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Intensive Archaeological Survey for the City of Midland Water Pollution Control Plant Rehabilitation Project

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By: Melanie Johnson, Diana Garnett, and Kristin Morgan
Principal Investigator: Clayton Tinsley

Texas Antiquities Permit Number 8175

Final Draft

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Management Summary

The City of Midland is proposing to install a new 12-inch (in; 30.5-centimeter [cm]) water pipeline at the Water Pollution Control Plant (WPCP) located south of the intersection of IH 20 and Farm-to-Market (FM) 307 on the east side of the City of Midland in Midland County, Texas (Figure 1-1). This pipeline installation is part of the 2017 WPCP Rehabilitation Project. In advance of the proposed project, the City of Midland contracted HDR, Inc. (HDR) to conduct an intensive archaeological survey of the project area in order to be in compliance with Chapter 191 of the Texas Natural Resources Code, also known as the Antiquities Code of Texas (13 Texas Administrative Code [TAC] 26.12).

The Area of Potential Effects (APE) for this project is composed of the pipeline easement, which will be 0.22 mile (mi; 0.35 kilometer [km]) long and 50 feet (ft; 15 meters [m]) wide for a total of 1.33 acres (ac; 0.54 hectares [ha]). The depth of impacts will be 5–6 ft (1.5–1.8 m). Pipeline construction will include boring at waterway crossings.

The general purpose of the survey was to determine the presence/absence of archaeological resources within the APE as per the Antiquities Code of Texas (13 TAC 26.12) and to evaluate identified resources for their eligibility for inclusion in the National Register of Historic Places (NRHP) or as a designated State Antiquities Landmark (SAL). The archaeological survey was conducted under Texas Antiquities Permit Number 8175. The field effort was led by archaeology crew chief Melanie Johnson on October 17, 2017.

HDR conducted an intensive archaeological survey within the APE. A total of eight shovel tests were excavated during the survey. The soils encountered were typically deep with eroded limestone bedrock appearing on the west side of Midland Draw. All shovel tests were negative for cultural materials. No cultural materials were encountered during the investigation.

In accordance with 13 TAC 26.12, no further archaeological investigations are recommended, and construction may proceed. In the event that any archaeological deposits are encountered during construction, work should cease, and the Texas Historical Commission (THC) should be notified.

All records and materials generated by this project will be permanently curated at the Center for Archaeological Studies (CAS) at Texas State University in San Marcos, Texas.

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Abbreviations and Acronyms

APE	Area of Potential Effects
Atlas	Texas Archeological Sites Atlas
CAS	Center for Archaeological Research
CFR	Code of Federal Regulations
cm	centimeter(s)
cmbs	centimeters below surface
FM	Farm-to-Market
ft	foot/Feet
IH	Interstate Highway
in	inch(es)
inbs	inches below surface
GPS	Global Positioning System
km	kilometers
m	meter(s)
mi	mile(s)
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
SAL	State Antiquities Landmark
THC	Texas Historical Commission

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1 Introduction

The City of Midland is proposing to install a new 12-inch (in; 30.5-centimeter [cm]) water pipeline at the Water Pollution Control Plant (WPCP) located south of the intersection of IH 20 and Farm-to-Market (FM) 307 on the east side of the City of Midland in Midland County, Texas (see Figure 1-1). This pipeline installation is part of the 2017 WPCP Rehabilitation Project. In advance of the proposed project, the City of Midland contracted HDR, Inc. (HDR) to conduct an intensive archaeological survey of the project area in order to be in compliance with Chapter 191 of the Texas Natural Resources Code, also known as the Antiquities Code of Texas (13 Texas Administrative Code [TAC] 26.12).

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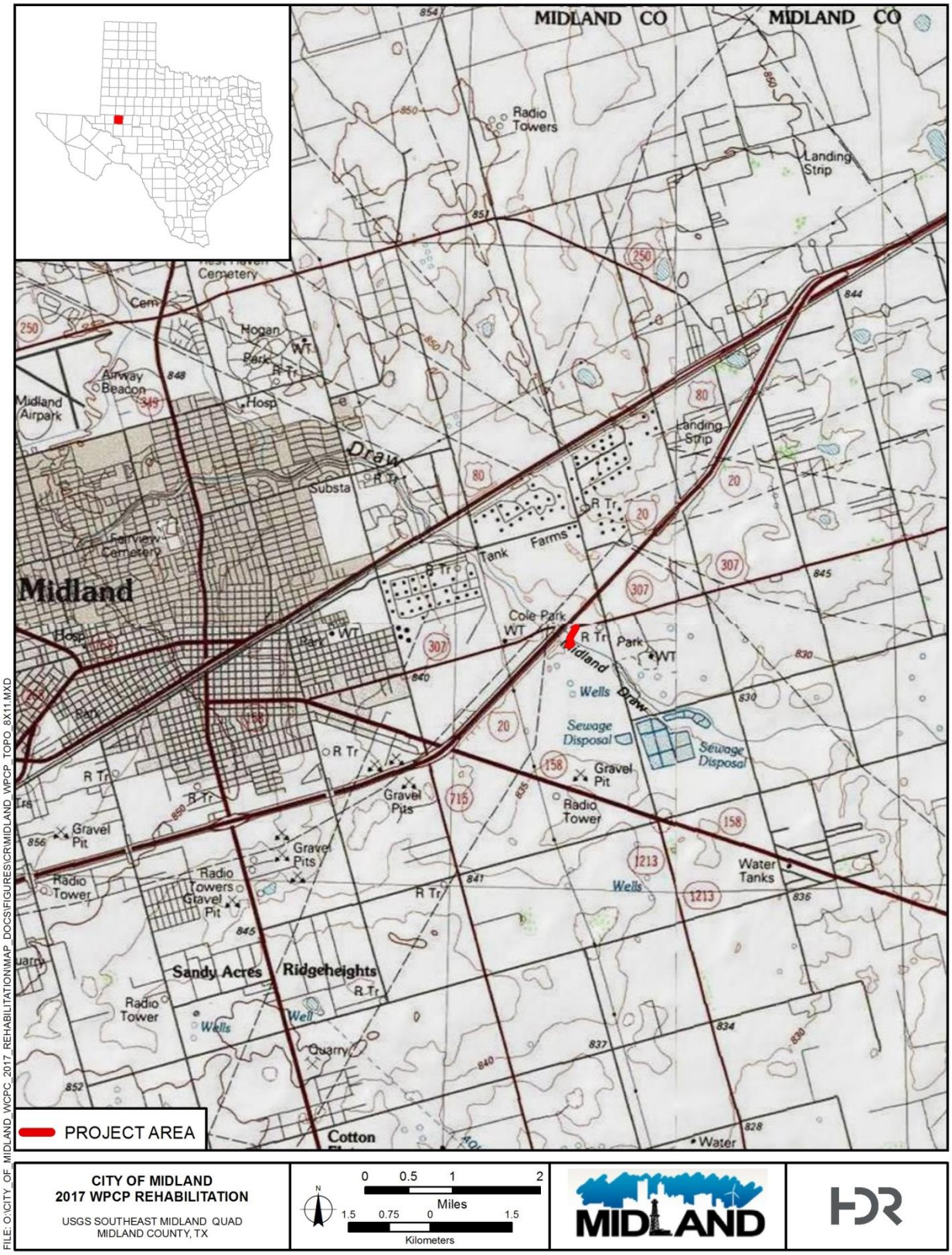
Figure 1-1. Project Location.



2 Background

2.1 Geology and Soils

The underlying geology of the majority of the APE consists of windblown cover sand of Pleistocene age (USGS 2017). The portion of the APE that crosses Midland Draw is underlain by fluviatile terrace deposits of Pleistocene age (USGS 2017).

According to data from the Natural Resources Conservation Service (NRCS), the APE contains three soil map units: Midessa fine sandy loam, 1 to 3 percent slopes; Bippus clay loam, 0 to 2 percent slopes, occasionally flooded; and Midessa fine sandy loam, 0 to 1 percent slopes (Soil Survey Staff 2017). The Midessa soils within the APE consist of very deep, fine sandy loam with calcium carbonate nodules appearing at 25 centimeters (cm; 10 inches [in]) below surface, becoming gradually larger with depth. The Bippus clay loam is very deep and consists of clay loam changing to a sandy clay loam at 20 cm (8in) below surface.

2.2 Cultural History

2.2.1 Prehistoric

The study area falls within the Southern High Plains region which is divided into five temporal divisions: Paleoindian, Archaic, Ceramic, Protohistoric, and Historic (Johnson and Holliday 2012). These general divisions will provide a framework for the following discussion of the cultural chronology of the region (Table 2-1). It should be noted that the study area is located near the boundary between the Southern High Plains and Trans-Pecos regions, but the project setting is more closely related to the Southern High Plains region.

Table 2-1. Cultural Chronology

Cultural Stage	Time Periods
Paleoindian	11,500–8500 BP
Archaic	8500–2000 BP
Ceramic	2000 BP–AD1450
Protohistoric	AD 1450–1725
Historic	AD 1725–1950

2.2.2 Paleoindian Period (11,500–8500 BP)

The Southern High Plains is known for its high concentration of Paleoindian sites located within it (Holliday 1997). Researchers have subdivided the Paleoindian period based on projectile point types. These subdivisions are Clovis (11,500–11,000 BP), Folsom (10,800–10,300 BP), and Late Paleoindian (10,000–8500 BP) (Johnson and Holliday 2012). Paleoindian people are believed to have been hunter gatherers and are typically associated with the exploitation of megafauna such as mammoth and bison.

The Clovis complex in the Southern High Plains coincided with a period of a cooler and wetter environment which was probably well suited to the needs of these hunter gatherers (Holliday 1997). During this period, megafauna were abundant, along with other food sources utilized by Clovis groups (Holliday 1997). Several Clovis sites have been identified in the Southern High Plains region. Clovis sites such as Blackwater Draw Locality #1, Miami, and Lubbock Lake contained the processed remains of various megafauna and other animals along with Clovis points. At Miami, Clovis points were reused as butchering tools (Johnson and Holliday 2012).

Around 11,000 BP, the Folsom complex began to replace the Clovis complex in the Southern High Plains. During this time, climatic changes were underway. Seasonal fluctuations increased, and a general warming trend characterized this period (Johnson and Holliday 2012). In addition, the transition period witnessed widespread extinctions (Johnson and Holliday 2012). Folsom sites in the region, such as Lake Theo and Lipscomb, consist of bison kill and butchering sites (Johnson and Holliday 2012). Lake Theo represents an extended camp associated with the bison kill. Both transported tools as well as expedient lithic tools made from local materials were recovered from the site (Johnson and Holliday 2012). Lipscomb represents the largest single-event Folsom kill in North America, with evidence of at least 55 bison present at the site (Johnson and Holliday 2012).

The Late Paleoindian complex in the Southern High Plains began around 10,000 BP. Environmental conditions continued to become drier and warmer (Johnson and Holliday 2012). The lanceolate projectile points that characterize this period are not fluted and can be associated with two different cultures: the Plainview (10,000 BP) and Firstview (8600 BP) cultures (Johnson and Holliday 2012). Similar to the Folsom sites in the Southern High Plains, Late Paleoindian sites usually consist of bison kills, such as at Running Water Draw and Lubbock Lake (Johnson and Holliday 2012).

2.2.1 Archaic Period (8500–2000 BP)

The climate during the Archaic period in the Southern High Plains continued the drying and warming trend that began during the Paleoindian period (Johnson and Holliday 2012). The cultural development during the Archaic period is "… best conceived as a time of varied responses to a changing Holocene landscape, biota, and climate, on the one hand, and to equally dynamic hunting and gathering systems on the other" (Kay 1998, 193). The Archaic period saw the introduction of various barbed projectile points which were used along with the atlatl (Hughes 2001). In addition, evidence of plant processing emerged during this period, indicating an increased reliance on plant based food sources (Hughes 2001). This period is divided into three subdivisions; the Early Archaic, Middle Archaic, and Late Archaic.

Only two Early Archaic sites, Lubbock Lake and San Juan, have been excavated in this region (Johnson and Holliday 2012). As such, our understanding of the Early Archaic in the Southern High Plains is fairly limited. Radiocarbon dates from both sites date them to around 8000 BP. The sites show evidence of continued bison hunting, and the only evidence of lithic tools at the sites are the lithic retouch flakes (Johnson and Holliday 2012).

The Middle Archaic period is much better documented, with several excavated sites in good stratigraphic context (Johnson and Holliday 2012). The climate during the Middle Archaic is known as the Altithermal, which is characterized by semiarid to arid conditions, reduced vegetation, and decreased surface water (Johnson and Holliday 2012). Three sites from the Middle Archaic had excavated wells to cope with the diminished surface water during this period (Johnson and Holliday 2012). Evidence of plant processing is notable during the Middle Archaic, such as a broken sandstone metate and an oval oven discovered at Lubbock Lake and dated to 4800 BP (Johnson and Holliday 2012). As the Archaic period progressed, the lithic tool kit became more diverse, including more projectile points, knives, and ground stone (Hughes 2001). The Middle Archaic period began to transition into the Late Archaic as the climate began to cool around 4500 BP (Johnson and Holliday 2012).

In the Southern High Plains, the Late Archaic period saw the dawn of the Medithermal climate, which is similar to modern climactic conditions (Hughes 2001). The Late Archaic period saw an increase in the number of sites in the region (Hughes 2001). Few sites are in good stratigraphic context, but the sites during this time were usually campsites consisting of hearths, lithic materials, and animal remains (Johnson and Holliday 2012; Hughes 2001). Bison kills have been associated with Late Archaic sites, such as at San Juan, Area III, where at least seven bison were killed and butchered (Johnson and Holliday 2012). The Archaic period came to an end in the Southern High Plains around 2000 BP.

2.2.2 Ceramic Period (2000 BP–AD 1450)

The Ceramic period is marked by the introduction of new technologies such as ceramics and the bow and arrow (Johnson and Holliday 2012). The climate during this period shifted between moderate, modern conditions and periodic droughts (Johnson and Holliday 2012). Groups became more sedentary and began using horticulture to supplement their diet (Hughes 2001). The Early Ceramic period was a transitional phase from the Archaic period (Johnson and Holliday 2012). Two complexes have been noted in the region: they are the Palo Duro complex (2000 BP–AD 1100) and the Antelope Creek focus (AD 1200–1450) (Boyd 2012; Hughes 2001).

The Caprock Canyonlands region developed unique characteristics during the Early Ceramic period, and some researchers have termed it the Palo Duro complex (Boyd 2012). The Caprock Escarpment provided a lush environment for prehistoric peoples, with reliable water sources and other resources, so the region would have been an enticing settlement location (Boyd 2012). The Palo Duro complex is characterized by the influence of the Jornada Mogollon cultures of New Mexico, the Trans-Pecos, and Chihuahua (Boyd 2012). The complex was first established during the excavation of Deadman's Shelter (41SW73), which consisted of corner and basal notched projectile points and Mogollon brownware ceramics (Boyd 2012). Evidence suggests that people during this time were semi-sedentary, seasonally living in pithouses at sites such as Kent Creek (41HL66), as well as open camps and rock shelters, such as Deadman's Shelter (Boyd 2012).

Beginning around AD 1200, the Antelope Creek focus is characterized by the unique architecture in the region, utilizing stone-slab wall foundations to construct single and

multi-room dwellings in the Texas and Oklahoma Panhandles (Lintz 1984). Artifact assemblages include unnotched and side-notched projectile points, ground and pecked stone tools, cord-marked ceramics, bone tools, and utilized mussel shells (Lintz 1984; Hughes 2001). The Antelope Creek focus is closely related to the Plains Village tradition based on the architectural features as well as the various artifacts found associated with the focus (Hughes 2001). These groups relied on a mixture of hunting, gathering, and horticulture for subsistence (Brooks 2012). Ceramics and obsidian provide evidence of trade among the Antelope Creek peoples with Puebloan peoples and surrounding Plains groups (Brooks 2012). Warfare among the groups is also apparent based on burned structures and human remains at some sites, such as disarticulated human remains found at the Footprint site (Brooks 2012). Around AD 1450, prior to the arrival of Coronado, the Antelope Creek peoples seem to have left the region, probably as a result of climactic pressures and the intrusions of the Apache (Lintz 1984).

2.2.3 Protohistoric Period (AD 1450–1725)

The Protohistoric period refers to the time when Europeans were present in the region but not visible in the aboriginal archaeological record (Johnson and Holliday 2012). By the arrival of Coronado, the area was occupied by the Apaches (Hughes 2001). Coronado described them as nomadic hunter-gatherers, reliant on big game, such as bison (Hughes 2001). This is supported by Protohistoric sites which are typically camp sites or bison kill sites (Johnson and Holliday 2012). Two complexes have been identified in the Southern High Plains during the Protohistoric period: the Edwards complex (AD 1500–1650) and the Wheeler complex (AD 1650–1725) (Hofman 1984).

The Edwards complex was located in what is today southwest Oklahoma (Hofman 1984). The complex is characterized by the grey, sand-tempered plain-surfaced ceramics found on their sites (Hofman 1984). Artifact assemblages from Edwards complex sites consist of projectile points (primarily unnotched Fresno points), drills, bison bone tools (such as a bison-scapula hoe) and plain grey ceramics (Hofman 1984). Chipped stone tools from Edwards complex sites are primarily made from Alibates, with Kay County flint only comprising about 10 percent of the assemblages and a notable presence of obsidian, which comprised about 4 percent (Hofman 1984). Subsistence patterns relied on bison hunting, but some degree of horticulture is apparent in the archaeological record (Hofman 1984). The Edwards complex peoples traded with both the Puebloans and Prairie Villages (Hoffman 1984).

Around AD 1650, the Wheeler complex emerged in west-central Oklahoma (Hofman 1984). The primary difference between the Wheeler and Edwards complexes is the dominating lithic material used for chipped stone tools at the sites (Hofman 1984). The dominant lithic material at Wheeler complex sites is Kay County flint with Alibates and Edwards chert comprising a minor portion of the lithic assemblage (Hofman 1984). This shift in lithic materials could reflect a change in trade networks and resource procurement (Hofman 1984). A distinguishing chipped stone tool for the Wheeler complex is the large scrapers made of Kay Country chert found on the sites (Hofman 1984). In addition, European trade items, such as glass beads, have been recorded at Wheeler complex sites (Hofman 1984). By AD 1725, the European influence in the region had grown, ending the Protohistoric period and giving rise to the Historic.

2.2.4 Historic European and Euro-American Cultural Period (1725–1950)

Prior to the establishment of Midland County in 1885, Native Americans, Mexicans, and Euro-American settlers traversed the area on several well-established trails. These included the Great Comanche War Trail; the Chihuahua Trail, a trade route running from Big Spring to Castle Gap; the Emigrant Road, which extended from Preston on the Red River; and multiple wagon roads. Sheep ranchers began moving into the area by the 1870s and 1880s, and settlement was further encouraged by the Texas and Pacific Railway, built through Midland, Odessa, and Abilene in 1881. The town of Midland, initially named Midway due to its location along the rail line (Midway Station), was established at this time. Midland County was organized in 1885, and Midland was established as the county seat that same year. A courthouse was built the next year, followed by the construction of several churches and the town's first school (Leffler 2010).

Cattle surpassed sheep as the major livestock industry in Midland County by the late nineteenth century, though both were livestock staples in 1890, with that year's census recording 29 ranches running a total of 14,867 head of cattle and 13,364 head of sheep. Irrigation was employed in a limited capacity during this time, allowing some settlers to grow corn and grains in relatively small quantities. The population of Midland County was 1,033 in 1890 (U.S. Census Bureau 2014). Midland was one of the state's preeminent cattle shipping centers by this time. The Four-Section Act of 1895 encouraged further settlement by selling land and leasing rights at an inexpensive price. Residents drilled water wells and powered them with windmills. Nearly every home had a windmill pump in its yard, earning the town the nickname "the Windmill Town." By the end of the nineteenth century, the number of ranches in the county had jumped to 73, and the number of cattle had tripled, while the number of sheep had plummeted to less than 2,300 (Leffler 2010).

The turn of the twentieth century saw an increase in farming—primarily cotton, corn, and sorghum. However, successive droughts, fires, and a lagging economy drove many people from the county during the early 1900s. The county's population rose from 1,741 in 1900 to 3,464 in 1910; but then dropped to 2,449 in 1920 (U.S. Census Bureau 2014). It was the establishment of the oil industry in the 1920s that anchored the county's economy through subsequent drought periods and the Great Depression, and ultimately shaped the area's industry into the present day. Midland County is located near the eastern edge of the Permian (or West Texas) Basin, a region rich in natural reserves of petroleum, natural gas, and potassium. Oil was first struck in the area in 1923 (Reagan County) and 1926 (Ector County), and the city of Midland was shortly thereafter established as the corporate headquarters for the new industry. Within a decade, U.S. Highway 80 extended through Midland County, as one of relatively few paved roads in West Texas. The highway was part of a transcontinental route that linked the booming oil industry in Midland to both coasts (Weingroff 2017; Conoco Travel Bureau 1936).

Though cotton farming continued to be a major economic driver into the middle of the twentieth century, farming operations generally decreased as the oil industry continued to expand. The oil boom correlated to a boom in the county's population as well. The population of Midland County reached 8,005 in 1930 and 11,721 in 1940; reflecting the

rapid growth of local infrastructure and commercial and industrial development (U.S. Census Bureau 2014). Midland Army Air Force Base was constructed during World War II on the site of Sloan Field, a private airport opened in Midland in 1927. The Air Base was built primarily as a Works Progress Administration (WPA) project, and a Bombardier College was established to train bomber pilots. The base operated 1942–1945 and was converted to what is now the Midland International Airport after the war.

The post-World War II era was a period of peak prosperity and growth in Midland County, once again fueled by the oil industry. Major booms occurred in the county in 1945, 1949, and 1952. The county's population skyrocketed to 25,785 in 1950 and then even further to 67,717 in 1960 (U.S. Census Bureau 2014). The city of Midland was nicknamed "The Tall City" as high-rise buildings began to dominate the cityscape (McEwen 2012). In 1956, Midland County produced nearly 17,060,000 barrels of crude oil. Oil production during the subsequent decades of the twentieth century fluctuated between roughly 7,600,000 and 11,700,000 barrels. The population of Midland, the county seat, also skyrocketed during this growth period—from 5,484 residents in 1930 to 62,625 in 1960 (Leffler 2010).

Infrastructure improvements made in the mid-1900s included the Water Pollution Control Plant for the City of Midland, located within the APE. It was constructed in 1952 to accommodate the rapidly growing population (RDG Planning & Design 2016:43). Subsequent expansions of the facility were undertaken in the early 1970s and early 1980s as Midland's population continued to grow (*Odessa American* 1971:30; O'Neil 1979:2). Based on aerial photography, significant construction at the plant has continued into the twenty-first century, reflecting the city's ongoing growth. Interstate 20, immediately north of the APE, was built through Midland County in the mid-1960s and was completed from Culberson County, Texas, where it splits from Interstate 10, to the Louisiana border by 1967 (Esso 1965; Texaco 1967). I-20 effectively replaced U.S. Highway 80, connecting the important oil resources of Midland to distant parts of the country (Weingroff 2017).

Though oil came to dominate Midland County's twentieth-century economy, the vast majority of land acreage remained agricultural. In 1982, 90 percent of the county's land was allocated for farms or ranches, and 9 percent of the county's land was used for crop cultivation—cotton, wheat, hay, sorghum, pecans, and watermelons. Ranches raised sheep, cattle, and hogs. In 1980, the population of the county stood at approximately 83,000—and just under 25 percent of residents worked in the agriculture industry. Other non-oil industries active in Midland and the surrounding area included construction, trucking, and the manufacturing of plastic (Leffler 2010).

The population and prosperity of Midland County directly reflected the fluctuating oil market, which alternately rose and fell throughout the latter half of the twentieth century in accordance with foreign competition and international affairs. The oil industry throughout Texas boomed during the 1970s following the 1973–1974 Oil Embargo, when members of the Organization of Petroleum Exporting Countries (OPEC) refused to export oil to the United States because of U.S. support for Israel. The industry declined dramatically in the 1980s with an unexpected drop in oil prices and a subsequent reduction in the number of drilling rigs. The 1980s ushered in an era of more varied industries and job fields for Midland County, helping to diversify its economic base.

However, throughout the remainder of the century and into the twenty-first century, the city of Midland continued to serve as the financial and administrative center for the oil industry of the Permian Basin (Leffler 2010).

By 2014, the population of Midland County was 155,830. The great majority of this population (approximately 124,000) resided in the city of Midland. Land use for agriculture dropped to 70 percent; just under half of this acreage consisted of harvested (and mostly irrigated) cropland, with the rest allocated for livestock or grazing. The city of Midland continued to function as a hub for agricultural supplies and shipping. Agricultural employment constituted less than four percent of the county's job force, with oil construction and extraction employing 24 percent of the population. Other common industries in Midland County today include health care, education, retail, and lodging and food services (City-Data 2014; USDA 2012). The county seat is also home to manufacturing plants for chemicals, plastics, and electronic calculators (Leffler 2010).

3 Methods

3.1 Previous Investigations near the Project Area

A review of the Texas Historical Commission's (THC) Archeological Sites Atlas (Atlas) indicates that seven previous surveys have been conducted, and two archaeological sites have been recorded within one mile (1.6 km) of the APE (Figure 3-1). No Official Texas Historical Markers (OTHMs), Recorded Texas Historic Landmarks (RHTLs), cemeteries, or National Register of Historic Places (NRHP) listed properties or districts are located within the one-mile search area.

Only one of the seven previous cultural resources surveys within the one-mile buffer crosses the APE (ID #8400008346). This survey was part of a series of surveys conducted in this area for the Texas Water Development Board in 1996. Details for the cultural resources surveys conducted within one mile of the APE are listed in Table 3-1.

Two archaeological sites are located within one mile of the APE. Neither has been evaluated for inclusion in the NRHP. Site 41MD26 was an open campsite where only three lithics were found including two flakes and a metate fragment. Burnt caliche was also found at this site. Due to the scant nature of the site, no further work was recommended by the previous investigators. Site 41MD27 is located along Midland Draw and is composed of one hearth. No artifacts were discovered at this site. All finds for both sites were on the surface; no subsurface testing was conducted on either site.

Figure 3-1. Previously Recorded Cultural Resources and Surveys within One Mile of the APE.

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Table 3-1. Previous Cultural Resources Surveys Conducted within One Mile of the Project Area.

Survey ID	Funding Agency	Report Title	Consultant/ Contractor	Report Year	Comments / Recommendations
8500005132	Bureau of Land Management	—	—	1987	—
8400008346	Texas Water Development Board	Texas Water Development Board 1996 Annual Report to the Texas Historical Commission for Texas Antiquities Permit 1641	—	1996	Crosses APE TAC #1641
8400008347	Texas Water Development Board	Texas Water Development Board 1996 Annual Report to the Texas Historical Commission for Texas Antiquities Permit 1641	—	1996	TAC #1641
8400008348	Texas Water Development Board	Texas Water Development Board 1996 Annual Report to the Texas Historical Commission for Texas Antiquities Permit 1641	—	1996	TAC #1641
8400008349	Texas Water Development Board	Texas Water Development Board 1996 Annual Report to the Texas Historical Commission for Texas Antiquities Permit 1641	—	1996	TAC #1641
8500016115	COE–Fort Worth District / City of Midland	A Cultural Resources Survey for the TEPPCO Crude Pipeline, LLC Proposed El Camino to Midland Pipeline Project: City of Midland Properties Midland County, Texas	PBS&J / Maywald and Sager	2009	TAC #5306
8500079874	University Lands	Intensive Cultural Resources Survey of a 23.75-Mile Segment of the Proposed Delaware Basin Project, Leased to Midland Pipeline on University Lands in Andrews County, Texas	SWCA Environmental Consultants / Young and Cody	2015	TAC #7269

3.2 Survey Methods

HDR conducted an intensive archaeological study consisting of pedestrian survey and shovel testing throughout the entire 1.33 ac (0.54 ha) APE. The APE was divided into two sections: the 0.10 mi (0.16 km) western portion within the WPCP property and the 0.12 mi (0.19 km) eastern portion that crosses Midland Draw and terminates at FM 307. The western portion within the WPCP property was considered to have a low probability of encountering cultural deposits and shovel testing was conducted at a 100 m (328 ft) interval. The eastern portion that crosses Midland Draw was considered to have a high probability of encountering cultural deposits and shovel testing was conducted at a 30 m (98 ft) interval. The survey resulted in a total of eight shovel tests. The field effort was led by archaeology crew chief Melanie Johnson on October 17, 2017.

Each shovel test was approximately 30 cm (12 in) in diameter and was excavated in 20-cm (8-in) arbitrary levels to a depth of 80 cm (32 in) below surface or until sterile subsoil was encountered. The soil removed was screened through 0.635-cm (0.25-in) mesh screen, and soil descriptions followed the guidelines and terminology established by the National Soil Survey Center (Schoeneberger et al. 2002). Soil colors were recorded using a Munsell Soil Color Chart. All excavated shovel tests were recorded on shovel test forms which note depth, soil matrix descriptions, and cultural materials recovered. Digital photographs were used to document the survey conditions, disturbances, and any cultural features observed; and details of each photograph were recorded on standardized forms. All shovel test locations were recorded using a sub-meter Global Positioning System (GPS) unit.

4 Results

HDR conducted an intensive archaeological study with shovel testing and pedestrian survey of the APE. The APE west of Midland Draw had been cleared of large vegetation and included a two-track through a portion of the APE (Figure 4-2 and Figure 4-3). South of the existing flow equalization flow basin, the ground surface had a thin covering of weeds with 20-30% ground visibility (Figure 4-2). Prairie dog holes were common, and eroded limestone gravels were present on the ground surface (Figure 4-4). North of the flow equalization basin, grass covered the ground surface resulting in no ground visibility (Figure 4-5). The APE on the Midland Draw floodplain was covered in grass with a few oak trees resulting in 10-20% ground visibility (Figure 4-6). At the time of the survey, the floodplain was underwater due to drainage from the WPCP (Figure 4-7 through Figure 4-9). The APE east of the Midland Draw floodplain contained mesquite, oak trees, and various grasses that reduced toward the eastern end of the APE increasing ground visibility from 10-20% to 60-70% visibility (Figure 4-10).

A total of eight shovel tests were excavated within the APE: two shovel tests were excavated in the low probability setting, and six shovel tests were excavated within the high probability setting (Figure 4-1). On the west side of Midland Draw, the soil was typically sandy loam with limestone gravels throughout (15-20 percent) (Figure 4-11). The gravels became larger with depth. Soil on the east side of Midland Draw was typically silty loam or silty clay loam (Figure 4-12). All shovel tests were negative for cultural materials.

No cultural materials were discovered during the survey.

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Figure 4-1. Results of the Archaeological Survey.

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Figure 4-2. Overview of the APE Located South of the Flow Equalization Basin, Facing East.

Figure 4-3. Two-track Road Located East of Flow Equalization Basin, Facing Northeast.

Figure 4-4. Ground Surface South of the Flow Equalization Basin, Facing East.

Figure 4-5. Vegetation North of Flow Equalization Basin, Facing Southwest.

Figure 4-6. Vegetation of Midland Draw Western Floodplain, Facing South.

Figure 4-7. Midland Draw Eastern Floodplain Underwater, Facing East.

Figure 4-8. Plant Drainage into Midland Draw Floodplain, Facing Southwest.

Figure 4-9. Attempt to Excavate Shovel Test 4 in Midland Draw Eastern Floodplain.

Figure 4-10. Vegetation East of Midland Draw Floodplain.

Figure 4-11. Typical Soil Profile on West Side of Midland Draw (ST 2).

Figure 4-12. Typical Soil Profile on East Side of Midland Draw (ST 5).

5 Summary and Recommendations

5.1 National Register Eligibility

5.1.1 Criteria for Evaluation of Eligibility

As part of this review process, cultural resources investigations are undertaken with the purpose of identifying resources that are listed in, or eligible for listing in, the NRHP. The assessment of significance of cultural resources is based on federal guidelines and regulations. Any cultural resource that is listed in or eligible for inclusion in the NRHP is known as a "historic property," and the term "eligible for inclusion in the NRHP" includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria (36 CFR 800.2). The criteria for evaluating properties for inclusion in the NRHP (36 CFR 60.4 [a–d]) are codified under the authority of the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation has set forth guidelines to use in determining site eligibility. Subsequent to the identification of relevant historical themes and related research questions, these four criteria for eligibility are applied:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association and

A. that are *associated with events* that have made a significant contribution to the broad patterns of our history; or

B. that are *associated with the lives of persons* significant in our past; or

C. that *embody the distinctive characteristics* of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that have *yielded, or may be likely to yield, information important in prehistory or history*. Note that the application of Criterion D presupposes that the information imparted by the site is significant in history or prehistory [36 CFR 60.4, emphasis added].

The physical characteristics and historic significance of the overall property are examined when conducting NRHP evaluations. Although a property in its entirety may be considered eligible based on Criteria A, B, C, and/or D, specific data are also required for individual components therein based on date, function, history, physical characteristics, and other information. Resources that do not relate in a significant way to the overall property may contribute if they independently meet the NRHP criteria.

For a historic resource, district, or landscape to be determined eligible for the NRHP, it must retain enough of its historic integrity to convey its significance. For the NRHP, there are seven aspects of integrity:

1. Location
2. Design
3. Setting
4. Materials
5. Workmanship
6. Feeling
7. Association

Occasionally, certain resources fall into categories in which they must be evaluated further using one or more of the following Criterion Considerations. If a resource identified during the reconnaissance-level survey falls into one of these categories, the following Criterion Considerations will be applied in conjunction with one or more of the four National Register criteria:

A. A religious property deriving primary significance from architectural or artistic distinction or historical importance, or

B. A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event, or

C. A birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with his or her productive life, or

D. A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events, or

E. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived, or

F. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance, or

G. A property achieving significance within the past 50 years if it is of exceptional importance (36 CFR 60.4).

The scientific value of archaeological sites is often assessed under Criterion D. With regard specifically to this criterion, the goal of prehistoric archaeological research and management is to fill gaps in the knowledge about specific research domains. Scientific importance is driven, in part, by the research paradigms of the time and in part by the amount of information available about a particular research topic in a specific geographic area. The most robust forms of scientific importance should honor diverse and occasionally competing schools of research interests and their attendant approaches. In order to fulfill Criterion D, a site must possess certain attributes (e.g., intact buried cultural strata with functionally and temporally diagnostic materials, datable cultural features) such that further intensive research at the site could be expected to add additional information to relevant research questions.

5.2 Conclusion and Recommendation Summary

HDR conducted an intensive archaeological study of the APE, which included the 0.22 mi (0.35 km) long and 50 ft (15 m) wide pipeline easement. The survey included shovel testing, pedestrian survey, and photo-documentation of the APE. A total of eight shovel tests were excavated but revealed no buried cultural materials. No cultural materials were discovered during the survey.

In accordance with 13 TAC 26.12, no further archaeological investigations are recommended, and construction may proceed. In the event that any archaeological deposits are encountered during construction, work should cease, and the Texas Historical Commission (THC) should be notified.

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