmstead operating between 1870 and 1920 (Minor 2019).

Impacts of the Great Depression led to population decline and reduction in agricultural production in Collin County. Following World War II, agricultural production rebounded, causing the county to be a noteworthy center of agricultural activity by the 1960s. The proximity to the rapidly growing urban centers of Dallas and Fort Worth especially attracted young adults to seek permanent employment outside the county. Unlike those living in more remote rural counties in Texas, persons taking jobs in Dallas and Fort Worth were sufficiently close to regularly return to provide constant support for family members still residing on the county and to retain vitality in these family land holdings (Minor 2019).

From 1920 to 1940, and then to 1960, population dropped from 49,609 to 47,190, then to 41,247. With the cumulative value of crops harvested in 1920 at more than $10 million, this value plummeted to $6.5 million in 1940. As the effects of the Great Depression lingered, unemployment stood at 19 percent that year. The number of farms fluctuated over these decades. It increased from 6,001 in 1920 to an all-time high in 1930 of 6,069. Farms dropped to 4.771 in 1940, then to 3,166 in 1950 and to 2001 in 1960. The proportion of farmers who did not own their land, i.e. "tenant farmers," spiked at 74 percent in 1925. This percentage had fallen to 38 percent by 1960. The vast majority of those tenant farmers no longer being recorded as farmers had sought employment outside the county or had joined the military during World War II and subsequently became employed elsewhere (Minor 2019).

Overall prosperity involving agricultural production and those who remained in farming rebounded after the War, especially in Collin County. By 1960, 62 percent of farmers owned their cultivated fields and were able to retain substantially greater percentages of their earnings. Wheat, which had remained the largest cash crop from prior to the Civil War, increased from 352,229 bushels in 1949 to 1,224,664 bushels in 1959 (Minor 2019).

Quality of life for farm families increased as a result of federal programs instituted to end the Great Depression. During the late 1930s, the Rural Electrification Administration established three co-operatives that brought electricity to virtually all of the more isolated rural communities of the county. The Collin County Soil Conservation District was formed in 1946. One of its purposes was to reduce destruction of crops by unwanted floodwaters having previously covered thousands of rich bottomlands in southeastern Collin County. In the immediate environs of the Lavon waterline project area, the dam and associated infrastructure comprising Lake Lavon helped control flooding on farmlands in the area of Lavon, Texas. In 1954 the Texas Research Foundation, established in Renner, Collin County, introduced cutting-edge scientific practices for improving farming practices. By residing and farming in close proximity to this research center, nearby farmers derived enhanced benefit, involving wheat production and likely other crops. This information contributed ultimately to enhanced income for Collin County farming families. Finally, paved roads serving rural areas of Collin County, as funded by a variety of federal and state programs, skyrocketed from 138 miles in 1946 to 2,333 miles in the early 1970s. These enhanced quality roads aided in the efficient economic transporting of harvested crops to rail depots, cotton gins, or grain elevators and in providing considerably quicker and smoother transportation of family members to school and nearby city and town services. By the late 1960s, most farm families enjoyed most of the services that their urban neighbors had enjoyed for many past generations (Minor 2019).

Starting in the 1970s, the rapid and sustained growth of the Dallas metropolitan area brought a diverse array of light industry and other commercial activities to the cities and towns of Collin County. From 1980 to 2010 and more recently, Collin County's cities and towns have been transformed into bedroom suburbs and exurbs in support of the massive Dallas/Fort Worth Metroplex. County population, 41,247 in 1960, following a 40-year decline, skyrocketed to 144,576 (1980), 264,036 (1990), and most recently 885,241 (2014).

Agriculture has drastically declined in importance, as tens of thousands of acres have been removed from production of crops in support of commercial businesses and subdivisions of homes. These domestic and workplace locations are now served by recently built transportation infrastructure consisting of freeways, toll roads, DART Light Rail, and numerous neighborhood streets. Recent upgrading of State Highway 78 has resulted in an almost constant presence of concrete fragments within the project area scattered across the ground surface and up to 30 cm below surface (cmbs). These fragments are presumed to be less than 50 years old and thus are not regarded as being archaeological artifacts with historic importance.

In 1960, the town of Plano, 18 miles north of downtown Dallas and 15 miles west of the project area, had 3,695, nowhere as large as the county seat of McKinney. In the past three decades, however, Plano has exploded into one of the largest cities in Texas, from 128,673 in 1990 to 278,495 in 2014 (Minor 2019). Hundreds of recently built residences of families with adults employed in Dallas, Plano, or other locations in the Metroplex form several subdivisions on either side of Texas State Highway 78, along which was conducted this archaeological survey for Bear Creek SUD.

SUMMARY AND RECOMMENDATIONS

In summary, approximately 5.1 ha (12.7 ac) was surveyed to assess for existing cultural resources in the pump station facilities area and two segments of waterline ROW for water improvements proposed by the Bear Creek SUD in Lavon, Texas. Texas Antiquities Permit #8745 was obtained and all stipulations of the permit were completed. The goal of the survey was to identify cultural resources and to make a preliminary evaluation of the documented cultural resources as to their eligibility for inclusion in the NRHP and for being listed as a SAL.

The investigations conducted by Sphere 3 included an examination of previous archaeological and other cultural resources investigations within one mile of the project area, an historical sketch of each prehistoric, protohistoric, and historic period of Collin County and the north-central Texas region, an analysis of aerial imagery and topographic maps over the past eighty years, and an intensive pedestrian archaeological survey supported by systematic shovel testing of the project area. A total of 64 shovel tests were excavated.

Shovel testing discovered the indeterminate prehistoric component of Site 41COL316. The historic component of this site was first identified by inspection of the highly visible plowed ground surface. Two artifacts, both solarized or amethyst bottle glass fragments, chronologically diagnostic for late 19th-century through 1914, were found and collected. This site was assessed as having no historic integrity. No features were identified. Regular plowing and other cultivation activities occurred for many decades in the field containing Site 41COL316, causing high disturbance to approximately 30.0 cmbs (11.8 inbs). Site 41COL316 therefore is evaluated as not eligible for inclusion on the NRHP and not worthy for listing as a SAL. The same evaluation applies to Isolated Find #1 and the presence of cultural objects in four additional areas, each of which has been interpreted as a recent cultural anomaly. Sphere 3 requests the Texas Historical Commission, as the State Historic Preservation Office for Texas, to concur with these evaluations of non-eligibility and thus to concur with the determination of "no effect" to historic properties listed on or eligible for inclusion in the NRHP and those listed in or worthy of being included as a SAL.

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Walsh, William Edward

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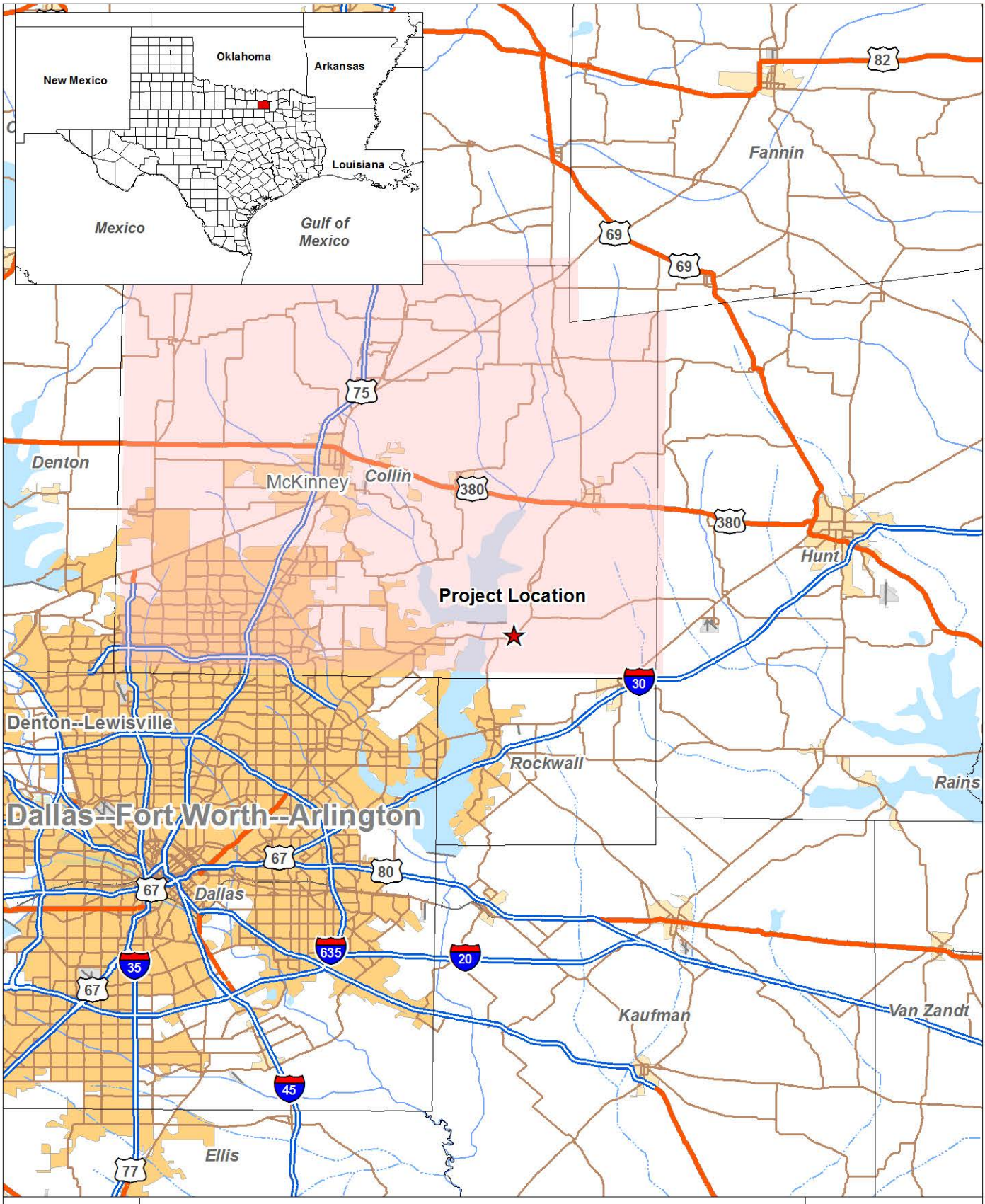
APPENDIX A:

FIGURES



Appendix A: Figure 1
Vicinity Map of the Proposed Bear Creek SUD
Water System Improvements Project in Collin County, TX

N W E S

0 5 10 20 30 40 Miles

Bear Creek SUD Project Number: 048734.00	Date: 02/12/2019	Coordinate System: NAD 1983 UTM Zone 15 North

SPHERE 3 ENVIRONMENTAL
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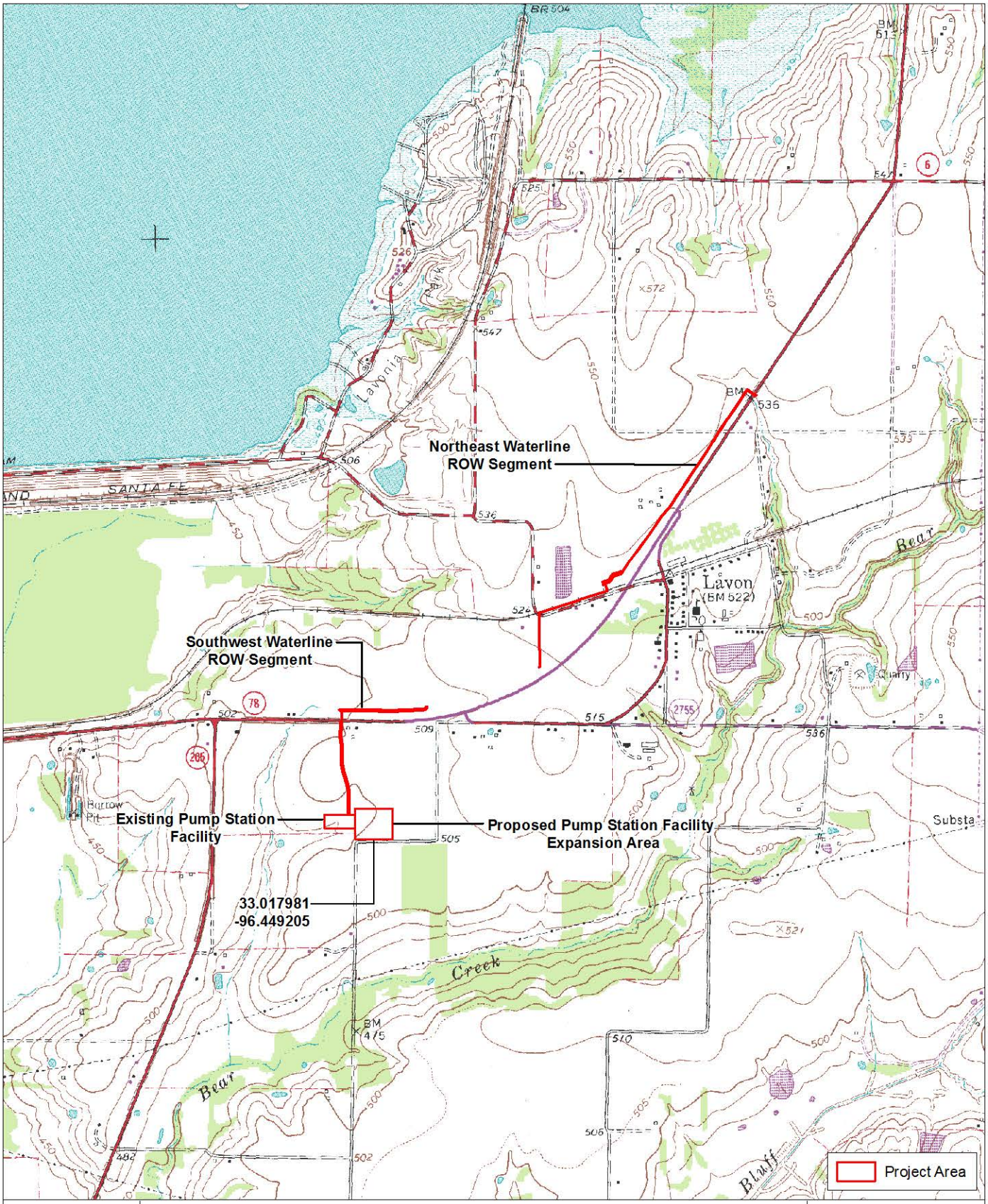

Appendix A: Figure 2
Topographic Features of the Proposed Bear Creek SUD
Water System Improvements Project in Collin County, TX

N
W E
S

0 1,000 2,000 4,000 6,000 8,000 Feet

Bear Creek SUD
Project Number: 048734.00

Date: 02/12/2019

Base Map: USGS 7.5 Minute Topographic Quadrangle:
Lavon, TX (Published 1963; Photorevised 1968)

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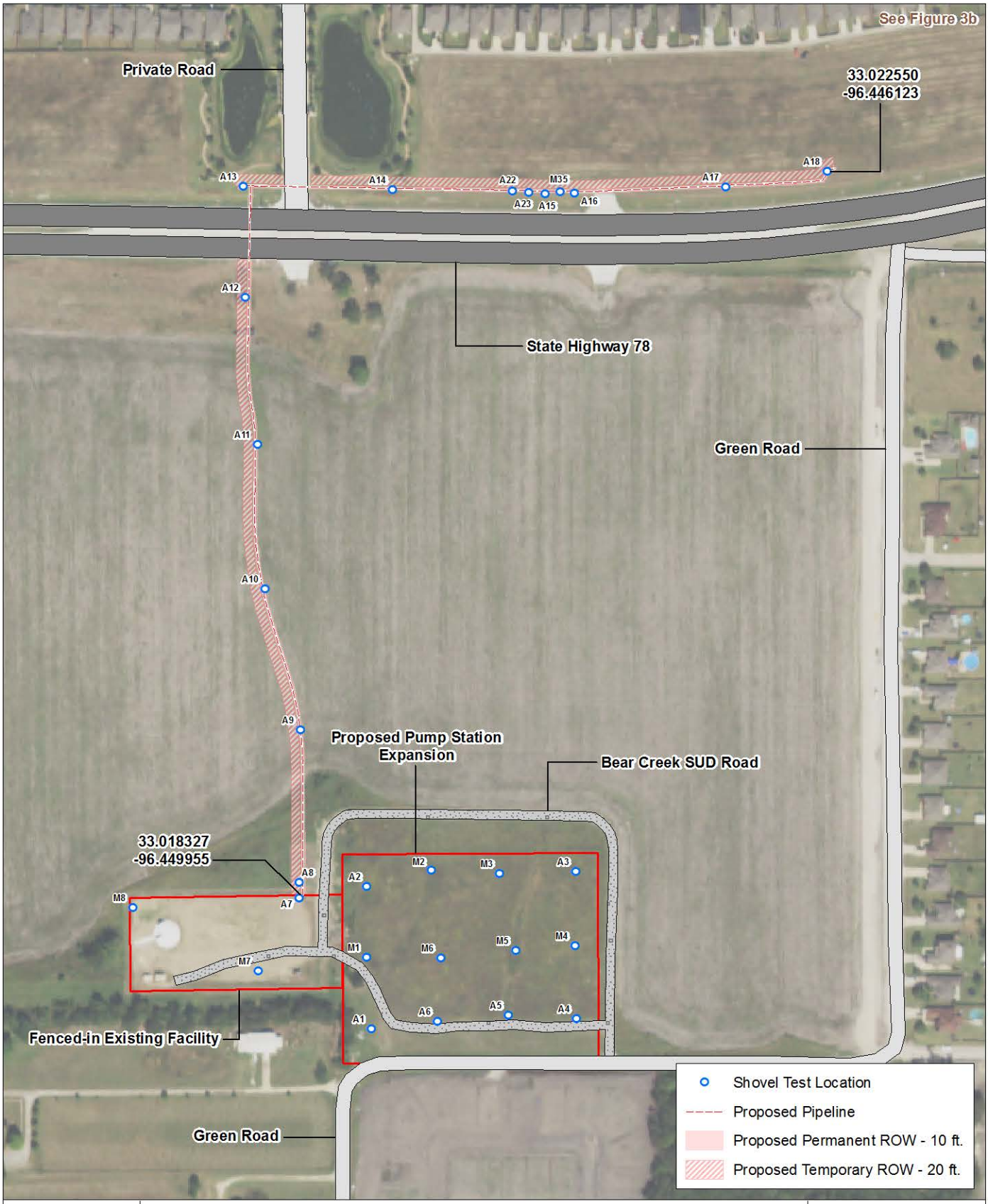

Appendix A: Figure 3a
Shovel Test Locations of the Proposed Bear Creek SUD
Water System Improvements Project in Collin County, TX

0 150 300 600 900 1,200 Feet

Bear Creek SUD Project Number: 048734.00	Date: 02/12/2019	Base Map: NRCS Geospatial Data Gateway 2016 NAIP Aerial Imagery (Collin County, TX)

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N
W E
S

Appendix A: Figure 3b
Shovel Test Locations on the Northeast Waterline ROW Segment

0 100 200 400 600 800 1,000 Feet

Bear Creek SUD
Project Number: 048734.00

Date: 02/12/2019

Base Map: NRCS Geospatial Data Gateway
2016 NAIP Aerial Imagery (Collin County, TX)

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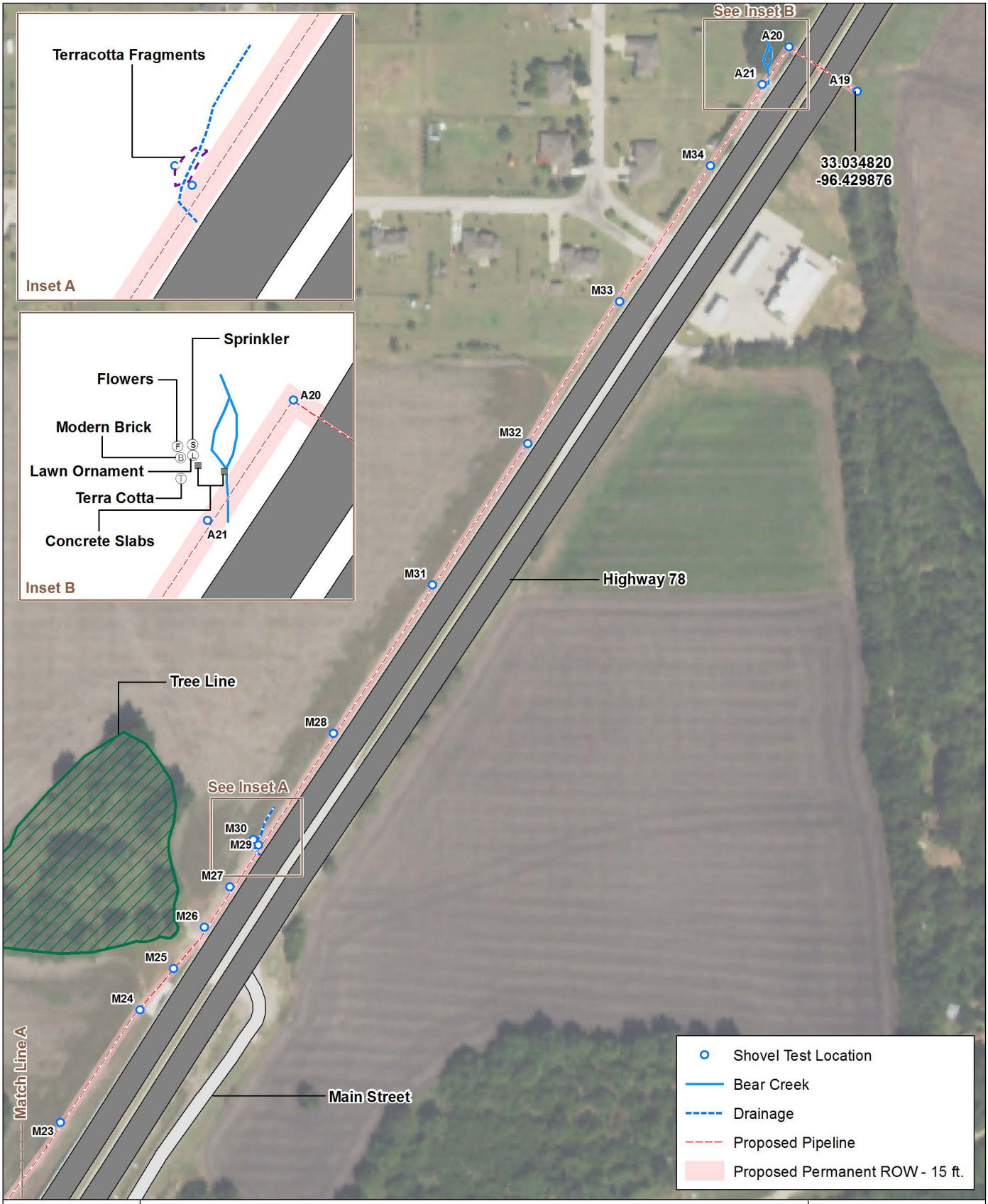

Appendix A: Figure 3c
Shovel Test Locations of the Proposed Bear Creek SUD
Water System Improvements Project in Collin County, TX

Feet
0 100 200 400 600 800 1,000

Bear Creek SUD Project Number: 048734.00	Date: 02/12/2019	Base Map: NRCS Geospatial Data Gateway 2016 NAIP Aerial Imagery (Collin County, TX)

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Appendix A: Figure 4

Previously Conducted CRM Surveys and Previously Recorded Archaeological Sites Within One Mile of the Project Area

Removed to Protect Location of Sensitive Resources

N
W E
S

Appendix A: Figure 5
Aerial Photograph (2016) of the Project Area

0 500 1,000 2,000 3,000 4,000 Feet

Bear Creek SUD
Project Number: 048734.00

Date: 02/12/2019

Base Map: NRCS Geospatial Data Gateway
2016 NAIP Aerial Imagery (Collin County, TX)

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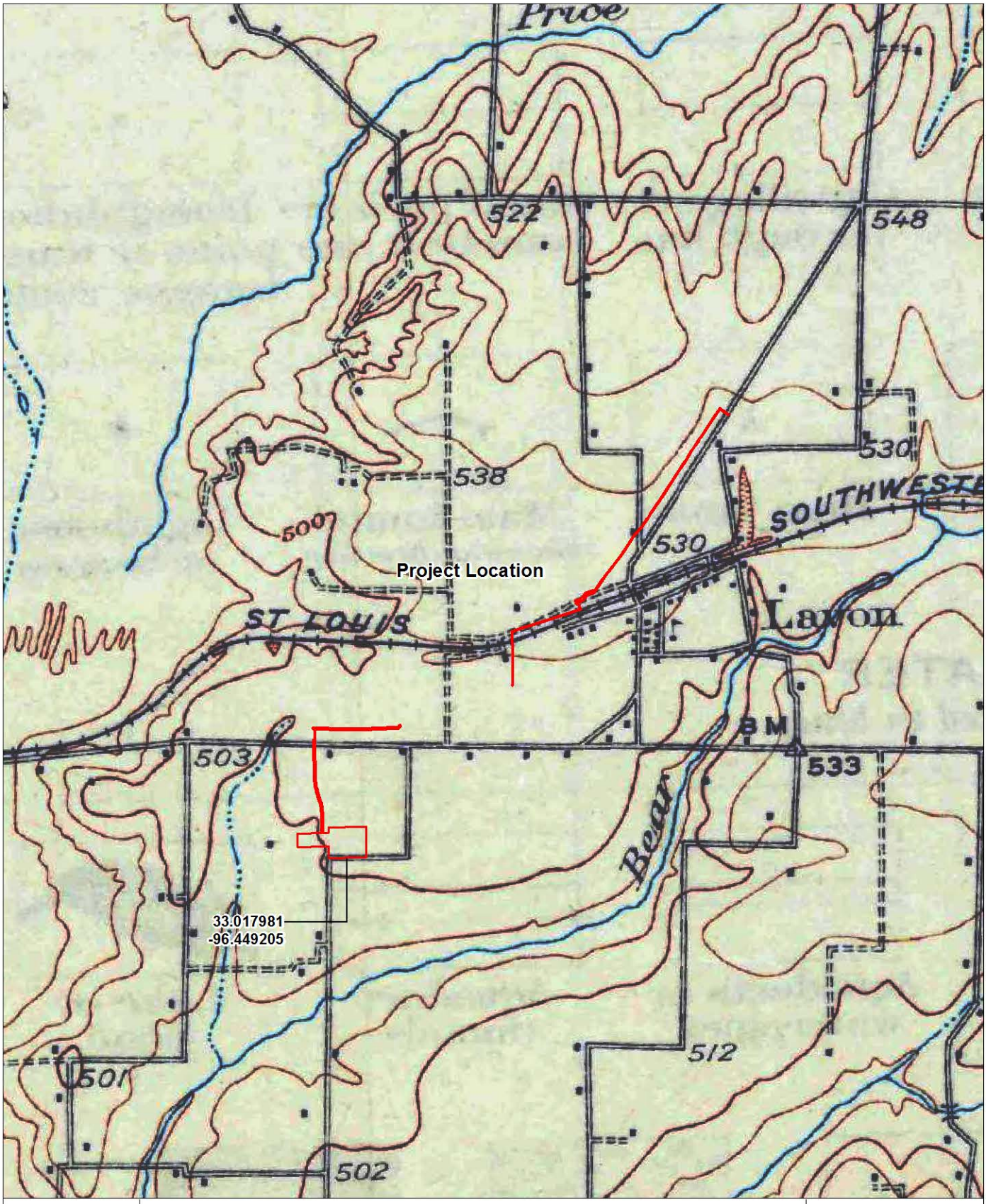

Appendix A: Figure 6
Historic Topographic Map of Project Area Published 1930

N
W E
S

0 1,000 2,000 4,000 6,000 8,000 Feet

Bear Creek SUD Project Number: 048734.00	Date: 02/12/2019	Base Map: USGS 15 Minute Topographic Quadrangle: Farmersville, TX (Published 1930)

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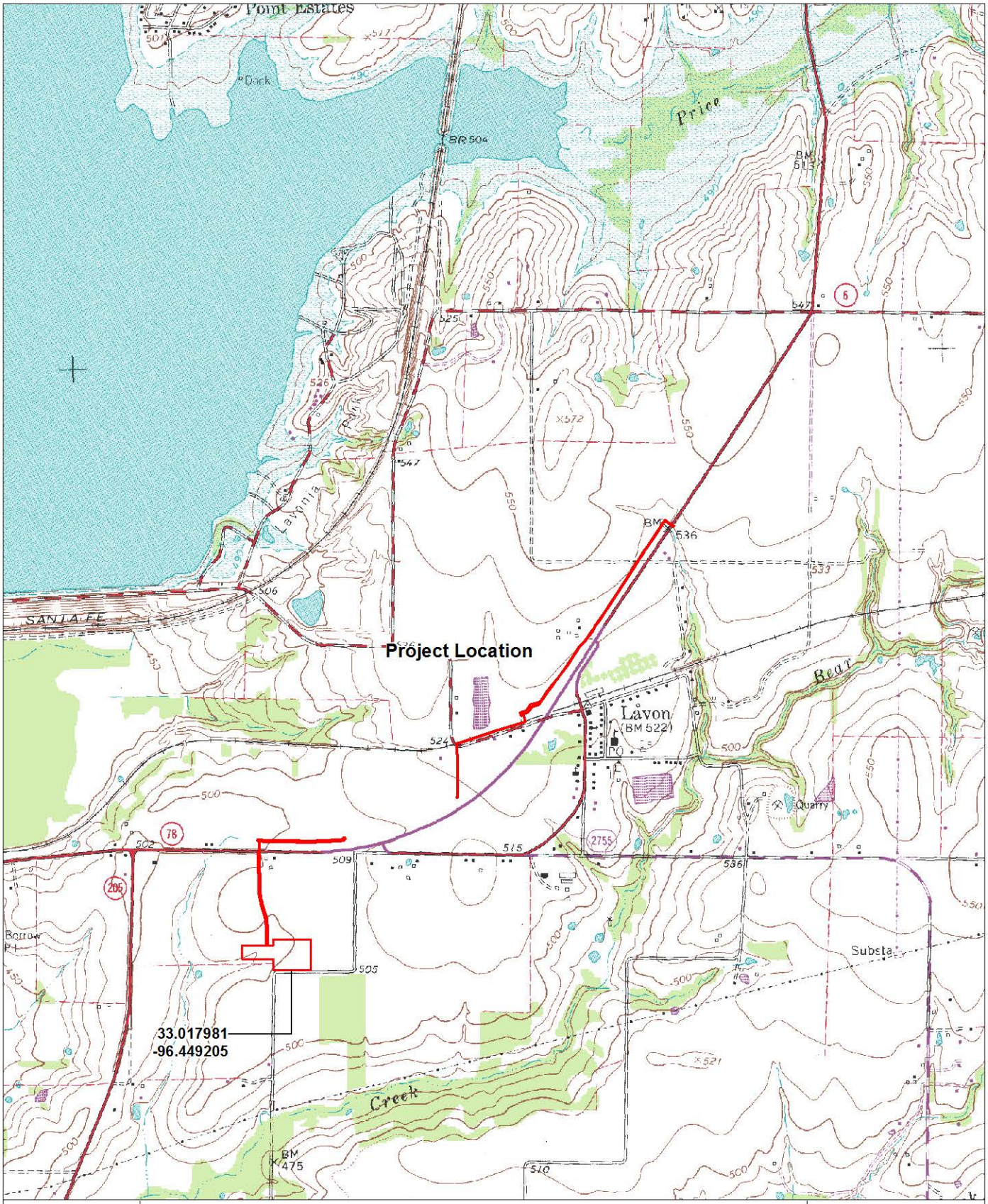

Appendix A: Figure 7
Historic Topographic Map of Project Area Published 1963 and Photorevised 1968

N
W E
S

0 1,000 2,000 4,000 6,000 8,000 Feet

Bear Creek SUD Project Number: 048734.00	Date: 02/12/2019	Base Map: USGS 7.5 Minute Topographic Quadrangle: Lavon, TX (Published 1963; Photorevised 1968)

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Appendix A: Figure 8

Site Map of 41COL316

Removed to Protect Location of Sensitive Resources

APPENDIX B

TABLES

Project: Bear Creek SUD Water System Improvements Project

APPENDIX B: Table 1: Large Facilities Tract of Bear Creek SUD Water Improvement Project Shovel Test Log

Shovel Test Number	Project Feature	Landform	Depth of Soil Horizon (cm below surface)	Horizon Soil Type	Munsell Color	Presence of Cultural Resources ("positive"-one or more artifacts)
M1	station	terrace	0-13	clay	10YR4/1	negative
M2	station	terrace	0-18	clay	dark gray	negative
M3	station	terrace	0-15	clay	dark gray	negative
M4	station	terrace	0-6	clay	10YR4/1	negative
			6-14	clay	10YR3/1	
M5	station	terrace	0-12	clay	10YR4/1	negative
M6	station	terrace	0-12	clay	dark gray	negative
A1	station	terrace	0-10	loamy clay	10YR4/1	negative
			10-16	clay	10YR3/1 with 10YR4/2 mottles	
A2	station	terrace	0-8	clay	2.5Y3/1	negative
			8-11	clay	2.5Y3/1	
A3	station	terrace	0-8	clay	gray	negative
			8-15	clay	gray	
A4	station	terrace	0-10	loamy clay	gray	negative
			10-20	clay	gray	
			20-24	clay	gray	
A5	station	terrace	0-8	clay	gray	negative
			8-19	clay	gray	
A6	station	terrace	0-7	clay	gray	negative
			7-12	clay	gray	

Project: Bear Creek SUD Water Systems Improvements Project

APPENDIX B: Table 2: Small Fenced Facilities Tract of Bear Creek SUD Water Improvement Project Shovel Test Log

Shovel Test Number	Project Feature	Landform	Depth of Soil Horizon (cm below surface)	Horizon Soil Type	Munsell Color	Presence of Cultural Resources ("positive"-one or more artifacts)
M7	station	raised terrace	0-15	sandy clay	10YR4/2 with 10YR5/4 and 10YR3/1 mottles	negative
			15-40	clay	10YR2/1 with 10YR5/4 and 10YR8/1 mottles	
M8	station	raised terrace	0-7	clay	10YR4/2	negative
			7-12	clay	10YR5/8 with 10YR5/4 and 10YR8/1 mottles	
			12-30	clay	10YR3/1	
A7	station	raised terrace	0-14	clay	10YR3/2 with gray mottles	positive
			14-25	clay	10YR3/1 with 10YR5/1 mottles	
			25-30	clay	10YR4/1 with 10YR5/3 mottles	
			30-40	clay	2.5Y4/1 with 2.5Y5/2 mottles	

Project: Bear Creek SUD Water System Improvements Project

APPENDIX B: Table 3: Southwest Waterline ROW Segment of Bear Creek SUD Water Improvement Project Shovel Test Log

Shovel Test Number	Project Feature	Landform	Depth of Soil Horizon (cm below surface)	Horizon Soil Type	Munsell Color	Presence of Cultural Resources ("positive"-one or more artifacts)
A8	water line	terrace	0-10	clay	gray	negative
			10-20	clay	gray	
			20-28	clay	gray	
A9	water line	plowed field	0-9	clay loam	10YR3/1	negative
			9-15	clay	10YR4/1	
A10	water line	plowed field	0-8	loamy clay	gray	negative
			8-13	clay	gray	
A11	water line	plowed field	0-10	loamy clay	gray	negative
			10-18	clay	gray	
A12	water line	terrace	0-16	clay	gray	negative
			16-20	clay	gray	
A13	water line	terrace	0-9	humus	10YR3/1	negative
			9-17	clay	10YR3/1	
A14	water line	terrace	0-8	humus	gray	negative
			8-15	clay	gray	
A15	water line	terrace	0-9	humus	10YR3/1	positive
			9-18	clay	10YR3/1	
A16	delineation	terrace	0-10	humus	gray	negative
			10-15	clay	gray	
A17	water line	terrace	0-9	humus	gray	negative
			9-20	clay	gray	
			20-22	clay	gray	
A18	delineation	terrace	0-8	humus	10YR3/1	negative
			8-15	clay	10YR2/1 with 10YR3/1 mottles	
			15-20	clay	10YR7/1 with 10YR5/6 and 10YR2/1 mottles	

APPENDIX B: Table 3: Southwest Waterline ROW Segment of Bear Creek SUD Water Improvement Project Shovel Test Log

Shovel Test Number	Project Feature	Landform	Depth of Soil Horizon (cm below surface)	Horizon Soil Type	Munsell Color	Presence of Cultural Resources ("positive"-one or more artifacts)
A22	water line	terrace	0-10	clay	gray brown	negative
			10-20	clay	gray brown	
A23	delineation	terrace	0-10	clay	10YR3/1	negative
			10-20	clay	10YR3/1	
			20-30	clay	10YR2/1	
M35	delineation	terrace	0-20	clay	10YR3/1	negative

Appendix B: Table 4

Northeast Waterline ROW Segment of Bear Creek SUD Water Improvement Project Shovel Test Log

Removed to Protect Location of Sensitive Resources

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Appendix B: Table 4 Continued

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Appendix B: Table 4 Continued

Appendix B: Table 5

Site 41COL316 Field Specimen Catalogue

Removed to Protect Location of Sensitive Resources

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Appendix B: Table 5 Continued

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Appendix B: Table 5 Continued

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Appendix B: Table 5 Continued

Project Name: Bear Creek SUD Water System Improvements Project **Collection Date: 1/31/19 - 2/1/19**

APPENDIX B: Table 6: Isolated Find #1 Field Specimen Catalogue

Provenience	Count	Description	Curated	Comments
ST A15; 0-10cm	1	colorless glass vessel shard - aqua hue	yes	non-diagnostic
ST A23; 10-20cm	2	pin flag fragments	no	modern manufacture

Project Name: Bear Creek SUD Water System Improvements Project **Collection Date: 2/1/19**

APPENDIX B: Table 7: Recent Anomalies Field Specimen Catalogue

Provenience	Count	Description	Curated	Comments
ST A21; Surface	1	colorless glass vessel shard	yes	non-diagnostic
ST A21; 0-10cm	2	concrete fragments	no	modern manufacture
ST A21; 10-20cm	1	sandstone-quartz rock - concrete attached	no	naturally occuring
ST A21; 20-30cm	1	plastic fragment	no	modern manufacture

APPENDIX C

PHOTOGRAPH LOG

Project: Bear Creek SUD Water Systems Improvements Project

APPENDIX C: Photograph Log

Photograph # 1 Date: 1-31-2019 Large Facilities Tract Subject: General environmental photograph of proposed pump station expansion area. Facing south from ST M2 near northern project boundary.	

Photograph # 2 Date: 1-31-2019 Large Facilities Tract Subject: ST M1 soil profile. Representative of Large Facilities Tract soils.	

Photograph # 3 Date: 1-31-2019 Pump Station Subject: Existing pump station facility. Facing west from entrance.	

Photograph # 4 Date: 1-31-2019 SW Segment of waterline Subject: Photo of existing pump station illustrating the raised ground surface from the surrounding area. Facing west toward ST A7 and point at which waterline ties into the existing pump station.	

Photograph # 5 Date: 1-31-2019 SW Segment of waterline Subject: ST A7 profile. Slag and flecks of brick rubble visible in top layer of profile.	

Photograph # 6 Date: 2-1-2019 SW Segment of waterline Subject: General environmental photograph of SW Segment of waterline north of Hwy. 78. Facing west	

Photograph # 7 Date: 1-31-2019 NE Segment of waterline Subject: General environmental photograph of NE Segment of waterline east of Lake Road and north of Hwy. 78. Facing north from ST M10.	

Photograph # 8 Date: 1-31-2019 NE Segment of waterline Subject: ST [Removed] profile. Original positive shovel test excavated at 41COL316. Representative of soils between Hwy. 78 and Moore Lane.	

Photograph # 9 Date: 1-31-2019 NE Segment of waterline Subject: Photograph of NE Section of waterline north of Moore Lane. Large artificial berm is visible on the left side of the image. Facing northeast from corner of Lake Road and Moore Lane.	

Photograph # 10 Date: 1-31-2019 NE Segment of waterline Subject: Drainage extending from man-made reservoir north of Moore Lane. Modern brick and stone scatter and cement erosion control feature visible. Facing north from north edge of project area.	

Photograph # 11 Date: 1-31-2019 NE Segment of waterline Subject: Photograph taken from top of artificial berm north of Moore Lane. Project area extends through bar ditch along Moore Lane on the right of image. Facing northeast from ST M15.	

Photograph # 12 Date: 1-31-2019 NE Segment of waterline Subject: Soil profile of ST M15. Representative of disturbance from large artificial berm. Small pieces of brick visible in profile.	

Photograph # 13 Date: 1-31-2019 NE Segment of waterline Subject: Project area after it turns northeastward to follow Hwy. 78 north of Moore Lane. Facing northeast from ST M21.	

Photograph # 14 Date: 2-1-2019 NE Segment of waterline Subject: ST M27 soil profile. Representative of soils within fallow field on the west side of Hwy. 78.	

Photograph # 15 Date: 1-31-2019 NE Segment of waterline Subject: Wooded area north of Hwy. 78 on the NE Segment of the waterline. Cement turn-off from Hwy. 78 visible in image. Facing north from ST M25.	

Photograph # 16 Date: 2-1-2019 NE Segment of waterline Subject: Drainage along Hwy. 78 in which modern artifact scatter was observed. Project area extends along the road berm to the right of the drainage. Facing northeast.	

Photograph # 17 Date: 2-1-2019 NE Segment of waterline Subject: Project area as it enters manicured lawns just south of Bois D Arc Creek. Facing northeast.	

Photograph # 18 Date: 2-1-2019 NE Segment of waterline Subject: Bois D Arc Creek. Facing northeast from project area.	

Photograph # 19 Date: 2-1-2019 NE Segment of waterline Subject: Bois D Arc Creek as it passes under Hwy. 78. Facing east from ST A21.	

Photograph # 20 Date: 2-1-2019 NE Segment of waterline Subject: ST A21 soil profile.	

Photograph # 21 Date: 2-1-2019 NE Segment of waterline Subject: Bulbs north of project area on the bank of Bois D Arc Creek. Plastic lawn ornament is also visible in image. Facing north.	

Photograph # 22 Date: 2-1-2019 NE Segment of waterline Subject: Sprinkler in Bois D Arc Creek near bulbs. Made by Gilmour (1949 – present). Facing west.	

Photograph # 23 Date: 2-1-2019 NE Segment of waterline Subject: Terra Cotta sherds found near bulbs on Bois D Arc Creek. Facing west.	

Photograph # 24 Date: 2-1-2019 NE Segment of waterline Subject: 41COL316 environmental photo. Facing south from northern boundary of site.	

Photograph # 25 Date: 2-7-2019 NE Segment of waterline Subject: 41COL316 representative artifacts.	

Photograph # 26 Date: 2-8-2019 NE Segment of waterline Subject: 41COL316 representative modern objects recovered from site.	

Photograph # 27 Date: 2-8-2019 SW Segment of waterline Subject: Isolated Find 1.	

Photograph # 28 Date: 2-8-2019 NE Segment of waterline Subject: Colorless bottle glass shard found on surface near ST A21.