Volume 2018 Article 86

2018

An Intensive Cultural Resources Survey of the Portions of Enterprise Crude Pipeline LLC's Proposed Loving to Midland Pipeline ROW on Public Land in Midland and Martin Counties, Texas

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Texas Antiquities Committee Permit No. 8095
HJN 170063 AR

Prepared for:

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February 201

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MANAGEMENT SUMMARY

During the months of July and August 2017, Horizon Environmental Services, Inc. (Horizon) conducted an intensive cultural resources survey of the portions of Enterprise Crude Pipeline LLC's (Enterprise) proposed Loving to Midland pipeline right-of-way (ROW) that are located on public land in southwestern Martin County and north-central Midland County, Texas (Project Area). The development of the pipeline ROW will be privately funded and will not require any federal permitting or coordination. However, portions of the proposed ROW cross land owned by the City of Midland. Because this is public property, the portion of the proposed ROW on the City of Midland property falls under the regulations of the Antiquities Code of Texas (ACT). At the request of Whitenton Group, Inc. (Whitenton), Horizon conducted the cultural resources survey of the Project Area on behalf of Enterprise in compliance with the ACT. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites considered eligible for formal designation as State Antiquities Landmarks (SALs). The cultural resources investigations were conducted under Texas Antiquities Committee (TAC) permit number 8095.

Overall, the entire proposed ROW measures 106.0 miles (170.6 kilometers [km]) long by 100.0 feet (30.5 meters [m]) wide, with a total area of approximately 1,284.8 acres. However, the Project Area consists of only the segments of the proposed ROW on the property owned by the City of Midland. The original route across the City of Midland property measured approximately 2.4 miles (3.7 km) long by 100.0 feet (30.5 m) wide, with a total area of approximately 29.1 acres. A subsequent reroute of this alignment shifted the proposed ROW to the northwest and northeast, resulting in a route across the City of Midland property that measured approximately 5.2 miles (8.4 km) long by 100.0 feet (30.5 m) wide, with a new total area of approximately 63.0 acres.

The cultural resources survey of the original alignment of the Project Area resulted in entirely negative findings. No cultural materials were observed on the surface of the original alignment of the Project Area or within any of the 40 excavated shovel tests.

The cultural resources investigations conducted along the rerouted alignment of the Project Area resulted in the formal documentation of Hughes' Site 1, which he noted in 1985 during an earlier assessment of the property containing the rerouted alignment of the Project

Area. This site, 41MT78, is technically located just outside of the limits of the current Project Area and will not be impacted. However, Horizon elected to formally document it due to its relative proximity to the Project Area. It consists of sparse and diffuse scatter of burned caliche pebbles within a plowed agricultural field. No other cultural materials aside from burned caliche were observed at this location. Hughes' Site 2 and Site 3 are located a considerable distance away from the current Project Area. As such, they were not reassessed or formally documented.

Based on the negative survey results along the original and rerouted alignments of the Project Area, it is Horizon's opinion that the construction of the proposed Loving to Midland pipeline ROW across property owned by the City of Midland will have no adverse effect on significant cultural resources designated as or considered eligible for designation as SALs. Horizon therefore recommends that Enterprise be allowed to proceed with the construction of the proposed pipeline relative to the jurisdiction of the ACT.

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ACKNOWLEDGEMENTS

Horizon Environmental Services, Inc. (Horizon) conducted the intensive cultural resources survey of the portion of Enterprise Crude Pipeline LLC's (Enterprise) proposed Loving to Midland pipeline right-of-way (ROW) located on public land reported herein in compliance with the Antiquities Code of Texas (ACT). Russell K. Brownlow served as the Principal Investigator for the project and lead author on this report. Jacob Lyons, Stephanie Mueller, Jared Wiersema, and Benjamin Johnson conducted the field investigations, while Jacob Lyons and Jared Wiersema were responsible for drafting the figures.

1.0 INTRODUCTION

This document reports the results of an intensive cultural resources survey of the portions of Enterprise Crude Pipeline LLC's (Enterprise) proposed Loving to Midland pipeline right-of-way (ROW) that are located on public land in southwestern Martin County and north-central Midland County, Texas (Project Area; Figures 1-1 through 1-3). The development of the pipeline ROW will be privately funded and will not require any federal permitting or coordination. However, portions of the proposed ROW cross land owned by the City of Midland. Because this is public property, the portions of the proposed ROW on the City of Midland property fall under the regulations of the Antiquities Code of Texas (ACT). At the request of Whitenton Group, Inc. (Whitenton), Horizon conducted the cultural resources survey of the Project Area on behalf of Enterprise in compliance with the ACT. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites considered eligible for formal designation as State Antiquities Landmarks (SALs). The cultural resources investigations were conducted under Texas Antiquities Committee (TAC) permit number 8095.

Overall, the entire proposed ROW measures 106.0 miles (170.6 kilometers [km]) long by 100.0 feet (30.5 meters [m]) wide, with a total area of approximately 1,284.8 acres (see Figure 1-1). However, the Project Area consists of only the segments of the proposed ROW on the property owned by the City of Midland (see Figures 1-2 and 1-3). The original route across the City of Midland property measured approximately 2.4 miles (3.7 km) long by 100.0 feet (30.5 m) wide, with a total area of approximately 29.1 acres. A subsequent reroute of this alignment shifted the proposed ROW to the northwest and northeast, resulting in a route across the City of Midland property that measured approximately 5.2 miles (8.4 km) long by 100.0 feet (30.5 m) wide, with a new total area of approximately 63.0 acres.

The cultural resources investigations consisted of an archival review, an intensive cultural resources survey of the Project Area, and the production of a report suitable for review by the State Historic Preservation Officer (SHPO) in accordance with the Texas Historical Commission's (THC) *Rules of Practice and Procedure*, Chapter 26, Section 27, and the Council of Texas Archeologists (CTA) *Guidelines for Cultural Resources Management Reports*. Russell K. Brownlow (Horizon's cultural resources director) served as the project's Principal Investigator, while Jacob Lyons, Jared Wiersema, Stephanie Mueller, and Benjamin Johnson (Horizon archeological technicians) conducted the field investigations.

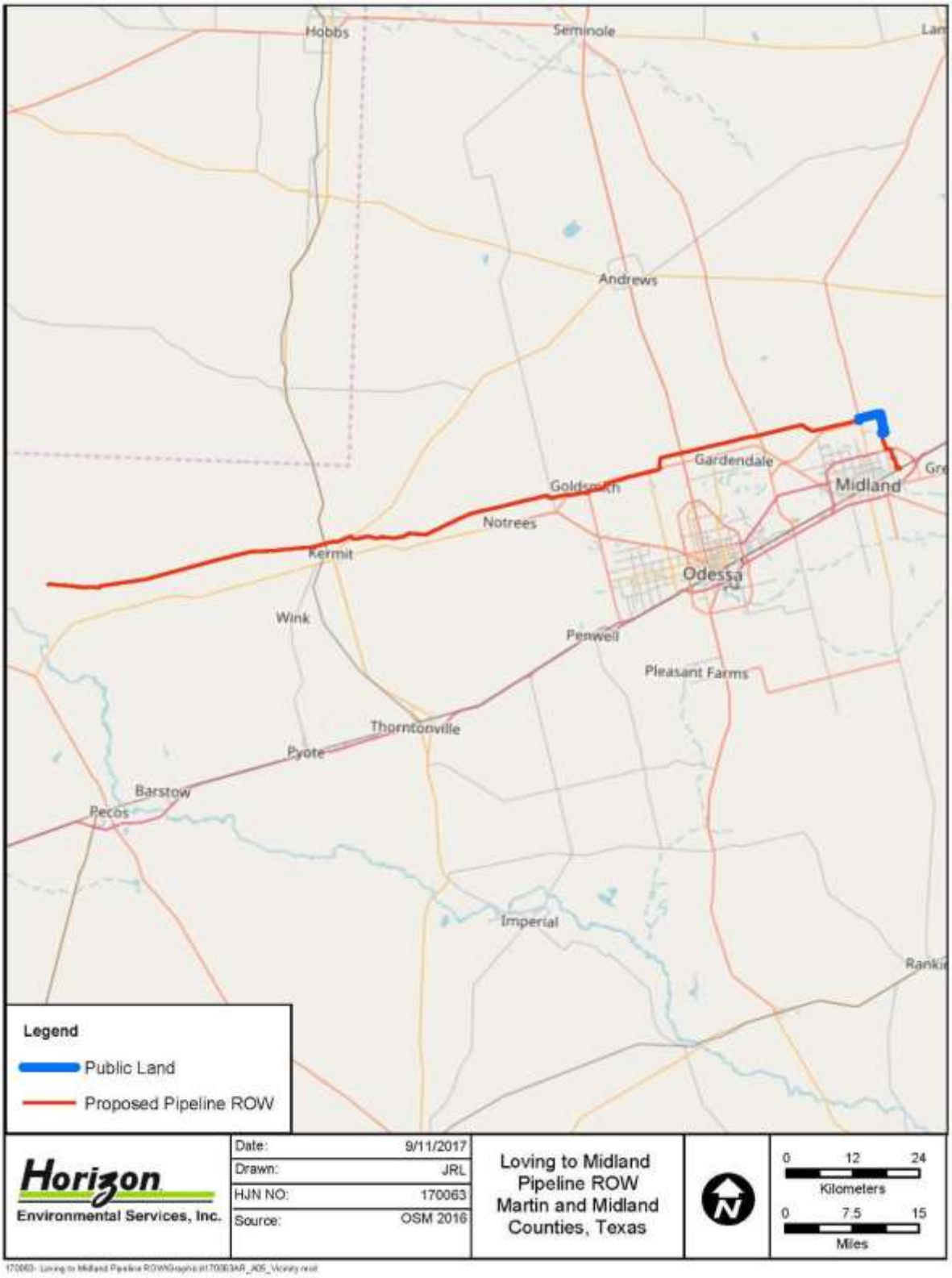

Figure 1-1. General vicinity map of the Loving to Midland Pipeline ROW

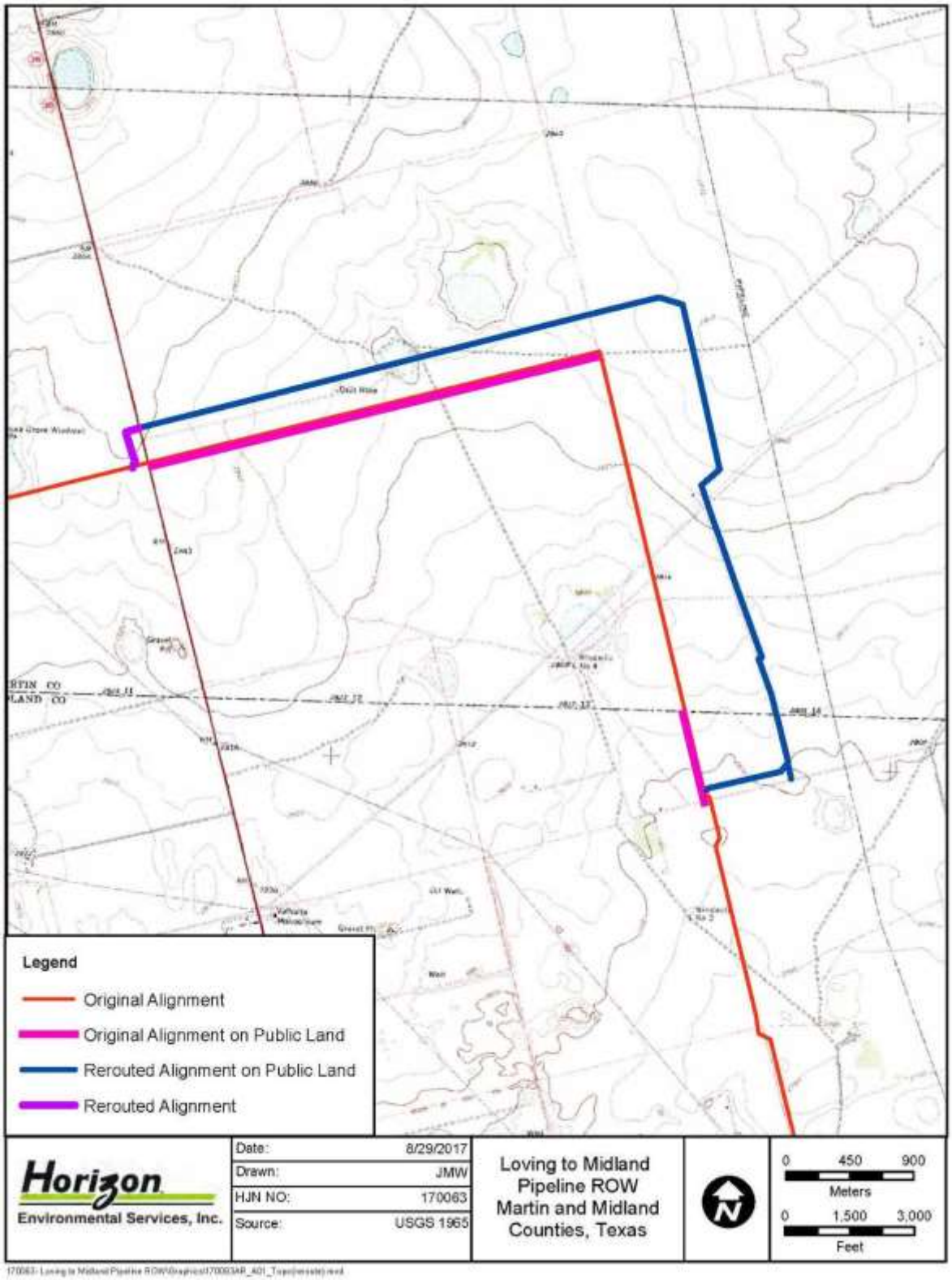

Figure 1-2. Topographic map with the location of the Project Area

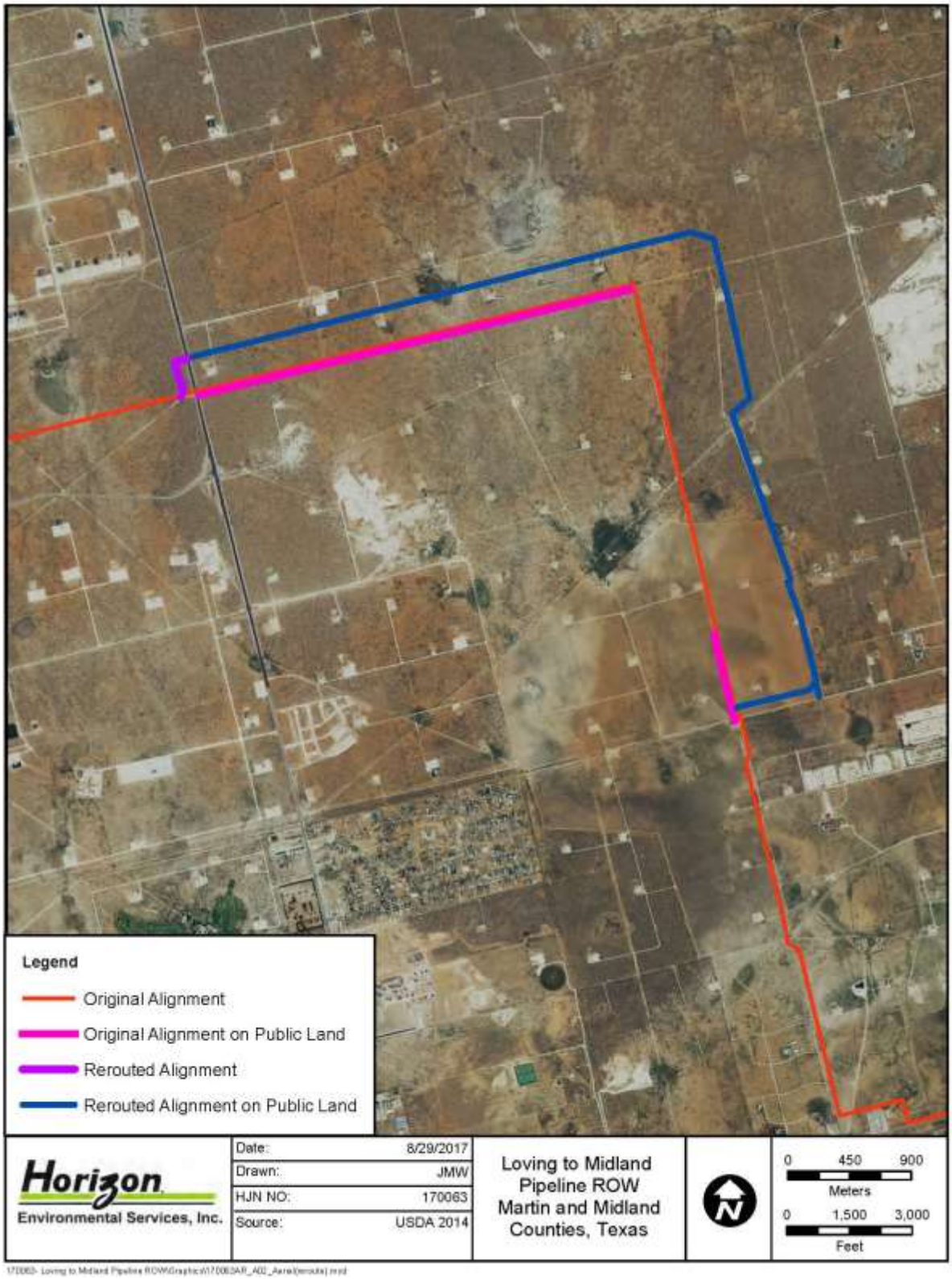

Figure 1-3. Aerial photograph with the location of the Project Area

Horizon conducted the survey of the original alignment of the Project Area on 10 July 2017 and the survey of the rerouted alignment on 30 and 31 August 2017. This entailed intensive surface inspection and subsurface shovel testing across the Project Area. The Texas State Minimum Archeological Survey Standards (TSMASS) require a minimum of 16 shovel tests per mile for linear projects measuring up to 100.0 feet (30.5 m) wide. As the original alignment of the Project Area totaled 2.4 miles (3.7 km) in length, a minimum of 37 shovel tests were necessary in order to comply with the TSMASS. Horizon exceeded the TSMASS by excavating a total of 40 shovel tests along the original alignment of the Project Area. The rerouted alignment of the Project Area totaled 5.2 miles (8.4 km) in length and required a minimum of 84 shovel tests to meet the TSMASS. Horizon fell just short of the TSMASS by excavating a total of 81 shovel tests along the rerouted alignment of the Project Area.

The cultural resources survey of the original alignment of the Project Area resulted in entirely negative findings. No cultural materials were observed on the surface of the original alignment of the Project Area or within any of the 40 excavated shovel tests.

The cultural resources investigations conducted along the rerouted alignment of the Project Area resulted in the formal documentation of Hughes' Site 1, which he noted in 1985 during an earlier assessment of the property containing the rerouted alignment of the Project Area. This site, 41MT78, is technically located just outside of the limits of the current Project Area and will not be impacted. However, Horizon elected to formally document it due to its relative proximity to the Project Area. It consists of sparse and diffuse scatter of burned caliche pebbles within a plowed agricultural field. No other cultural materials aside from burned caliche were observed at this location. Hughes' Site 2 and Site 3 are located a considerable distance away from the current Project Area. As such, they were not reassessed or formally documented.

Based on the negative survey results along the original and rerouted alignments of the Project Area, it is Horizon's opinion that the construction of the proposed Loving to Midland pipeline ROW across property owned by the City of Midland will have no adverse effect on significant cultural resources designated as or considered eligible for designation as SALs. Horizon therefore recommends that Enterprise be allowed to proceed with the construction of the proposed pipeline relative to the jurisdiction of the ACT. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during construction, use, or ongoing maintenance of the proposed pipeline ROW, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the THC should be notified of the discovery.

2.0 ENVIRONMENTAL SETTING

2.1 GENERAL PROJECT AREA DESCRIPTION

Enterprise's proposed Loving to Midland pipeline ROW is located in Loving, Winkler, Ector, Anderson, Midland, and Martin counties, Texas. It initiates at an existing facility in Loving County and extends northeasterly to a storage facility near Midland, Texas. It can be found on the US Geological Survey (USGS) 7.5-minute Lindley Ranch, Rudd Draw, Cheyenne Draw SW, Cheyenne Draw SE, Wink North, Kermit, Vesrue, Notrees NW, Notrees, Turnbaugh Corner, Goldsmith, North Cowden, Gardendale, Hackberry Lake, Northwest Midland, and Northeast Midland, Texas topographic quadrangle maps (see Figure 1-1).

Overall, the entire proposed ROW measures 106.0 miles (170.6 km) long by 100.0 feet (30.5 m) wide, with a total area of approximately 1,284.8 acres (see Figure 1-1). However, the Project Area consists of only the segments of the proposed ROW on the property owned by the City of Midland (see Figures 1-2 and 1-3). The original route across the City of Midland property measured approximately 2.4 miles (3.7 km) long by 100.0 feet (30.5 m) wide, with a total area of approximately 29.1 acres. A subsequent reroute of this alignment shifted the proposed ROW to the northwest and northeast, resulting in a route across the City of Midland property that measured approximately 5.2 miles (8.4 km) long by 100.0 feet (30.5 m) wide, with a new total area of approximately 63.0 acres. These 2 alignments of the proposed ROW are both located just north of Midland in southwestern Martin County and north-central Midland County, Texas. Representative images of the Project Area at the time of the cultural resources survey are presented in Figures 2-1 through 2-4.

2.2 PHYSIOGRAPHY AND HYDROLOGY

The Project Area is located just north of Midland on the Midland and Martin county line in far West Texas. It is situated within an area of gently undulating desert hills scattered with playa basins (see Figure 1-1). Elevations within the Project Area range from 2790.0 to 2850.0 feet (850.4 to 868.7 m) above mean sea level. Hydrologically, Midland and Martin counties drain into 4 watersheds: Mustang Draw, Johnson Draw, Sulphur Springs Draw, and the Middle Concho River (EPA 2017). No obvious drainages or tributaries are located near the current Project Area, although several large playa basins are in its vicinity.

Figure 2-1. View of northern extent of the original Project Area alignment, facing east

Figure 2-2. View of southern extent of the original Project Area alignment, facing north

Figure 2-3. View of northern extent of the rerouted Project Area alignment, facing north

Figure 2-4. View of southern extent of the rerouted Project Area alignment, facing south

2.3 CLIMATE

The climate of Midland and Martin counties is semiarid. Winters are mild, with an average temperature of 46.2 degrees Fahrenheit (°F). The summer months are hot, with an average temperature of 94.5°F. The average annual total precipitation is about 14.0 inches (35.6 centimeters [cm]), with roughly 74% of it falling between May and October (NRCS 1973).

2.4 FLORA AND FAUNA

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

2.5 SOILS

A total of 9 soil types are mapped within the boundaries of the Project Area. These soils are presented in Table 2-1 (NRCS 1973 and 1974) and in Figure 2-5.

Table 2-1. Soils mapped within the Project Area

Soil Name	Soil Type	Soil Depth (inches)	Setting
Amarillo fine sandy loam, 0 to 1% slopes (AfA)	Fine sandy loam	0 to 11: Fine sandy loam 11 to 99: Sandy clay loam	Nearly level to gently sloping plains and playa slopes
Kimbrough-Slaughter complex, 0 to 2% slopes (KsA)	Kimbrough Loam Slaughter Loam	Kimbrough 0 to 8: Gravelly loam 8 to 80: Caliche Slaughter 0 to 7: Loam 7 to 17: Clay 17 to 39: Cemented material 39 to 80: Very gravelly loam	Kimbrough Sloping plains, narrow ridges, and side slopes along draws Slaughter Nearly level to very gently sloping plains
Kimbrough and Upton soils, nearly level (KuA)	Kimbrough Loam Upton Loam	Kimbrough 0 to 8: Gravelly loam 8 to 80: Calcium carbonate soil Upton 0 to 13: Gravelly loam 13 to 80: Caliche	Kimbrough Sloping plains, narrow ridges, and side slopes along draws Upton Sloping footslopes or fans of ridges on dissected plateaus
Lipan-Randall complex (Lr)	Lipan Clay Randall Clay	Lipan 0 to 72: Clay Randall 0 to 80: Clay	Lipan Alluvial plains and slightly depressed playas Randall Floors of playa basins
Mansker loam, 0 to 2% slopes (MaB)	Loam	0 to 8: Clay loam 8 to 16: Loam 16 to 80: Clay loam	Level to moderately sloping plains
Midessa fine sandy loam, 0 to 1% slopes (MdA)	Fine sandy loam	0 to 10: Fine sandy loam 10 to 80: Sandy clay loam	Sloping plains, playa slopes, and draws
Slaughter loam, 0 to 1% slopes (SlA)	Loam	7 to 17: Clay 17 to 39: Cemented material 39 to 80: Very gravelly loam	Nearly level to very gently sloping plains
Stegall clay loam, 0 to 1% slopes (SwA)	Clay loam	0 to 7: Loam 7 to 28: Clay loam 28 to 38: Caliche 38 to 80: Clay loam	Sloping plains
Upton loam, 0 to 2% slopes (UpA)	Gravelly loam	0 to 13: Gravelly loam 13 to 80: Caliche	Sloping footslopes or fans of ridges on dissected plateaus

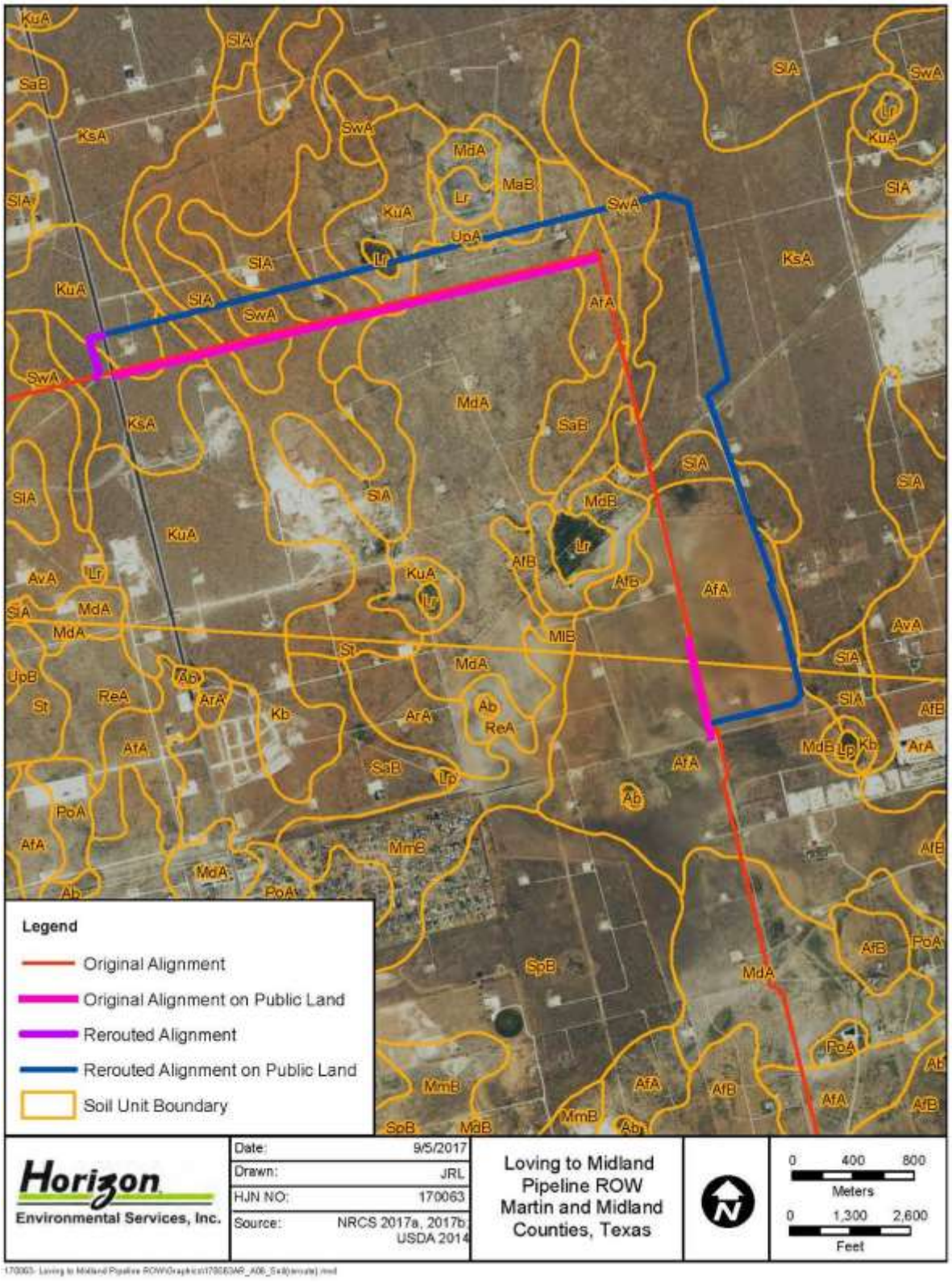

Figure 2-5. Soils mapped within the Project Area

3.0 CULTURAL BACKGROUND

The general temporal framework for most prehistoric archeological sites in Texas is based on the seriation of projectile point types originally established by Suhm et al. (1954) and later revised by Suhm and Jelks (1962), Prewitt (1981, 1985), and Turner and Hester (1999). This temporal framework, consisting of a tri-partite system based on technological changes in diagnostic artifacts that occurred as a result of indigenous adaptation to changing environments and subsistence strategies, is broken down into 3 main periods: PaleoIndian (pre-8,500 B.P.), Archaic (8500 to 1250 B.P.), and Late Prehistoric (1250 to 250 B.P.). The Archaic period is further subdivided into Early Archaic (8500 to 6000 B.P.), Middle Archaic (6000 to 3500 B.P.), and Late Archaic (3500 to 1250 B.P.).

3.1 PALEOINDIAN (PRE-8500 B.P.)

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

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

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

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

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

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

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

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

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

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

4.0 ARCHIVAL RESEARCH

4.1 DATABASE AND MAP REVIEW

Archival research conducted via the THC's *Texas Archeological Sites Atlas* (Atlas) online database indicated the presence of 1 previously recorded archeological site within a 1.0-mile (1.6-km) radius of the Project Area (THC 2017), while a review of the National Park Service's (NPS) National Register of Historic Places (NRHP) Google Earth map layer indicated the presence of no historic properties listed on the NRHP within the review perimeter (NPS 2017). The previously recorded archeological site and its distance from the Project Area are summarized in Table 4-1 below, while its location relative to the Project Area is presented in Figure 4-1. Based on the locations of mapped cultural resources on the Atlas database, no documented cultural resources, including any listed on the NRHP, are located within or immediately adjacent to the Project Area.

Table 4-1. Summary of Documented Cultural Resources within 1.0 Mile of Project Area

Site Trinomial, Cemetery, or Historic Property	Site Type	NRHP Eligibility Status	Distance/Direction from Project Area	Potential to be Impacted by Project?
41MD46	No site file available on the Atlas database	Unknown	750.0 feet southwest	No

According to the Atlas database, the portions of the proposed ROW on public land extend along the edges and through a previous block acreage survey area that was assessed in 1985 for a then-proposed airport project that required permitting with the Federal Aviation Administration (FAA). As no archeological sites are mapped within this block on the Atlas database, it was assumed that the prior survey produced negative results. However, with the assistance of staff at the THC, Horizon was able to obtain a copy of the letter report produced in 1985 for these investigations (Hughes 1985). This letter report indicated that 3 sparse prehistoric campsites (Sites 1, 2, and 3) were observed on the edges of 3 playa basins on the property (see Figure 4-1). However, it does not appear that any of them were ever formally recorded and assigned trinomials.

Sensitive Site Location Data Omitted

Figure 4-1. Locations of cultural resources in proximity to the Project Area

Site 1 is described as being located on a slope to the west and southwest of a very small playa basin, across a north-south road in a cotton field (see Figure 4-1). It was evidenced by a light scatter of burned caliche and 1 Edwards chert flake within an area of cultivated blowsand. This scatter measured approximately 164.0 feet (50.0 m) in diameter. Hughes (1985) inferred the scatter to represent a brief campsite occupied by a small group of natives.

Site 2 is described as being located on the southeastern slope of the larger of 2 paired playa basins (see Figure 4-1). The archeologist noted a few pieces of burned caliche and 1 Edwards chert flake within an area covering roughly 32.8 feet (10.0 m) in diameter. Hughes (1985) inferred the scatter to represent a very brief camp by a small group of natives.

Site 3 is described as being located on the northwestern edge of the smaller of the 2 paired playa basins, north of an east-west road that crosses the northern portion of the basin (see Figure 4-1). Hughes (1985) observed occasional pieces of burned caliche within heavily disturbed contexts over an area covering approximately 98.4 feet (30.0 m) in diameter. He also noted a palm-sized biface of Edwards chert and a crudely flaked quartzite uniface. This site was also inferred to be a limited-use campsite.

All 3 of these sites were noted as being heavily disturbed by plowing and/or brush-grubbing. Due to their sparse and heavily disturbed nature, Hughes (1985) indicated that none of the 3 sites appeared to merit further investigation or protective measures.

In addition to the 3 sites on the fringes of the playa basins on the property, Hughes (1985) concluded his letter by indicating that a prairie dog town located in the southern and western edges of the floor of the larger of the 2 paired playa basins contains burrows that may have penetrated a Pleistocene pond deposit based on the presence of whitish sediment (caliche?) within the spoil mounds (see Figure 4-1). Within one of these mounds, Hughes (1985) observed a "mineralized fragment of a cervical vertebra of a fossil bison." Hughes (1985) felt that the fossil fragment had at least some potential to represent a PaleoIndian bison kill site, and therefore recommended archeological monitoring efforts if any impacts to the playa basin floor were ever proposed. However, if the fossil fragment was excavated from the underlying caliche sediments of the area by the burrowing prairie dogs, it also has the potential to represent a paleontological specimen that predates human occupations within the region.

4.2 PROBABILITY ASSESSMENT

Prehistoric archeological sites are commonly found in upland areas and on alluvial terraces near stream/river channels or drainages. Additionally, in this part of the state, they are often found in proximity to playa lake beds and dune blowouts. Based on the location of the Project Area in proximity to several playa basins, in conjunction with the presence of 3 unrecorded prehistoric sites noted by Hughes (1985) on the property, it was Horizon's opinion prior to the field efforts that there existed a high potential for prehistoric cultural deposits within the Project Area. In regard to historic-era resources, the lack of visible structures in immediate proximity to the Project Area on the relevant topographic quadrangle suggested a decreased potential for historic-era standing structures or associated cultural deposits within the boundaries of the Project Area.

5.0 SURVEY METHODOLOGY

A 3-person Horizon archeological field crew completed the intensive survey of the original alignment of the Project Area on 10 July 2017 and the survey of the rerouted alignment on 30 and 31 August 2017. Survey efforts entailed surface inspection and subsurface shovel testing across the Project Area. The TSMASS require a minimum 16 shovel tests per mile for linear projects measuring up to 100.0 feet (30.5 m) wide. As the original alignment of the Project Area totaled 2.4 miles (3.7 km) in length, a minimum of 37 shovel tests were necessary within the Project Area in order to comply with the TSMASS. Horizon exceeded the TSMASS by excavating a total of 40 shovel tests within the original alignment of the Project Area. The rerouted alignment of the Project Area totaled 5.2 miles (8.4 km) in length and required a minimum of 84 shovel tests to meet the TSMASS. Horizon fell just short of the TSMASS by excavating a total of 81 shovel tests along the rerouted alignment of the Project Area. All excavated matrices were screened through 0.25-inch (6.3-millimeter [mm]) hardware mesh or were trowel-sorted if the dense clay soils prohibited successful screening.

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

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

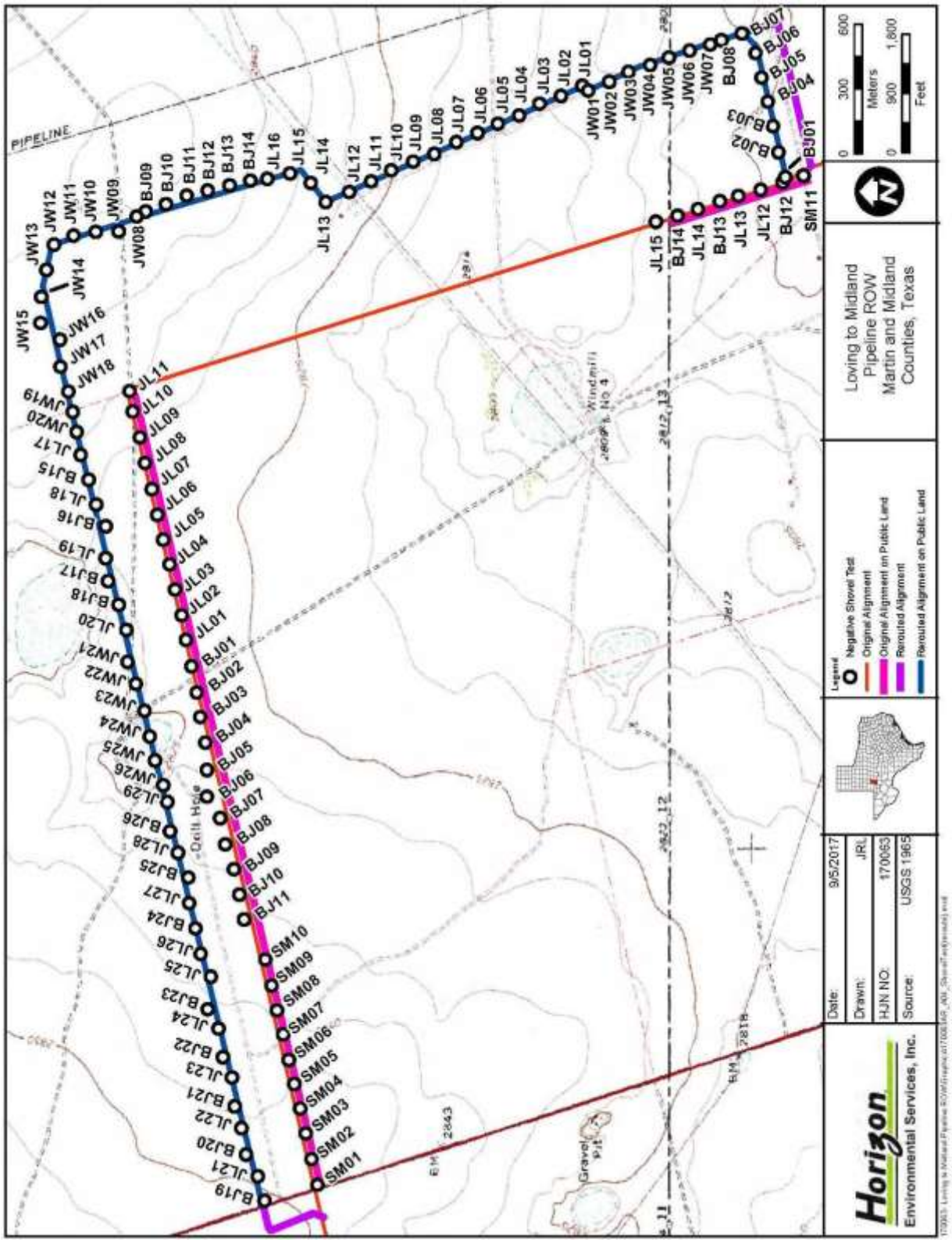

Figure 5-1. Shovel test locations within the Project Area

6.0 RESULTS

The cultural resources investigations along the original alignment of the Project Area resulted in entirely negative findings. No cultural materials were observed on this surface of this alignment or within any of the 40 excavated shovel tests.

The cultural resources investigations conducted along the rerouted alignment of the Project Area resulted in the formal documentation of Hughes' Site 1, which he noted in 1985 during an earlier assessment of the property containing the rerouted alignment of the Project Area. This site, 41MT78, is technically located just outside of the limits of the current Project Area and will not be impacted. However, Horizon elected to formally document it due to its relative proximity to the Project Area. It is detailed below.

Based on his descriptions, the inferred locations of Hughes' (1985) Site 2 and Site 3, as well as the prairie dog town where he observed a fragment of fossilized bison vertebra, are all located between 1300.0 and 1700.0 feet (396.2 and 518.2 m) northwest of the original alignment of the Project Area and between 400.0 and 800.0 feet (121.9 and 243.8 m) northwest of the rerouted alignment of the Project Area (see Figure 4-1). As they will not be impacted by the current undertaking, they were not reevaluated during the current investigations.

6.1 SITE 41MT78

General Description

Site 41MT78 coincides with Hughes' Site 1 that he assessed in 1985 during a survey of a then-proposed airport location for the City of Midland. In his letter report, Hughes describes Site 1 as follows:

> *Site 1 is located on a gentle slope to the west and southwest of the very small basin, in a cottonfield across a north-south road from the bottom of the depression. It is evidenced by a light scattering of burned caliche pebbles over an area some 50 meters in diameter. The field is in a large area of reddish blowsand, well exposed by cultivation. The only other evidence observed was a waste flake of Edwards chert. About all that can be inferred with regard to Site 1 is that it may represent a brief camp by a small group of prehistoric Indians* (Hughes 1985; see Figure 4-1).

Upon returning to the described location during the current survey efforts along the rerouted alignment of the Project Area, the Horizon field crew also observed a sparse scattering of burned caliche specimens within an active cotton field to the west of the small playa basin noted by Hughes (1985; Figures 6-1 and 6-2). This scatter is located entirely to the west of an existing north-south lease road and artificial berm, while the proposed reroute of the Project Area is located entirely to the east of this existing lease road and artificial berm. As it is located within an active cotton field, the vegetation across the site currently consists of short cotton plants (Figures 6-3 and 6-4). The surface visibility across the site range from 75% to 100%.

Since the observed caliche scatter is located outside of the limits of the current Project Area within an active cotton field, only surface inspection was conducted over the site. However, a total of 7 shovel tests were excavated within the boundaries current Project Area, just to the east of the site (see Figure 5-1). All of these produced negative results. Similarly, surface inspection within the current Project Area also produced negative results, indicating that the deposits of site 41MT78 do not extend in the current Project Area and will not be impacted by the undertaking.

Observed Cultural Materials

Observed cultural materials on site 41MT78 consist of a sparse scatter of burned caliche specimens within an active cotton field (Figure 6-5). Aside from burned caliche specimens, no other cultural materials of any sort (e.g. lithic tools, ceramics, bone, charcoal, etc.) were observed during the reevaluation of site 41MT78.

Observed Cultural Features

No evidence of any intact cultural features was observed on the modern, plowed ground surface of the site or within any of the 7 shovel tests excavated to the east of site 41MT78. However, the presence of scattered burned caliche at this location suggests that small hearths or other cooking features may have once been utilized on this site.

Horizontal and Vertical Extents of Cultural Materials

Hughes (1985) originally observed the scatter comprising his Site 1 over an area with a diameter of 164.0 feet (50.0 m). Based on the distribution of observed cultural materials on the modern, plowed ground surface, site 41MT78 measures approximately 246.1 feet (75.0 m) north-south by 246.1 feet (75.0 m) east-west. This area is located just west and outside of the rerouted alignment of the Project Area. No evidence of this site was noted within the limits of the rerouted alignment.

When originally observed in 1985, Hughes only conducted a surface inspection over his Site 1. Similarly, because the site's deposits were observed just outside of the current Project Area to the west, the Horizon field crew also only conducted surface inspections over the site. As such, its exact vertical extent remains undetermined. However, as it is situated within an upland desert setting lacking in alluvial sediments, it is assumed to have only surficial or near-surface cultural deposits within heavily disturbed plowzone contexts. No subsurface cultural materials were recovered from any of the 7 shovel tests excavated to the east of the site.

Sensitive Site Location Data Omitted

Figure 6-1. Location map of site 41MT78

Sensitive Site Location Data Omitted

Figure 6-2. Sketch map of site 41MT78

Figure 6-3. General view of site 41MT78, facing north

Figure 6-4. General view of site 41MT78, facing west from Project Area

Figure 6-5. View of burned caliche specimens on surface of site 41MT78

Site Summary

Site 41MT78 was originally documented by Hughes (1985) as Site 1 during a survey of a then-proposed airport property. At that time, Hughes noted that the site was a light scatter of burned caliche to the west and southwest of a small playa basin that may represent a brief prehistoric encampment. As the site was sparse and heavily disturbed by routine agricultural plowing, he indicated that it did not appear to merit further investigation or protective measures.

Horizon's current investigations also found the site to consist of a sparse scatter of burned caliche within a plowed agricultural field. While Hughes (1985) did note the presence of 1 chert flake on the site, the Horizon field crew observed no lithic debitage or any other type of cultural material aside from the burned caliche specimens.

Site 41MT78 is located just outside of the limits of the current Project Area to the west and will not be impacted by the current undertaking. Horizon only elected to formally document it due to its relative proximity to the Project Area as well as the fact that it was never formally documented when originally observed in 1985. As it is not located within the current Project Area, its assessed significance has no relevance in regard to the current undertaking. However, considering the lack of buried deposits, formal tools, temporally diagnostic material, and preserved floral and faunal remains, it is Horizon's opinion that site 41MT78 would not qualify for formal designation as a SAL if it ever needs to be considered in compliance with the ACT.

7.0 SUMMARY AND RECOMMENDATIONS

7.1 SUMMARY

During the months of July and August 2017, Horizon conducted an intensive cultural resources survey of the portions of Enterprise's proposed Loving to Midland pipeline ROW that are located on public land in southwestern Martin County and north-central Midland County, Texas. The development of the pipeline ROW will be privately funded and will not require any federal permitting or coordination. However, portions of the proposed ROW cross land owned by the City of Midland. Because this is public property, the portion of the proposed ROW on the City of Midland property falls under the regulations of the ACT. At the request of Whitenton, Horizon conducted the cultural resources survey of the Project Area on behalf of Enterprise in compliance with the ACT. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites considered eligible for formal designation as SALs. The cultural resources investigations were conducted under TAC permit number 8095.

Overall, the entire proposed ROW measures 106.0 miles (170.6 km) long by 100.0 feet (30.5 m) wide, with a total area of approximately 1,284.8 acres. However, the Project Area consists of only the segments of the proposed ROW on the property owned by the City of Midland. The original route across the City of Midland property measured approximately 2.4 miles (3.7 km) long by 100.0 feet (30.5 m) wide, with a total area of approximately 29.1 acres. A subsequent reroute of this alignment shifted the proposed ROW to the northwest and northeast, resulting in a route across the City of Midland property that measured approximately 5.2 miles (8.4 km) long by 100.0 feet (30.5 m) wide, with a new total area of approximately 63.0 acres.

Horizon conducted the survey of the original alignment of the Project Area on 10 July 2017 and the survey of the rerouted alignment on 30 and 31 August 2017. This entailed intensive surface inspection and subsurface shovel testing across the Project Area. The Texas State Minimum Archeological Survey Standards (TSMASS) require a minimum of 16 shovel tests per mile for linear projects measuring up to 100.0 feet (30.5 m) wide. As the original alignment of the Project Area totaled 2.4 miles (3.7 km) in length, a minimum of 37 shovel tests were necessary in order to comply with the TSMASS. Horizon exceeded the TSMASS by excavating a total of 40 shovel tests along the original alignment of the Project Area. The rerouted alignment of the Project Area totaled 5.2 miles (8.4 km) in length and required a

minimum of 84 shovel tests to meet the TSMASS. Horizon fell just short of the TSMASS by excavating a total of 81 shovel tests along the rerouted alignment of the Project Area.

The cultural resources survey of the original alignment of the Project Area resulted in entirely negative findings. No cultural materials were observed on the surface of the original alignment of the Project Area or within any of the 40 excavated shovel tests.

The cultural resources investigations conducted along the rerouted alignment of the Project Area resulted in the formal documentation of Hughes' Site 1, which he noted in 1985 during an earlier assessment of the property containing the rerouted alignment of the Project Area. This site, 41MT78, is technically located just outside of the limits of the current Project Area and will not be impacted. However, Horizon elected to formally document it due to its relative proximity to the Project Area. It consists of sparse and diffuse scatter of burned caliche pebbles within a plowed agricultural field. No other cultural materials aside from burned caliche were observed at this location. Considering the lack of buried deposits, formal tools, temporally diagnostic material, and preserved floral and faunal remains, it is Horizon's opinion that site 41MT78 would not qualify for formal designation as a SAL if it ever needs to be considered in compliance with the ACT.

Based on his descriptions, the inferred locations of Hughes' (1985) Site 2 and Site 3, as well as the prairie dog town where he observed a fragment of fossilized bison vertebra, are all located between 1300.0 and 1700.0 feet (396.2 and 518.2 m) northwest of the original alignment of the Project Area and between 400.0 and 800.0 feet (121.9 and 243.8 m) northwest of the rerouted alignment of the Project Area. As they will not be impacted by the current undertaking, they were not reevaluated during the current investigations.

7.2 RECOMMENDATIONS

Based on the negative survey results along the original and rerouted alignments of the Project Area, it is Horizon's opinion that the construction of the proposed Loving to Midland pipeline ROW across property owned by the City of Midland will have no adverse effect on significant cultural resources designated as or considered eligible for designation as SALs. Horizon therefore recommends that Enterprise be allowed to proceed with the construction of the proposed pipeline relative to the jurisdiction of the ACT. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during construction, use, or ongoing maintenance of the proposed pipeline ROW, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the THC should be notified of the discovery.

8.0 REFERENCES CITED

Blair, W.F.

1950 The Biotic Provinces of Texas. *Texas Journal of Science* 2(1):93-117.

(EPA) US Environmental Protection Agency

2017 *Surf Your Watershed: Midland County, Texas*. <https://cfpub.epa.gov/surf/county.cfm?fips_code=48329>. Accessed 12 July 2017.

Griffith, G., S. Bryce, J. Omernik, and A. Rogers

2007 *Ecoregions of Texas*. Prepared for the Texas Commission on Environmental Quality. <ftp://ftp.epa.gov/wed/ecoregions/tx/TXeco_Jan08_v8_Cmprsd.pdf>. Accessed 23 June 2017.

Hughes, J.T.

1985 An Archeological Survey of the Proposed New Airport at Midland, Texas. Letter report submitted to Cress and Associates, Inc., Lexington, Kentucky. Resource Conservation Library, Texas Historical Commission.

(NPS) National Park Service

2017 *National Park Service National Register of Historic Places Google Earth Map Layer – South Region*. <http://nrhp.focus.nps.gov/natreg/docs/Google_Earth_Layers.html>. Accessed 29 August 2017.

(NRCS) US Department of Agriculture, Natural Resources Conservation Service

1973 *Soil Survey of Midland County, Texas*. <https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/texas/TX329/0/Midland.pdf>. Accessed 31 August 2017.

1974 *Soil Survey of Martin County, Texas*. <https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/texas/martinTX1974/martinTX1974.pdf>. Accessed 31 August 2017.

2017a Soil Survey Geographic (SSURGO) Database for Martin County, Texas.

2017b Soil Survey Geographic (SSURGO) Database for Midland County, Texas.

Prewitt, E.R.

1981 Cultural Chronology in Central Texas. *Bulletin of the Texas Archeological Society* No. 52, pp. 65-89.

1985 From Circleville to Toyah: Comments on Central Texas Chronology. *Bulletin of the Texas Archeological Society* 54 (for 1983), pp. 201-238.

Suhm, D.A. and E. B. Jelks

1962 *Handbook of Texas Archeology: Type Descriptions*. The Texas Archeological Society Special Publication No. 1 and The Texas Memorial Museum Bulletin No. 4. Austin.

Suhm, D.A., A.D. Krieger, and E. B. Jelks

1954 *An Introductory Handbook of Texas Archeology*. Bulletin of the Texas Archeological Society No. 25, pp. 1-562.

(THC) Texas Historical Commission

2017 *Texas Archeological Sites Atlas Restricted Database*. <http://atlas.thc.state.tx.us/>. Accessed 29 August 2017.

Turner, E.S., and T.R. Hester

1999 *A Field Guide to Stone Artifacts of Texas Indians*. Third Revised Edition. Gulf Publishing Company, Houston.

(USDA) US Department of Agriculture

2014 Digital aerial photography, Martin and Midland Counties, Texas. US Department of Agriculture, National Agriculture Imagery Program, Farm Service Agency, Aerial Photography Field Office.

(USGS) US Geological Survey

1965 7.5-minute series topographic map, Northeast Midland, Texas, quadrangle.

APPENDIX A:

Shovel Test Data

Table A-1. Shovel Test Summary Data for Original Project Area Alignment

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
BJ1	775910	3556015	0-40	Pale reddish-brown silt	None
			40+	Pale reddish-brown silt	None
BJ2	775808	3555989	0-70	Pale reddish-brown silt	None
			70+	pale red-brown silt/caliche	None
BJ3	775712	3555970	0-50	Pale reddish-brown silt	None
			50+	Pale reddish-brown silt over limestone bedrock	None
BJ4	775611	3555943	0-60	Pale reddish-brown silt	None
			60+	Pale reddish-brown silt over limestone bedrock	None
BJ5	775503	3555933	0-45	Pale reddish-brown silt	None
			45+	Gravels with some pale reddish-brown silt	None
BJ6	775399	3555930	0+	Disturbed	None
BJ7	775315	3555868	0-55	Pale reddish-brown silt	None
			55+	Reddish-brown silt over limestone bedrock	None
BJ8	775213	3555842	0-80+	Pale reddish-brown silt	None
BJ9	775116	3555799	0-45	Pale reddish-brown silt with limestone gravels	None
			45+	Limestone bedrock	None
BJ10	775017	3555770	0-50	Medium brown silt	None
			50+	Very compact medium brown silt	None
BJ11	774919	3555745	0-35	Medium brown silt	None
			35+	Limestone bedrock	None
BJ12	777890	3553337	0-40	Medium reddish-brown sand	None
			40-80+	Dark brown sandy clay	None
BJ13	777806	3553625	0-35	Medium brown sand	None
			35+	Dark brown sandy clay	None
BJ14	777745	3553818	0-50	Medium brown sand	None
			50+	Dark brown sandy clay	None
JL1	776013	3556044	0-70	Reddish-brown sandy loam with CaCO3 inclusions	None
			70-80+	Light reddish-brown compact sandy loam with CaCO3 inclusions	None
JL2	776110	3556067	0-50	Reddish-brown sandy loam with CaCO3 inclusions	None
			50-60+	Light reddish-brown compact sandy loam with CaCO3 inclusions	
JL3	776210	3556100	0-30+	Mottled dark reddish-brown, reddish-	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
				yellow, and pale brown very compact sandy loam	
JL4	776309	3556129	0-30+	Dark reddish-brown very compact sandy loam with CaCO3 inclusions	None
JL5	776404	3556161	0-45	Strong brown sandy loam with CaCO3 inclusions	None
			45-55+	Dark reddish-brown compact sandy loam with CaCO3 inclusions	None
JL6	776501	3556190	0-50	Strong brown sandy loam with CaCO3 inclusions	None
			50-60+	Dark reddish-brown compact sandy loam with CaCO3 inclusions	None
JL7	776602	3556219	0-40	Strong brown sandy loam with CaCO3 inclusions	None
			40-50+	Dark reddish-brown compact sandy loam with CaCO3 inclusions	None
JL8	776704	3556251	0-40	Strong brown sandy loam with CaCO3 inclusions	None
			40-50+	Dark reddish-brown compact sandy loam with CaCO3 inclusions	None
JL9	776805	3556280	0-30+	Strong brown very compact sandy loam	None
JL10	776906	3556315	0-30+	Reddish-brown very compact sandy loam	None
JL11	776986	3556332	0-30+	Reddish-brown very compact sandy loam	None
JL12	777857	3553437	0-35	Dark reddish-brown loamy sand	None
			35-45+	Very dark brown sandy clay loam with CaCO3 inclusions	None
JL13	777831	3553539	0-50	Dark reddish-brown loamy sand	None
			50-60+	Very dusky red dense sandy clay	None
JL14	777773	3553724	0-35	Dark reddish-brown loamy sand	None
			35-75	Very dark brown sandy loam with CaCO3 inclusions	None
			75-85+	Very dusky red dense sandy clay	None
JL15	777718	3553917	0-50	Dark reddish-brown loamy sand	None
			50-60+	Very dusky red dense sandy clay	None
SM1	773885	3555378	0-30+	Strong brown loam with 70% limestone gravels	None
SM2	773985	3555408	0-25	Strong brown loam with 40% limestone gravels	None
			25-30+	Limestone bedrock	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
SM3	774085	3555438	0-25+	Reddish-brown loam with 70% limestone gravels	None
SM4	774183	3555466	0-10+	Strong brown loam over limestone bedrock	None
SM5	774278	3555496	0-10+	Light brown loam over limestone bedrock	None
SM6	774373	3555525	0-15+	Strong brown compact loam with limestone gravels	None
SM7	774473	3555554	0-60+	Strong brown sand with limestone gravels	None
SM8	774567	3555584	0-55+	Strong brown sand with limestone gravels	None
SM9	774663	3555612	0-10+	Strong brown loam over limestone bedrock	None
SM10	774765	3555643	0-75	Strong brown loam with limestone gravels	None
			75+	Caliche	None
SM11	777918	3553240	0-40	Light brown loam	None
			40-80+	Brown sandy loam with caliche	None

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

cmbs = Centimeters below surface

ST = Shovel test

UTM = Universal Transverse Mercator

Table A-2. Shovel Test Summary Data for Rerouted Project Area Alignment

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
BJ1	777909	3553325	0-10	Pale reddish brown silt	None
			10-45+	Pale reddish brown silty clay	None
BJ2	778006	3553358	0-25	Pale reddish brown silt	None
			25-40+	Pale reddish brown silty clay	None
BJ3	778109	3553386	0-30	Pale reddish brown sand	None
			30-40+	Dark reddish brown sandy clay	None
BJ4	778206	3553412	0-50	Pale brown sand	None
			50-60+	Dark reddish brown sandy clay	None
BJ5	778299	3553445	0-40	Medium brown sand	None
			40-50+	Dark reddish brown sandy clay	None
BJ6	778395	3553474	0-50	Medium brown sand	None
			50-55+	Dark reddish brown sandy clay	None
BJ7	778471	3553541	0-40	Medium brown sand	None
			40-50+	Dark reddish brown sandy clay	None
BJ8	778441	3553635	0-40	Medium brown sand	None
			40-50+	Dark reddish brown sandy clay	None
BJ9	777693	3556276	0-20	Pale reddish brown gravelly silt	None
			20+	Very compact pale reddish brown gravelly silt	None
BJ10	777725	3556184	0-30	Pale reddish brown silt	None
			30+	Limestone bedrock	None
BJ11	777762	3556087	0-35	Pale reddish brown silt	None
			35-40+	Dark reddish brown clay	None
BJ12	777785	3555992	0-20	Pale reddish brown silt	None
			20+	Limestone bedrock	None
BJ13	777809	3555892	0-10	Pale reddish brown silt	None
			10+	Limestone bedrock	None
BJ14	777830	3555795	0-10	Pale reddish brown silt	None
			10+	Limestone bedrock	None
BJ15	776630	3556511	0-40	Pale reddish brown silt	None
			40+	Limestone bedrock	None
BJ16	776450	3556427	0-100+	Gravelly pale reddish brown silt	None
BJ17	776234	3556410	0-10	Pale reddish brown silt	None
			10+	Limestone bedrock	None
BJ18	776143	3556359	0-30	Pale reddish brown silt	None
			30+	Limestone bedrock	None
BJ19	773815	3555621	0-20	Medium reddish brown silt	None
			20+	Limestone bedrock	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
BJ20	773993	3555711	0-15	Pale reddish brown silt	None
			15+	Limestone bedrock	None
BJ21	774182	3555769	0-15	Pale reddish brown silt	None
			15+	Limestone bedrock	None
BJ22	774374	3555829	0-30	Medium reddish brown silt	None
			30+	Limestone bedrock	None
BJ23	774562	3555905	0-15	Pale reddish brown silt	None
			15+	Limestone bedrock	None
BJ24	774878	3555969	0-60	Dark brown silty clay	None
			60+	Limestone bedrock	None
BJ25	775078	3556008	0-45	Medium reddish brown silt	None
			45+	Dark reddish brown silty clay	None
BJ26	775259	3556097	0-40	Medium reddish brown silt	None
			40+	Limestone bedrock	None
JW1	778227	3554244	0-40	Reddish brown sand	None
			40-45	Compact reddish brown sandy loam	None
			45+	Limestone bedrock	None
JW2	778263	3554149	0-60	Reddish brown sandy loam	None
			60+	Dark reddish brown sandy clay loam	None
JW3	778305	3554060	0-60	Reddish brown sandy loam	None
			60+	Dark reddish brown sandy clay loam	None
JW4	778335	3553961	0-35	Reddish brown sandy loam	None
			35+	Decomposed limestone bedrock	None
JW5	778367	3553875	0-25	Reddish brown sandy loam	None
			25+	Decomposed limestone bedrock	None
JW6	778397	3553780	0-25	Reddish brown sandy loam	None
			25+	Decomposed limestone bedrock	None
JW7	778424	3553685	0-25	Reddish brown sandy loam	None
			25+	Decomposed limestone bedrock	None
JW8	777675	3556317	0-20	Grayish brown silty loam	None
			20+	Very compact grayish brown silty loam	None
JW9	777612	3556400	0-20	Grayish brown silty loam	None
			20+	Very compact grayish brown silty loam	None
JW10	777608	3556505	0-5	Reddish brown silty loam	None
			5+	Limestone bedrock	None
JW11	777591	3556607	0-15	Reddish brown silty loam	None
			15+	Limestone bedrock	None
JW12	777552	3556697	0-15	Reddish brown silty loam	None
			15+	Limestone bedrock	None
JW13	777451	3556729	0-30	Reddish brown silty loam	None
			30+	Rocky reddish brown silty loam	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JW14	777345	3556749	0-20	Reddish gray brown silty loam	None
			20+	Rocky reddish brown silty loam	None
JW15	777243	3556750	0-20	Reddish gray brown silty loam	None
			20+	Rocky reddish brown silty loam	None
JW16	777178	3556657	0-30	Reddish brown silty loam	None
			30-40	Very rocky reddish brown silty loam	None
			40+	Limestone bedrock	None
JW17	777073	3556654	0-30	Reddish brown silty loam	None
			30-40	Very rocky reddish brown silty loam	None
			40+	Limestone bedrock	None
JW18	776977	3556613	0-30	Pale reddish brown silty loam	None
			30-40	Pale reddish brown silty loam	None
			40+	Decomposed limestone bedrock	None
JW19	776895	3556592	0-30	Pale reddish brown silty loam	None
			30-40	Pale reddish brown silty loam	None
			40+	Decomposed limestone bedrock	None
JW20	776895	3556599	0-30	Reddish gray brown silty loam	None
			30+	Decomposed limestone bedrock	None
JW21	775919	3556312	0-60	Pale reddish brown silty loam	None
			60+	Very compact reddish brown silty clay	None
JW22	775834	3556270	0-60	Pale reddish brown silty loam	None
			60+	Very compact reddish brown silty clay	None
JW23	775728	3556227	0-10	Grayish brown silty loam	None
			10+	Limestone bedrock	None
JW24	775628	3556201	80	Grayish brown silty loam	None
			80-100+	Grayish brown silty clay loam	None
JW25	775534	3556175	0-60	Grayish brown silty loam	None
			60-80+	Dark brown silty clay	None
JW26	775438	3556134	0-10	Gravelly reddish brown silty loam	None
			10+	Limestone bedrock	None
JL1	778244	3554272	0-70	Very fine orange brown sandy loam	None
			70+	Dark reddish brown sandstone bedrock	None
JL2	778201	3554368	0-60	Very fine orange brown sandy loam	None
			60+	Dark reddish brown sandstone bedrock	None
JL3	778168	3554469	0-85	Very fine orange brown sandy loam	None
			85+	Dark reddish brown sandstone bedrock	None
JL4	778120	3554561	0-30	Very fine orange brown sandy loam	None
			30+	Limestone gravels	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JL5	778084	3554657	0-90	Very fine orange brown sandy loam	None
			90+	Compact mottled gray brown/orange reddish brown sandy loam with gravels	None
JL6	778045	3554752	0-40	Very fine orange brown sandy loam	None
			40+	Compact dark reddish brown sandy clay loam	None
JL7	778006	3554847	0-15	Compact mottled pale gray brown/orange brown sandy loam	None
			15-25+	Very compact dark reddish brown sandy clay loam	None
JL8	777957	3554949	0-15	Compact mottled pale gray brown/orange brown sandy loam	None
			15-25+	Very compact dark reddish brown sandy clay loam	None
JL9	777924	3555046	0-10	Compact dark reddish brown sandy loam with gravels	None
			10-20+	Limestone cobbles	None
JL10	777888	3555146	0-25	Compact dark reddish brown sandy loam with gravels	None
			25+	Limestone cobbles	None
JL11	777842	3555237	0-20	Compact dark reddish brown sandy loam with gravels	None
			20+	Limestone cobbles	None
JL12	777797	3555339	0-10+	Limestone cobbles	None
JL13	777753	3555444	0-10	Compact dark reddish brown sandy clay loam with gravels	None
			10+	Limestone bedrock	None
JL14	777829	3555516	0-30	Compact dark reddish brown sandy clay loam with gravels	None
			30+	Limestone bedrock	None
JL15	777863	3555614	0-15	Reddish brown sandy loam	None
			15+	Limestone bedrock	None
JL16	777838	3555717	0-10	Reddish brown sandy loam	None
			10-30	Compact dark reddish brown sandy clay loam	None
			30+	Limestone bedrock	None
JL17	776727	3556551	0-70	Pale reddish brown rocky silty loam	None
			70+	Limestone bedrock	None
JL18	776534	3556474	0-60	Pale brown gravelly silty loam	None
			60-70+	Compact pale reddish brown sandy clay loam with limestone gravels	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JL19	776325	3556425	0-80	Pale brown gravelly silty loam	None
			80+	Limestone bedrock	None
JL20	776045	3556321	0-30	Pale reddish brown gravelly silty loam	None
			30+	Limestone bedrock	None
JL21	773911	3555654	0-20	Rocky pale brown silty loam	None
			20+	Limestone bedrock	None
JL22	774097	3555736	0-15	Rocky pale brown silty loam	None
			15+	Limestone bedrock	None
JL23	774296	3555786	0-65	Gravelly pale reddish brown silty loam	None
			65-75+	Compact rocky dark reddish brown silty loam	None
JL24	774488	3555852	0-30	Compact rocky dark reddish brown silty loam	None
			30+	Limestone bedrock	None
JL25	774691	3555893	0-30	Compact rocky dark reddish brown silty loam	None
			30+	Limestone bedrock	None
JL26	774778	3555942	0-15	Compact reddish brown silty loam	None
			15+	Dark reddish brown sandstone bedrock	None
JL27	774978	3556002	0-25	Compact reddish brown silty loam	None
			25-40+	Very compact dark reddish brown silty clay loam	None
JL28	775173	3556060	0-20	Compact reddish brown silty loam	None
			20-30+	Very compact dark reddish brown silty clay loam	None
JL29	775372	3556114	0-30	Dark reddish brown silty loam	None
			30+	Limestone bedrock	None

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

cmbs = Centimeters below surface

ST = Shovel test

UTM = Universal Transverse Mercator