Part four of four

Identification of Historic Properties
within the Area of Potential Effects for
Tenaska Brownsville Partners'
Tenaska Brownsville Generating Station,
Cameron County, Texas

Attachment 3

Results of a Cultural Resources Survey for
The BPUB Water Reuse Pipeline Project

December 18, 2013
Project No. 0185680

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A Cultural Resources Survey for the Proposed Brownsville Public Utilities Board Water Reuse Pipeline Project Cameron County, Texas

Document No. 130122
Job No. 100033612

A CULTURAL RESOURCES SURVEY FOR THE PROPOSED BROWNSVILLE PUBLIC UTILITIES BOARD WATER REUSE PIPELINE PROJECT CAMERON COUNTY, TEXAS

TEXAS ANTIQUITIES PERMIT NO. 6655

Prepared for:

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December 2013

Abstract

In September and October 2013, Atkins North America, Inc. (Atkins) conducted a cultural resources survey for the proposed Water Reuse Pipeline Project on behalf of the City of Brownsville Public Utilities Board. The proposed project consists of 7.57 miles (15.24 kilometers) of new 30-inch diameter effluent water pipeline in Cameron County, Texas. The survey was conducted within a corridor that measured no more than 120 feet (35.56 meters) wide and no less than 50 feet (15.24 meters) wide. A total area of approximately 99.56 acres (40 hectares) was surveyed during this project. As the survey corridor is located on publicly owned lands, compliance with the Texas Antiquities Code (TAC) is required, and work was conducted under TAC Permit 6655.

No archeological sites were located during the survey, and no artifacts were collected. A total of 31 shovel tests were conducted within the survey corridor, all of which were culturally sterile. The minimum number of shovel tests recommended in state guidelines for projects of this size was not met due to the nature of the soils and disturbances evident throughout much of the urbanized survey corridor. Field records will be curated at The University of Texas Archeological Research Laboratory in Austin, Texas.

Three components of the Brownsville Irrigation District are within the proposed pipeline right of way, including two sections of underground pipeline and two aboveground standpipes. The Texas Historical Commission (THC) determined that this district does not meet the qualifications for National Register of Historic Places (NRHP) inclusion under any of the applicable criteria in 2008 in association with a Texas Department of Transportation-sponsored project. As a result, construction of the proposed waterline at each of the locations would not result an adverse impact to any NRHP-listed or -eligible resource within this district, and thus, no further consideration of the resources or of the irrigation district under Section 106 is recommended in connection with the current project. One historic-age canal was recorded in the survey corridor. The drainage canal is not associated with a historic irrigation district and is not eligible for listing in the NRHP.

Atkins recommends that cultural resource consultations be considered complete for the project presented in this report. Atkins also recommends that construction activities be allowed to proceed without further consultation and no further investigations are recommended. However, if during the course of the proposed project any cultural resources are encountered, the project should cease at that location until a qualified professional archeologist can assess the significance of the findings, and the THC and U.S. Environmental Protection Agency can provide a determination of the cultural resource's potential NRHP eligibility.

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Atkins North America, Inc. (Atkins) conducted a cultural resources survey for the proposed Water Reuse Pipeline Project on behalf of the City of Brownsville Public Utilities Board. The proposed project consists of 7.57 miles (15.24 kilometers) of new 30-inch diameter effluent water pipeline in Cameron County, Texas. The survey was conducted within a corridor that measured no more than 120 feet (35.56 meters) wide and no less than 50 feet (15.24 meters) wide. A total area of approximately 99.56 acres (40 hectares) was surveyed during this project. As the survey corridor is located on publicly owned lands, compliance with the Texas Antiquities Code (TAC) is required, and work was conducted under TAC Permit 6655.

No new archeological sites were located during the survey. Three components of the Brownsville Irrigation District are within the proposed pipeline right of way, including two sections of underground pipeline and two aboveground standpipes. In 2008, The Texas Historical Commission (THC) determined that this district does not meet the qualifications for National Register of Historic Places (NRHP) inclusion under any of the applicable criteria in association with a Texas Department of Transportation-sponsored project. One historic-aged canal, constructed in the early 1950s, was recorded in the survey corridor. The canal appears to lack association physically and temporally with historic irrigation districts and is not recommended for NRHP inclusion.

Atkins recommends that cultural resource consultations be considered complete for the project presented in this report. Atkins also recommends that construction activities be allowed to proceed without further consultation, and no further investigations are recommended. However, if during the course of the proposed project any cultural resources are encountered, the project should cease at that location until a qualified professional archeologist can assess the significance of the findings, and the THC and U.S. Environmental Protection Agency can provide a determination of the cultural resource's potential NRHP eligibility.

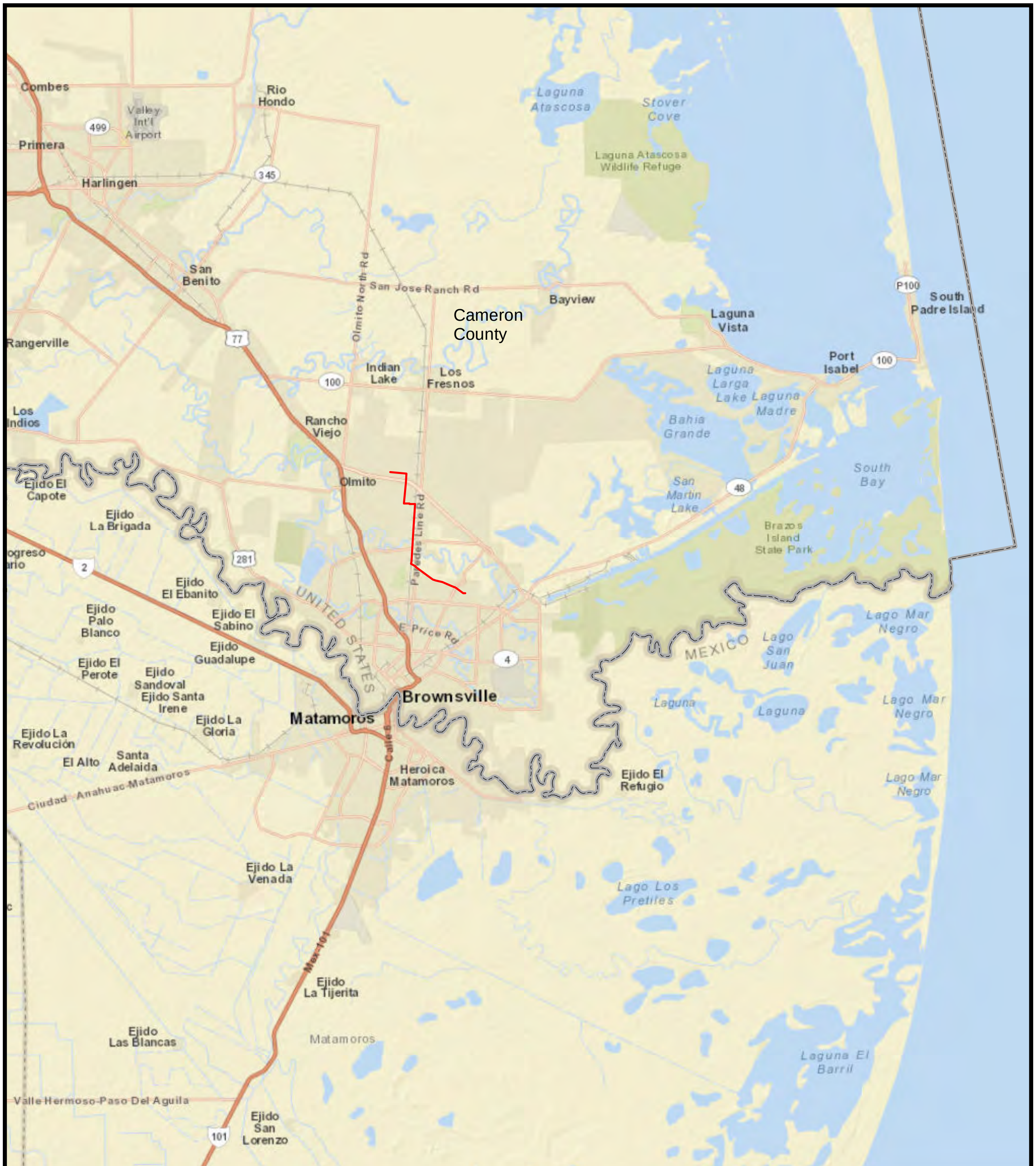
I. INTRODUCTION

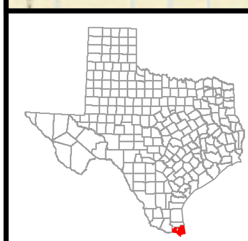
In September and October of 2013, Atkins North America, Inc. (Atkins) conducted a cultural resources survey for the proposed new 30-inch diameter effluent water pipeline on behalf of the City of Brownsville Public Utilities Board (BPUB) in Cameron County, Texas. The survey corridor was 7.57 miles (11.27 kilometers) long, and extended from the Robindale Wastewater Treatment Plant to the future Teneska Generating Station (Figures 1 and 2). More specifically, the proposed project intersects the East Brownsville, Los Fresnos, and Olmito, Texas, U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangle maps. Refer to the enclosed Project Vicinity Map (Appendix A) for a depiction of the project route.

The project traversed a mostly urban environment with a few small undeveloped areas. Development in the area, including road construction and urban and commercial development, has impacted the original topography, changed the face of the landscape, and eliminated many of the natural topographic contours. These impacts greatly reduced the likelihood of encountering historic and prehistoric cultural artifacts in an undisturbed context. However, the presence of historic-age irrigation resources and the proximity of the Resaca de la Palma Battlefield to the survey corridor suggested the potential for encountering cultural resources and thus warranted field investigations.

The survey was conducted within a corridor that measured no more than 120 feet (ft) (36.58 meters [m])wide and no less than 50 ft (15.24 m) wide. The survey corridor width was consistent with the estimated typical construction, design, and anticipated construction impacts for the project maps available at the time the Texas Antiquities permit application was submitted. Based on these estimated designs, the anticipated maximum depth of disturbance is approximately 13 ft (3.96 m) below ground surface. A total area of approximately 99.56 acres (40 hectares) was surveyed during this project. As the survey corridor is located on publicly owned lands, compliance with the Texas Antiquities Code (TAC) is required, and work was conducted under TAC Permit 6655. The cultural resources field investigation was conducted by Atkins archeologists Darren Schubert, Rhiana Casias, Don Badon, and subconsultant Virginia Hatfield. Dale Norton served as the Principal Investigator.

This investigation was performed in compliance with the National Historic Preservation Act of 1966 (PL89-665), as amended, and the TAC (Texas Natural Resources Code of 1977, Title 9, Chapter 191) (Texas Antiquities Permit No. 6643); and in accordance with the Procedures for the Protection of Historic and Cultural Properties (36 CFR 800), the Rules of Practice and Procedure (TAC, Title 13, Chapter 26), and guidelines set forth by the Council of Texas Archeologists and the Register of Professional Archaeologists.





Proposed Waterline Alignment

County Boundary

PUBLIC UTILITIES BOARD

ATKINS

Figure 1
Project Vicinity Location Map
Brownsville Public Utilities Board
Proposed 24-inch Water Reuse Pipeline Project
Cameron County, Texas

Datum: NAD 1983
Projection: UTM
Zone: 14
Units: Meter

0 3 6 Miles

Prepared By: ATKINS/14923	Scale: 1 " = 6 Miles
Job No.: 100033612	Date: Oct 25, 2013

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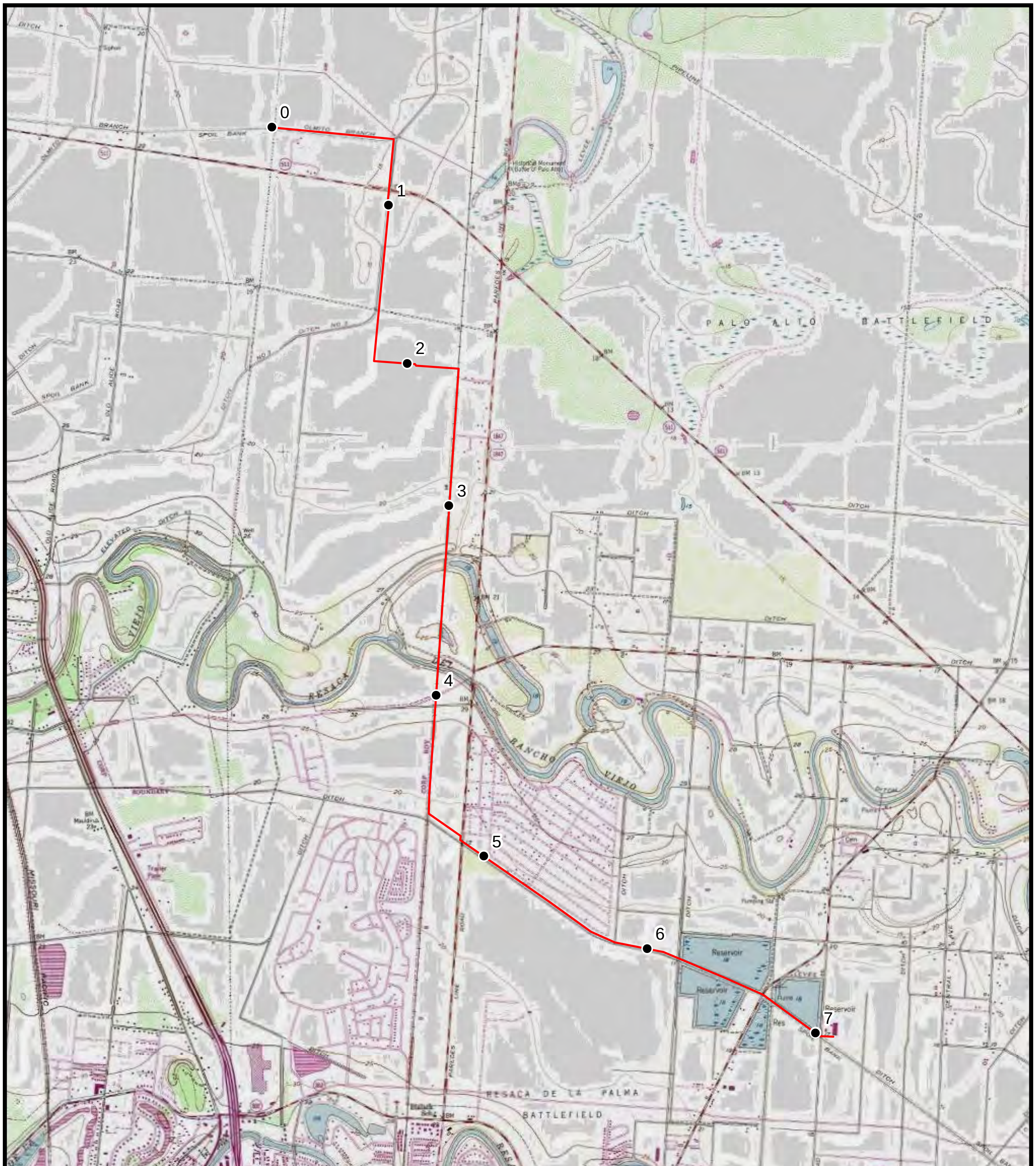
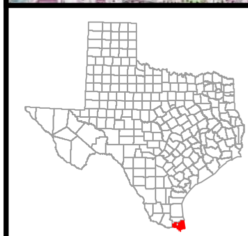
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013





Proposed Waterline Alignment

Datum: NAD 1983
Projection: UTM
Zone: 14
Units: Meter

0 0.4 0.8 Miles

BROWNSVILLE PUBLIC UTILITIES BOARD

ATKINS

Figure 2
Project Location Topographic Map
Brownsville Public Utilities Board
Proposed 24-inch Water Reuse Pipeline Project
Cameron County, Texas

Prepared By: ATKINS/14923	Scale: 1 " = 0.8 Miles
Job No.: 100033612	Date: Oct 25, 2013

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The objectives of the survey were to (1) locate cultural resource sites, if any, within the survey corridor, (2) delineate the vertical and horizontal extent of any identified sites, (3) assess site integrity, (4) locate and describe any historic structures and/or irrigation feature, and (5) provide a preliminary evaluation of each identified site's potential eligibility for listing on the National Register of Historic Places (NRHP) and/or for designation as a State Antiquities Landmark (SAL).

This report is divided into five sections and two appendices. Following this introduction, Sections II and III discusses the general environmental setting and cultural background information pertinent to the project. Section IV provides a summary of the methods used for conducting the fieldwork and summarizes the results of the field investigation. Section V provides conclusions and recommendations. Section VI lists references utilized to compile this report. An appendix contains overview maps of the project area showing the areas surveyed.

II. GENERAL ENVIRONMENTAL SETTING

This section provides an overview of the general environmental setting surrounding the proposed BPUB Water Reuse Pipeline Project. Specific relevant information for the overview discusses the region's natural environment (i.e., flora and climate), geology, soils, and terrestrial resources (i.e., fauna). Characteristics of the natural environment that affect the nature and preservation of cultural resources are also noted.

NATURAL ENVIRONMENT

The project area is located at the lower end of the Rio Grande Basin, in the city of Brownsville, Texas. This area is at the southern end of the Gulf Prairies and Marshes Vegetative Area of Texas and contains elements of the South Texas Plains vegetation area, which occurs to the north and west (Gould 1975), and within the Lower Rio Grande Alluvial Floodplain portion of the Western Gulf Coastal Plain ecoregion (Griffith et al. 2004). The Western Gulf Coast Plain maintains a relatively flat topography with predominantly grassland vegetation adjacent to the coast, with elevations ranging from sea level to approximately 100 ft (30 m) above mean sea level. Moving inland, the region's plains are older, more irregular, and have mostly forest or savanna-type vegetation.

The Lower Rio Grande Alluvial Floodplain portion of the ecoregion predominantly consists of Holocene-aged alluvial sands and clays of the Rio Grande. Historically, the floodplain ridges once had abundant palm trees, and early Spanish explorers called the river "Rio de las Palmas" (Griffith et al. 2004). However, most large palm trees and floodplain forests had been cleared by the early 1900s. Currently, the region is dominated by cropland with rice, grain sorghum, cotton, and soybeans as the principal crops. In addition, urban and industrial land uses have expanded greatly in recent decades, and oil and gas production is common. Channels for irrigation and urban use have mostly diverted the waters of the Rio Grande with little or no flow reaching the Gulf of Mexico.

The Lower Rio Grande Valley has a climate which includes marine, coastal-type, subtropical, and semiarid characteristics (United States Army Corps of Engineers [USACE] 1977). Average annual precipitation ranges from 16 to 35 inches (40 to 89 centimeters [cm]), occurring mostly in the spring and fall. Summers are often characterized by drought conditions that are frequently of sufficient duration to depress crop growth.

TERRESTRIAL RESOURCES

Extreme southern Texas has a very diverse faunal assemblage. Wildlife typical of the Tamaulipan Biotic Province includes many species of the Neotropical, Texan, and Kansan Biotic provinces and a few species common to the Austroriparian and Chihuahuan provinces (Blair 1950). Animals common in the region are Virginia opossum, nine-banded armadillo, longtailed weasel, striped skunk, hog-nosed skunk, coyote, bobcat, black-tailed jack rabbit, cottontail, javelina, and white-tailed deer (USACE 1977). Thirty-six species of snakes and numerous species of rodents also live in the area (Blair 1950).

Geology

All geologic deposits in the project area represent fluvial components of the Rio Grande system. It has been a major, meandering system throughout its Pleistocene and Holocene history. Holocene fluvial and deltaic deposits have accumulated in a valley eroded during the Pleistocene Epoch. The Rio Grande system has been undergoing net retreat for about the last 3,000 or 4,000 years, and its subsiding Gulf margin is undergoing transgression by the Laguna Madre and Padre Island. Discharge data collected at Matamoros, Mexico, indicate that prior to about 1940 the maximum discharge was almost 6 million acre-feet. This has been dramatically reduced by the construction of dams such as Falcon Dam as well as the increasing use of irrigation. In 1963 the discharge rate was measured at less than 125,000 acre-feet (Brown et al. 1980).

The current Lower Rio Grande Valley is a mix of riverbank, shore, marsh, and lake settings with the amalgamation of silty and sandy flat floodplain giving rise to shifting stream channels. This system of altered steam channels results in the resacas and oxbows and meander scars that are found throughout the region. These structures are perpetually affected by wind-borne sediments (Butzer 1982).

Since the last glacial maximum (ca. 20,000 B.P.), the river valley has changed dramatically. Ocean levels had risen approximately 100 m causing the course of the Rio Grande to shorten with the influx of the rising sea water, which caused an increase in valley aggregation (Brown et al. 1980). After the last glacial maximum by the middle of the Holocene, the Rio Grande was depositing alluvial soils and ultimately flooding the valley several times (Boyd et al. 1994). These flooding episodes created an estuarine environment (Brown et al. 1980). The filling of the valley ceased between 10,000 and 7000 B.P., resulting in additional soil aggregation manifested as prograding delta lobes over earlier Holocene deposits. Sea level reached its present level at around 3000 B.P., and due to the rising water, the lobes were reworked, eroded away, and redeposited.

The geology of the Lower Rio Grande Valley consists of Holocene (>10,000 years), Pleistocene (10,000–2 million years [my]), and Pliocene (12.5–4.5 my) fluvial and deltaic deposits (Brown et al. 1980). Multiple high, level Pleistocene terraces border the Holocene floodplain and delta complex. These terraces were formed by fluvial-deltaic deposition during maximum sea level periods and under glacial minimum conditions during the middle to late Pleistocene (Paine 2000). Overlying the terraces are extensive windblown deposits of sand and clay dunes, interspersed with sand sheets and localized wind deflation areas. Holocene stabilized sand dunes occur as broad, segmented expanses of northwestward-trending eolian deposits (Mallouf et al. 1977:9–10). These deposits usually have a height of 1 to 9 m. The surface relief of the stabilized sand dunes is typically undulating with occasional eolian depressions of varying size and shape (Mallouf et al. 1977:9–10). Because of the active nature of these windblown deposits, archeological sites may be repeatedly buried and eroded. In addition, the depressions that can occur in them possess the capability of retaining water for a limited time after rains and, given the importance of water in the arid landscape, would have been attractive to prehistoric animals and people.

A primary characteristic of the Rio Grande is its meandering. Changes in the river's course can be seen historically on many of the maps of the area. This meandering has undoubtedly had an adverse impact on buried cultural deposits, as channel movements can coincide with wide scale landform erosion from scouring during times of overbank flooding, as the increase water flow seeks out less resistant paths. Periods of activity are usually generated by the passing of intense tropical storms or hurricanes over the area and are marked by the activation of point bar accretions, levee and crevasse splay building, and floodwater discharge into flood basin and interdistributary areas. With the passing of the storms, periods of inactivity occur (Brown et al. 1980).

In many cases, however, the stream simply abandons its previous course, creating oxbow lakes, particularly in areas of sharp bends. Such abandoned meander belts are locally known as resacas and are surrounded by land known as bancos. Of importance to the present study are the Lozano Banco and the Jeronimo Banco.

Soils

The project survey corridor traverses a mostly rural environment surrounded by pastures, agricultural fields, and forested lands. Agricultural activities and some urban development such as road and ditch construction have impacted the original landscape. These impacts slightly reduce the likelihood of encountering historic and prehistoric cultural artifacts in an undisturbed context.

According to the *Soil Survey of Cameron County, Texas* (Soil Conservation Service 1977), the cultural resources survey corridor crosses seven soil mapping series including Benito, Chargo, Harlingen, Laredo, Lamolta, Olmito, and Tiocano (Table 1).

Benito Series

The Benito series consist of deep, poorly drained, very slowly permeable soils that formed in calcareous alluvial sediments. These soils are on nearly level terraces above normal overflow. Located on old flood plains and deltas, Benito clays are highly erodible soils. Slopes are less than 1 percent.

Table 1. Soils Present Within Survey Corridor

Soil Series	Mapping Unit	Texture	Order
Benito	Benito Clay (BE)	Clay	Vertisol
Chargo	Chargo Silty Clay (CH)	Clay	Inceptisol
Harlingen	Harlingen Clay (HA)	Clay	Vertisol
	Harlingen Clay Saline (HC)	Clay	Vertisol
Laredo	Laredo Silty Clay Loam (LAA)	Silty Clay Loam	Mollisol
	Laredo Silty Clay Loam, Saline (LC)	Silty Clay Loam	Mollisol
	Laredo-Olmito Complex (LD)	Silty Clay Loam	Mollisol
Lomalta	Lomalta Clay (LM)	Clay	Vertisol
Olmito	Olmito Silty Clay (OM)	Silty Clay	Mollisol
Tiocano	Tiocano Clay (TC)	Clay	Vertisol

Chargo Series

The Chargo series consist of very deep, moderately well drained, slowly permeable soils that formed in calcareous silty and saline clayey alluvial sediments. These nearly level soils are on ancient stream terraces. Slopes are less than 1 percent.

Harlingen Series

The Harlingen series consist of deep, moderately well-drained, calcareous soils. These level-to-nearly level soils occur on old flood plains and deltas. Runoff is slow, making them prime areas for irrigated crops. Slopes are less than 1 percent.

Laredo Series

The Laredo series consist of very deep, well-drained, moderately permeable soils that formed in calcareous, silty alluvium derived from mixed sources. These nearly level to very gently sloping soils are found on tributary drainage ways or Holocene stream terraces. Slope ranges from 0 to 3 percent.

Lomalta Series

The Lomalta series consist of very deep, poorly drained calcareous, saline clays that formed in clayey deltaic sediments. These very slowly permeable soils are found on nearly level coastal plains slightly above sea level. Slopes are less than 1 percent and surfaces are plane to concave.

Olmito Series

The Olmito series consist of deep, moderately, well-drained calcareous soils, saline clays that are found on old flood plains and deltas. Slopes are less than 1 percent and surfaces are plane to weakly concave. Runoff is slow, and is used for irrigated crops and pasture.

Tiocano Series

The Tiocano series consist of deep, somewhat poorly drained soils that occur in small enclosed depressions that generally 1 to 3 ft lower than the surrounding nearly level topography. Permeability is very slow, and runoff is ponded. Slopes are less than 1 percent.

III. CULTURAL SETTING

This chapter presents information concerning the cultural setting of the proposed project area by providing a chronological summary of human occupation in the region. This chapter summarizes the prehistoric setting and different prehistoric and historic time periods followed by a brief description of the results of the review of previous archeological investigations and recorded sites within 0.5 mile (0.8 kilometer) of the project location.

PREHISTORIC TIME PERIODS

The prehistory of the Lower Rio Grande Valley of Texas and Tamaulipas is poorly understood. Archeological investigations have primarily been limited to surface collections by professional and amateur archeologists. To date, no extensive controlled excavations have been undertaken in the area, and with the exception of occasionally found burials, definable subsurface components, and/or stratigraphy are only rarely found south from Baffin Bay to the Rio Grande.

The earliest and most extensive work in the area is that of A.E. Anderson. From 1908 to 1940, Anderson, a civil engineer by training, collected and kept accurate records on data from almost 400 sites in Cameron County and adjacent parts of Tamaulipas, Mexico. In 1932, he published a brief description of his artifacts from the Brownsville area (Anderson 1932). Artifacts from his collection are generally typical of cultural material found on the Lower Rio Grande Delta, and his collection reflects the predominance of a shell-working industry that has frequently been called the outstanding characteristic of the area by later investigators. Many professional archeologists have relied heavily on the Anderson Collection as a supplement to their own survey data in making interregional comparisons and in establishing chronological schemes (Campbell 1947; Jackson 1940; MacNeish 1947; Pierce 1917; Prewitt 1974; Sayles 1935).

Paleoindian Period (11,500 to 8000 B.P.)

The earliest evidence of man in the Americas is generally accepted as being represented by the Paleoindian period. Although intact deposits containing evidence of Paleoindian occupations are unknown in South Texas, evidence from sites in adjacent regions suggests the period was characterized by low population density, small bands, and large territorial ranges of nomadic groups that subsisted by hunting Late Pleistocene megafauna. During this period, great expanses of land were inundated by the rising sea levels brought on by the melting of the glacial masses at the end of the Pleistocene. The final rise in sea level began about 18,000 years ago with the present coastline being achieved some 3,000 years ago (Brown et al. 1976). No Paleoindian sites have been found in the immediate project area. Anderson's collection contains one *Clovis* point base, an isolated find reportedly found near the Laguna Atascosa National Wildlife Refuge. W.A. Price saw mammoth bones eroding in the same vicinity in later years (Suhm et al. 1954). It should be pointed out, however, that the barrier island and riverine systems of the Lower Rio Grande

Valley are very dynamic environments (e.g., Morton and Pieper 1975); thus, preservation of sites dating to the Paleoindian period would not necessarily be expected.

Archaic Period (8000–1200 B.P.)

The Archaic period witnessed a shift to an exploitation of a wider range of plant and animal species, coupled with a decrease in mobility that was probably associated with climate change. Perennial steams existed in some areas of the local draws, but extensive freshwater ponds producing diatomaceous muds also began to appear where discharge declined. Water in the lakes and ponds fluctuated, sometimes completely drying up. By the end of the period, many of the streams ceased to flow and the diatomite lakes evolved into muddy marshes. The transition from flowing water to standing water represents a dramatic hydrologic change in the area. The widespread decrease in water was the result of decrease in regional effective precipitation from the late Pleistocene to the early Holocene. This decrease affected both runoff and spring discharge. Paleontological data (Graham 1987; Johnson 1986) document this environmental change as well as sedimentologic and stratigraphic information (Holliday 1995), which caused streams that formerly flowed year-round to dry up.

Such a drastic, though perhaps gradual, loss of primary food sources exploited during the Paleoindian period would have caused considerable cultural stress. It was probably this stress that caused a shift of attention to previously unexploited plants and animals. Throughout the Americas, the archaic was a time of increasing technological (and probably social) complexity. Toolkits become larger, and through time the many regional differences slowly coalesced into more-homogenous forms. This includes an emphasis on the exploitation of marine resources in coastal zones (Terneny 2005). The Archaic period is often divided into the Early, Middle, and Late periods; however, the period is poorly understood in the Lower Rio Grande Valley. While recognized Archaic dart points in the Anderson collection indicate the presence of Archaic peoples in the area, sites dating to this time, especially Early and Middle Archaic sites, are rarely encountered and have been limited to surface finds. Late archaic sites are more common, but are often mixed with Late Prehistoric-aged deposits (Kibler and Freeman 1993).

Late Prehistoric Period (circa 1200 B.P.–A.D. 1600)

The bulk of our knowledge of the archeology of the Late Prehistoric in South Texas is from MacNeish's (1958) definition of two closely related complexes, the Brownsville and Barril, for the Lower Rio Grande area. This cultural complex has been defined on basic analysis and characteristics observed from small surface collections, salvage excavations, and a small number of cultural resource surveys. Common to both complexes are shell disks, pierced shell disk beads, plugs made from a columella that are round in cross section, rectangular conch shell pendants, mollusc shell scrapers, and Starr, Fresno, and Matamoros projectile points. Intrusive artifacts include pottery of Huastec origin from southern Tamaulipas, which appears in occupation sites and in burials (Anderson 1932; MacNeish 1947; Mason 1935), as well as obsidian and jadeite used in pendants. Burials of individuals are tightly flexed and located away from living areas.

The Late Prehistoric occupation of the area by hunter-gatherer inhabitants has been often referred to as the "Brownsville Complex." This complex has been defined on basic analysis and characteristics observed from small surface collections, salvage excavations, and a small number of cultural resource surveys. However, Terneny (2005:225) argues that the ". . . [Brownsville Complex] artifact sets thought to be present only in the Late Prehistoric burial situations were present in the Archaic as well." She goes on to say: "As such, the 'Brownsville Complex' must be redefined in terms of its presence in the Archaic and Late Prehistoric; cemeteries and burials that contain 'Brownsville Complex' artifacts cannot automatically be assumed to belong to the Late Prehistoric" (Terneny 2005:225).

Although a hunting and gathering life way continued in the Late Prehistoric as in the Archaic, the material culture, hunting patterns, settlement types, and other facets of the era mark a fairly distinctive break with the past (Turner et al. 2011). In this time period, the bow and arrow and pottery are introduced, along with other distinctive types of stone tools (Turner et al. 2011). As with any time period distinction, there is limited evidence to suggest that a new phase of cultural history was launched by the immigration of new peoples into the region as opposed to cultural diffusion or by the coming of a radically new mode of subsistence such as agriculture. The mode of organization of the Late Prehistoric people appears to mirror the full expression of traits already in existence. Therefore, it appears the Late Prehistoric societies took certain practices begun in the Archaic period and refined them to various degrees, which ultimately transformed the whole way of life.

Historic Period (1600–Present)

Historic Indian sites are distinguished by the presence of both European and nonaboriginal American trade goods that date from the sixteenth through mid-nineteenth centuries. Debris on Historic Indian sites indicates a continuing nomadic hunting and gathering existence. One site from this time period is the Garcia's Pasture site, 41CF8, north of the project area.

Colonial Contact and Early Settlement Period

The Lower Rio Grande Valley, with its rich and diverse history, has long played a pivotal role in the history of the vast territories that extend on either side of the river. Because of its strategic location upstream from the mouth of one of the great waterways of North America, the region has been an important center of activity since the sixteenth century. Spain was the first European nation to lay claim to the region including present-day Cameron County and to make contact with the Native American groups living in the region. Spanish exploration in the Rio Grande Valley may have occurred as early as 1528 when Àlvar Núñez Cabeza de Vaca reportedly traveled through the area following his shipwreck in the Gulf of Mexico (Covey 1972); however, this theory remains unsubstantiated. After a series of attempts to settle other areas in the Lower Rio Grande Valley by Gonzalo de Ocampo (1523), Sancho de Canielo (1528), and Pedro de Alvarado (1535) proved unsuccessful, Spanish activity in the area centered on maintaining their sovereignty over the region rather than on encouraging colonization. As a result, subsequent exploration of what became Cameron County was only initiated in response to feared encroachment by other European nations (Dixon et al. 2003).

For example, in 1638, Jacinto García de Sepulveda crossed the Rio Grande from Mexico (then Spanish territory) in search of Dutch sailors reported to be in the current Hidalgo County area. The expedition "marched down the north bank of the river as far as the site of present Brownsville" (Garza and Long 2013b). Other excursions into the region were made by Alonzo de León in 1687 in search of a French fort on the Texas coast and in 1747 by Miguel de la Garza Falcón, who traveled north of the Rio Grande in search of an area in which to establish a settlement. Falcón was unimpressed and characterized the land north of the river as unfit for settlement or for stock raising (Garza 2011).

Permanent settlement in present day Cameron County during the Spanish Colonial period was initiated with the establishment of the community of San Juan de los Esteros (or present-day Matamoros) along the southern banks of the Rio Grande. Ranchers there often used the lands along the northern bank of the river as pasture for their livestock. In 1781, the Spanish government "granted fifty-nine leagues of land . . . on the north bank of the river (including the entire site of Brownsville) to José Salvador de la Garza." He established a ranch in the area, and though several other grants were issued in present day Cameron County during the Spanish and Mexican periods, it was still sparsely settled at the advent of the Texas Revolution (Garza and Long 2013b).

Early landowners found the land conducive to livestock ranching, and several large-scale ranches formed in the Lower Rio Grande area. Small communities of ranch workers and their families soon developed in association with these ranches. Ranching continued to characterize the region's economy through the remainder of the eighteenth century and into the period of Mexican sovereignty. As original grantees died and passed their lands to their heirs, the large ranches began to be subdivided. Through these subdivisions, new communities developed, and settlement expanded to more remote parts of the region.

Mexican Sovereignty and the Texas Republic Era

Mexico received its independence from Spain in 1821, and the new government continued the practice of encouraging settlement in the lower Rio Grande Valley, "especially along the navigable stretch of the river between the Gulf and Roma in Starr County" (Dixon et al. 2003). During this period, scattered ranching enterprises continued to characterize the local landscape. The key shift in local development that occurred during the brief period of Mexican ascendency involved the increasing importance of trade to the regional economy, which was a result of and in turn prompted an influx of American and European entrepreneurs and settlers "seeking economic opportunities" (Dixon et al. 2003).

It was also during this period that steamship service was inaugurated along the Rio Grande. Henry Austin, a cousin of Stephen F. Austin, arrived with his steamer *Ariel* from New York on June 29, 1829. Despite Austin's grand intentions, the operation of the steamboat was not profitable. The difficulty of navigation on the river and the lack of cooperation and participation among Mexican merchants were prime factors for its abandonment in September 1830. Austin then took the vessel to the Brazos River (Graf 1942). Although its impact on commercial trade was hardly noticeable, the arrival of Austin's steamboat ushered in an era that gained considerable significance in subsequent decades.

Texas' struggle for independence, for the most part, bypassed the Lower Rio Grande Valley, as most military and political events took place farther north. Following the war's conclusion, 4,000 soldiers of Santa Anna's defeated army converged on Matamoros and depleted much of the available food supplies. Commerce and trade in the town and nearby areas diminished with this sudden influx, but its effects were only temporary. Soon, the economy rebounded, and residents returned to their pre-war lifestyles (Thompson 1965).

After the Republic of Texas was officially formed and was truly independent of Mexico, territory between the Rio Grande and Nueces River was claimed by both countries. The inability of each government to effectively control or exert much influence in this area left many residents vulnerable to attack by Indians and roaming bands of "soldiers" of both countries. Another event that increased tensions occurred in 1839 when Francisco Viadaurri and others declared that a new nation, the Republic of the Rio Grande, was being formed from the Mexican states of Nuevo Leon, Chihuahua, Coahuila, and Tamaulipas, including the Lower Rio Grande. Laredo, a settlement established in 1755 by Jose de Escandon was selected as the capital of the newly formed republic. Unlike the Texas war for independence, this rebellion was successfully quelled by Mexican forces (Webb 1952 I).

The Mexican War

Disputes between Mexico and the United States erupted into full-scale warfare over the location of the boundary between the two countries. The United States recognized the Rio Grande as the sole boundary, while Mexico recognized the Rio Grande only to the headwaters of the Nueces River and from that point following the Nueces to its mouth near Corpus Christi. Present-day Cameron County was part of the disputed territory during the Mexican War. The dispute reached an impasse and President James Polk, in an effort to reinforce the American position, ordered General Zachary Taylor's army to the disputed areas. Taylor's infantry, artillery, and support units arrived in Corpus Christi via steamer from New Orleans, while his dragoons traveled overland from San Antonio.

Personnel from his army surveyed the area across from Matamoros, selecting a site for the army's encampment.

Taylor's army arrived at the Rio Grande following a brief skirmish with Mexican irregulars at Arroyo Colorado. Taylor immediately began receiving dispatches from the Mexican commander General Mejia ordering the Americans to withdraw from the Rio Grande. When Taylor refused, the Mexican army placed artillery along the riverbank south of the fort. Taylor responded by placing his own heavy artillery in position to fire on Matamoros and ordered his chief engineer, Captain Joseph K.F. Mansfield to construct defensive works. Mansfield constructed a six-sided earthen bastion, 800 yards in circumference, with walls 8.5 to 9 feet in height and surrounded by a ditch 20 feet wide and 9 to 10 feet deep. The fort's earthen ramparts were topped by wood and mud parapets and the bastions were protected by sandbag merlons between gun embrasures (Mahr-Yanez and Perttula 1995). Before the fort could be completed, Taylor was informed by Captain Walker of the Texas Rangers that Mexican General Arista, now commanding the Mexican forces, had crossed the Rio Grande downstream from the American army and was marching towards the American base at Port Isabel. Taylor, in a night march, beat the Mexican army to Port Isabel and secured his supply line. In his absence, he left Major Jacob Brown in command of the newly constructed fort, along with the 7th U.S. Infantry.

On May 3, the Mexican artillery opened fire on the fort. Major Brown responded with his artillery, destroying one Mexican gun and forcing the Mexicans to reposition the others. The Mexican infantry next attacked but were repulsed. In an artillery bombardment on May 6, Major Brown received a mortal would, dying on the afternoon of May 9.

After securing his supply base at Port Isabel, General Taylor returned to relieve the fort's defenders. On the return march, his forces encountered those of General Arista at Palo Alto and Resaca de la Palma and inflicted severe casualties, forcing the Mexican army to retreat. Upon learning of Major Brown's death, Taylor ordered the fort named after him and pursued the Mexican army into Matamoros.

All subsequent fighting took place within Mexico, thus, the battles at Palo Alto and Resaca de la Palma were the only ones north of the Rio Grande. The current project area is located between the battlefields associated with both conflicts. Hostilities ceased with the signing of the Treaty of Hidalgo on July 4, 1848. Provisions of this agreement established the Rio Grande as the boundary between the two countries, but also recognized land titles issued by the Spanish and Mexican governments. All public lands, however, were granted to the State of Texas (Thompson 1965). At the conclusion of the war with Mexico, counties were formed throughout southern Texas. Cameron County was created by the Texas legislature and originally included 3,308 square miles "including parts of Hidalgo, Willacy, Kenedy, and Brooks Counties" (Garza and Long 2013b).

Another significant event during this period was the designation of the Old Military Road. Zachary Taylor oversaw the laying out of this road that connected Brownsville and Rio Grande City. The route, roughly paralleling the Rio Grande, became a major transportation artery through the area, linking many established communities and providing the impetus for the foundation of more communities along its reach during the antebellum period. The route likely paralleled or followed established trails linking area ranches and associated communities. Following the Mexican-American War, the road continued to serve as a shipping route for cotton and other goods and as the Rio Grande valley's main travel artery. The road was paved and improved by the 1960s and still serves as a major transportation thoroughfare for the region (Jones 2011).

Nineteenth-Century Ranching and the Transition to Commercial Cultivation

By 1850, a number of large ranches were operating in present-day Cameron County. The ranches not only served as the economic mainstay for residents, but also influenced local community development during the eighteenth and nineteenth centuries. Ranching continued to be an important part of the local economy into the twentieth century; however, the advent of irrigation and amplified Anglo-American migration to the area increased the significance of commercial agriculture during the period.

One example of an early commercial agricultural operation that served as a model for later operations throughout the Rio Grande Valley was the San Juan Plantation located in adjacent Hidalgo County. The plantation's founder John Closner began acquiring land in the area in 1884, and his plantation eventually contained 45,000 acres. He was an innovator in the area and transformed the land through a system of irrigation canals and a water pumping plant, creating the first irrigation system from the Rio Grande. These efforts inspired the extensive irrigation systems now present throughout the region. Diverse crops were grown on the plantation, including sugarcane, alfalfa, tobacco, vegetables, fruits, melons, and nuts, and he traded on both sides of the river. Many families worked on the plantation, and a community developed in the area with a school and general store (McKenna 2011; Texas Historic Sites Atlas 1964). George Paul Brulay introduced irrigation on a small scale near Brownsville in 1876, but irrigation remained limited through the turn of the twentieth century (Garza and Long 2013b).

Railroad Era and Early-twentieth-century Development

The arrival of the St. Louis, Brownsville and Mexico Railway to the Rio Grande Valley in 1904 dramatically affected regional development patterns and increased the significance of commercial agriculture further. New communities sprang up along the railway and subsequent lines that intersected this route, and old settlements originally founded around ranches grew into sizable communities. For example, the towns of Harlingen and Brownsville grew significantly after the arrival of the railroad. Harlingen was founded in 1904, the same year the railroad arrived in the area. Early promoters thought the nearby Arroyo Colorado could be used as a commercial waterway; however, like other communities in the region, the city's economy was based almost solely on agriculture during the early twentieth century (Gilbert 2013).

Brownsville already existed prior to the arrival of the railroad, though development there had stagnated dramatically during the postbellum period due to lack of railroad access and a deepwater port facility. After the construction of the railroad, not only did the agricultural economy of the area diversify with the planting of the first citrus crop in 1904, but rail access also initiated dramatic infrastructure improvements in the community as the city sought to make itself appealing to the influx of new immigrants from the American Midwest. Growth continued through the first decades of the twentieth century, and in the 1930s, the Port of Brownsville and associated shipping channel opened, making the city an international trading port (Garza and Long 2013a).

Irrigation and the Creation of the "Magic Valley"

Contemporaneous with the emergence of the railroad and its influence on local community and economic development patterns, irrigation was also advancing in Cameron County. Advances in irrigation technology and the development of major irrigation systems increased both large-scale commercial farming and small-scale irrigated farming in the area. Between its inception and the 1920s, irrigation was the impetus for a steady pattern of Anglo-American land promotion that altered the demographic, physical, political, and economic character of the entire Rio Grande Valley. The recruitment procedures for new residents became formulaic during this period. The process is described in detail in the NRHP nomination for the Louisiana-Rio Grande Canal Company Irrigation System (Meyers [Myers] and Weitze 1995):

> Valley land promotion from 1904 through the 1920s followed an elaborate, highly orchestrated procedure. A group of private investors obtained a large parcel of land with access to the Rio Grande where they established an irrigation system. Using cheap, primarily Mexican American labor, they financed the construction of pumping plants and irrigation canal systems. These systems extended throughout their property, which was subdivided into 20- to 80-acre farm plots. Simultaneously, the consortiums promoted their farms through mass distribution of glossy brochures that extolled the valley's many virtues—both real and imagined—particularly to midwestern [*sic*] farmers. . . . Interested parties contacted sales agents who enticed them to the valley on excursion trips that land companies either partly or wholly subsidized.

Many of the new settlers considered themselves civilizers and pioneers and tended to alienate or suppress the political and civil rights of the Mexican and Mexican-American residents who had lived in the area for centuries. Tension between the groups erupted into violence or unrest at various times during the twentieth century, particularly as the number of Mexican citizens seeking asylum from the unrest at home and/or economic opportunities in the United States increased during the early twentieth century. Many found work as underpaid farm labor on the newly irrigated lands of the Anglo immigrants or even as workers constructing the elaborate irrigation systems that made the region's transition into the "Magic Valley" possible.

The trend of increased irrigated farming and railroad expansion continued through the 1930s as more railroad companies built lines through the area and irrigation improvements continued to multiply. The area's transition from a ranch-based economy to one based on truck farming was complete by 1930, when there were 2,936 farms in Cameron County, "more than double the number in 1920." As in other areas of the state, the majority of the farms engaged in cotton cultivation during the early twentieth century (Garza 2011; Garza and Long 2013b), although truck farming was also significant to economic development in the county during the period. Archeologists recorded components of the historic-age Brownsville Irrigation District within the project vicinity.

Concurrent with the implementation of irrigation in the region, steps were taken to control periodic flooding along the Rio Grande that, along with periods of drought, had plagued agricultural development in the area. In 1892, W.H. Chatfield was the first to propose development of a levee system for the Lower Rio Grande Valley that would address irrigation needs and flood control. His plan included a series of levees, canals, and floodgates built around the *resacas* to collect water during times of flooding and to distribute it in times of need (Matthews 1938:53–54). His plan was not directly implemented, but may have influenced John Closner's development of an irrigation system on his sugarcane plantation in 1895. Nevertheless, early canals did little to alleviate flooding in the area, and flooding concerns were confronted in 1924 and again in 1925 when bond issues were passed to build levees along the Rio Grande from Donna to Brownsville (Borunda 2007).

Though the levees were a limited success, the 1933 Brownsville Hurricane caused severe flooding that resulted in a massive realignment of the Rio Grande. As a result of this and many other river realignments, the original levees roughly follow the course of the river as it ran in 1903, with the river's current position ½ mile to the southwest. Historic map research suggests that the 1924/1925 levee system was subsequently adapted for irrigation purposes and is now located around *resacas.* The 1933 flood also demonstrated that a levee system located only on the American side was insufficient to control flooding in the area. In 1932, the International Boundary Commission recommended that floodways be constructed on either side of the river. These recommendations led to the construction of "300 miles of river and floodway levees, improvements, and control works" (Borunda 2007). The work was completed in 1951.

Mid- to Late-twentieth-century Development

Unlike other areas in Texas and the country as a whole, the population and number of farms in the Rio Grande Valley increased during the Great Depression. This was due in part to the discovery of oil in 1934, which continued to represent an important part of the local economy through the remainder of the twentieth century (Garza 2011). Besides its economic impact, the success of the oil and gas industry also resulted in significant alterations to the local built environment, as oil and gas wells and related roadways became a common interruption in the agricultural landscape. Other extractive industries, such as sand and gravel quarrying, also aided the region's economic development and altered the local landscape.

In the 1960s, a decline in the cotton market resulted in a dramatic reduction in land values in the region, and many farmers sold all or portions of their land to developers. Some of these developers platted new subdivisions near cities, where employment opportunities were available in processing and other fields. In more-rural areas, some sold small plots at exorbitantly low rates to low-income families. These areas, known as *colonias,* were located outside of city limits on unfavorable farmland and were largely unregulated and without public services. These communities were characterized by squalid living conditions and a lack of public works services. Many of the houses were constructed by hand of scrap material, and residents obtained water from tainted wells or brought water in from incorporated areas, often in contaminated containers. By the 1980s, activists began urging officials to act regarding the high rates of disease in border *colonias,* but despite these efforts, no legislation was passed (García 2011). Many of these *colonias* remain in the area and are home to low-income farm laborers and their families.

Cameron County continues to depend heavily on large-scale agricultural production, processing, and transportation, though commercial agricultural corporations have replaced the independent growers as the biggest producers. The Old Military Road is now part of U.S. Highway 281, which links several international border-crossing points along the Rio Grande and continues north to the Oklahoma-Texas state line. Since the passage of the North American Free Trade Agreement in 1994, truck-transport traffic along the highway has increased in the region as more imports from Mexico are brought to the United States (Vigness and Odintz 2011). Other important facets of the area's economy and development at present include oil and gas extraction and tourism.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS AND SITES

Atkins conducted a records search to locate recorded cultural resource properties resources within 0.5 mile of the proposed water reuse pipeline. A review of the files and maps at the Texas Archeological Research Laboratory (TARL), the Texas Historical Commission's (THC) on-line Restricted Archeological Sites Atlas, and the National Park Service's NRHP database and GIS Spatial Data, Geographic Resources Program National Historic Trails Map Viewer, as well as the National Historic Landmarks Program identified one previously recorded archeological site, 41CF3, within 0.5 mile of the proposed waterline. Site 41CF3 is the Resaca de la Palma Battlefield, which has never been fully delineated. Currently, the centroid for the archeological site is located where the burials associated with the battle are located, within the NHL boundary. Neither the burials nor the NHL boundary as currently defined are within 0.5 mile of the proposed water reuse pipeline route. However, because the archeological site boundary has never been fully delineated, it cannot be said with certainty whether portions of the battlefield extend within the area of potential effect (APE) of the proposed waterline. Additionally, while a portion of the waterline falls within the Brownsville Irrigation District, those resources have been determined ineligible for NRHP inclusion under any of the applicable criteria.

No additional previously recorded cultural resources were identified in the records search. The proposed waterline has not been previously archeologically investigated. However, various surveys have been conducted within and adjacent to the proposed waterline project. Early investigations in the area include those of A.E. Anderson from 1917 to 1941. Anderson provided much of what is known about the Brownsville-Barril complex of the Rio Grande Delta. The land clearing, agricultural modification, and urban development of the area post World War II has likely destroyed many of the sites recorded by Anderson (Texas Beyond History 2013). More recently, the U.S. Environmental Protection Agency (EPA) has conducted a variety of studies mostly associated with ditch construction in 1982, 1986, and 1999. The Federal Highway Administration/Texas Department of Transportation (TxDOT) conducted a survey in 1995 for the Paredes Line Road. A survey was conducted to the west of the proposed waterline in 2002 for the USACE-VD, Border Patrol, and Department of Homeland Security. An archival research and survey project was conducted in 2004 by Hicks and Company on behalf of TxDOT for the Texas Historic Battlefield Trails Southern Pacific Linear Park (King and Feit 2005). An additional survey was conducted to the south of the proposed project in 2005 by QORE Environmental on behalf of U.S. Department of Housing and Urban Development. SWCA conducted two surveys on behalf of TxDOT for the SH 511 expansion project; one consisted of archival research and survey (Bonine 2006), while the second included an intensive cultural resources and metal detector survey (Bonine et al. 2009). SWCA also conducted a reconnaissance study and survey on the north side of SH 511 in 2003 for the Southmost Regional Water Authority (Houk and Barile 2003).

IV. FIELD METHODS AND RESULTS OF INVESTIGATIONS

This investigation was performed in compliance with the National Historic Preservation Act of 1966 (PL 89-665), as amended, and TAC (Texas Natural Resources Code of 1977, Title 9, Chapter 191) (Texas Antiquities Permit No. 6643); and in accordance with the Procedures for the Protection of Historic and Cultural Properties (36 CFR 800), the Rules of Practice and Procedure (TAC, Title 13, Chapter 26,) and guidelines set forth by the Council of Texas Archeologists and the Register of Professional Archaeologists.

Soils in the project area date from the Pleistocene, Pliocene, and Holocene; the age of the soils roughly correlates with their position relative to the Arroyo Colorado. In general, soils north of the Arroyo Colorado are Pliocene and Pleistocene in age, although there are some Holocene-aged soils within the floodplain north of the Arroyo Colorado. South of this waterbody, the soils are Holocene in age (Bureau of Economic Geology 1976), and so could have the potential to harbor archeological deposits.

Shovel testing was conducted in areas with less than 30 percent visibility that did not show clear evidence of heavy disturbances. Where feasible, shovel tests were excavated to a depth where pre-Holocene sterile substrates were encountered. Where clay soils are encountered, the shovel tests were excavated to 30 cm. All soil matrices were sifted through 6.3-millimeter (¼-inch) mesh hardware cloth unless the matrix is dominated by clay. Clayey matrix were be finely divided by trowel and visually inspected.

For each of the shovel tests, the following information was recorded on Atkins shovel test logs: location, maximum depth, and the number of soil strata. For each soil stratum, thickness, texture, color, and the presence or absence and nature of cultural materials will be recorded. All shovel tests will be backfilled upon completion.

During the field survey efforts, archeologists photographed any aboveground irrigation resources within or extending into the survey corridor and mapped their locations. Following completion of the survey, all recorded data was returned to for evaluation during production of this report. All documents associated with the field effort will be submitted to TARL for permit curation.

RESULTS OF FIELD INVESTIGATIONS

In September and October of 2013, Atkins conducted a cultural resources survey for the proposed new 30-inch diameter effluent water pipeline project for the City of Brownsville Public Utilities Board. The survey corridor consisted of 7.57 miles (11.27 kilometers) and extended from the Robindale Wastewater Treatment Plant to the future Teneska Generating Station. More specifically, the project area intersects the East Brownsville, Los Fresnos, and Olmito, Texas, USGS 7.5 minute series topographic quadrangle maps.

The survey corridor traversed a mostly urban environment interspersed with a few small undeveloped areas. Development in the area, including road construction, construction of a hike-and-bike trail along a former rail line, a canal, a levee, and urban and commercial development, has impacted the original topography, changed the face of the landscape, and eliminated most of the natural topographic contours. Areas of tall grass, scrub brush, and cactus patches are also present.

The survey was conducted within a corridor that measured no more than 120 ft (36.58 m) wide but and no less than 50 ft (15.24 m) wide. A total area of approximately 99.56 acres (40 hectares) was surveyed during this project. All portions of the project area were visually inspected, though not all areas were shovel tested. Ground visibility was generally poor, ranging from zero to 20 percent throughout much of the project area; however, in some areas, visibility ranged from 30 to 80 percent.

A total of 31 shovel tests were excavated. Shovel tests were typically terminated between 30 cm (11.81 inches) and 50 cm (19.69 inches) below surface at the clay subsoil. All 31 shovel tests were culturally sterile. Therefore, no previously unrecorded prehistoric archeological sites were found as a result of this effort.

A pedestrian survey of the Cambridge Investment properties along the northwest end of the line showed heavy disturbance along the length and width of the survey corridor (Figures 3 and 4). In the proposed generating station, ground surface visibility was good across most of the area. Four shovel tests were excavated in the areas of poor ground surface visibility. All four shovel tests were culturally sterile.

Much of the northern survey corridor overlaps a paved hike-and-bike trail, which had been constructed on an old railroad grade. Disturbance is visible along the entire length and width of the APE adjacent to the trail (Figures 5–8).

The hike-and-bike trail terminates at Morrison Road and follows Morrison Road for several feet before following a drainage canal and levee road. The portion of the survey corridor paralleling the canal is covered with low lying tall grass and patches of cactus. There is heavy disturbance due to construction of the canals (Figures 9–13). Ground visibility was generally poor near Mile Post (MP) 1, but visibility increased nearer MP 2. Nine shovel tests were judgmentally placed at the base of the levee berm in areas with the poorest visibility. All nine shovel tests were culturally sterile.

Just past MP 2, one shovel test was placed to the side of an old gravel road located within the survey corridor. This shovel test was also culturally sterile.

Just north of MP 4, where the survey corridor crosses the Resaca Del Rancho, another four shovel tests were conducted. All were culturally sterile. These shovel tests contained heavily disturbed soils with gravels and fill dirt presumably associated with urban development and past construction activities.

Figure 3: Cambridge Investment Property, ROW overview, facing east

Figure 4: Cambridge Investment Property, northeast corner of Levee Road, facing south

Figure 5: Northern end of hike-and-bike trail showing disturbance

Figure 6: Hike-and-bike trail, facing southwest

Figure 7: Hike-and-bike trail at Dennett Road

Figure 8: Southern terminus of hike-and-bike trail at Morrison Road

Figure 9: Levee Road at edge of housing development, facing east-southeast

Figure 10: Levee Road abutting housing development, facing north

Figure 11: Canal paralleling ROW, facing west-northwest

Figure 12: Canal paralleling ROW, facing west-northwest

Figure 13: Southeast terminus of canal showing disturbance

A pedestrian survey with judgmental shovel testing within the survey corridor located closest to site 41CF3 (near MP5 and south) did not indicate any areas of concern. A total of 10 shovel tests were excavated in the area south of MP 5, confirming the presence of disturbed soils associated with the canal embankment (Figure 14) and urban development (Figures 15 and 16). A large open field located in the area of 41CF3 was visible southwest of the survey corridor; however, much of the area near the survey corridor is covered by urban development. Where the survey corridor is nearest to the 41CF3 boundary, disturbances from canal construction and urban development are likely to have obliterated any battle-related features if they were ever present in the corridor. All of the shovel tests encountered disturbed soils.

Between MP 6 and MP 7, archeologists observed and photographed one aboveground irrigation resource (a concrete standpipe) within the survey corridor and mapped it location, (Figure 17). The field data were compared to irrigation district maps prepared by Texas A&M University's Irrigation Technology Center to determine if the feature was a component of an established irrigation district. This review resulted in the identification of two sections of underground pipeline that were not recorded during the field survey effort. All of the features are within the Brownsville Irrigation District, which was determined ineligible for NRHP inclusion by the THC in October of 2008 (Figure 18). No other irrigation resources associated with an established irrigation district were recorded within the project APE.

Figure 14: Shovel Test near MP 6 showing mottled disturbed clay

Figure 15: Bridge and trail construction within survey corridor.

Figure 16: Project ROW looking west along irrigation canal

Figure 17. Concrete standpipe

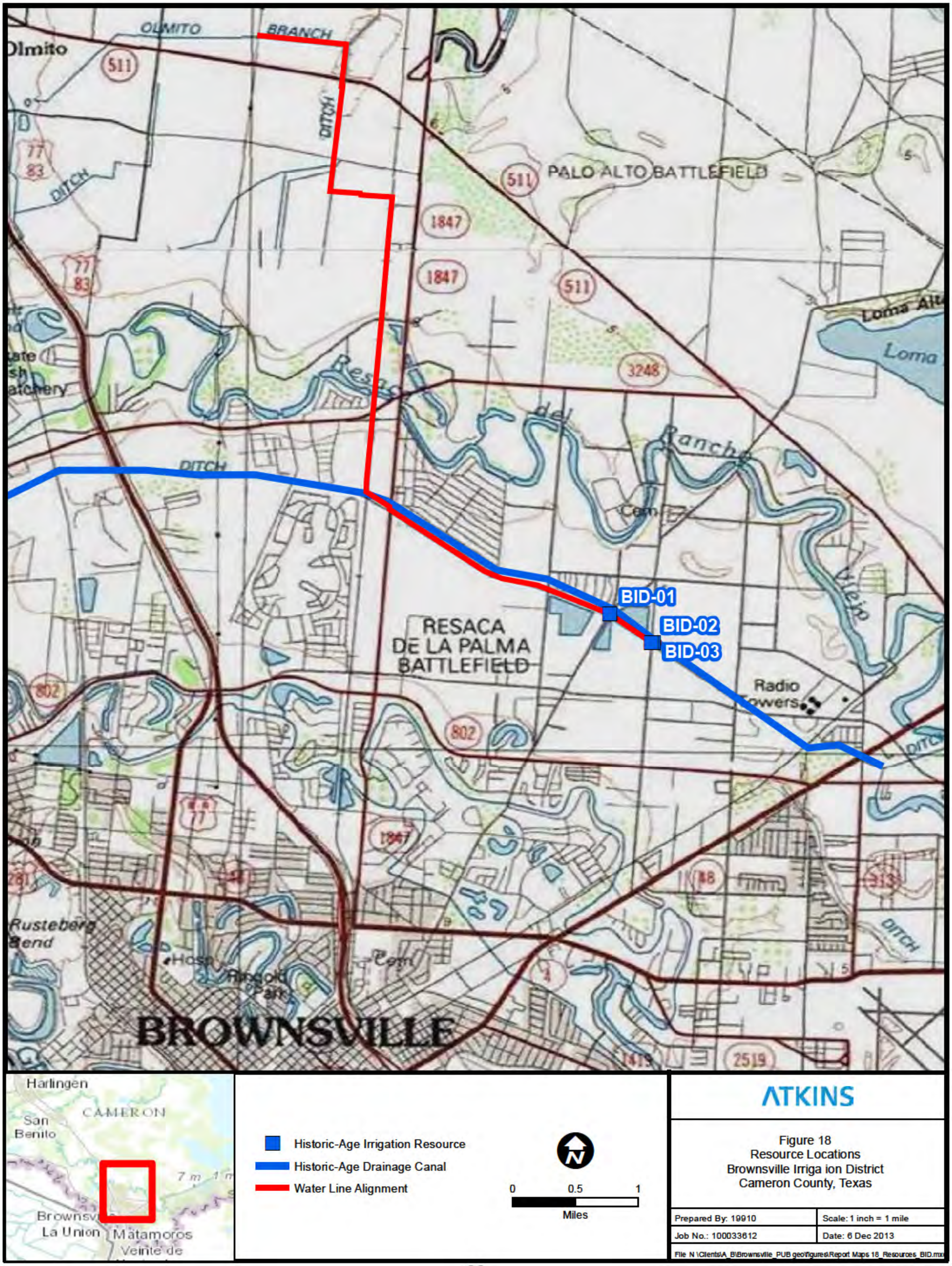

Figure 18
Resource Locations
Brownsville Irriga ion District
Cameron County, Texas

Project archeologists recorded one additional historic-age nonarcheological resource, a canal, within the APE (see Figure 18). Historic maps indicate the flood-control feature was constructed between 1949 and 1958. This late construction date, which is after the established period of significance for irrigation-related resources in the Rio Grande Valley (1904–1949), and its apparent use for flood control in conjunction with nearby reservoirs suggests it does not maintain any significant historic associations with agricultural or community development patterns that would warrant consideration under NRHP Criterion A. Additionally, it appears to have been enlarged and modified in subsequent years, reducing its integrity of design, workmanship, and feeling. Due to its lack of integrity and known historic associations, it is not recommended for NRHP inclusion under any of the applicable criteria. No further consideration of the resource under Section 106 in connection with the current project is anticipated.

V. CONCLUSIONS AND RECOMMENDATIONS

The proposed project areas have been subjected to heavy disturbances associated with previous construction activities related to a hike-and-bike trail, a canal, a levee, road construction, urban and commercial development, and agricultural activities. No archeological resources were recorded within the project areas during the surveys. Survey and shovel testing of the southern portions of the survey corridor nearest 41CF3 failed to encounter any evidence of the battlefield site. The portions of the survey corridor nearest to the mapped boundary of 41CF3 have been disturbed by canal excavations and urban development. No impacts to 41CF3 are anticipated as a result of the project. Although three historic-age components of the Brownsville Irrigation District were found within the proposed pipeline ROW, the THC has determined that this district does not meet the qualifications for NRHP inclusion under any of the applicable criteria. Therefore, construction of the proposed waterline at each of the locations would not result an adverse impact to any NRHP-listed or -eligible resource within this district. The only other historic-age nonarcheological resource within the project APE was a drainage/flood control channel constructed during the early 1950s. The resource does not appear to qualify for NRHP inclusion and thus will not likely require any additional consideration in association with the proposed project.

In conclusion, it is Atkins' opinion that the proposed project will have no adverse effect on either archeological or historic properties. This opinion is supported by the project areas' high level of disturbance associated with having already undergone significant impacts as a result of previous construction activities and long-term farming activities.

Atkins recommends that cultural and historic resource consultations be considered complete for the project presented in this report. Atkins also recommends that the proposed BPUB Wastewater Reuse Project be allowed to proceed without further consultation. However, if during the course of the proposed project any cultural resources are encountered, the project should cease at that location until a qualified professional archeologist can assess the significance of the findings, and the THC and EPA can provide a determination of the cultural resource's potential NRHP eligibility.

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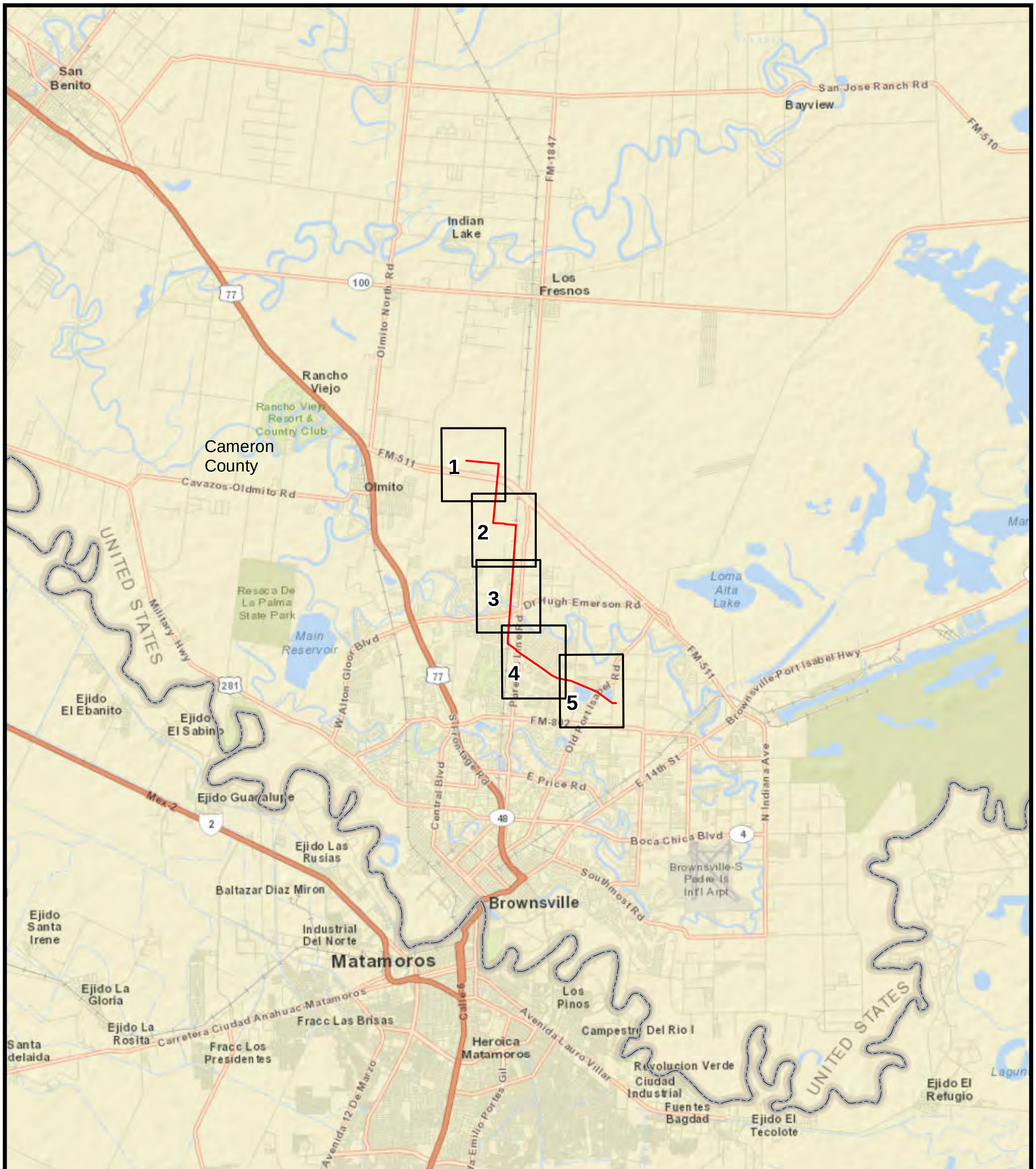
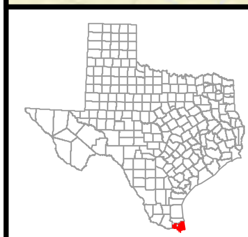
Appendix

Project Overview Maps
(not for public disclosure)





- Map Sheet
- Proposed Waterline Alignment
- County Boundary

Datum: NAD 1983
Projection: UTM
Zone: 14
Units: Meter

0 1.5 3 Miles

Brownsville Public Utilities Board

ATKINS

Appendix A
Map Sheet Index
Brownsville Public Utilities Board
Proposed 24-inch Water Reuse Pipeline Project

Cameron County, Texas

Prepared By: ATKINS/14923	Scale: 1 " = 3 Miles
Job No.: 100033615	Date: Nov 01, 2013

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Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

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Attachment 4

Results of a Cultural Resources Survey
For The BPUB Natural Gas Transmission Pipeline

December 18, 2013
Project No. 0185680

Environmental Resources Management, Inc.
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
(281) 600-1000

Draft
Results of a Phase I Cultural Resources Survey for the Proposed Cross Valley Pipeline Project Cameron and Hidalgo Counties, Texas

Document No. 130126
Job No. 100033612

DRAFT

RESULTS OF A PHASE I CULTURAL RESOURCES SURVEY FOR THE PROPOSED CROSS VALLEY PIPELINE PROJECT CAMERON AND HIDALGO COUNTIES, TEXAS

TEXAS ANTIQUITIES PERMIT NO. 6643

Prepared for:

City of Brownsville Public Utilities Board
1425 Robinhood Drive
Brownsville, Texas 78520

Prepared by:

Atkins
6504 Bridge Point Parkway
Suite 200
Austin, Texas 78730

Principal Investigator:
Dale C. Norton

Report Authors:
Andrea S. Burden
Brandy Harris
Darren Schubert

December 2013

Abstract

Between July 8 and November 10, 2013, Atkins North America, Inc. (Atkins) conducted a Phase I cultural resources survey for the proposed Cross Valley Pipeline Project on behalf of the City of Brownsville Public Utilities Board. The proposed project consists of 49.89 miles (80.29 kilometers) of new 24-inch natural gas pipeline located in Cameron and Hidalgo Counties, Texas. The survey was conducted within a corridor that measured approximately 300 feet (91 meters) wide and included examination of some areas in addition to the current proposed pipeline alignment. A total area of approximately 3,076 acres (1,245 hectares) was surveyed this project. As the survey corridor is located on publicly owned and/or controlled lands, compliance with the Texas Antiquities Code is required, and work was conducted under Texas Antiquities Code Permit 6643. A total of 141 labor days were worked associated with the fieldwork.

The survey resulted in the documentation of two newly recorded sites (41CF218 and the modern-age La Feria de las Flores Cemetery), components of four historic-period irrigation districts, two isolated finds (prehistoric lithic artifacts), and revisits to two previously recorded archeological sites (41CF196 and 41HG83). The two isolated finds are recommended not eligible for inclusion in the National Register of Historic Places (NRHP) or designation as State Antiquities Landmarks. The eligibility of site 41HG82, the historic Cementerio de las Burras, for inclusion in the NRHP and designation as a State Antiquities Landmark is unknown based on survey-level data alone. Nonetheless, Atkins recommends the proposed pipeline construction avoid impacts to 41HG82 by maintaining a 75-foot buffer between the proposed impacts and the presumed boundary of site. Although located within the initial survey corridor, sites 41CF196, 41CF218, and the modern-age La Feria de las Flores Cemetery will be avoided by the proposed construction due to revision of the current proposed alignment and therefore no adverse effects to these resources are anticipated. A number of irrigation resources documented during the survey are associated with NRHP-eligible irrigation districts; however, proposed construction activities at each of these locations do not appear to constitute an adverse effect to the resources under Section 106. As a result, no further consideration of impacts to the resources in connection with the proposed pipeline construction is anticipated.

Based on results of the pedestrian survey and background review, Atkins recommends that exploratory archeological trenching be conducted in several high probability areas within the survey corridor along the current proposed alignment.

Once consultations with the Texas Historical Commission are complete, Atkins recommends that construction activities be allowed to proceed without further consultation. Should evidence of archeological sites be encountered during construction, work in the immediate area should cease, and a qualified archeologist should be called upon to evaluate the evidence and provide recommendations for how to manage the resource under the State's Historic Preservation Plan.

Contents

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Figures

Tables

Acronyms and Abbreviations

B.P.	Before Present
cm	centimeter(s)
cmbs	centimeters below surface
ft	feet
FM	Farm-to-Market Road
HDD	Horizontal Directional Drill
HPA	High Probability Area
IF	Isolated Find
km	kilometer(s)
LPA	Low Probability Area
m	meter(s)
NRHP	National Register of Historic Places
NRCS	National Resource Conservation Service
ROW	Right of Way
SAL	State Antiquities Landmark
TAC	Texas Antiquities Code
TARL	Texas Archeological Research Laboratory
THC	Texas Historical Commission
TxDOT	Texas Department of Transportation
USIBWC	United States International Boundary and Water Commission
USDA	U.S. Department of Agriculture

I. INTRODUCTION

Between July 8 and November 10, 2013, Atkins North America, Inc. (Atkins) conducted a Phase I cultural resources survey for the proposed Cross Valley Pipeline Project on behalf of the City of Brownsville Public Utilities Board. The City of Brownsville Public Utilities Board is proposing construction of 49.62 miles (79.86 kilometers [km]) of new 24-inch natural gas pipeline in Cameron and Hidalgo Counties, Texas (Figure 1). The proposed project begins near Brush Line Road 5 miles (8 km) east of Faysville and continues in an east-southeast direction to its termination near the intersection of Farm-to-Market Road (FM) 511 and Old Alice Road in Brownsville, Texas. As the survey corridor is located on publicly owned and/or controlled lands, compliance with the Texas Antiquities Code is required, and work was conducted under Texas Antiquities Code Permit 6643.

Based on maps available at the time of Texas Antiquities permit application and estimated typical construction design, anticipated construction impacts for the majority of the project are limited to a corridor approximately 300 feet (ft) (91 meters[m]) wide stretching the entire length of the project that includes the proposed permanent easement as well as all temporary and permanent work space to a depth of approximately 8 ft (2.4 m) below ground surface. The proposed project will bisect two floodways under the jurisdiction of the United States International Boundary and Water Commission (USIBWC) in Cameron County, Texas. At each crossing, the proposed pipeline will be installed by horizontal directional drill (HDD). This technology will avoid surface impacts to each floodway. HDD entry/exit points will be a minimum of 300 ft (91 m) outside of the north and south levees demarcating the USIBWC boundary at the North Floodway and 300 ft (91 m) outside of the USIBWC regulated floodway at the Arroyo Colorado. The proposed project location west and east of each floodway has been heavily disturbed by intensive agricultural activities. No new access roads will be constructed at the proposed project locations.

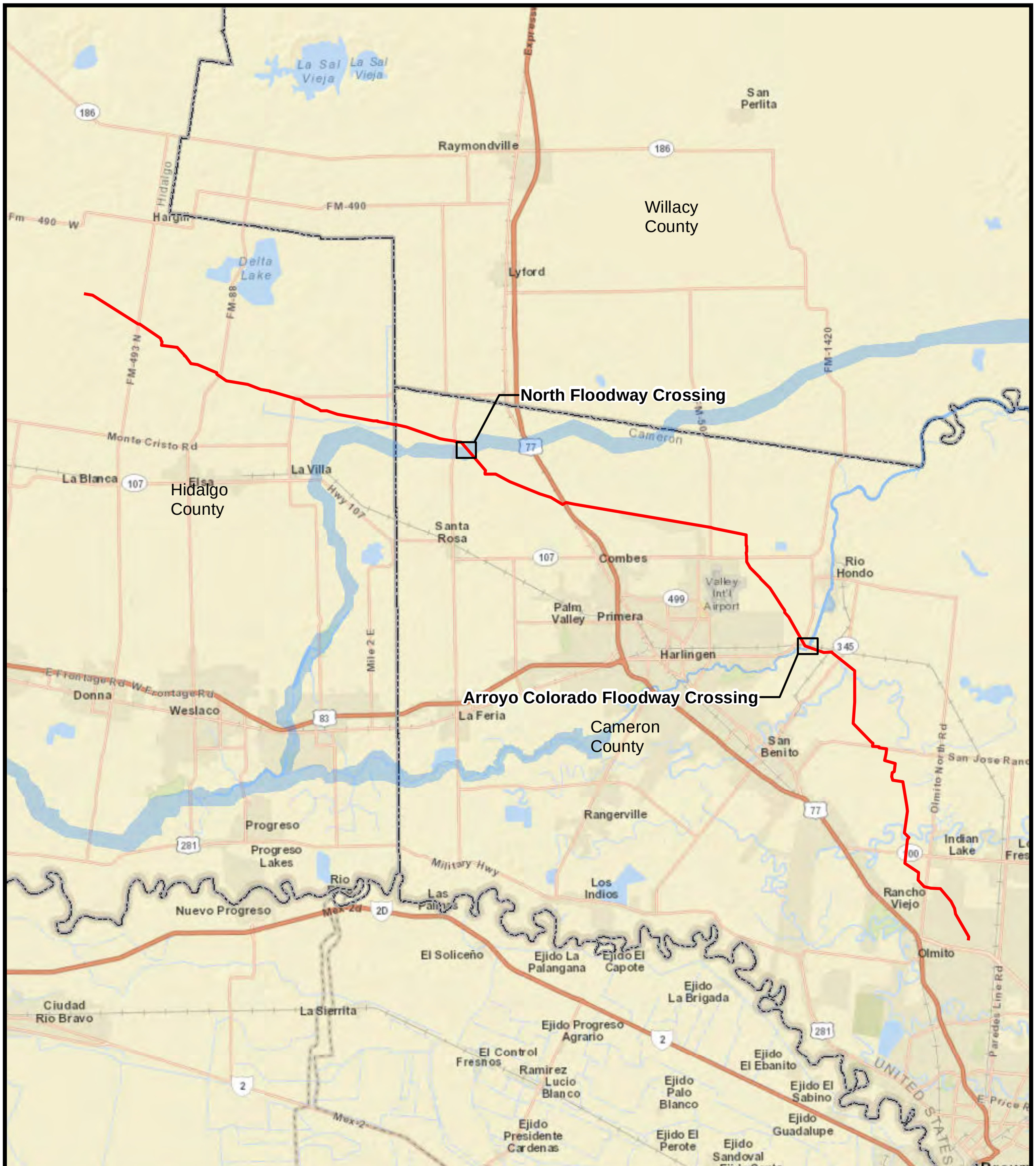
In total, an area of approximately 3,076 acres (1,245 hectares) was surveyed during this project, which includes areas in addition to the current proposed pipeline alignment. Although the original scope of work for this project exempted the two USIBWC jurisdictional areas from this survey, as no archeological or historic properties would be adversely affected by the proposed project at these locations based on the nature of the soils, historic disturbances associated with agricultural activities at HDD entry/exit locations, and review of previously documented sites recorded at these locations, Atkins completed pedestrian survey of these areas at the client's request.

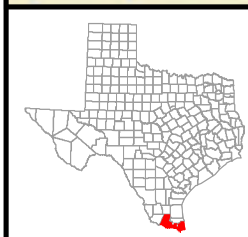
This investigation was performed in compliance with the National Historic Preservation Act of 1966 (PL 89-665), as amended, and the Texas Antiquities Code (Texas Natural Resources Code of 1977, Title 9, Chapter 191) (Texas Antiquities Permit No. 6643); and in accordance with the Procedures for the Protection of Historic and Cultural Properties (36 CFR 800), the Rules of Practice and Procedure (Texas Administrative Code [TAC], Title 13, Chapter 26), and guidelines set forth by the Council of Texas Archeologists and the Register of Professional Archaeologists.

Compliance with provisions of the Texas Health and Safety Code (Section 711) was also required as cemeteries were encountered in the vicinity of the project survey corridor.

The objectives of the survey were to (1) locate cultural resource sites (both archeological and standing structures), if any, within the survey corridor, (2) delineate the vertical and horizontal extent of any identified sites, (3) assess site integrity, and (4) provide a preliminary evaluation of each identified site's potential eligibility for listing in the National Register of Historic Places (NRHP) and/or for designation as a State Antiquities Landmark (SAL). Dale Norton served as Principal Investigator for the investigation. Field personnel included Don Badon, Karissa Basse, Rhiana Casias, Steven Cummins, Virginia Hatfield, Mel Nichols, Mike Smith, and James P. Washington under the direction of Project Archeologists Michael Nash and Darren Schubert. A total of 141 labor days were worked associated with the fieldwork.

This report is divided into seven sections and three appendices. Following this introduction, Sections II and III discusses the general environmental setting and cultural background information pertinent to the project. Section IV is a summary of the purpose of the investigations and the methods used for the literature and records review and for conducting the fieldwork. Section V summarizes the results of the investigation. Section VI provides conclusions and recommendations. Section VII lists references utilized to compile this report. The appendices contain overview maps of the project area showing the areas surveyed and locations of cultural resource sites and identified isolated finds; a copy of the Notice of Existence of a Cemetery as submitted to the Hidalgo County Clerk; and photographs of the historic irrigation resources identified during the survey.





Proposed Pipeline Alignment

USIBWC Floodway

County Boundary

Datum: NAD 1983
Projection: UTM
Zone: 14
Units: Meter

0 3 6 Miles

PUBLIC UTILITIES BOARD

ATKINS

Figure 1
Project Vicinity Map
Brownsville Public Utilities Board
Cross Valley Pipeline Project

Hidalgo and Cameron Counties, Texas

Prepared By: ATKINS/14923	Scale: 1 " = 6 Miles
Job No.: 100033612	Date: Dec 17, 2013

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Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

II. NATURAL ENVIRONMENT

This section provides an overview of the natural environment surrounding the proposed Cross Valley Pipeline Project. Specific relevant information for such an overview consists of the region's geology, soils, and terrestrial resources (flora and fauna). Characteristics of the natural environment that affect the nature and preservation of cultural resources are also noted.

The project area lies within the Lower Rio Grande Alluvial Floodplain portion of the Western Gulf Coastal Plain ecoregion (Griffith et al. 2004). The Western Gulf Coast Plain maintains a relatively flat topography with predominantly grassland vegetation adjacent to the coast. Moving inland, the region's plains are older, more irregular, and have mostly forest or savanna-type vegetation. The Lower Rio Grande Alluvial Floodplain portion of the ecoregion predominantly consists of Holocene-aged alluvial sands and clays of the Rio Grande. Historically, the floodplain ridges once had abundant palm trees, and early Spanish explorers called the river "Rio de las Palmas" (Griffith et al. 2004). However, most large palm trees and floodplain forests had been cleared by the early 1900s. Currently, the region is dominated by cropland with rice, grain sorghum, cotton, and soybeans as the principal crops. In addition, urban and industrial land uses have expanded greatly in recent decades, and oil and gas production is common. Channels for irrigation and urban use have mostly diverted the waters of the Rio Grande with little or no flow reaching the Gulf of Mexico.

Elevations throughout the region range from sea level to approximately 100 ft (30 m) above mean sea level. Average annual precipitation ranges from 16 to 35 inches (40 to 89 centimeters [cm]), occurring mostly in the spring and fall. Summers are often characterized by drought conditions that are frequently of sufficient duration to depress crop growth.

GEOLOGY

The current Lower Rio Grande Valley is a mix of riverbank, shore, marsh, and lake settings with the amalgamation of silty and sandy flat floodplain giving rise to shifting stream channels. This system of altered steam channels results in the resacas and oxbows and meander scars that are found throughout the region. These structures are perpetually affected by wind-borne sediments (Butzer 1982).

Since the last glacial maximum (ca. 20,000 B.P.), the river valley has changed dramatically. Ocean levels had risen approximately 100 m causing the course of the Rio Grande to shorten with the influx of the rising sea water, which caused an increase in valley aggregation (Brown et al. 1980). After the last glacial maximum by the middle of the Holocene, the Rio Grande was depositing alluvial soils and ultimately flooding the valley several times (Boyd et al. 1994). These flooding episodes created an estuarine environment (Brown et al. 1980). The filling of the valley ceased between 10,000 and 7000 B.P., resulting in additional soil aggregation manifested as prograding delta lobes over earlier Holocene deposits. Sea level reached its present level at around 3000 B.P., and due to the rising water, the lobes were reworked, eroded away, and redeposited.

The geology of the Lower Rio Grande Valley consists of Holocene (>10,000 years), Pleistocene (10,000–2 million years [my]), and Pliocene (12.5–4.5 my) fluvial and deltaic deposits (Brown et al. 1980). Multiple high, level Pleistocene terraces border the Holocene floodplain and delta complex. These terraces were formed by fluvial-deltaic deposition during maximum sea level periods and under glacial minimum conditions during the middle to late Pleistocene (Paine 2000). Overlying the terraces are extensive windblown deposits of sand and clay dunes, interspersed with sand sheets and localized wind deflation areas. Holocene stabilized sand dunes occur as broad, segmented expanses of northwestward-trending eolian deposits (Mallouf et al. 1977:9–10). These deposits usually have a height of 1 to 9 m. The surface relief of the stabilized sand dunes is typically undulating with occasional eolian depressions of varying size and shape (Mallouf et al. 1977:9–10). Because of the active nature of these windblown deposits, archeological sites may be repeatedly buried and eroded. In addition, the depressions that can occur in them possess the capability of retaining water for a limited time after rains and, given the importance of water in the arid landscape, would have been attractive to prehistoric animals and people.

The oldest bedrock deposit within the project area is the Pliocene epoch Goliad Formation (12.5–4.5 my). It is exposed in eastern Hidalgo County and manifested as fluvial deposits composed of clay, sand, sandstone, caliche, chert, limestone, and dark siliceous granules and pebbles in a caliche matrix (Brown et al. 1980). This formation is the source of much of the locally obtained raw materials used for prehistoric stone tools within the region (Bousman et al. 1990).

The Lissie Formation overlays the eastern edge of the Goliad Formation as an unconformity in eastern Hidalgo County. The formation was deposited during the Oligocene into the middle Pleistocene and ended at 14,000 B.P. and included at least 14 continental glacial advances interspersed by warmer periods (Day et al. 1981). The Lissie Formation consists of gray to brown to pale yellow clay, silt, sand, siliceous gravel, and sandy caliche. Pockets of stabilized sand dune deposits characterized by dense live oak copses and scrub vegetation occur within the formation (Brown et al. 1980).

Within eastern Hidalgo County and northwestern Cameron County is the Beaumont Formation of the Late Pleistocene, which is exposed as matrices of clay, silt, sand, and gravel to a depth to 270 m. The sediments composing the Beaumont Formation were primarily deposited by rivers and include natural levees and deltas that coalesced through shifting of the river mouths as they reached the coast. The marine element of the formation is much less pronounced and includes marine and lagoonal waters in the embayments between the stream ridges and delta plains (Sellards et al. 1966). Archeologically, the age of these deposits precludes the presence of deeply buried sites, but may contain megafaunal remains.

SOILS

The soils of 17 soil series have been mapped within the survey corridor from USDA soil maps of the area (Table 1) (Natural Resources Conservation Service, U.S. Department of Agriculture [NRCS] 2013). These soils can be grouped into five soil orders: Vertisols, Mollisols, Inceptisols, Entisols, and Aflisols. Soils in the project vicinity date from the Pleistocene, Pliocene, and Holocene; the age of the soils roughly correlates with their position relative to the Arroyo Colorado. In general, soils north of the Arroyo Colorado are Pliocene and Pleistocene in age, although there are some Holocene-aged soils within the floodplain north of the Arroyo Colorado. South of this water body, the soils are Holocene in age (Bureau of Economic Geology 1976), and so could have the potential to harbor archeological deposits.

Table 1. Soils Present Within Survey Corridor

Soil Series	Texture	Order
Lozano	Fine Sandy Loam	Alfisol
Mercedes	Clay	Vertisol
Olmito	Silty Clay	Mollisol
Racombes	Sandy Clay Loam	Mollisol
Raymondville	Clay Loam	Mollisol
Rio	Clay Loam	Entisol
Tiocano	Clay	Vertisol
Willacy	Fine Sandy Loam	Mollisol
Laredo	Silty Clay Loam	Mollisol
Lozano	Fine Sandy Loam	Alfisol
Mercedes	Clay	Vertisol
Olmito	Silty Clay	Mollisol
Racombes	Sandy Clay Loam	Mollisol
Raymondville	Clay Loam	Mollisol
Rio	Clay Loam	Entisol
Tiocano	Clay	Vertisol
Willacy	Fine Sandy Loam	Mollisol

TERRESTRIAL RESOURCES

The native flora of the Lower Rio Grande Valley is a mixture of elements from diverse geographic origins (Correll and Johnston 1970; Gould 1975). Blair (1950) includes south Texas and adjacent northern Tamaulipas in the Tamaulipan Biotic Province. Thorny brush is the dominant vegetation in this province. Because of more luxuriant growth in Cameron, Starr, Willacy, and Hidalgo Counties, Blair (1950) separates this area from the rest of the Tamaulipan Biotic Province by calling it the Matamoran District. The immediate project area is principally a mixture of coastal prairie grasslands, thorn-scrub and cultivated fields. Plant species that occur in the area include black mangrove, buffalograss, curly mesquite, saltcedar, sumpweed, mesquite, yucca, and prickly pear cactus (Hatch et al. 1990).

Extreme southern Texas has a very diverse faunal assemblage. Wildlife typical of the Tamaulipan Biotic Province includes many species of the Neotropical, Texan, and Kansan Biotic provinces and a few species common to the Austroriparian and Chihuahuan provinces (Blair 1950). Animals common in the region are Virginia opossum, nine-banded armadillo, longtailed weasel, striped skunk, hog-nosed skunk, coyote, bobcat, black-tailed jack rabbit, cottontail, javelina, and white-tailed deer (Davis and Schmidly 1994). Thirty-six species of snakes and numerous species of rodents also live in the area (Blair 1950).

III. CULTURAL SETTING

This section presents information concerning the cultural setting of the proposed project area by providing a chronological summary of human occupation in the region. The chapter summarizes the prehistoric setting and different prehistoric and historic time periods followed by a brief description of the results of the review of previous archeological investigations and recorded sites within 0.5 mile (0.8 km) of the project location.

PREHISTORIC PERIODS

Paleoindian Period (11,500–8000 B.P.)

The Paleoindian period in South Texas is recognized by the presence of projectile points such as Clovis, Folsom, Plainview, Golondrina, Scottsbluff, and Angostura. These points coupled with spears aided in the pursuit of large game animals. Although intact deposits containing evidence of Paleoindian occupations are unknown in South Texas, evidence from sites in adjacent regions suggests the period was characterized by low population density, small bands, and large territorial ranges of nomadic groups that subsisted by hunting Late Pleistocene megafauna. During this period, great expanses of land were inundated by the rising sea levels. Temperatures may have been 10–15.4 degrees Fahrenheit cooler than today (Bousman et al. 1990:94).

The scant evidence of Paleoindian occupations in the South Texas region includes Clovis points found at archeological sites in Wilson, Dimmit, and Atascosa Counties as well as at the Southern Island site on the Mexican side of the Rio Grande at Falcon Reservoir (Hester 2004). Folsom artifacts have been found on the Rio Grande Plain, such as preforms and failures in Webb County and near Falcon reservoir, and isolated finds such as a Folsom projectile point base recovered from 41CF54 near Laguna Atascosa in Cameron County (Terneny 2005). However, no Folsom camp or kill sites have been found in the region (Hester 2004). Later Paleoindian projectile points have been recovered mostly from the northern extent of the region, such as Golondrina, Plainview, Angostura, and Scottsbluff types from Uvalde, Bexar, Victoria, and Williamson Counties (Terneny 2005). Noted Paleoindian sites in the South Texas Archeological Region include Berger Bluff (41GD30) in Goliad County, 41WY140 in Willacy County, and the Johnston-Heller (41VT15), J2 Ranch (41VT6), and Willeke (41VT16) sites in Victoria County.

Archaic Period (8000–1200 B.P.)

The Archaic period witnessed a shift to an exploitation of a wider range of plant and animal species, coupled with a decrease in mobility that was probably associated with climate change. Perennial steams existed in some areas of the local draws, but extensive freshwater ponds producing diatomaceous muds also began to appear where discharge declined. Water in the lakes and ponds fluctuated, sometimes completely drying up. By the end of the period, many of the streams ceased to flow and the diatomite lakes evolved into muddy marshes. The transition from flowing water to standing water represents a dramatic hydrologic change in the area. The widespread decrease in water was the result of decrease in regional effective precipitation from the late Pleistocene to the early Holocene. This decrease affected both runoff and spring discharge. Paleontological data (Graham 1987; Johnson 1986) document this environmental change as well as sedimentologic and stratigraphic information (Holliday 1995), which caused streams that formerly flowed year-round to dry up.

Such a drastic, though perhaps gradual, loss of primary food sources exploited in the Paleoindian period would have caused considerable cultural stress. It was probably this stress that caused a shift of attention to previously unexploited plants and animals. Throughout the Americas, the Archaic was a time of increasing technological (and probably social) complexity. Toolkits become larger, and through time the many regional differences slowly coalesced into more-homogenous forms. This includes an emphasis on the exploitation of marine resources in coastal zones (Terneny 2005). The Archaic period is often divided into the Early, Middle, and Late periods with additional divisions such as complexes and horizons attributed to the Archaic throughout the region. These include the Repelo (4000–2000 B.P.) and Abasolo (4000–2000 B.P.) complexes identified by MacNeish (1947) and the early corner-notched horizon (circa 8000–5500 B.P.) and the early basal-notched horizon (circa 5600–4500 B.P.) outlined by Hester (2004a). However, overall the period is also poorly understood in the Lower Rio Grande Valley, and sites dating to this time, especially Early and Middle Archaic sites, are rarely encountered and are limited to surface finds. Late Archaic sites are more common, but are often mixed with Late Prehistoric-aged deposits (Kibler and Freeman 1993).

Early Archaic (6000–2500 B.C.)

Like the Paleoindian period, sites associated with the Early Archaic are rare in South Texas, and areas such as the Rio Grande Delta and Sand Sheet have no representative sites for this time (Terneny 2005). Hester's distinction between the early corner-notched and the early basal-notched horizons is primarily derived from data generated from Central Texas and the Lower Pecos areas with stronger cultural chronologies (Hester 2004). Representative artifacts associated with the early corner-notched horizon include early expanding-stem (Bandy, Martindale, and Uvalde) dart points and the Guadalupe distally beveled tool (Terneny 2005). The subsequent early basal-notched horizon includes Bell and Andice points, early triangular bifaces, and Clear Fork tools (Hester 2004; Terneny 2005). The Mackenzie site (41VT17) in Victoria County produced Bell points and radiocarbon assays indicating an Early Archaic occupation and thus became the oldest shell midden in South Texas (Ricklis 1986).

Middle Archaic (2500–400 B.C.)

The Middle Archaic is identified by an easily recognized change in material culture patterns. This includes assemblages in South Texas consisting of triangular dart point forms, known as

Tortugas, Abasolo, and Carrizo. In addition, smaller unifacially distally beveled tools and stemmed projectile points have been recovered in the northern part of South Texas. These points include Pedernales, Lange, Langtry, and Morhiss (Hester 2004). Information on settlement patterns during this period is sparse. However, substantial data from Choke Canyon and Chaparrosa indicate that open campsites were located along former stream channels early in the period before relocating to floodplains, low terraces, and natural levees later in the period (Hester 2004). Survey work in Willacy and Hidalgo Counties has yielded dart points that may be Archaic (Mallouf et al. 1977). However, work at Falcon Reservoir showed that some of these types continue into the Late Prehistoric period (Suhm and Jelks 1962). Investigations at the cemetery site Loma Sandia (41LK28) in Live Oak County yielded detailed information on Middle Archaic burial practices derived from 205 burials, which included interments with dart points, stone pipes, shell ornaments, and deer antlers (Taylor and Highley 1995).

Late Archaic (400 B.C.–A.D. 800)

Dart points associated with the Late Archaic are small, with corner or side notches. Examples include Shumla, Ensor, Frio, Marcos, Montell, Fairland, and Ellis. Tools diagnostic of this period in South Texas include Olmos bifaces, Nueces scrapers, and corner tang bifaces (Black 1989:51). Examples of Late Archaic sites include Choke Canyon (41LK201), the Johnson site, the Kent-Crane site (41AS3), and a site at Ingleside Cove. At Choke Canyon, hearths, earth ovens, and manos and metates have been found, which illustrate exploitation of plant resources. Also recorded at the site were faunal remains of deer, rabbit, turtles, fish, and other species, as well as evidence that peoples were exploiting *Rabdotus* snails and mussel species (Hall et al. 1987). Additional data from Choke Canyon illustrate that favored locales for open campsites are on stream channels and their adjacent sloughs.

Late Prehistoric Period (circa A.D. 800–1600)

The Late Prehistoric occupation of the area by hunter-gatherer inhabitants has been often referred to as the "Brownsville Complex." This complex has been defined on basic analysis and characteristics observed from small surface collections, salvage excavations, and a small number of cultural resource surveys. However, Terneny (2005:225) argues that the ". . . [Brownsville Complex] artifact sets thought to be present only in the Late Prehistoric burial situations were present in the Archaic as well." She goes on to say: "As such, the 'Brownsville Complex' must be redefined in terms of its presence in the Archaic and Late Prehistoric; cemeteries and burials that contain 'Brownsville Complex' artifacts cannot automatically be assumed to belong to the Late Prehistoric" (Terneny 2005:225).

Therefore, this Late Prehistoric section provides a summary of the Late Prehistoric period of South Texas by Hester (2004a) and a summary of the Brownsville Complex. However, the Brownsville Complex summary should be understood as needing further research to determine a more precise temporal affiliation (see Terneny 2005 for a more-in-depth discussion). Although a hunting and gathering lifeway continues in the Late Prehistoric as in the Archaic, the material culture, hunting patterns, settlement types, and other facets of the era mark a fairly distinctive break with the past (Hester and Turner 2010). In this time period, the bow and arrow and pottery are introduced, along with other distinctive types of stone tools (Hester and Turner 2010). As with any time period distinction, there is limited evidence to suggest that a new phase of cultural history was launched by the immigration of new peoples into the region as opposed to cultural diffusion or by the coming of a radically new mode of subsistence such as agriculture. The mode of organization of the Late Prehistoric people appears to mirror the full expression of traits already in existence. Therefore, it appears the Late Prehistoric societies took certain practices begun in the Archaic period and refined them to various degrees, which ultimately transformed the whole way of life.

The Late Prehistoric in southern Texas shares cultural patterns with Central Texas (Hester 2004). This includes transitional Archaic “dart points” such as Ensor and Matamoros, and Late Prehistoric Scallorn arrow points found at Blue Bayou (41VT94) in Victoria County and a burial site in Frio County. The main marker for the Late Prehistoric in the region is the occurrence of the Toyah horizon. Artifacts associated with the Toyah horizon include the Perdiz arrow point, small end scrapers, flake knives, beveled knives, bone-tempered pottery, perforators, shell ornaments, and assorted ornamental beads and objects (Hester 2004). These have been found at sites in Jim Wells County (41JW8) and Live Oak County (41LK201) and at other sites closer to central Texas. Although sites closer to the project areas in Zapata and Webb Counties often yield Perdiz points and some combination of Toyah-trait artifacts, the whole assemblage is not present, with bison often absent (Hester 2004).

The bulk of our knowledge of the archeology of the Late Prehistoric in South Texas is from MacNeish’s (1958) definition of two closely related complexes, the Brownsville and Barril, for the Lower Rio Grande area. This cultural complex has been defined on basic analysis and characteristics observed from small surface collections, salvage excavations, and a small number of cultural resource surveys. Common to both complexes are shell disks, pierced shell disk beads, plugs made from a columella that are round in cross section, rectangular conch shell pendants, mollusc shell scrapers, and Starr, Fresno, and Matamoros projectile points. Intrusive artifacts include pottery of Huastec origin from southern Tamaulipas, which appears in occupation sites and in burials (Anderson 1932; MacNeish 1947; Mason 1935), as well as obsidian and jadeite used in pendants. Burials of individuals are tightly flexed and located away from living areas.

The largest known Brownsville/Barril site near the proposed project area is located approximately 19 miles (30 km) southwest of the western end of the survey corridor and is known as the Ayala site (41HG1); the site is located on a bluff of a resaca and consisted of at least 45 flexed burials with associated burial materials. The site has been heavily looted, but it has also been subjected to an archeological excavation (Campbell and Frizzell 1949; Hester and Ruecking 1969).

Protohistoric Period (circa A.D. 1600–1800)

The Protohistoric period is described as the transition period between the prehistoric and historic periods. The beginning of the period is attributed to the arrival in the early 1600s of Europeans (Spanish) to South Texas (Hester 2004). Native American sites from the final period are distinguished by the presence of European and nonaboriginal American trade goods that date from the sixteenth through mid-eighteenth centuries. Debris on Protohistoric sites indicates a continuation of the nomadic hunting and gathering existence that was begun during the Archaic period. The best account of the native peoples of Texas comes from the chronicle of Àlvar Núñez Cabeza de Vaca, a survivor of a Spanish shipwreck in 1528 (Covey 1972). These first Spaniards encountered as many as 50 different groups living in the immediate area. Many of these indigenous people were identified as speaking the Coahuiltecan language of southern Texas and northeastern Mexico (Salinas 1990).

The Coahuiltecan language is similar to the Karankawan, which was spoken by coastal peoples north of Corpus Christi up to the west side of Galveston Bay (Swanton 1940). From Corpus Christi, the Coahuiltecan area extended northwestward to San Antonio, westward to just below the confluence of the Pecos River and Rio Grande, and southward into Nuevo Leon, northeast of Coahuila, northern San Luis Potosi, northeastern Zacatecas, and northern Tamaulipas. Coahuiltecan peoples were originally considered to be linguistically related to the Hokan groups of languages in California (Ruecking 1955; Sapir 1920; Swanton 1940). The theory of linking the prehistoric languages of Texas and California was known as the "Hokan Hypotheses" (Lyle 1997). Current studies suggest that Coahuiltecan was an isolated language (Lyle 1997).

Research has indicated that the Coahuiltecans probably never existed as a single tribe. Rather, groups with similar language were identified by the Spanish as Coahuilteco, presumably because the native homeland of many groups was Coahuila, Mexico. By the 1850s, a combination of European-introduced diseases and tribal wars stimulated by Europeans had decimated the Indians of South Texas (Campbell 1958). There is no extant Coahuiltecan tribe today; however, there is a group based in the San Antonio area that calls itself the Tap Pilam—the Coahuiltecan Nation. They are not a federally recognized tribe at this time, but the tribe has filed a petition for recognition by the Secretary of the Interior that the group exists as an Indian tribe (*Federal Register* 1998).

There are no indigenous tribes extant in the area. Modern tribes that in the past have been active in this part of Texas include the Comanche, Kiowa, and Lipan Apache. The Comanche and Kiowa, who both were mobile Southern Plains tribes, came into South Texas following herds of wild mustangs and bison as well as to raid Mexican towns near the present-day international border.

The traditional homeland of the Lipan Apache included the area between the Texas Panhandle and the Hill Country of Central Texas; however, they conducted incursions into South Texas.

HISTORIC PERIOD DEVELOPMENT IN HIDALGO AND CAMERON COUNTIES

The Lower Rio Grande Valley, with its rich and diverse history, has long played a pivotal role in the history of the vast territories that extend on either side of the river. Because of its strategic location upstream from the mouth of one of the great waterways of North America, the region has been an important center of activity since the sixteenth century.

Colonial Contact and Early Settlement Period

Spain was the first European nation to lay claim to the region including present-day Hidalgo and Cameron Counties and to make contact with the Native American groups living in the region. Spanish exploration in the Rio Grande Valley may have occurred as early as 1528 when Àlvar Núñez Cabeza de Vaca reportedly traveled through the area following his shipwreck in the Gulf of Mexico; however, this theory remains unsubstantiated. After a series of attempts to settle other areas in the Lower Rio Grande Valley by Gonzalo de Ocampo (1523), Sancho de Canielo (1528), and Pedro de Alvarado (1535) proved unsuccessful, Spanish activity in the area centered on maintaining their sovereignty over the region rather than on encouraging colonization. As a result, subsequent exploration of what became Hidalgo and Cameron Counties was only initiated in response to feared encroachment by other European nations (Dixon et al. 2003).

For example, in 1638, Jacinto García de Sepulveda crossed the Rio Grande from Mexico (then Spanish territory) in search of Dutch sailors reported to be in the current Hidalgo County area. The expedition "marched down the north bank of the river as far as the site of present Brownsville" (Garza and Long 2013b). Other excursions into modern Hidalgo and Cameron Counties were made by Alonzo de León in 1687 in search of a French fort on the Texas coast and in 1747 by Miguel de la Garza Falcón, who traveled north of the Rio Grande in search of an area in which to establish a settlement. Falcón was unimpressed and characterized the land north of the river as unfit for settlement or for stock raising (Garza 2011a).

Despite Falcón's opinion, the Spanish crown was determined to settle the region and tasked José de Escandón with colonizing the area along the Rio Grande. In 1746, he was appointed "conquistador and governor of Nuevo Santander," the larger region containing the Lower Rio Grande Valley, and began the process of settling the area that continued throughout his 23-year-long career. He founded 23 settlements in all (Dixon et al. 2003), four of which were located south of the river in or near present-day Hidalgo County. These settlements, including Reynosa (1749), Camargo (1749), Mier (1750), and Revilla, or present-day Guerrero (1752), were different from traditional Spanish colonization efforts in that they were not centered on a strong military and/or religious presence, but relied instead on civil defense and governance (Dixon et al. 2003). Some of these settlers migrated and settled north of the river, forming communities "along the river as well as in the northern reaches of the future county" (Garza 2011a).

In 1753, residents of the area requested official, individual land allotments from the Spanish Crown. Spain did not begin surveying and granting land possessions until 1767, at which time land was granted on the basis of merit and seniority. Colonists were classified as "original," "old," and "recent" settlers, with the original settlers receiving the perceived best *porciones*. Riverfront acreage was most valuable, as river access gave settlers the ability to irrigate their land and provided a shipping channel. Thus, surveyors laid out riverfront *porciones* in long, narrow strips extending several miles to the north. Larger grants were made north of the riverfront *porciones* and were usually composed of significantly more acreage. These grants were typically intended for livestock grazing, and many were granted to influential citizens of Escandón's original settlements (Lang and Long 2011).

Early settlement in present day Cameron County during the Spanish Colonial period was initiated with the establishment of the community of San Juan de los Esteros (or present-day Matamoros) along the southern banks of the Rio Grande. Ranchers there often used the lands along the northern bank of the river as pasture for their livestock. In 1781, the Spanish government "granted fifty-nine leagues of land . . . on the north bank of the river (including all of the site of Brownsville) to José Salvador de la Garza." He established a ranch in the area, and though several other grants were issued in present day Cameron County during the Spanish and Mexican periods, it was still sparsely settled at the advent of the Texas Revolution (Garza and Long 2013b).

Early landowners found the land conducive to livestock ranching, and several large-scale ranches formed in the Lower Rio Grande area. Small communities of ranch workers and their families soon developed in association with these ranches. Ranching continued to characterize the region's economy through the remainder of the eighteenth century and into the period of Mexican sovereignty. As original grantees died and passed their lands to their heirs, the large ranches began to be subdivided. Through these subdivisions, new communities developed, and settlement expanded to more remote parts of the region.

Mexican Sovereignty and the Texas Republic Era

Mexico received its independence from Spain in 1821, and the new government continued the practice of encouraging settlement in the lower Rio Grande Valley, "especially along the navigable stretch of the river between the Gulf and Roma in Starr County" (Dixon et al. 2003). During this period, scattered ranching enterprises continued to characterize the local landscape. The key shift in local development that occurred during the brief period of Mexican ascendency involved the increasing importance of trade to the regional economy, which was a result of and in turn prompted an influx of American and European entrepreneurs and settlers "seeking economic opportunities" (Dixon et al. 2003).

It was also during this period that steamship service was inaugurated along the Rio Grande. Henry Austin, a cousin of Stephen F. Austin, arrived with his steamer *Ariel* from New York on June 29, 1829. Despite Austin's grand intentions, the operation of the steamboat was not profitable. The difficulty of navigation on the river and the lack of cooperation and participation among Mexican merchants were prime factors for its abandonment in September 1830. Austin then took the vessel to the Brazos River (Graf 1942). Although its impact on commercial trade was hardly noticeable, the arrival of Austin's steamboat ushered in an era that gained considerable significance in subsequent decades.

Texas' struggle for independence, for the most part, bypassed the Lower Rio Grande Valley, as most military and political events took place farther north. Following the war's conclusion, 4,000 soldiers of Santa Anna's defeated army converged on Matamoros and depleted much of the available food supplies. Commerce and trade in the town and nearby areas diminished with this sudden influx, but its effects were only temporary. Soon, the economy rebounded and residents went on about their business (Thompson 1965).

After the Republic of Texas was officially formed and was truly independent of Mexico, territory between the Rio Grande and Nueces River was claimed by both countries. The inability of each government to effectively control or exert much influence in this area left many residents vulnerable to attack by Indians and roaming bands of "soldiers" of both countries. Another event that increased tensions occurred in 1839 when Francisco Viadaurri and others declared that a new nation, the Republic of the Rio Grande, was being formed from the Mexican states of Nuevo Leon, Chihuahua, Coahuila and Tamaulipas, including the Lower Rio Grande. Laredo, a settlement established in 1755 by Jose de Escandon was selected as the capital of the newly-formed republic. Unlike the Texas war for independence, this rebellion was successfully quelled by Mexican forces (Webb 1952).

The Mexican War

Disputes between Mexico and the United States erupted into full-scale warfare over the location of the boundary between the two countries. The United States recognized the Rio Grande as the sole boundary, while Mexico recognized the Rio Grande only to the headwaters of the Nueces River and from that point following the Nueces to its mouth near Corpus Christi. Present day Hidalgo and Cameron Counties were part of the disputed territory during the Mexican War. The dispute reached an impasse and President James Polk, in an effort to reinforce the American position, ordered General Zachary Taylor's army to the disputed areas. Taylor's infantry, artillery, and support units arrived in Corpus Christi via steamer from New Orleans, while his dragoons traveled overland from San Antonio. Personnel from his army surveyed the area across for Matamoros, selecting a site for the army's encampment.

Taylor's army arrived at the Rio Grande following a brief skirmish with Mexican irregulars at Arroyo Colorado. Taylor immediately began receiving dispatches from the Mexican commander General Mejia ordering the Americans to withdraw from the Rio Grande. When Taylor refused, the Mexican army placed artillery along the riverbank south of the fort. Taylor responded by placing his own heavy artillery in position to fire on Matamoros and ordered his chief engineer, Captain Joseph K.F. Mansfield to construct defensive works. Mansfield constructed a six-sided earthen bastion, 800 yards in circumference, with walls 8.5 to 9 feet in height and surrounded by a ditch 20 feet wide and 9 to 10 feet deep. The fort's earthen ramparts were topped by wood and mud parapets and the bastions were protected by sandbag merlons between gun embrasures (Mahr-Yanez and Perttula 1995). Before the fort could be completed, Taylor was informed by Captain Walker of the Texas Rangers that Mexican General Arista, now commanding the Mexican forces, had crossed the Rio Grande downstream from the American army and was marching towards the American base at Port Isabel. Taylor, in a night march, beat the Mexican army to Port Isabel and secured his supply line. In his absence, he left Major Jacob Brown in command of the newly constructed fort, along with the 7th U.S. Infantry.

On May 3, the Mexican artillery opened fire on the fort. Major Brown responded with his artillery, destroying one Mexican gun and forcing the Mexicans to reposition the others. The Mexican infantry next attacked, but were repulsed. In an artillery bombardment on May 6, Major Brown received a mortal would, dying on the afternoon of May 9.

After securing his supply base at Port Isabel, General Taylor returned to relieve the fort's defenders. On the return march, his forces encountered those of General Arista at Palo Alto and Resaca de la Palma and inflicted severe casualties, forcing the Mexican army to retreat. Upon learning of Major Brown's death, Taylor ordered the fort named after him and pursued the Mexican army into Matamoros.

All subsequent fighting took place within Mexico, thus, the battles at Palo Alto and Resaca de la Palma were the only ones north of the Rio Grande. Hostilities ceased with the signing of the Treaty of Hidalgo on July 4, 1848. Provisions of this agreement established the Rio Grande as the boundary between the two countries, but also recognized land titles issued by the Spanish and Mexican governments. All public lands, however, were granted to the State of Texas (Thompson 1965).

At the conclusion of the war with Mexico, counties were formed throughout southern Texas. Cameron County was created by the Texas legislature and originally included 3,308 square miles "including parts of Hidalgo, Willacy, Kenedy, and Brooks Counties" (Garza and Long 2013b). Hidalgo County was formed in 1850 and named for Miguel Hidalgo y Costilla, a Mexican patriot (Dixon et al 2003).

Another significant event during this period was the designation of the Old Military Road. Zachary Taylor oversaw the laying out of this road that connected Brownsville and Rio Grande City. The route, roughly paralleling the Rio Grande, became a major transportation artery through the area, linking many established communities and providing the impetus for the foundation of more communities along its reach during the antebellum period. The route likely paralleled or followed established trails linking area ranches and associated communities. Following the Mexican-American War, the road continued to serve as a shipping route for cotton and other goods and as the Rio Grande valley's main travel artery. The road was paved and improved by the 1960s and still serves as a major transportation thoroughfare for the region (Jones 2011).

Nineteenth-Century Ranching and the Transition to Commercial Cultivation

By 1850, a number of large ranches were operating in present-day Cameron and Hidalgo Counties. The ranches not only served as the economic mainstay for residents, but also influenced local community development during the eighteenth and nineteenth centuries. For example, some of the first communities established in Hidalgo County were developed in support of large ranches. La Habitación, at the site of present-day Hidalgo, formed in association with Rancho San Luis in 1749 (Garza 2011b). The city of McAllen owes its roots to the McAllen Ranch, originally known as the Santa Anita Ranch, founded circa 1797 by José Manuel Gómez, an original Spanish grantee (Garza 2011c). Present-day Peñitas originally served as the "common grazing grounds" for Escandón's Villa de Nuestra Señora de Guadalupe de Reynosa located south of the Rio Grande in the mid-eighteenth century. After 1850, the community was associated with numerous populous ranches in the area, including those of Rómulo Martínez and Jesús Chapa Cantú (Garza 2011d).

Ranching continued to be an important part of the local economy during the late nineteenth and early twentieth centuries; however, the advent of irrigation and increased Anglo-American migration to the area increased the significance of commercial agriculture during the period. One example of an early commercial agricultural operation located in Hidalgo County was the San Juan Plantation, named by owner John Closner. Closner began acquiring land in the area in 1884, and his plantation eventually contained 45,000 acres. He was an innovator in the area and transformed the land through a system of irrigation canals and a water pumping plant, creating the first irrigation system from the Rio Grande. These efforts inspired the extensive irrigation systems now present in both counties. Diverse crops were grown on the plantation, including sugarcane, alfalfa, tobacco, vegetables, fruits, melons, and nuts, and he traded on both sides of the river. Many families worked on the plantation, and a community developed in the area with a school and general store (McKenna 2011a; Texas Historic Sites Atlas 1964). George Paul Brulay introduced irrigation on a small scale near Brownsville in 1876, but irrigation remained limited in both counties through the turn of the twentieth century (Garza and Long 2013b).

Railroad Era and Early-Twentieth-Century Development

The arrival of the St. Louis, Brownsville and Mexico Railway to the Rio Grande Valley in 1904 dramatically affected regional development patterns and increased the significance of commercial agriculture further. New communities sprang up along the railway and subsequent lines that intersected this route, and old settlements originally founded around ranches grew into sizable communities. Notable examples in Hidalgo County include the community of Pharr, which was originally part of lands granted to Juan José Hinojosa in 1767 by the Spanish government. The Hinojosa family resided in the region through the 1880s during which time the area remained predominantly undeveloped. In 1909, partners John Connally Kelley Sr. and Henry N. Pharr purchased 16,000 acres containing the future community. Pharr, a Louisiana sugarcane farmer and founder of the Louisiana-Rio Grande Canal Company, became the namesake of the community. Pharr became a stop on the St. Louis, Brownsville and Mexico Railway by 1911 (Garza 2011e; Meyers [Myers] and Weitze 1995) and was the center of an agricultural boom that characterized development in the area during the early twentieth century.

McAllen, which was a small community associated with the McAllen/Santa Anita Ranch established circa 1797, also experienced a period of growth with the arrival of the railroad. In 1904, when the Hidalgo and San Miguel Extension of the St. Louis, Brownsville and Mexico Railway reached the site, members of the Ballí and McAllen families, proprietors of McAllen Ranch, donated land to allow the railroad to cross their property. The McAllen Townsite Company formed later that year and named the new townsite McAllen. McAllen grew at a steady, yet somewhat slower rate than other railroad towns in the area due to competition from neighboring communities. However, the town incorporated in 1911 and experienced a population boom during the late 1910s as a result of federal troops being stationed in the area during World War I (Garza 2011c).

Similarly, the communities of Harlingen and Brownsville in Cameron County grew significantly after the arrival of the railroad. Harlingen was founded in 1904, the same year the railroad arrived in the area. Early promoters thought the nearby Arroyo Colorado could be used as a commercial waterway; however, like other communities in the region, the city's economy was based almost solely on agriculture during the early twentieth century (Gilbert 2013).

Brownsville already existed prior to the arrival of the railroad, though development there had stagnated dramatically during the postbellum period due to lack of railroad access and a deepwater port facility. After the construction of the railroad, not only did the agricultural economy of the area diversify with the planting of the first citrus crop in 1904, but rail access also initiated dramatic infrastructure improvements in the community as the city sought to make itself appealing to the influx of new immigrants from the American Midwest. Growth continued through the first decades of the twentieth century, and in the 1930s, the Port of Brownsville and associated shipping channel opened, making the city an international trading port (Garza and Long 2013a).

Irrigation and the Creation of the "Magic Valley"

Contemporaneous with the emergence of the railroad and its influence on local community and economic development patterns, irrigation was also advancing in Hidalgo and Cameron Counties.

Advances in irrigation technology and the development of major irrigation systems increased both large-scale commercial farming and small-scale irrigated farming in the area. As previously mentioned, the first irrigation system in Hidalgo County was developed in 1895 to serve the San Juan Plantation located on the banks of the Rio Grande. This private system was composed of pumping stations, canals, and laterals (McKenna 2011b). The American Rio Grande Land and Irrigation Company, incorporated in 1905, constructed a massive system of pumping stations, canals, laterals, and settling basins in Hidalgo County. This system, like many others, was a public system in that it sold water to private landowners, allowing an increase in irrigated farmland (Goza 2011).

Between its inception and the 1920s, irrigation was the impetus for a steady pattern of Anglo-American land promotion that altered the demographic, physical, political, and economic character of the entire Rio Grande Valley. The recruitment procedures for new residents became formulaic during this period. The process is described in detail in the NRHP nomination for the Louisiana-Rio Grande Canal Company Irrigation System:

> Valley land promotion from 1904 through the 1920s followed an elaborate, highly orchestrated procedure. A group of private investors obtained a large parcel of land with access to the Rio Grande where they established an irrigation system. Using cheap, primarily Mexican American labor, they financed the construction of pumping plants and irrigation canal systems. These systems extended throughout their property, which was subdivided into 20- to 80-acre farm plots. Simultaneously, the consortiums promoted their farms through mass distribution of glossy brochures that extolled the valley's many virtues—both real and imagined—particularly to midwestern [*sic*] farmers. . . . Interested parties contacted sales agents who enticed them to the valley on excursion trips that land companies either partly or wholly subsidized. (Meyers [Myers] and Weitze 1995)

Many of the new settlers considered themselves civilizers and pioneers and tended to alienate or suppress the political and civil rights of the Mexican and Mexican-American residents who had lived in the area for centuries. Tension between the groups erupted into violence or unrest at various times during the twentieth century, particularly as the number of Mexican citizens seeking asylum from the unrest at home and/or economic opportunities in the United States increased during the early twentieth century. Many found work as underpaid farm labor on the newly irrigated lands of the Anglo immigrants or even as workers constructing the elaborate irrigation systems that made the region's transition into the "Magic Valley" possible.

The trend of increased irrigated farming and railroad expansion continued through the 1930s as more railroad companies built lines through the area and irrigation improvements continued to multiply. The area's transition from a ranch-based economy to one based on truck farming was complete by 1930, when there were 4,321 farms in Hidalgo County and 2,936 in Cameron County, "more than double the number in 1920." As in other areas of the state, the majority of the farms engaged in cotton cultivation during the early twentieth century (Garza 2011a; Garza and Long 2013b), although truck farming was also significant to economic development in both counties during the period.

Concurrent with the implementation of irrigation in the region, steps were taken to control periodic flooding along the Rio Grande that, along with periods of drought, had plagued agricultural development in the area. In 1892, W.H. Chatfield was the first to propose development of a levee system for the Lower Rio Grande Valley that would address irrigation needs and flood control. His plan included a series of levees, canals, and floodgates built around the *resacas* to collect water during times of flooding and to distribute it in times of need (Matthews 1938:53–54). His plan was not directly implemented, but may have influenced John Closner's development of an irrigation system on his sugarcane plantation in 1895. Nevertheless, early canals did little to alleviate flooding in the area, and flooding concerns were confronted in 1924 and again in 1925 when bond issues were passed to build levees along the Rio Grande from Donna to Brownsville (Borunda 2007).

Though the levees were a limited success, the 1933 Brownsville Hurricane caused severe flooding that resulted in a massive realignment of the Rio Grande. As a result of this and many other river realignments, the original levees roughly follow the course of the river as it ran in 1903, with the river's current position ½ mile to the southwest. Historic map research suggests that the 1924/1925 levee system was subsequently adapted for irrigation purposes and is now located around *resacas.* The 1933 flood also demonstrated that a levee system located only on the American side was insufficient to control flooding in the area. In 1932, the International Boundary Commission (IBC) recommended that floodways be constructed on either side of the river. These recommendations led to the construction of "300 miles of river and floodway levees, improvements, and control works" (Borunda 2007). The work was completed in 1951. The proposed survey corridor follows portions of the larger IBC (now International Boundary and Water Commission [IBWC]) floodway, and many of the existing canals recorded as part of the irrigation districts are also used for flood control.

Mid- to Late-Twentieth-Century Development

Unlike other areas in Texas and the country as a whole, the population and number of farms in the Rio Grande Valley increased during the Great Depression. This was due in part to the discovery of oil in 1934, which continued to represent an important part of the local economy through the remainder of the twentieth century (Garza 2011a). Besides its economic impact, the success of the oil and gas industry also resulted in significant alterations to the local built environment, as oil and gas wells and related roadways became a common interruption in the agricultural landscape. Other extractive industries, such as sand and gravel quarrying, also aided the region's economic development and altered the local landscape.

In the 1960s, a decline in the cotton market resulted in a dramatic reduction in land values in the region, and many farmers sold all or portions of their land to developers. Some of these developers platted new subdivisions near cities, where employment opportunities were available in processing and other fields. In more-rural areas, some sold small plots at exorbitantly low rates to low-income families. These areas, known as *colonias,* were located outside of city limits on unfavorable farmland and were largely unregulated and without public services. These communities were characterized by squalid living conditions and a lack of public works services. Many of the houses were constructed by hand of scrap material, and residents obtained water from tainted wells or brought water in from incorporated areas, often in contaminated containers. By the 1980s, activists began urging officials to act regarding the high rates of disease in border *colonias,* but despite these efforts, no legislation was passed (García 2011). Many of these *colonias* remain in the area and are home to low-income farm laborers and their families.

Hidalgo and Cameron Counties continue to depend heavily on large-scale agricultural production, processing, and transportation, though commercial agricultural corporations have replaced the independent growers as the biggest producers. The Old Military Road is now part of U.S. Highway (US) 281, which links several international border-crossing points along the Rio Grande and continues north to the Oklahoma-Texas state line. Since the passage of the North American Free Trade Agreement in 1994, truck-transport traffic along the highway has increased in the region as more imports from Mexico are brought to the United States (Vigness and Odintz 2011). Other important facets of the area's economy and development at present include oil and gas extraction and tourism.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS AND SITES

Atkins conducted a records search to locate recorded cultural resource sites within 0.5 mile (0.8 km) of the survey corridor. Atkins consulted the Texas Historical Commission's (THC) online Restricted Archeological Sites Atlas, maps and records at the Texas Archeological Research Laboratory (TARL), the National Park Service NRHP database and GIS Spatial Data, and the Geographic Resources Program National Historic Trails Map Viewer as well as the National Historic Landmarks Program for locations of previously-recorded cultural resource sites. Sites designated as State Antiquities Landmarks (SALs), Official Texas Historical Markers, and records of previously conducted cultural resource surveys were also researched.

Results of this review indicate that seven previously recorded archeological sites, 41HG134, 41CF192, 41CF193, 41CF196, 41CF197, 41HG82, and 41HG84, as well as and two modern cemeteries (El Azadon and Monte Mesa), are located within 0.5 mile of the survey corridor (see Appendix A, Sheets 9, 11, 12, 25, and 27).

Sites 41HG134, 41CF192, 41CF196, 41CF197, and 41HG84 are all described as prehistoric open campsites, while site 41HG82 is a historic cemetery, and 41CF193 is described as an early-twentieth-century farmstead. Records also indicate that portions of the survey corridor were previously surveyed by Horizon in 2005 (Brownlow and Clark 2006) and SWCA in 2007 (Galindo et al. 2012).

The project survey corridor also crosses four historic period irrigation districts: Cameron County Irrigation District No. 1, also known as the Harlingen Irrigation District, Cameron County Irrigation District No. 2, Cameron County Irrigation District No. 6, and Delta Lake Irrigation District (Figure 2). Two of these districts are currently assumed eligible for inclusion in the NRHP by the THC pending additional studies and one has been determined eligible for inclusion in the NRHP by the THC. Resources such as canals and standpipes that extend from any of these historic irrigation districts into the survey corridor would be considered part of the district and by association may be considered potentially eligible for inclusion in the NRHP.

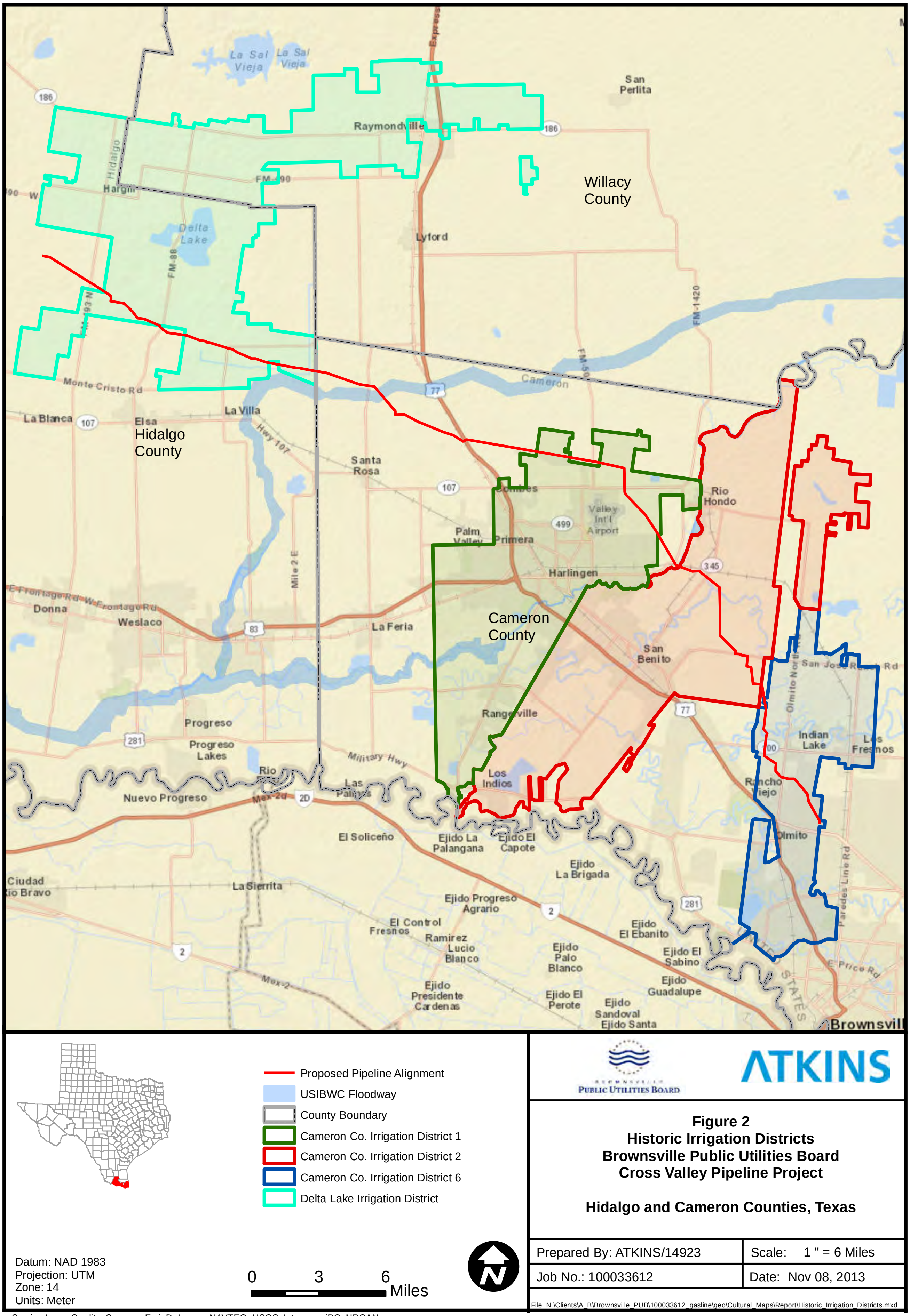

Figure 2
Historic Irrigation Districts
Brownsville Public Utilities Board
Cross Valley Pipeline Project

Hidalgo and Cameron Counties, Texas

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

IV. FIELD METHODS

The survey corridor was assessed for high probability areas (HPAs) and low probability areas (LPAs) for containing archeological deposits (see Appendix A). HPAs were defined areas within 300 ft of a floodplain or within 1,000 ft of a major natural water source, resaca, abandoned channel, previously recorded site, and/or a cemetery (whichever was greater). Survey methods followed the *Archeological Survey Standards for Texas* established by the THC with transects spaced 30 m apart and shovel tests excavated at intervals of 30 m within HPA and judgmentally placed in areas of LPA.

The entirety of the survey corridor was pedestrian surveyed in an effort to identify surface scatters and above-ground, non-archeological cultural resources. Shovel testing was conducted in areas with less than 30 percent ground surface visibility that did not show clear evidence of heavy disturbances. Shovel tests were excavated to a depth where pre-Holocene sterile substrates were encountered, when possible. Where clay soils are encountered, the shovel tests were excavated to a depth of 30 cm. All soil matrices were sifted through 6.3-millimeter (¼-inch) mesh hardware cloth unless the matrix was dominated by clay. Clayey matrix was finely divided by trowel and visually inspected.

For each of the shovel tests, the following information was recorded on Atkins shovel test logs: location, maximum depth, and the number of soil strata. For each soil stratum, thickness, texture, color, and the presence or absence and nature of cultural materials will be recorded. No collection of surface or subsurface artifacts was proposed, so all potentially diagnostic artifacts were photographed to determine their cultural affiliation. All artifacts were identified in the field by the crew chiefs or Project Archeologist, recorded by provenience (site, unit, layer, level, content, and date), and reburied in the shovel test unit. All shovel tests were backfilled upon completion. Documents associated with the field effort will be submitted to TARL for curation.

V. RESULTS

Atkins' cultural resources survey covered a total of approximately 3,076 acres (1,245 hectares) and 50 miles (80_km) of the proposed Cross Valley Pipeline Project. Appendix A maps reflect previously proposed and surveyed alignments as well as the current proposed pipeline alignment. Atkins surveyed a corridor approximately 300 ft (90 m) in width. Approximately 21.7 miles (34.84 km) of HPA were recognized near streams or in floodplains, as described in Section IV, a total of approximately 775 acres (313 hectares) of HPA.

A total of 365 shovel tests were excavated within the survey corridor to an average depth of 11 inches (30 cm) below ground surface (see Appendix A). Much of the soils encountered were clay loam extending from surface. The majority of the survey corridor consists of agricultural fields and some improved pasture, affording excellent ground surface visibility within much of the survey corridor, averaging 60 percent. Noted disturbances included agricultural plowing, and construction related to canals, levees, roads, transmission lines, and pipelines. Within the HPA mapped along the final alignment, 302 shovel tests were excavated, resulting in an average of one shovel test per 2.6 acres (1.05 hectares) of HPA. In total, one shovel test was excavated per 8 acres (3.24 hectares) of surveyed area.

Two newly recorded sites (41CF218 and the modern-age La Feria de las Flores Cemetery) and two isolated finds were recorded during the survey, and two previously recorded archeological sites (41CF196 and 41HG83) were revisited (see Appendix A). Atkins also recorded components of four historic-period irrigation districts (see Appendix A). Based on survey results, Atkins also proposes exploratory trenching within portions of the current survey corridor where alluvial deposits retain the potential to harbor deeply-buried archeological remains.

RECORDED SITES

41CF196 Revisit

Site 41CF196 is a prehistoric open campsite of unknown temporal affiliation that is approximately 45 m east-west by 75 m north-south (Figure 3; see Appendix A, Sheet 25). The site is located 500 m Redacted FM 1595 and 1,600 m west of State Highway (SH) 106 in a cultivated cotton field on gently sloping ground near Abbott Reservoir (Figure 4). Soils at the site are mapped as Raymondville clay loam, less than 0.5 percent slopes. Ground surface visibility at the site at the time of survey was 50 percent.

Originally recorded in 2005 by Horizon Environmental Services, Inc., the site consists of a surficial scatter of prehistoric artifacts (a distal dart point fragment, small bone fragment, and daub) in a plowed agricultural field. Despite excavation of six shovel tests, Horizon Environmental, Inc., found no subsurface artifacts or intact features and recommended the site not eligible for inclusion in the NRHP or designation as an SAL (Brownlow and Clark 2006).

Map Redacted

Figure 4. Overview of site 41CF196, facing southeast.

Atkins archeologists revisited the plotted location of site 41CF196 during the current survey and excavated six additional shovel tests (see Figure 3). Each shovel test was excavated to a terminal depth of 30 cm. No cultural materials or evidence of any intact features were observed either on the ground surface or within any of the shovel tests. The site appears to have been impacted by agricultural plowing as well as a pipeline and a transmission line. Subsequent to survey, the proposed pipeline alignment was modified away from the site such that no impacts to the site are anticipated in conjunction with the proposed construction (see Appendix A, Sheet 25).

41CF218

Site 41CF218 is a scatter of historic artifacts dating to the mid-twentieth century that is Redacted approximately 130 m east-west by 45 m north-south within the survey corridor (Figure 5; see Appendix A, Sheet 25). The scatter extends to the north outside of the survey corridor. The site is located in a plowed field east of an unnamed drainage that has been dammed downstream to create the Abbott Reservoir (Figure 6). FM 1595 runs along the southern boundary of the site. Soils at the site are mapped as Mercedes clay, 0 to 1 percent slopes and 1 to 3 percent slopes (NRCS 2013). Ground surface visibility at the site at the time of survey was nearly 100 percent.

Map Redacted

Figure 6. Overview of 41CF218, facing north.

Investigators excavated 11 shovel tests at the site to an average depth of 31 centimeters below surface (cmbs). Of these, four were positive for cultural materials, and artifacts were recovered as deep as 30 cmbs. Artifacts observed on the surface and in the shovel tests include domestic and architectural debris. Domestic artifacts consist of glass vessels and bottles of various colors and morphologies including solarized, pressed glass; colorless, bottle shards with commercial embossing; aquamarine shards; dark olive and dark amber bottle glass shards; opaque white glass shards from a cosmetics jar; cobalt rim shards exhibiting an external continuous thread finish from a small jar; a Dr. Pepper bottle fragment; and a Vicks Vapo-Rub jar fragment. Ceramic artifacts include Bristol-glazed stoneware sherds, and decorated and undecorated ironstone sherds. Brick fragments, flat glass shards, wire nails, roof shingles, PVC pipe fragments, and assorted other construction debris comprise the architectural remains observed. Gravels suggestive of a driveway were encountered in one of the shovel tests. The bulk of these materials date from around the early to mid-twentieth century with some more modern intrusions.

Inspection of historic aerial photographs suggests a farmstead occupied the site area in the 1950s, and was gone by 1962. A later farmstead near the eastern edge of the site is depicted on a 1996 aerial and is razed by 2003. Since the razing and removal of the buildings, the site has been subject to repeated plowing. The entire site has been heavily disturbed by past and present agricultural practices. Given the extensive disturbances to the site, there is very little potential for intact cultural features or deposits, and thus, it is very unlikely that more intensive investigation will yield any significant additional information. Subsequent to survey, the proposed pipeline alignment was modified away from the site such that no impacts to the site are anticipated in conjunction with the proposed construction (see Appendix A, Sheet 25).

41HG82-Cementerio de las Burras

Site 41HG82 is the h

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ility at the site at the time of survey was 0 to 10 percent. The cemetery is located on an intact rectangular-shaped portion of land in the middle of a cultivated agricultural field (Figure 8). It appears overgrown with tall grasses, cacti, and thorn brush beneath a canopy of mature mesquite trees (Figure 9).

Online records suggest Cementerio de las Burras is a private family cemetery on the Las Burras or Los Burros Ranch containing at least 32 interments (Find a Grave 2013a). Originally recorded in 1980 by Prewitt & Associates, site 41HG82 contains of over 20 grave markers ranging from wooden crosses to concrete and tile markers (Day et al. 1981). Observed surface artifacts at the site associated with grave tending activities included glass bottles and jars, plastic flowers, and marine shells. One family plot is surrounded by a chain-link fence. Death dates on the grave markers indicate the cemetery dates between the late nineteenth and mid-twentieth centuries. Family surnames observed on the markers suggest a Mexican-American cultural affiliation for this population. Many more unmarked graves are likely present at the cemetery given the age of interments and present unkempt condition.

The cemetery is not fenced, there is no signage, the property is not maintained, and appears abandoned. The eligibility of site 41HG82 for inclusion in the NRHP and as a SAL is unknown. Nonetheless, Atkins recommends the proposed pipeline construction avoid impacts within 75 ft (23 m) of the presumed boundary of site 41HG82 outlined on Figure 7 due to the potential for unmarked graves in this area. In accordance with the Texas Health and Safety Code Section 711.011, as amended, and 13 TAC 22.4, Atkins has filed a Notice of Existence of a Cemetery with the Hidalgo County Clerk (see Appendix B).

Map Redacted

Figure 8. Overview of site 41HG82 (Cementerio de las Burras), facing southeast.

Figure 9. Overview of grave markers at 41HG82 (Cementerio de las Burras), facing northwest.

La Feria de las Flores Cemetery

The modern-age La Feria de las Flores Cemetery, also known as Los Cantu Cemetery and Muniz Family Cemetery, is located on private property approximately 1,075 ft (327 m) northeast of the intersection of FM 506 and 472nd Road near Santa Rosa in Cameron County, Texas (see Appendix A, Sheet 14). Online records indicate this is a private family cemetery on the Muniz Ranch with two sections: one for the Muniz Family and the other for the Cantu Family (Find a Grave 2013b). Surveyors noted indications of up to 17 currently marked graves at this site with interment dates ranging from 1974 to 2013 (Figure 10). The oldest marked interment appears to be that of Luis Muniz, Jr., died 1974. No site trinomial was sought due to the modern age of the cemetery (i.e., not older than 50 years).

Figure 10. Overview of La Feria de las Flores Cemetery, facing northwest.

Although not fenced and without signage, the La Feria de las Flores Cemetery appears maintained and well known. It does not appear abandoned but also does not appear to be a perpetual care cemetery. Subsequent to the survey, the proposed alignment was rerouted northward to avoid the site such that the southern edge of the survey corridor is now approximately 300 ft (91 m) away from the cemetery (see Appendix A, Sheet 14). Therefore, no adverse effects to the cemetery are anticipated as a result of the proposed pipeline construction.

ISOLATED FINDS

Isolated find (IF) 1 is the distal end of a projectile point comprised of quartz (Figure 11; see Appendix A, Sheet 1). The find exhibits a beveled blade and a broken edge reworked into a scraper. IF 2 is a very thin proximal scraper fragment comprised of yellowish-brown chert with fossils, exhibits parallel flaking (Figure 12; see Appendix A, Sheet 20). Neither IF meets the eligibility criteria for inclusion in the NRHP or designation as an SAL.

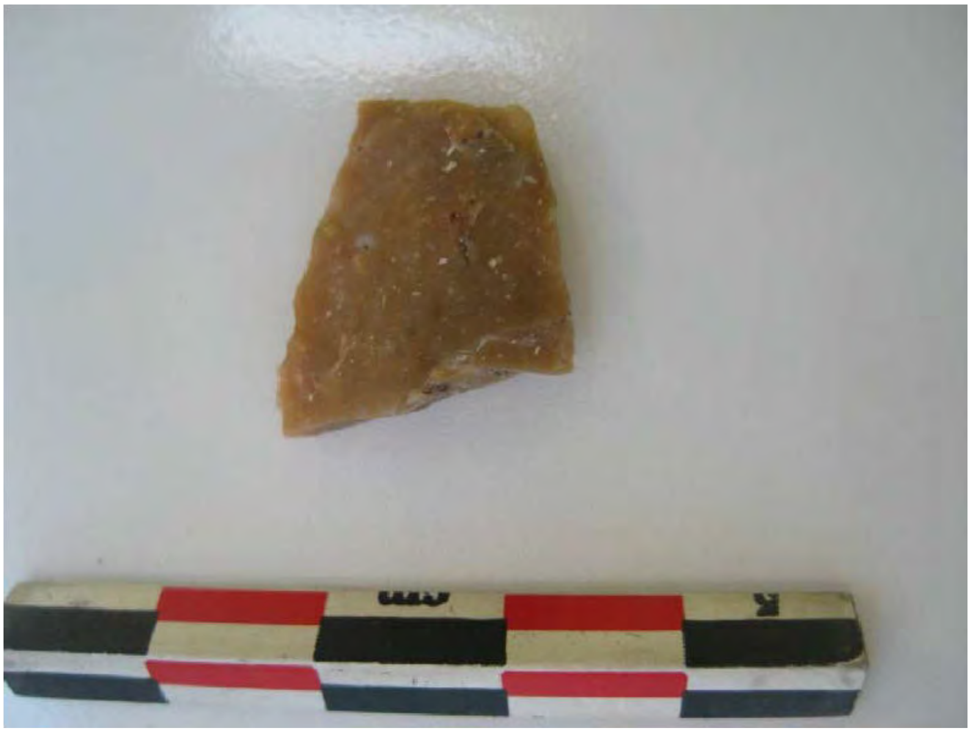


Figure 11. IF 1, a prehistoric lithic scraper.

Figure 12. IF 2, a prehistoric lithic projectile point fragment.

HISTORIC IRRIGATION DISTRICTS

During the field survey efforts, archeologists photographed any aboveground irrigation resources within or extending into the survey corridor, including canals, ditches, and standpipes, and mapped their locations. The data was compared to irrigation district maps prepared by Texas A&M University's Irrigation Technology Center to determine what features were components of established irrigation districts. This review resulted in the identification of additional sections of underground pipeline that were not recorded during the field survey effort. As three of the four irrigation districts within which the project passes are considered eligible for NRHP inclusion, Figures 13 and 14 illustrate the locations of associated resources, and Tables 2–4 identify each component, its resource type, and provide a preliminary Section 106 effect assessment based on the construction specifications currently available.

Irrigation Resources

Irrigation features associated with the four irrigation districts crossed by the proposed pipeline represent the predominant resource type recorded during the current survey. Archeologists documented 38 resources related to irrigation within or extending into the survey corridor, including canals/ditches, sections of underground pipeline, and aboveground standpipes. These components were recorded within four historic-age irrigation districts, including Cameron County Irrigation District No. 1 (Harlingen Irrigation District), Cameron County Irrigation District No. 2 (San Benito), Cameron County Irrigation District No. 6 (Los Fresnos), and Delta Lake Irrigation

District. The THC determined that the Harlingen Irrigation District was not eligible for NRHP inclusion in 2009. In contrast, Cameron County Irrigation District No. 6 was determined to be NRHP eligible in 2009, and both Cameron County Irrigation District No. 2 and the Delta Lake Irrigation District are currently assumed eligible for the purposes of project coordination pending additional studies.

Tables 2–4 list the individual resources within the three NRHP-eligible irrigation districts and include their resource types and preliminary Section 106 effect assessments. Photographs of the resources where available are included in Appendix C, and the locations of all of the resources were mapped and are depicted on Figures 13 and 14, as well as Appendix A.

In general, all pipeline crossings at irrigation feature locations will be underground and will be constructed by one of three methods: open-cut, conventional boring, or HDD. For the open-cut construction method, a trenchline will be excavated through a given canal/ditch section. After the pipeline is installed, the open-cut will be backfilled. Any excess material that may result from backfilling a pipeline installed by open-cut will be removed from the floodplain and disposed of according to specifications included as part of construction plans as signed and sealed by a professional engineer. The canals/ditches will be returned to existing section within the limits of the open-cut after backfilling. All riprap or other slope protection shall be installed according to construction plans as signed and sealed by a professional engineer. This method is not preferred with regard to irrigation crossings and will only be used if conditions or permit requirements mandate its implementation.

The conventional boring method involves boring beneath an irrigation feature in order to install the proposed pipeline crossing. No surface excavation or fill between the bore entry and exit locations results when this method of construction is utilized. Thus, there are no post-construction physical changes to the irrigation resource, and as a result, there will be no impacts to its conveyance or storage capacity. Typically, a 250-x-250-ft entrance/exit workspace will be located outside the banks of each canal/ditch or other feature that is to be crossed. The workspace is required for the placement of temporary bore pits utilized to drill the pipeline tunnel. This process produces drill cuttings from the bore hole, which will be distributed through landfarming. Landfarming is an activity regulated by the Railroad Commission of Texas for oil and gas activities. It involves the process of spreading and incorporating drilling spoils material into the top soil layer. BPUB will landfarm the spoils generated from the bore process in accordance with the Railroad Commission of Texas guidelines, which state, among other things, that landfarm sites may not be located within the 100-year floodplain. This is one of the two preferred methods of construction favored by Cameron County Irrigation District No. 2 and the Delta Lake Irrigation District.

The HDD construction method involves drilling beneath an irrigation feature in order to install the proposed pipeline crossing. No surface excavation or fill between the HDD entry and exit locations results when this method of construction is utilized. Thus, the construction results in no physical changes to the canal/ditch or other irrigation resource. As such, the pipeline crossing does not induce impacts to the storage or conveyance capacity of irrigation system components. Typically, 250-x-250-ft entrance and exit workspaces are located outside the banks of each feature to be crossed. The workspace is required for the drilling rigs, mud circulation pits, and pipe stringing. The HDD process produces drill cuttings from the bore hole, which will be distributed through landfarming in accordance with the Railroad Commission of Texas guidelines. This method and conventional boring are the preferred construction methods at irrigation resource locations as specified by the respective irrigation districts and the project engineers.

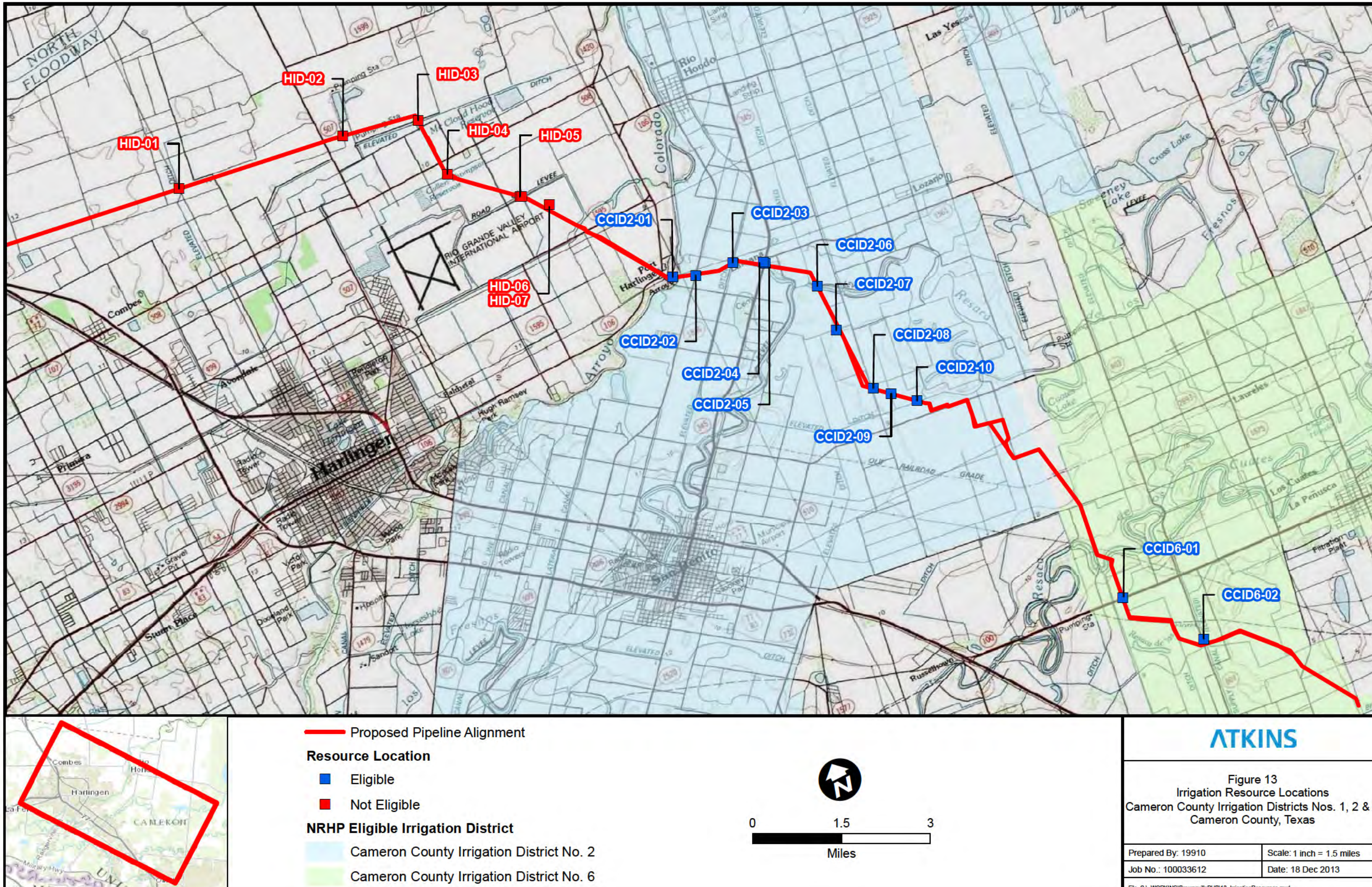
Cameron County Irrigation District No. 1 (Harlingen Irrigation District)

Archeologists recorded seven components of the Cameron County Irrigation District No. 1 within the survey corridor (Figure 13). The THC determined that this district does not meet the qualifications for NRHP inclusion under any of the applicable criteria in 2009 in association with a Texas Department of Transportation (TxDOT)-sponsored project (CSJ# 2094-01-038). As a result, construction of the proposed pipeline at each of the locations would not result an adverse impact to any NRHP-listed or -eligible resource within this district. Thus, no further consideration of the resources or of the irrigation district under Section 106 is anticipated in connection with the current project.

Cameron County Irrigation District No. 2 (San Benito Irrigation District)

Ten features associated with the Cameron County Irrigation District No. 2 were documented within the survey corridor (Table 2; see Figure 13). As per communication between TxDOT and the THC, this irrigation district is currently assumed to be NRHP eligible for the purposes of project coordination. Documented features included one lined canal, seven unlined canals, one segment of underground pipeline, one canal associated with a segment of underground pipeline, and one standpipe. As per an agreement with the irrigation district, pipeline construction within the boundaries of the district will have to comply with the following standards:

- The pipeline will have to be constructed a minimum of 5 ft below the flow line of any canal.
- Required angles will be approved on a case-by-case basis depending on any other infrastructure or other existing utilities.
- Casing is required; it may be concrete or steel.
- The preferred method of construction is boring, although open cut is permissible only with specific authorization through the license agreement. All canals would have to be returned to their original form and functionality.



HID-01
HID-02
HID-03
HID-04
HID-05
HID-06
HID-07
CCID2-01
CCID2-02
CCID2-03
CCID2-04
CCID2-05
CCID2-06
CCID2-07
CCID2-08
CCID2-09
CCID2-10
CCID6-01
CCID6-02
Harlingen
Combes
Rio Hondo
RIO GRANDE VALLEY INTERNATIONAL AIRPORT
NORTH FLOODWAY
Proposed Pipeline Alignment
Resource Location
Eligible
Not Eligible
NRHP Eligible Irrigation District
Cameron County Irrigation District No. 2
Cameron County Irrigation District No. 6
0
1.5
3
Miles
ATKINS
Figure 13
Irrigation Resource Locations
Cameron County Irrigation Districts Nos. 1, 2 & 6
Cameron County, Texas
Prepared By: 19910
Scale: 1 inch = 1.5 miles
Job No.: 100033612
Date: 18 Dec 2013
File: C:_WORKING\BrownsvillePUB\13_IrrigationResources.mxd

Table 2. Irrigation Resources Within Cameron County Irrigation District No. 2

New Site #	Resource Type	Preliminary Section 106 Effect Assessment
CCID2-01	Lined Canal	No Adverse Effect
CCID2-02	Unlined Canal	No Adverse Effect
CCID2-03	Unlined Canal	No Adverse Effect
CCID2-04	Underground Pipeline	No Adverse Effect
CCID2-05	Standpipe	No Adverse Effect
CCID2-06	Unlined Canal	No Adverse Effect
CCID2-07	Unlined Canal	No Adverse Effect
CCID2-08	Unlined Canal	No Adverse Effect
CCID2-09	Unlined Canal	No Adverse Effect
CCID2-10	Unlined Canal	No Adverse Effect

For many of the irrigation canal and underground pipeline crossings, right of way (ROW) data are not currently available, so the exact crossing locations and methods have not been finalized. Resources CCID2-01, CCID2-03, and CCID2-04 are preliminarily planned to be bored under using HDD; however, this may change as project plans are finalized. If the canals or segments of pipeline are bored under, there is no possibility for direct or other adverse impacts to the resources that would affect their historic integrity. If open cut is selected at any of the canal locations, construction practices for this method include returning the canals to their original dimensions and function. As a result, there would be no permanent physical alteration to the canals. Similarly, any materials replaced will be those that are typically replaced during regular maintenance. As neither the appearance nor functionality of the structures will be impacted by the proposed project regardless of the selected construction method, there should be no adverse effect to the resources under Section 106 of the National Historic Preservation Act. Additionally, any aboveground standpipes within the proposed ROW will be avoided by project construction. As a result, no impact to this resource is anticipated, and no further consideration of it is recommended in relation to the current project.

Cameron County Irrigation District No. 6 (Los Fresnos Irrigation District)

Archeologists documented two features of Cameron County Irrigation District No. 6 within the survey corridor (Table 3; see Figure 13). The resources include an unlined canal and an aboveground standpipe. The THC determined this district qualifies for NRHP inclusion under Criterion C for its engineering qualities in 2009. At present, the district has not provided construction requirements to the project engineers. As a result, specific construction methods at the canal crossing location are not currently available. In general, project plans include construction of a pipeline via bore (conventional or HDD) or open cut. If the pipeline is installed via boring, there will be no direct impact to the resource nor will its historic integrity be compromised. Furthermore, any portion of the canal that is open cut for pipeline construction will be repaired to its original condition and functionality. Finally, project planners have indicated that all aboveground concrete standpipes within the proposed ROW will be avoided during pipeline construction. As a result, no adverse impact is anticipated to resources within Cameron County Irrigation District No. 6, and no further consideration of the district or its associated resources is recommended under Section 106.

Table 3. Irrigation Resources Within
Cameron County Irrigation District No. 6

New Site #	Resource Type	Preliminary Section 106 Effect Assessment
CCID6-01	Unlined Canal	No Adverse Effect
CCID6-02	Standpipe	No Adverse Effect

Delta Lake Irrigation District

Archeologists documented 19 features associated with the Delta Lake Irrigation District within the survey corridor (Table 4; Figure 14). As per communication between TxDOT and the THC, this irrigation district is currently assumed to be NRHP eligible for the purposes of project coordination under Section 106. Documented features included 4 lined canals, 1 lined canal associated with a section of underground pipeline, 2 unlined canals, and 12 sections of underground pipeline. As per an agreement with the irrigation district, pipeline construction within the boundaries of the district will have to comply with the following standards:

For conventional bore crossings, the following is required:

- Pipeline must be installed a minimum depth of 5 ft below all Delta Lake Irrigation District facilities (i.e., canals, drainage ditches, pipelines, and ROW).
- If the gas pipeline pressure is greater than 200 pounds per square inch, the pipeline must be cased throughout the total ROW length.
- No angle restrictions.

For HDD crossings, the following is required:

- If casing is not used, a minimum depth of 10 ft below all Delta Lake Irrigation District facilities is required, including canals, drainage ditches, pipelines, and ROW).
- No angle restrictions.

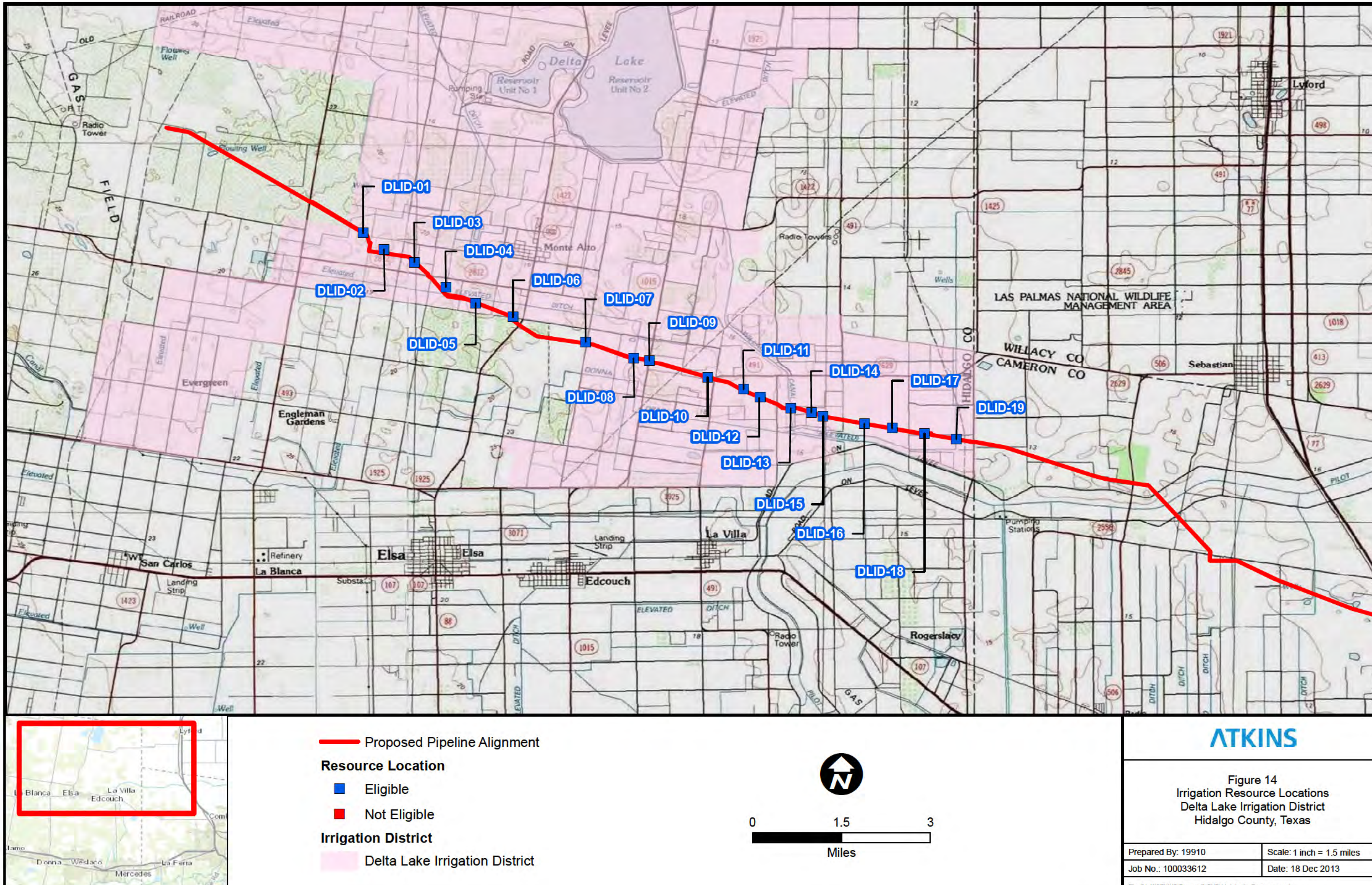


Figure 14
Irrigation Resource Locations
Delta Lake Irrigation District
Hidalgo County, Texas

Though ROW data for all of the components are not currently available, meaning construction plans at each of these locations has not been finalized, the canals and pipeline sections will either be bored under using conventional or HDD boring methods or open cut. Regardless of which construction method is employed, construction of the pipeline will not constitute an adverse effect to any of the contributing features of the irrigation system. In particular, boring under the resources would avoid both direct impacts and other adverse impacts that would affect their integrity or functionality. Additionally, open-cut methods specify that the resource will have to be returned to its original dimensions and capacity. As a result, any temporary impacts to a particular resource during construction would not constitute a permanent or otherwise adverse effect to the irrigation system or its components. Therefore, no further consideration of impacts to the district under Section 106 is recommended in connection with the proposed project.

Table 4. Irrigation Resources Within Delta Lake Irrigation District

New Site #	Resource Type	Preliminary Section 106 Effect Assessment
DLID-01	Underground Pipeline	No Adverse Effect
DLID-02	Underground Pipeline	No Adverse Effect
DLID-03	Underground Pipeline	No Adverse Effect
DLID-04	Lined Canal	No Adverse Effect
DLID-05	Lined Canal/ Underground Pipeline	No Adverse Effect
DLID-06	Underground Pipeline	No Adverse Effect
DLID-07	Underground Pipeline	No Adverse Effect
DLID-08	Lined Canal	No Adverse Effect
DLID-09	Underground Pipeline	No Adverse Effect
DLID-10	Underground Pipeline	No Adverse Effect
DLID-11	Lined Canal	No Adverse Effect
DLID-12	Lined Canal	No Adverse Effect
DLID-13	Unlined Canal	No Adverse Effect
DLID-14	Underground Pipeline	No Adverse Effect
DLID-15	Underground Pipeline	No Adverse Effect
DLID-16	Underground Pipeline	No Adverse Effect
DLID-17	Underground Pipeline	No Adverse Effect
DLID-18	Underground Pipeline	No Adverse Effect
DLID-19	Unlined Canal	No Adverse Effect

Conclusions

Though 31 of the 38 irrigation-related resources recorded within the proposed ROW are associated with NRHP-eligible irrigation systems, proposed construction plans at the locations would not constitute adverse effects to any of the resources. Specifically, aboveground standpipes will be avoided by project construction, and construction specifications maintained by at least two of the irrigation districts suggest that conventional boring or HDD will be used to construct sections of the proposed pipeline under canals/ditches and sections of irrigation pipeline. If bored under, the project would not result in any direct or otherwise adverse impacts to irrigation features in the eligible districts. Alternatively, some canals may be open cut. Though not the preferred construction method with regard to impacting significant irrigation features, specifications require that all open cut canals be returned to their original form, function, and capacity. As a result, any impacts would be temporary and would not result in alterations to any of the resources' character-defining features. As a result, the proposed project does not appear to represent a potential adverse effect to any NRHP-eligible irrigation feature and no further consideration of the resources under Section 106 is recommended.

PROPOSED EXPLORATORY TRENCHING

As a result of the cultural resources survey and background review, Atkins determined that portions of the current proposed pipeline alignment cross floodplain deposits that possess the potential for harboring deeply-buried prehistoric archeological remains. Soils within these settings are composed of deep, modern alluvium that extend below a depth that standard archeological shovel tests can penetrate and require mechanical excavation to effectively assess the likelihood of buried archeological materials. Therefore, Atkins recommends a program of exploratory trenching be initiated to further examine alluvial deposits within the survey corridor considered to be potentially attractive to prehistoric occupation, including topographic rises within the floodplain, remnant natural levees, abandoned meander scars, and adjacent fossil channels. These locations for proposed trenches are illustrated in Appendix A. Each trench will be excavated to a depth commensurate with the depth of pipeline construction or terminated once pre-Holocene substrates are reached. If access is denied for any of the parcels proposed for trenching, Atkins recommends that construction be monitored in these areas. Once completed, the results of the trenching will be detailed in an addendum to this report.

VI. CONCLUSIONS AND RECOMMENDATIONS

As a result of the cultural resources survey, Atkins recorded two sites, a scatter of mid-twentieth-century domestic and architectural artifacts (41CF218), the modern-age La Feria de las Flores Cemetery, components of four historic-period irrigation districts, and two isolated finds (prehistoric lithic artifacts). Atkins also revisited two previously recorded archeological sites, a surface scatter of prehistoric artifacts (41CF196) and the historic Cementerio de las Burras (41HG83).

Based on survey results, Atkins recommends that neither of the two isolated finds meets the eligibility criteria for inclusion in the NRHP or designation as an SAL. Atkins further recommends that no further work is required and that pipeline construction be allowed to proceed in the area of these finds.

The eligibility of site 41HG82, the historic Cementerio de las Burras, for inclusion in the NRHP and designation as a SAL is unknown based on survey-level data alone. Nonetheless, Atkins recommends the proposed pipeline construction avoid impacts within 75 ft of the presumed boundary of site 41HG82 outlined in this report due to the potential for unmarked graves in this area in deference to the Texas Health and Safety Code, Section 711.035 (d). If impacts to the site cannot be avoided within this 75-ft buffer zone, further consultation with the THC may be necessary.

Due to a modification in the proposed pipeline alignment, sites 41CF196, 41CF218, and the La Feria de las Flores Cemetery are no longer within the proposed pipeline alignment, and therefore, no adverse impacts to the sites or cemetery associated with the proposed construction are anticipated. Atkins recommends that pipeline construction be allowed to proceed in the vicinity of these sites.

With regard to the irrigation resources, planned construction activities within the NRHP-eligible districts do not appear to constitute adverse effects to any of the resources under Section 106. While not finalized, construction of the underground pipeline via boring methods would avoid all impacts to the resources, including to their integrity and functionality. Similarly, if the pipeline was constructed via open cut methods, impacted sections of aboveground canals would be returned to their original dimensions and function. Project engineers have specified that aboveground standpipes within the ROW will be avoided by project construction. As no adverse impacts to any NRHP-eligible irrigation features are anticipated in association with the proposed project, no further consideration of the resources under Section 106 is recommended.

Atkins further recommends that exploratory trenching be conducted within several portions of the survey corridor that feature floodplain deposits that retain the potential to harbor deeply buried archeological remains (defined as HPAs) beyond the reach of shovel testing in accordance with state survey guidelines. If access is denied for any of the parcels proposed for trenching, Atkins recommends that construction be monitored in these areas.

Once consultations with the THC are complete, Atkins recommends that construction activities be allowed to proceed without further consultation. Should evidence of archeological sites be encountered during construction, work in the immediate area should cease, and a qualified archeologist should be called upon to evaluate the evidence and provide recommendations for how to manage the resource under the State's Historic Preservation Plan.

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Appendix A

Project Overview Maps with Site Locations
(Not for Public Disclosure)

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Appendix B

Notice of Existence of a Cemetery

NOTICE OF EXISTENCE OF CEMETERY

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
COUNTY OF **Hidalgo** §

THAT the undersigned, acting pursuant to the provisions of Section 711.011 of the Texas Health and Safety Code, files this notice of the discovery of an unknown or abandoned cemetery.

The Cementerio de las Burras is located approximately 1 kilometer southeast of the intersection of Highway 491 and the Willacy Canal and approximately 1.4 kilometers southwest of the intersection of Highway 491 and County Road 8499. Its central point has an approximate UTM of E 609256.01 / N 2913066.95.

A location map (Exhibit A) is attached.

The Cementerio de las Burras is evidenced by an abundance of grave markers of stone, concrete, and wood, plot fencing, and brick curbing within a heavily vegetated rise within an agricultural field. Tall, mixed grasses as well as mesquite trees obscure the many grave markers. Some graves are decorated with glass bottles and artificial flowers.

A location photograph (Exhibit B) is attached.

The legal description for the land occupied by the cemetery is:
OJO DE AGUA LAS BURRAS SH 24 ABST 75 12.5 AC

This Notice signed and executed on the 18 day of October ,2013 .

(signature)

Karissa Basse
(printed name)

Atkins
6504 Bridge Point Parkway
Austin, TX 78730
(address)

THE STATE OF TEXAS §
§
COUNTY OF **Travis** §

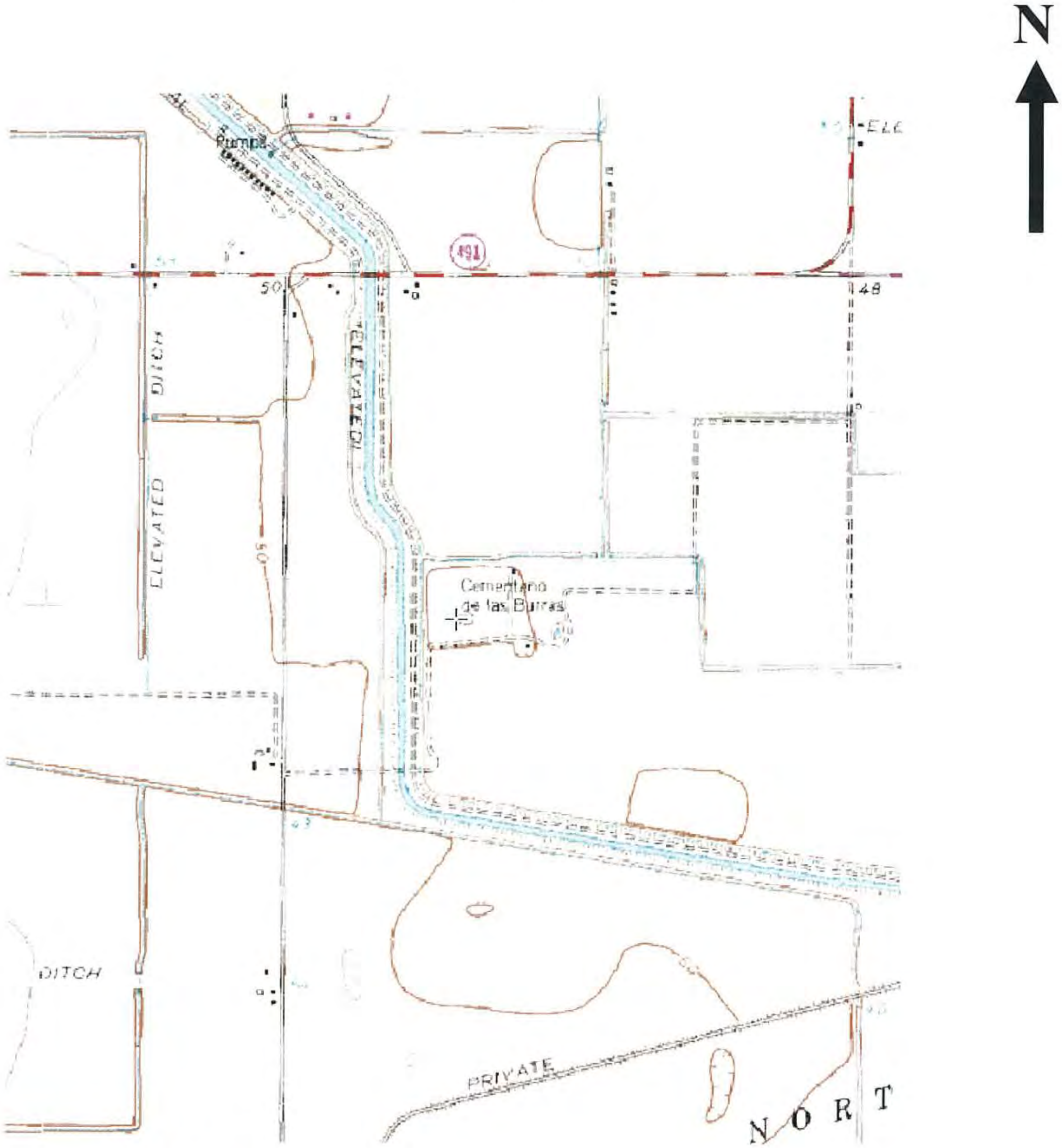
This instrument was acknowledged before me on the 18 day of October , 2013 ,

by KARISSA BASSE.

ARLENE B. SMITH
Notary Public, State of Texas
My Commission Expires
October 18, 2014

Arlene B. Smith
Notary Public, State of Texas

EXHIBIT A
Location map



Center: 26.3334°N 97.9052°W
Elevation at center: 62 feet (19 meters)
Quad: USGS Edcouch

EXHIBIT B
Location Photograph

Appendix C

Photographs of Historic Irrigation Resources

View of canal in Cameron County Irrigation District No. 2 (CCID2-01), camera facing northwest

View of canal in Cameron County Irrigation District No. 2 (CCID02-02), camera facing southwest

View of canal in Cameron County Irrigation District No. 2 (CCID2-03), camera facing north

View of canal in Cameron County Irrigation District No. 2 (CCID2-05), camera facing north

View of canal/ditch in Cameron County Irrigation District No. 2 (CCID2-07), camera facing north

View of canal in Cameron County Irrigation District No. 2 (CCID2-08), camera facing south

View of canal in Cameron County Irrigation District No. 2 (CCID2-09), camera facing west

View of canal in Cameron County Irrigation No. 6 (CCID6-01), camera facing north

View of canal in Delta Lake Irrigation District (DLID-04), camera facing south

View of canal in Delta Lake Irrigation District (DLID-08), camera facing south

View of canal in Delta Lake Irrigation District (DLID-11), camera facing north

View of canal in Delta Lake Irrigation District (DLID-13), camera facing west

View of canal in Delta Lake Irrigation District (DLID-19), camera facing north