Appendix A U.S. Fish and Wildlife Service Official Species List

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CULTURAL ASSESSMENT REPORT
FOR THE
CITY OF FIREBAUGH HUD TANK REPLACEMENT PROJECT
FRESNO COUNTY, CALIFORNIA

Prepared for:
Gouveia Engineering
456 Sixth Street
Gustine, CA 95322

and

City of Firebaugh Public Works Department
1666 Eleventh Street
Firebaugh, CA 93622

Prepared by:
Dina Ryan, M.A., RPA
Montse Osterlye, B.A.
Garcia and Associates
813 D Street
San Rafael, CA 94901

August 2018

GANDA

- CONFIDENTIAL -

STATEMENT OF CONFIDENTIALITY

This report identifies the locations of cultural resources, which are confidential. As nonrenewable resources, archaeological sites can be significantly impacted by disturbances that can affect their cultural, scientific, and artistic values. Disclosure of this information to the public may be in violation of both federal and state laws. To discourage damage resulting from vandalism and artifact looting, cultural resources locations should be kept confidential and report distribution restricted. Applicable U.S. laws include, but are not limited to, Section 304 of the National Historic Preservation Act (16 USC 470w-3) and California state laws that apply include, but are not limited to, Government Code Sections 6250 *et seq.* and 6254 *et seq.*

MANAGEMENT SUMMARY

This report presents the results of a cultural resources investigation for the City of Firebaugh's United States Department of Housing and Urban Development (HUD) Tank Replacement Project in Fresno County, California. The City of Firebaugh, the project proponent, applied for grant funding from the Safe Drinking Water State Revolving Fund through the State Water Resources Control Board Division of Drinking Water (formerly California Department of Public Health) to replace the existing HUD tank with a 750,000-gallon storage tank, a 3.0-million gallon-per-day booster pump station, and a transmission line from the tank site to the north side of the Delta-Mendota Canal on Washoe Avenue. This undertaking is part of a larger effort to replace existing water infrastructure to improve drinking water quality in the community of Las Deltas. This project must comply with Section 106 of the National Historic Preservation Act of 1966 due the project's State Revolving Fund (federal funding) and meet the State Water Resources Control Board Federal Cross-Cutter Requirements for Cultural Resources. As a result, the investigation must consider the effects of the undertaking on any sites, buildings, structures, or objects that are included in, or may be eligible for inclusion in, the National Register of Historic Places. The City of Firebaugh contracted Gouveia Engineering to design and install the City's replacement HUD tank and associated water pipeline, and Gouveia Engineering procured Garcia and Associates to conduct the cultural resources investigation required for compliance with Section 106 of the National Historic Preservation Act.

Garcia and Associates conducted the cultural resources investigation to identify historic properties, including prehistoric and historic-period archaeological and architectural resources more than 45 years of age, per 36 Code of Federal Regulations §800.4. This report documents the methods and results of an inventory of all cultural resources located within the 21.356-acre Area of Potential Effects of the City's proposed HUD tank replacement project. In order to complete the identification of historic properties within the Area of Potential Effects, the cultural resources investigation included the following:

- A records search at the Southern San Joaquin Valley Information Center of the California Historic Resource Inventory System at California State University Bakersfield;
- Archival research and historic map review conducted at local, regional, and online repositories;
- Consultation with Native American groups and individuals identified by the Native American Heritage Commission and with local historical societies;
- A pedestrian field survey;
- A site assessment for buried prehistoric archaeological resources; and,
- Preparation of this Section 106 Inventory Report documenting identification and evaluation efforts.

The cultural resources records search, archival and map review, and consultation with Native American groups and historical societies resulted in a finding that no historic properties will be affected by the proposed undertaking. The pedestrian field survey was conducted within the Area of Potential Effects on July 31, 2018 and no cultural resources were identified. Results of the historic archival and map research and the buried prehistoric site sensitivity assessment demonstrate that there is a moderate potential for encountering archaeological deposits within the Area of Potential Effects.

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APPENDICES

1.0 INTRODUCTION

This cultural resources investigation was conducted by Garcia and Associates (GANDA) in order to meet compliance requirements of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, for the City of Firebaugh's proposed HUD Tank Replacement Project (Project) at the Firebaugh HUD tank in Fresno County, California (Appendix A: Figures 1 and 2). This report presents the methods and results of the cultural resources investigation within the Project's Area of Potential Effects (APE) (Appendix A: Figure 3) and includes the results of a cultural resources records search, a historic map review, archival research, consultation with the Native American groups and local historical societies, a pedestrian field survey of the APE, and a buried prehistoric site sensitivity assessment. The report includes discussions of the environmental, prehistoric, ethnographic, and historic contexts of the APE and the region.

The City of Firebaugh, as the Project proponent, applied for grant funding from the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) to replace the existing tank with a 750,000-gallon storage tank, 3.0--million-gallon-per-day (MGD) booster pump station, and the transmission line from the tank site to the north side of the Delta-Mendota Canal (DMC) on Washoe Avenue. This undertaking is part of a larger effort to replace existing water infrastructure to improve drinking water quality in the community of Las Deltas. This project must comply with Section 106 of the NHPA of 1966 due the Project's State Revolving Fund (SRF) (federal funding) and must meet the SWRCB Federal Cross-Cutter Requirements for Cultural Resources. As a result, the investigation must consider the effects of the undertaking on any sites, buildings, structures, or objects that are included in, or may be eligible for inclusion in, the National Register of Historic Places (NRHP).

1.1 PROJECT LOCATION AND DESCRIPTION

The Project is located along the western edge of the City of Firebaugh (Appendix A: Figure 1), situated on the west edge of the Helm Canal, directly west of Main Street and south of Nees Avenue (Appendix A: Figure 2). The HUD tank is located approximately half a mile south of West Nees Avenue off of Main Street in Firebaugh. The Project also includes a portion of the water transmission line which runs from the HUD Tank west through an agricultural field, then south along North Washoe Avenue, ending on the north side of the DMC (Appendix A: Figure 3).

A portion of the water from the HUD tank is pumped to Tomatek Inc, an industrial customer of the City of Firebaugh. From the HUD Tank, most of the stored water is pumped through the 8-inch-diameter transmission main to Las Deltas. The transmission main is approximately 21,000 feet in length. The transmission main was said to have been constructed in the 1960s (Gouveia 2016). However, portions of the transmission main north of the DMC (the segment included in this project) have been broken several times and therefore have been replaced over the years. There are four residential customers that receive water through six service connections located on the transmission main before it crosses the DMC to Las Deltas (the portion within the APE). The monthly water supplied by the City of Firebaugh in 2012 to these customers was approximately 12 million gallons. The water supplied to these customers comprises approximately 19 percent of the total water supplied from the HUD tank. The average water supplied per service connection is approximately 5,628 gallons per day.

A Preliminary Engineering Report (PER) has been prepared for the proposed Project (Gouveia 2016). The PER describes the conceptual plans and includes the demolition/abandoning/disposal of existing facilities and the installation of a temporary pump station; 750,000-gallon water storage tank; 3.0 MGD pump station; standby generator; electrical and controls; piping and valving; electromagnetic flow meters; fencing and gates; lighting; 12-inch transmission line from the HUD tank to the north side of the DMC; and, pipe crossings at Washoe Avenue and the Central California Irrigation District (CCID) canal.

1.2 Definition of the Area of Potential Effects

The APE encompasses a 21.356-acre area of the Firebaugh HUD water tank, booster pump station, and water transmission line alignment north of the DMC and includes the full extent of all Project activities (Appendix A: Figure 3). As such, the APE is defined as the entire footprint where ground-disturbing activities will occur. GANDA prepared an APE map (Appendix A: Figure 3) based on the design map dated January 2, 2018 and obtained from Consulting Engineers. The APE consists of all areas of proposed work including the location of the temporary pump station, areas designated for demolition, trenching for the pipeline replacement, fencing and gates, and an equipment laydown area. The APE of the HUD tank measures approximately 1.83 miles (140 meters [m]) north-south by 285 feet (87 m) east-west. The APE for the water transmission line measures approximately 1.83 miles (2.94 kilometers [km]) long and three feet (0.95 m) wide. The maximum vertical APE extends to 5 feet (1.5 m) below the current ground surface.

2.0 REGULATORY CONTEXT

The regulatory framework that mandates consideration of cultural resources in project planning includes federal, state, and local governments. Cultural resources include prehistoric and historic-period archaeological sites and objects, as well as extant historic structures, buildings, and locations of important historic events or sites of traditional and/or cultural importance to various groups. Archaeological or architectural resources may be determined significant under national, state, or local criteria. Since the Project is a federal undertaking as defined by Section 106 of the NHPA and its implementing regulations (36 CFR §800), the evaluation criteria used for evaluating resources in the APE is from the NRHP.

2.1 SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT (NHPA)

Section 106 of the NHPA (36 CFR §800) requires that projects undertaken by federal agencies (and/or federally funded projects or projects requiring federal approval) consider the effects of their actions on properties that may be eligible for listing, or are listed in, the NRHP. To determine whether an undertaking could affect NRHP-eligible properties, cultural resources (including archaeological and architectural properties) must be inventoried and evaluated for listing in the NRHP. The Section 106 process entails four primary steps, listed below.

1. Initiation of consultation with consulting parties (36 CFR §800.3).
2. Identification and evaluation of historic properties within the APE (36 CFR §800.4).
3. Assessment of adverse effects on historic properties within the APE (36 CFR §800.5).
    - If there are historic properties that will be affected, consult with the California State Historic Preservation Officer (SHPO) regarding adverse effects on historic properties.
    - If there are no historic properties that will be affected, implementation of the project in accordance with the findings of no adverse effect shall proceed (36 CFR 36 §800.5[d][1]).
4. Resolution of adverse effects and proceeds in accordance with the Memorandum of Agreement (MOA), if determined appropriate (36 CFR §800.6).

National Register of Historic Places (NRHP) Criteria for Evaluation

The significance of cultural resources is determined using the NRHP's four Criteria for Evaluation (Criteria A-D) at 36 CFR 60.4, which state that a historic property is any site, building, structure, or object that:

A. Is associated with events that made a significant contribution to the broad patterns of our history (Criterion A);
B. Is associated with the lives of persons significant to our past (Criterion B);
C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); and/or,
D. Has yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

If the SHPO determines that a cultural resource is eligible for inclusion in the NRHP, then it is automatically eligible for the California Register of Historic Resources (CRHR). If a resource does not have the level of integrity necessitated by the NRHP, it may still be eligible for the CRHR, which allows for a lower level of integrity.

NRHP Seven Aspects of Integrity

Cultural resources integrity is determined using the NRHP's seven aspects of integrity at 36 CFR 60.4, which state that a historic property must not only be shown to be significant under the NRHP criteria, but it also must retain historic integrity. The seven aspects of integrity include location, design, setting, materials, workmanship, feeling, and association. A property must meet one or more of the Criteria for Evaluation before a determination can be made about its integrity.

3.0 SOURCES CONSULTED

In order to complete 36 CFR Part 800.4, the identification of historic properties within the APE, archaeologists completed background research, including a records search at the Southern San Joaquin Valley Information Center (SSJVIC) of the California Historical Resources Information System (CHRIS), a review of historic maps and photographs, consultation with the Native American Heritage Commission (NAHC) and interested Native American groups and individuals, and consultation with historical societies local to the Project. The methodology and results of the background research and consultations are presented below.

GANDA completed a cultural resources constraints analysis in 2014 for the Las Deltas Safe Drinking Water Project (Siskin 2014), which includes the APE. The records searches from that project, dated June 12, 2014 and July 2, 2014, are also included in the results below.

3.1 RECORDS SEARCH

Records Search Methods
On July 12, 2018, GANDA requested an updated records search at the SSJVIC at California State University Bakersfield, California. The results were provided on July 25, 2018 (File No. 18-303). The SSJVIC is a repository of all cultural resources site records, previously conducted cultural resources investigations, and historic information concerning cultural resources for five counties, including Fresno County. The purpose of the records search was to compile information pertaining to the locations of previously recorded cultural resources and cultural resource studies within a 0.5-mile (0.8-km) radius of the APE. The following sources were consulted during the records search:

- SSJVIC base maps: USGS 7.5-minute series topographic quadrangle of Firebaugh, California (1984).
- Survey reports from previous cultural resources investigations and cultural resources site records to identify recorded archaeological sites and built environmental resources (i.e., buildings, structures, and objects) and previously conducted surveys.
- California Office of Historic Preservation (OHP) sources, including the California Inventory of Historic Resources (1976), the California Archaeological Determinations of Eligibility (2012a), and the Historic Properties Directory (2012b), which combines cultural resources listed as California Points of Historical Interest and California Historical Landmarks and those that are listed in, or determined eligible for listing in, the NRHP or the CRHR.

Records Search Results
The results of the records search indicate that no studies have been conducted directly within the APE and no previously recorded prehistoric archaeological sites have been recorded within the APE or within 0.50 mile of the APE. A total of eleven studies have been conducted within 0.50 mile of the APE (Kus 1988, Stuart 1974, Varner 1975, Marine 1999, Marine and Wallace 2000, Smith et al. 1989, Leach-Palm et al. 2010, Leach-Palm et al. 2006, Brady and Bunse 2006, Baloian and Lloyd 2013, Siskin 2014; Table 1).

Two historic-era built-environment resources have been identified within the APE (P-10-005796/CA-FRE-3515H and P-10-005797/CA-FRE-3516H) and four historic-era built-environment resources have been identified within 0.50 mile of the APE (P-10-005795/CA-FRE-3514H, P-10-003930/CA-FRE-3109H, P-10-005166, and P-10-005165). These resources are listed in Table 2, and depicted in Appendix A: Figure 4.

Table 1. Previous Studies within a 0.5mile Radius of the APE

Author(s)	Affiliation	Year	Report No.	Report Name
Kus	California Department of Transportation	1988	FR-00171	Negative Archaeological Survey Report 6-Fre-33 P.M. 64.1/69.4 06250-343530
Stuart	Department of Anthropology, California State University, Fresno	1974	FR-00716	An Archaeological survey of the Industrial Park Annexation, Firebaugh, California
Varner	California State University, Fresno	1975	FR-00763	Wastewater Treatment Plant Sites, City of Firebaugh
Marine	California Department of Transportation, District 06	1999	FR-01617	Negative Archaeological Survey Report - First Supplemental 6-Fre-33 P.M. 62.5/69.6 343531
Marine and Wallace	California Department of Transportation	2000	FR-1704	Negative Archeological Survey Report for State Route 33 A.C. Overlay and Culvert Replacement from Helm Canal Road to the Merced County Line (06-FRE-33; P.M. 69.4/83.0; E.A. 06-385500)
Smith, Brewer, and Powell	California State University, Fresno; Brewer's Historical Consultants	1989	FR-01751	Historical Architectural Survey Report for State Route 33 Road Widening 6-Fre-33-64.1/69.4, 06250-343530
Leach-Palm et al.	Far Western Anthropological Research Group, Inc., Davis and JRP Historical Consulting, LLC	2010	FR-02414	Cultural Resources Inventory of Caltrans District 6 Rural Conventional Highways in Fresno, Western Kern, Kings, Madera, and Tulare Counties Summary of Methods and Findings
Leach-Palm et al.	Far Western Anthropological Research Group, Inc.	2006	FR-03505	Preliminary Assessment of the Archaeological Sensitivity for the Route 180 Westside Expressway Route Adoption Study Between Interstate 5 and the City of Fresno, Fresno County, California Interstate 5 PM 9.0 (KP 14.5) to 06-FRE-180 PM 54.2 (KP 87 Valentine Avenue) EA06-451400
Brady and Bunse	California Department of Transportation	2006	FR-02506	Final Historic Resources Sensitivity Study Route 180 Westside Expressway Route Adoption Study
Baloian and Lloyd	Applied Earthworks	2013	FR-02591	Cultural Resources Inventory and Evaluation for the First Lift Canal Project, Fresno County, California
Siskin	Garcia and Associates	2014	FR-02737	Cultural Resources Constraints Analysis for the Las Deltas Safe Drinking Water Project, Firebaugh, Fresno County, California

Table 2. Previously Recorded Cultural Resources within a 0.5-mile Radius of the APE

Primary No./Trinomial	Resource Type	Distance from the APE	NRHP/CRHR Eligibility Status
P-10-005796/CA-FRE-3515H Outside Canal	Canal	Within APE	Not Formally Evaluated
P-10-005797/CA-FRE-3516H First Lift Canal	Canal	Within APE	Recommended Ineligible
P-10-005166 Delta Mendota Canal	Canal	2 feet east	Recommended Eligible
P-10-005165 Delta Mendota Bridge	Bridge	2 feet east	Recommended Eligible
P-10-005795/CA-FRE-3514H	Canal	65 feet northeast	Unknown
P-10-003930/CA-FRE-3109H	Railroad	70 feet east	Unknown

Outside Canal (P-10-005796/CA-FRE-3515H) is a 60-mile canal lying south and parallel to the earlier Main San Joaquin and Kings Canal. It is an earth canal built in 1896-1897 by the San Joaquin and Kings River Canal and Irrigation Company owned by Miller and Lux. The canal was originally used for grain, alfalfa, and wild grass irrigation and is still used for irrigation purposes today (Entrix 2007). This resource has not been formally evaluated for the NRHP or CRHR.

First Lift Canal (P-10-005797/CA-FRE-3516H) is part of a larger water conveyance system (the Main Lift Canal) that receives water from the Mendota Pool on the San Joaquin River. The First Lift Canal has been documented as a 1.8-mile segment with more than 14 associated water features (e.g., weirs) constructed in the late 1910s. The canal was evaluated for listing on the NRHP and CRHR and was recommended ineligible due to a lack of significance (Baloian and Lloyd 2013).

Delta-Mendota Canal (P-10-005166) extends 113 miles. The canal system was constructed between 1946 and1952 as part of the Central Valley Project. The DMC was evaluated for listing on the NRHP and CRHR and was recommended eligible under Criteria A and C (Brady 2003).

Delta-Mendota Bridge (P-10-005165) crosses the DMC at Washoe Avenue. The bridge was constructed in 1949 as part of construction for the DMC. The Delta-Mendota Bridge was evaluated for listing on the NRHP and the CRHR and was recommended eligible under Criteria A and C, as a contributor to the DMC. The bridge was designed by the Bureau of Reclamation as part of the DMC and is considered to retain a high level of integrity (Flint and Lloyd 2002).

3.2 Other Sources Consulted

Historical Map Review

GANDA cultural resources specialists reviewed historical maps depicting features, such as towns, roads, buildings, and creeks, to provide additional information regarding the potential for the presence of historic-period cultural resources within the APE. This map review also serves to examine the topography and environmental setting of the APE prior to significant historic and modern land filling and urban development, another component of assessing the sensitivity for prehistoric resources. Historic maps are available at several online repositories, particularly the USGS's repository, the David Rumsey Map Collection, and the University of California, Berkeley Earth Sciences and Map Library's historical map collections. The

following sources were consulted during the historic map review:

- *Range 13 East, Range 14 East, Township 12 South, Township 11 South* (Thompson 1891);
- Historical topo map (NETR 1913);
- *Firebaugh, California,* 15-minute topographic quadrangle (USGS 1923);
- *Firebaugh, California,* 15-minute topographic quadrangle (USGS 1941);
- *Firebaugh, California,* 15-minute topographic quadrangle (USGS 1946);
- *Firebaugh, California,* 7.5-minute topographic quadrangle (USGS 1947);
- *Firebaugh, California,* 7.5-minute topographic quadrangle (USGS 1956);
- *Firebaugh, California,* 15-minute topographic quadrangle (USGS 1962); and,
- *Firebaugh, California,* 7.5-minute topographic quadrangle (USGS 1984).

Historical Map Review Results

The earliest map reviewed shows the San Joaquin Valley Railroad, Main Street, and the San Joaquin & Kings River Canal all established. The Town of Firebaugh is much more rural and is simply drawn as single house (Appendix A: Figure 5). The area surrounding the San Joaquin River is depicted as marsh. The APE falls within land owned by San Joaquin & Kings River Canal Co. In 1923, little development has occurred in the area, and the DMC runs along its current alignment west of APE but does not cross N Street as it does today; instead it hugs the east side of the Santa Fe Grade. A dirt road in the vicinity of North Washoe Avenue is depicted, though its alignment does not entirely match the modern road. Firebaugh is smaller, bounded to the south by present-day 14th Street. A 1941 map looks almost exactly the same, but the dirt road to the west of the APE is gone and Washoe and Nees avenues are now built. By 1946, southern Firebaugh appears more built-up to the east across the canal, with churches and structures depicted. Two structures show up south of the fork of Washoe Avenue. The DMC moves to its modern alignment in 1956 and the seed plant appears as well. The HUD tank makes its first cartographic appearance in 1984 along with an expanded seed plant and the county roads that run east to west between the canals. The structures that make up modern-day Tomatek have been developed as well.

3.3 Native American Consultation

As part of the tribal consultation process with Native American groups and individuals, as per 36 CFR Part 800.3, GANDA archaeologist Montse Osterlye, B.A., contacted the NAHC on July 12, 2018 with a request to search the Sacred Lands File for information about sacred places or areas of cultural significance that may be located within the APE. On July 27, 2018, the NAHC responded and said that a search of their Sacred Lands File did not indicate the presence of such sites within the APE. The NAHC provided a list of contacts affiliated with local Native American tribes that may have knowledge of cultural resources within the APE, all of whom are listed in Table 3. GANDA sent letters to the individuals listed by the NAHC on August 6 and 16, 2018 to inform them of the project and follow-up phone calls will be placed on August 20, 2018. To date, no response has been received from any of the Native American tribes and individuals contacted. A copy of the consultation correspondence is presented in Appendix B.

Table 3. List of Native American Tribes and Individuals

Name	Tribal Affiliation
Elizabeth D. Kipp	Big Sandy Rancheria of Western Mono Indians
Carol Bill	Cold Springs Rancheria
Robert Ledger, Sr.	Dumna Wo-Wah Tribal Government
Benjamin Charley	Dunlap Band of Mono Indians
Dick Charley	Dunlap Band of Mono Indians
Stan Alec	Kings River Choinumni Farm Tribe
Ron Goode	North Fork Mono Tribe
Rueben Barrios, Sr.	Santa Rosa Rancheria Tachi Yokut Tribe
Leanne Walker-Grant	Table Mountain Rancheria
Bob Pennell	Table Mountain Rancheria
David Alvarez	Traditional Choinumni Tribe
Rick Osborne	Traditional Choinumni Tribe
Kenneth Woodrow	Wuksache Indian Tribe/Eshom Valley Band

3.4 Local Historical Society Consultation

Archaeologist Montse Osterlye, B.A., sent a consultation letter informing the Fresno Historical Society of this Project. The letter was sent via electronic mail on July 12, 2018. No response has been received to date. A copy of all correspondence with the Fresno Historical Society is presented in Appendix C.

4.0 BACKGROUND

This section provides background information pertaining to the natural and cultural context of the APE. The contexts describe the relationship of the APE to the broader natural environment, which provides information regarding the natural resources that indigenous groups accessed for subsistence, land use patterns during both the prehistoric period and historically, and the likelihood for buried archaeological sites based on hydrography, geomorphology, the proximity of nearby archaeological sites, and previous disturbance in the APE. This section also presents an overview of regional prehistoric cultural history, local ethnography, and the post-European contact history. The background information addresses the distribution and type of the cultural resources located within the vicinity of the APE and informs the assessment of the archaeological sensitivity of the APE.

4.1 ENVIRONMENT

The APE is located in Firebaugh in the San Joaquin Basin approximately 36 miles northwest of Fresno. The San Joaquin Basin, a portion of the greater Central Valley of California, stretches north to south from the Sacramento-San Joaquin River Delta to the Tehachapi Mountains and west to east from the California Coast Ranges to the Sierra Nevada foothills; it is known as one of the more notable structural depressions in the world (USGS 2017). The APE is located on the west bank of the San Joaquin River in the outer marshlands of the former Lake Tulare. The San Joaquin River and associated wetlands and streams are now largely channelized for crop irrigation and drinking water. Soils in the San Joaquin Basin consist of brown loam formed in old alluvium. Appendix A: Figure 6 illustrates the underlying geology and overlying soils, respectively, within the APE and surrounding vicinity. The APE sits on a vast plain at 151 feet above mean sea level.

The local climate, classified as semi-arid, is characterized by hot, dry summers and cool, mild winters. The majority of rainfall occurs between November and March, though average monthly precipitation during these months rarely breaks three inches.

4.2 PREHISTORY

The archaeological record of the Central Valley region represents the complex and intensive human occupation that took place well before the European explorers arrived in the eighteenth century. The area was occupied beginning early in prehistoric times as people settled in villages along the many lush and productive waterways that collected and flowed through the valley. In these villages, they created complex and sophisticated material cultures and developed extensive trading systems that stretched far into other regions. The environment they lived in was so productive that they were able to support a population growth that rivaled that of agricultural societies in the southwestern and southeastern United States, creating large mound sites throughout the valley (Rosenthal et al. 2007).

Archaeological studies were first undertaken in the San Joaquin Valley portion of the Central Valley through a series of anthropological expeditions funded by the University of California and the exploration of mounds in Kern Valley initiated by P. M. Jones in 1899 (Moratto 1984:174). Archaeologists have been studying the cultural materials of the indigenous inhabitants of the San Joaquin Valley for more than a century, though intensive archaeological research in the region has waned since the 1980s. Many prehistoric sites have been buried by heavy deposition and sedimentation rates and most of the mound sites have long since been destroyed by agricultural development, the construction of levees and irrigation systems, and natural erosion from rivers. A particular problem for archaeological research in the Central Valley is a lack of well-grounded chronologies for large segments of the valley that are able to accurately capture the diverse and complex archaeological record. Despite these issues, archaeological research throughout the Central Valley remains integral to the overall study of prehistoric California, as sites in the valley often serve as a proving ground for new theories, some of which have advanced new understanding of prehistoric populations throughout the state (Rosenthal et al. 2007).

Central Valley Chronology and Prehistory

The cultural chronology described by Rosenthal et al. (2007) for the Central Valley region incorporates a wide range of local and regional traditions throughout the Central Valley and is a modified version of the three basic chronological periods outlined by Fredrickson (1973, 1974): the Paleo-Indian, Archaic, and Emergent. The Rosenthal et al. (2007) model, which was adjusted to incorporate new radiocarbon dates and modern calibration curves, includes the following periods: Paleo-Indian (11,500–8550 cal B.C.), Lower Archaic (8550–5550 cal B.C.), Middle Archaic (5550–550 cal B.C.), Upper Archaic (550 cal B.C.–cal A.D. 1100), and Emergent (cal A.D. 1100–Historic). This section is based on the Rosenthal et al. 2007 model, unless otherwise noted.

Paleo-Indian Period (11,500 to 8550 cal B.C.)

Due to periodic episodes of erosion and deposition during the Holocene, large segments of the Late Pleistocene landscape have been destroyed and archaeological resources associated with this time period have either been destroyed along with the landforms or have been buried under centuries of alluvial deposits. Some of the earliest accepted evidence of human occupation from this time period are distinctive basally thinned and fluted projectile points that have been dated between 11,550 and 9550 cal B.C. As of 2007, early concave base points such as these had only been identified at three sites in the San Joaquin Valley: Tracy Lake, the Woolfsen mound (CA-MER-215), and the Tulare Lake basin.

Lower Archaic Period (8550 to 5550 cal B.C.)

At the end of the Pleistocene, beginning around 9050 cal B.C., significant climate change events caused new levels of soil deposition along the waterways and floodplains of the Central Valley, creating a relatively clear marker between archaeological materials that predated the sedimentation and those that were deposited after. Like the previous period, the Lower Archaic is predominately represented by isolated finds such as stemmed projectile points, chipped stone crescents, and other flaked stone artifacts. Again, many such finds in the San Joaquin Valley were found near the Tulare Lake basin alongside early concave base points. The artifacts recovered from this period indicate that economies of the Lower Archaic Period were focused on hunting artiodactyls at valley floor sites and more recent discoveries in the Sierra Nevada and Coast Range foothills indicate that nut crops associated with expanding woodlands may have been a target of seasonal plant exploitation at seasonally occupied foothill sites. A second significant climate change event occurred at the beginning of the Middle Holocene around 5550 cal. B.C., which led to another cycle of widespread deposition along alluvial fans and floodplains and helped mark the end of the Lower Archaic Period in the archaeological record.

Middle Archaic Period (5550 to 550 cal B.C.)

The beginning of the Middle Archaic Period was marked by a warmer, drier climate in the Central Valley. Tulare Lake and other western lakes shrunk in size and eventually dried up while at the same time alluvial fans and floodplains stabilized and new wetland environments developed in the Sacramento–San Joaquin Delta due to rising sea levels. Distinct settlement-subsistence adaptations were adopted during this period within the foothills and the valley floor. Archaeological sites in the foothill tradition dating to the Middle Archaic Period are relatively common and the majority of the artifact assemblages consist of utilitarian flaked and ground stone tools used in food procurement and processing. Archaeological sites in the valley tradition dating to the beginning of the Middle Archaic Period are uncommon but sites dating to the later portions of the Middle Archaic (post-cal 2550 B.C.) are comparatively well represented in the northern San Joaquin Valley. These later sites contain complex and diverse artifact assemblages which include mortars, pestles, fishing technologies, baked clay objects, obsidian, shell beads and other personal adornments, and faunal remains, reflecting an emerging adaptive pattern of logistically organized subsistence practices and increased residential stability along major waterways. The Windmiller Pattern, a Middle Archaic expression, arose in San Joaquin Valley sites, particularly those located along freshwater marshes and riparian environments along the Mokelumne and Cosumnes rivers in the delta region.

Upper Archaic Period (550 cal B.C. to cal A.D. 1100)
A climatic change to a cooler, wetter, and increasingly stable environment marked the start of the Upper Archaic Period that resulted in the renewal of many western lakes, greater freshwater flows in the San Joaquin River watershed, and renewed alluvial fan and floodplain soil deposition and formation. During this period, cultural diversity flourished and many specialized technologies were developed including new types of bone tools, shell bead manufacturing, obsidian roughouts and ceremonial blades, and ground stone plummets. While economies varied regionally, the lower foothill woodlands of the San Joaquin Valley appear to have functioned as a boundary area. On the western margin of the San Joaquin Valley, several discrete cemeteries with either extended or flexed burials dating to this period have been identified at multiple sites such as CA-CCO-696, CA-MER-3, and CA-MER-94 and likely represent alternating occupation by groups from the valley and the adjacent Coast Ranges. Inhabitants of the San Joaquin Valley continued to utilize significant amounts of obsidian obtained from the eastern Sierra Nevada and subsistence practices were focused on resources that could be harvested and processed in bulk such as acorns, fish, shellfish, rabbits, and deer.

Emergent Period (cal A.D. 1100 to Historic)
The archaeological record of the Emergent Period is the most substantial and the best represented of all the periods, though research in the San Joaquin Valley has resulted in relatively few Emergent Period components or phases. After approximately cal A.D. 1000, many older technologies and cultural traditions disappeared and were replaced with those that persisted to the time of European contact. The bow and arrow were introduced during this period and between A.D. 1000 and 1300 replaced the previously favored dart and atlatl. More complex social forms developed, represented by stratified burial practices, and villages and smaller residential communities were established in the San Joaquin Valley along river channels, sloughs, and side streams in the foothills.

The Emergent Period has been divided up into two broad phases: the Lower Emergent Period, marked by the introduction of banjo-type *Haliotis* shell bead ornaments, and the Upper Emergent Period, marked by the introduction of smaller corner-notched and desert series arrow point types, new shell bead manufacturing technologies, magnesite cylinders, hopper mortars, and village sites with associated house pits. In Stanislaus, Merced, and Fresno counties, older arrow point styles are uncommon but by approximately A.D. 1500, the Panoche side-notched point, a variant of the desert side-notched point, was used on the western side of the San Joaquin Valley. In general, the Emergent Period saw an increase in the importance of fishing and plant harvesting. There was also a decentralization of shell bead production within the Upper Emergent Period; clam shell disk beads were widely used and manufactured, particularly within the Sacramento Valley to the north, and may represent a more monetized system of exchange.

4.3 Ethnographic Context
The APE falls within territory ethnographically attributed to the Yokuts, which were comprised of approximately 60 tribelets, each with a few hundred to several thousand members, living throughout the San Joaquin Valley. The tribelets established permanent villages near perennial waterways and subsisted on the rich and diverse flora and fauna found in the environment through fishing, hunting, fowling, and intensive plant collecting (Moratto 1984). The San Joaquin River, and the myriad sloughs and channels that branch from it, was the center of the Northern Valley Yokuts territory, representing the northern portion of the greater Yokuts territory that encompassed an estimated population of 31,400 at the time of European contact (Wallace 1978).

Linguistic research regarding the Northern Valley Yokuts suggests that the Yokuts people immigrated to the northern San Joaquin Valley relatively recently in prehistory. The Numic-speaking Monache tribe from east of the Sierra Nevada began to enter the San Joaquin Valley approximately 500 years ago, pushing Yokuts tribes north up the San Joaquin and Kings rivers. This migration, which likely occurred over a number of centuries, greatly expanded the Yokuts' territory. When the Spaniards first arrived in the valley, they found a population that had flourished, many Northern Valley Yokuts villages having been described as being well stocked with

both food and people. The population, however, was not evenly distributed across the valley but instead clustered along the San Joaquin River and its many tributaries (Wallace 1978).

Early travelers and missionaries unfortunately recorded few details of Northern Valley Yokuts culture, but what was recorded has been corroborated by the archaeological record. Oval-shaped, tule mat covered dwellings were seen built along the shores of rivers and sloughs in addition to large, earth-covered sweathouses and earth-covered ceremonial assembly chambers (Moratto 1984; Wallace 1978). The use of earthen ceremonial lodges among the Northern Valley Yokuts may represent a temporary involvement in a specialized cult system that has also been seen among other indigenous groups in California. Early explorers also described tule boats and worn foot paths that cut across the prairie and along the waterways that the Northern Valley Yokuts used to trade with the Salinan in the mountains of the Coast Range, the Costanoan near Monterey Bay, and the Miwok to the east (Wallace 1978).

The name of the specific tribelet that inhabited the region near the Project area is unknown. An early Spanish explorer noted villages along the lower valley of the Merced River east of the San Joaquin River but did not record the name of the tribe inhabiting the villages. The Coconoon people were later reported in the general region but by that time it may have represented a more recent conglomeration of smaller tribelets. A headman likely guided the tribe, with a second tribal office held by a messenger, and visitors were often treated with lavish displays of hospitality. Smaller communities of two or three houses unassociated with a larger settlement also existed. Villages and communities were often built on low mounds or terraces near large waterways, elevated out of the seasonal floodplain, though flooding was a primary threat to permanent residences (Moratto 1984; Wallace 1978).

As a result of exploration and Spanish colonial expansion into the Delta and lower San Joaquin Valley in the 1770s, Yokuts populations were reduced and their settlement patterns were disrupted (Moratto 1984; Wallace 1978). At first, the Yokuts reportedly greeted Spanish soldiers or Franciscan padres warmly but, beginning around 1805, as more people were drawn into the mission system and local populations began to diminish, the Franciscan padres began to forcefully proselytize among the tribes located farther inland and tensions grew. Spanish soldiers began to pursue runaway neophytes, many of whom were likely forced against their will into the missions, and the Yokuts began to launch raiding parties on Franciscan cattle herds and horses. Several exploration expeditions were launched by the Franciscans to attempt to identify a location for a new inland mission to help quell hostilities in the region, but they were never able to establish a new mission in the Central Valley (Wallace 1978).

An epidemic disease, likely malaria, began to spread in 1833 and had an even more devastating impact on the Yokuts people, reducing the population in some places by as much as 75 percent by 1846 and destroying entire communities. The traditional lifeways of the Yokuts people were destroyed by the influx of Americans in 1848; while there was no gold to be had in the San Joaquin Valley, thousands of prospectors passed through it and the rich soil soon attracted farmers, who forced off or killed many indigenous peoples who remained on the land (Moratto 1984; Wallace 1978). All of these factors contributed to a distinct lack of ethnographic information regarding the Northern Valley Yokuts. By the time that intensive academic study of indigenous populations began in California, few of the native groups that made up the Northern Valley Yokuts remained and those which survived had scant information to share regarding their traditional lifeways (Wallace 1978). Today, descendants of the Northern Valley Yokuts continue to live in and around the San Joaquin Valley and despite more than a century of adversity, they continue to engage in traditional cultural practices and advocate for the preservation of their heritage.

4.4 History

The history of Fresno County, like much of the Central Valley, is centered around agriculture. Prior to established settlement for agricultural purposes, the San Joaquin basin was more of a stopping point between the Sierra Nevada Mountains and San Francisco rather than a place to settle. The City of Firebaugh is named for Andrew D. Firebaugh, who established a trading post and ferry service on the banks of the San Joaquin River, dubbed Firebaugh's Ferry, in 1854 (Bright 1998). This ferry, like others along the San Joaquin River, contributed to the area's main utility as a thoroughfare. Andrew Firebaugh oversaw the construction of the road now known as Pacheco Pass, which led to the 1857 addition of Firebaugh's Ferry as an established stop on the Butterfield Overland Mail Route (Rehart 2000). It was around this time that the San Joaquin Valley began to see more settlement and land development for agribusiness. With the advent of steam-powered riverboats, Firebaugh developed into a major stop along the San Joaquin River for transporting agricultural goods and livestock downstream to San Francisco and other urban markets (Villarejo 1998).

By the 1870s, a huge portion of the San Joaquin Valley (approximately 300,000 acres) was owned by the Miller and Lux company, one of the most influential cattle producers and landholders in California and the greater west in the 19th Century (Waldschmidt-Nelson 2013). Miller and Lux gained early control over many tributaries surrounding the managed land, and their acquisition of the San Joaquin and Kings River Canal and Irrigation Company in the 1870s led to the expansion and success of the canals that still operate in and around the APE (Waldschmidt-Nelson 2013), including the Outside Canal in the 1870s and the Lift Canal System in the 1910s. Additional canals, including the Delta-Mendota Canal which runs just south of the APE, have been constructed throughout the 20th century as part of the Central Valley Project (CVP) developed in 1933 to address California's notorious and continuous effort to control and divert water to support the giant agricultural economy and associated residential communities that rely on California's abundant, though limited, water resources (United States Bureau of Reclamation 2011).

The population of Firebaugh and the surrounding has historically been Hispanic or Latino by a large majority. With an overall population count of 7,549 reported in the 2010 United States Census, 6,887 of those counted identified as Hispanic or Latino (U.S. Census Bureau 2010). Today, the main industry for City of Firebaugh and greater Fresno County remains agriculture, with an emphasis on tomatoes, melons, stone fruits, cotton, and, livestock (Fresno County Farm Bureau 2007).

5.0 METHODS AND RESULTS

This section includes the methods and results of the pedestrian field survey of the APE and of the buried prehistoric site sensitivity assessment.

5.1 Field Survey Methods

GANDA archaeologist, Montse Osterlye, B.A., conducted a pedestrian survey of the APE in order to identify cultural resources, to assess prior ground disturbances and the presence of native soils in the APE, and to assess archaeological sensitivity, in accordance with 36 CFR Part 800.4. Due to the linear and narrow nature of the APE for this project, the survey was completed in one transect in the center of the APE line. Coverage was focused on all unpaved areas along the perimeter of the APE where native soils had the potential to be present and observable at the surface. Overview photographs were taken using a digital camera. Field notes, including soil conditions, ground visibility, and disturbances were recorded.

5.2 Field Survey Results

Results of the field survey confirmed that there are no observable cultural resources present within the APE, either historic built environment or archaeological. Approximately 15 percent of the APE (the entire surrounding of the HUD tank and various driveways and cross streets) is paved/graveled over and the surface of the natural ground is not visible. The northernmost portion of the pipeline, approximately 25 percent of the entire alignment, was completely obscured by thick vegetation.

The remaining 75 percent of the pipeline portion of the APE is exposed soils between Washoe Road and adjacent agricultural fields. These soils have undergone significant surface disturbance from plowing and road construction. Due to the fact that the APE surrounding the HUD tank was paved over, soils on the margin of the pavement were inspected for cultural resources.

Overall, the APE is heavily disturbed at the surface due to agricultural activities and infrastructure. No cultural resources were observed and the sensitivity for archaeological resources on the surface is low.

Both previously identified cultural resources located within the APE, the Outside Canal (P-10-5796/CA-FRE-3515H) and the First Lift Canal (P-10-005797/CA-FRE-3516H), were revisited and assessed for their current condition. Both resources, where they intersect with the APE, are consistent with the original description in the original Department of Parks and Recreation (DPR) forms and therefore did not require a site record update.

5.3 Buried Prehistoric Site Assessment

A desktop geoarchaeological analysis of the APE was conducted to assess the potential for buried prehistoric archaeological sites. Assessing where buried archaeological sites might be encountered is possible by analyzing a suite of specific factors that, when applied to the APE, can provide predictive models regarding the presence or absence of prehistoric archaeological deposits and assist with the identification and subsequent management of those archaeological deposits.

The suite of factors used to assess the potential for encountering buried archaeological sites in the APE pertains directly to known prehistoric settlement patterns, specific environmental conditions, geomorphology, and artificial cutting and filling. In their synthesis of research on the San Francisco Bay-Delta region, Byrd et al. (2017) addressed geoarchaeological approaches to identifying the potential for encountering archaeological sites in the greater Bay Area, as well as approaches to predictive modeling. Their comprehensive analysis of previously conducted archaeological investigations and recorded sites resulted in the identification of seven environmental factors associated with prehistoric settlement patterns: climate, ethnography, latitude, hydrography, lithic sources, topography, and vegetation class. Applying these seven factors to the archaeological record, they further observed that three specific environmental factors were identified as "effectively classifying the majority of known site locations" throughout the greater Bay Area (Byrd et al.

2017: 4-2). These three factors are: 1) proximity to perennial freshwater, 2) proximity to freshwater confluences or shorelines (both of these fall under the hydrography heading), and 3) slope (which falls under the topography heading).

Buried site sensitivity factors identified and ranked by Byrd et al. (2017) were adapted for the purposes of the present analysis. GANDA analyzed the same factors addressed by Byrd et al. and grouped them into three categories: 1) hydrography, 2) proximity to known prehistoric archaeological sites, and 3) geomorphology. GANDA then assigned Low, Moderate, and/or High sensitivity ratings to each factor based upon details of the Project. Results of the buried site sensitivity analysis are presented in Table 4 and specific findings for the APE are detailed below.

Hydrography: Short, accessible forays from freshwater sources to all types of archaeological sites are perhaps the strongest indicator of archaeological site sensitivity (Byrd et al. 2017). The Project is just west of the San Joaquin River floodplain (a category of wetlands) and the main course of the river is just 0.60mile east of the north end of the APE (Appendix A: Figure 2). Prior to containment of the once meandering San Joaquin River, the landscape was located on alluvial fan skirts (the furthest extent of an alluvial fan) directly adjacent to the alluvial basin of the San Joaquin River. The floodplain outside the main channel of the San Joaquin River is therefore considered a wetland environment. According to the United States Department of Agriculture (USDA), soils in the APE are categorized as Tranquility-Tranquility (Series 285), which consists of alluvial sediments derived from igneous and/or sedimentary rock and are common in wetland landscapes (Appendix A: Figure 6; NRCS 2018). Due to the proximity of the APE to a former wetland environment, the sensitivity rating for this factor is Moderate.

Nearby Prehistoric Sites: The records search results indicate that no prehistoric archaeological sites have been recorded within 0.50 mile of the APE. However, the depositional environment of the landform and environs (see Geomorphology below) heightens the sensitivity for buried prehistoric deposits, and the surface grading and disking resulting from the extensive agricultural development in the APE diminishes the preservation of any surficial prehistoric resources. Therefore, the sensitivity rating based on proximity to prehistoric sites is rated Moderate.

Geomorphology: According to the Geologic Map of California: Santa Cruz Sheet (Jennings and Strand 1958), the APE is underlain by Quaternary alluvial fan deposits (Qf) of Pleistocene to Holocene age (Appendix A: Figure 6). The deposits, located distally on fan skirts, are fine-grained, moderately well sorted, and moderately thick. The fan skirt lies adjacent to the western bank of the San Joaquin River and is presently used as agricultural fields. The soils within the APE are mapped by the Soil Survey of Fresno County, California, Western Part (Burton 2006; NRCS 2018) as Tranquility-Tranquility, wet, complex, saline-sodic soils (285) on 0-1 percent slopes (Appendix A: Figure 6). The very deep, somewhat poorly drained and mature soils were formed in alluvium derived from calcareous sedimentary rocks (rocks with high calcium carbonate content; calcium carbonate in soils is good for preservation of archaeological materials such as bone) that were deposited on fan skirts (the furthest extent of an alluvial fan) adjacent to alluvial basins (stream channel valleys), such as the San Joaquin River (Burton 2006).

In profile, the soil solum typically exhibits a plowed A Horizon (Ap Horizon) that extends from 0-22 inches, a thick B horizon that contains pedogenic carbonates (from calcareous parent material) and evidence of slickensides (evidence of expanding and contracting clays, such as Montmorillonites or Bentonites) (Bkss Horizon), that extends to 53 inches. The underlying Bk Horizon (no slickensides) extends to 71 inches below ground surface (Burton 2006). Due to the fact that soils are typically mapped to a maximum depth of 60-75 inches below ground surface, the local depth of the C Horizon, which is the parent material/natural water laid deposit, does not appear to have been recorded.

The APE and surrounding area has undergone some cutting due to surface grading and agricultural activities, however this land use history does not necessarily affect buried archaeological deposits.

The physical landscape position (on an alluvial fan adjacent to a stream basin) of the APE, the presence of mature (old and well formed), deep, fine-grained and carbonate-rich (considered to be beneficial for preservation of archaeological deposits) alluvial soils, and the surface, shallow subsurface (0-20 inches), and deep subsurface (20->60 inches) soil zones present in the APE are all considered to have High sensitivity for the presence of buried and well-preserved archaeological deposits.

Table 4. Buried Site Predictive Assessment for the APE

Predictive Factors	**Relationship to the Study Area**	**Prehistoric Archaeological Sensitivity Rating**
	HYDROGRAPHY	
Proximity to perennial water sources: *Low = Over 800 feet* *Moderate = 400-800 feet* *High = 400 feet or less*	San Joaquin River is 0.6 mile east of the APE; adjcacent to historical floodplain.	**Moderate**
	PROXIMITY TO KNOWN PREHISTORIC ARCHAEOLOGICAL SITES	
Proximity to prehistoric archaeological sites: *Low = Over 0.50 mile* *Moderate = 0.25-.50 mile* *High = Less than .25 mile*	CA-FRE-105 = 1.2 miles	**Low**
Results of pedestrian surface survey	No archaeological deposits identified	**Moderate**
	GEOMORPHOLOGY	
Natural landform stability	Alluvial fan adjacent to a stream basin	**High**
Soils	Pleistocene- to Holocene-age alluvial fan deposits	**High**
Slope: *Low = Over 10%* *Moderate = 5-10%* *High = Less than 5%*	0-1% slope	**High**
Artificial cutting and filling	Extensive waterway channeling, surface grading, and agricultural activities	**Moderate**
'Overall Sensitivity for Buried Prehistoric Deposits		***Moderate to High***

6.0 CONCLUSION

The APE for this Project is situated along a portion of the First Lift Canal (P-10-005797/CA-FRE-3516H) and the Outside Canal (P-10-005796/CA-FRE-3515H). The First Lift Canal is an artificially constructed canal and has been recommended ineligible for the NRHP and therefore is not considered an historic property, as defined in CFR 36 Part 800.16. The Outside Canal is also an artificially constructed canal that has been previously documented however, it has not been evaluated for listing in the NRHP. Overall, the proposed Project activities includes the installation of a temporary pump station, areas designated for demolition, trenching for the pipeline replacement, fencing and gates, and an equipment laydown area. The only project related activity proposed along the First Lift Canal and Outside Canal involves trenching for the water transmission line and no work is proposed within the canal, and the proposed project is consistent with both historic and modern use surrounding the canal.

The investigation resulted in the finding that no historic properties will be affected within the APE. Proposed construction activities are designed to reach a maximum depth of 5 feet (1.5 m) below the surface. Historic maps and soil data indicate that the APE was once located on Holocene-age alluvial fan skirts of the San Joaquin River floodplain. As such, there is a high sensitivity for the presence of previously unrecorded buried Holocene-age archaeological sites within the APE. There is also a low potential for encountering historic period resources.

6.1 Unanticipated Archaeological Sites

If there is an unanticipated discovery of archaeological deposits or remains during Project implementation, construction crews shall stop all work within 100 feet (30 m) of the discovery until a qualified archaeologist can assess the discovery and provide recommendations. Resources could include buried historic features, such as artifact-filled privies, wells, and refuse pits, and artifact deposits, along with concentrations of adobe, stone, or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Native American archaeological materials could include obsidian and chert flaked stone tools (such as projectile points and knives), midden (darkened soil created culturally from use and containing heat-affected rock, artifacts, animal bones, or shellfish remains), and/or groundstone implements (such as mortars and pestles).

6.2 Encountering Human Remains

Section 7050.5 of the California Health and Safety Code states that it is a misdemeanor to knowingly disturb a human burial and Section 5097.99 of the Public Resources Code defines the obtaining or possession of Native American remains or grave goods to be a felony. If human remains are encountered as a result of construction activities, any work in the vicinity shall stop and the Fresno County Coroner shall be contacted immediately. In addition, a qualified archaeologist shall be contacted immediately to evaluate the discovery if a monitor is not already present. If the human remains are Native American in origin, then the Coroner must notify NAHC within 24 hours of this identification.

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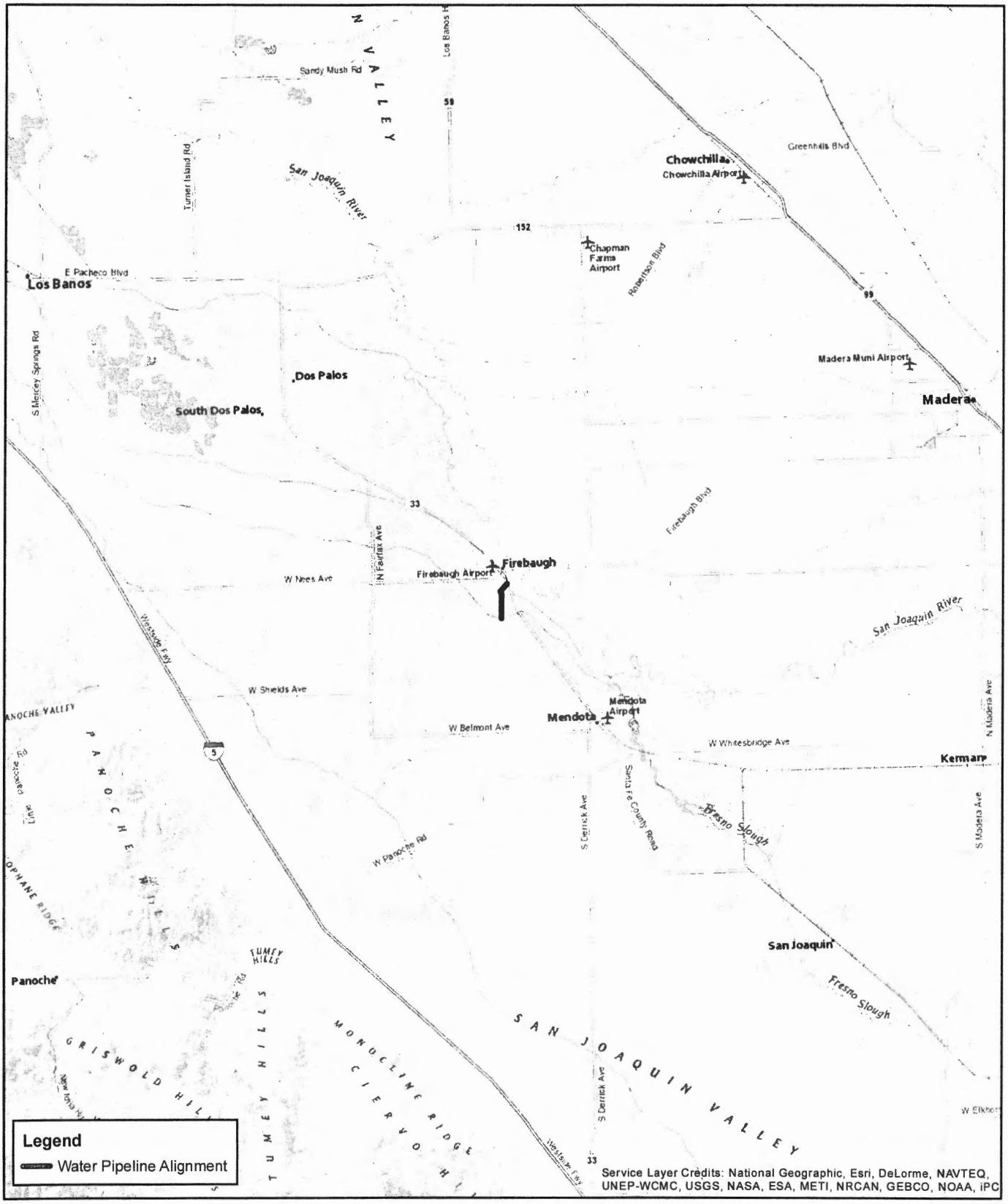
APPENDIX A. PROJECT FIGURES



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 28, 29, 32, 33
T13S, R14E Sections 4, 5

GANDA

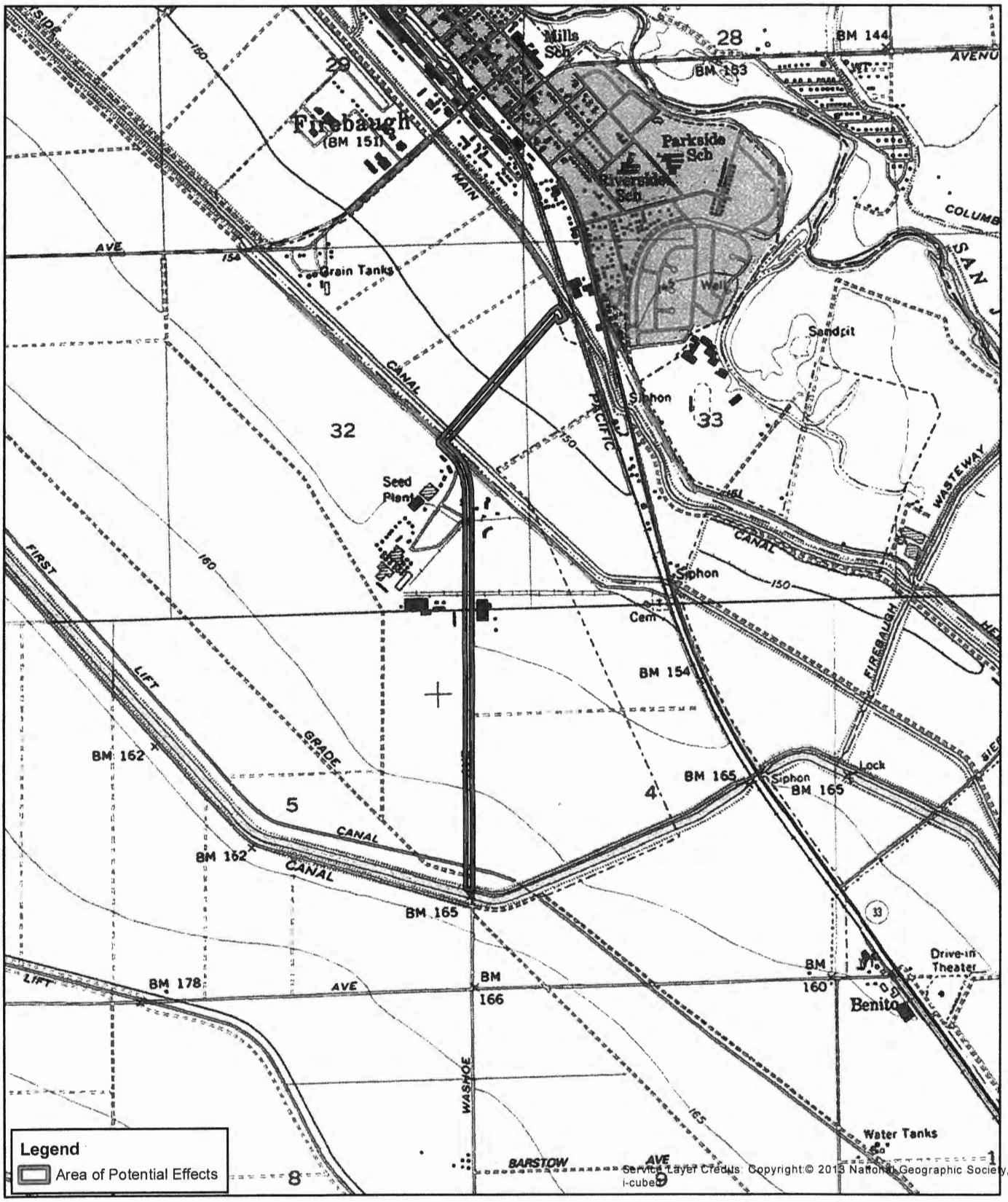
Scale 1:400,000
1 Inch = 33,333 Feet

Figure 1. Project Vicinity Map
City of Firebaugh HUD Project

Fresno County, California

0 4 8 Miles
0 5 10 Kilometers

N



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

GANDA

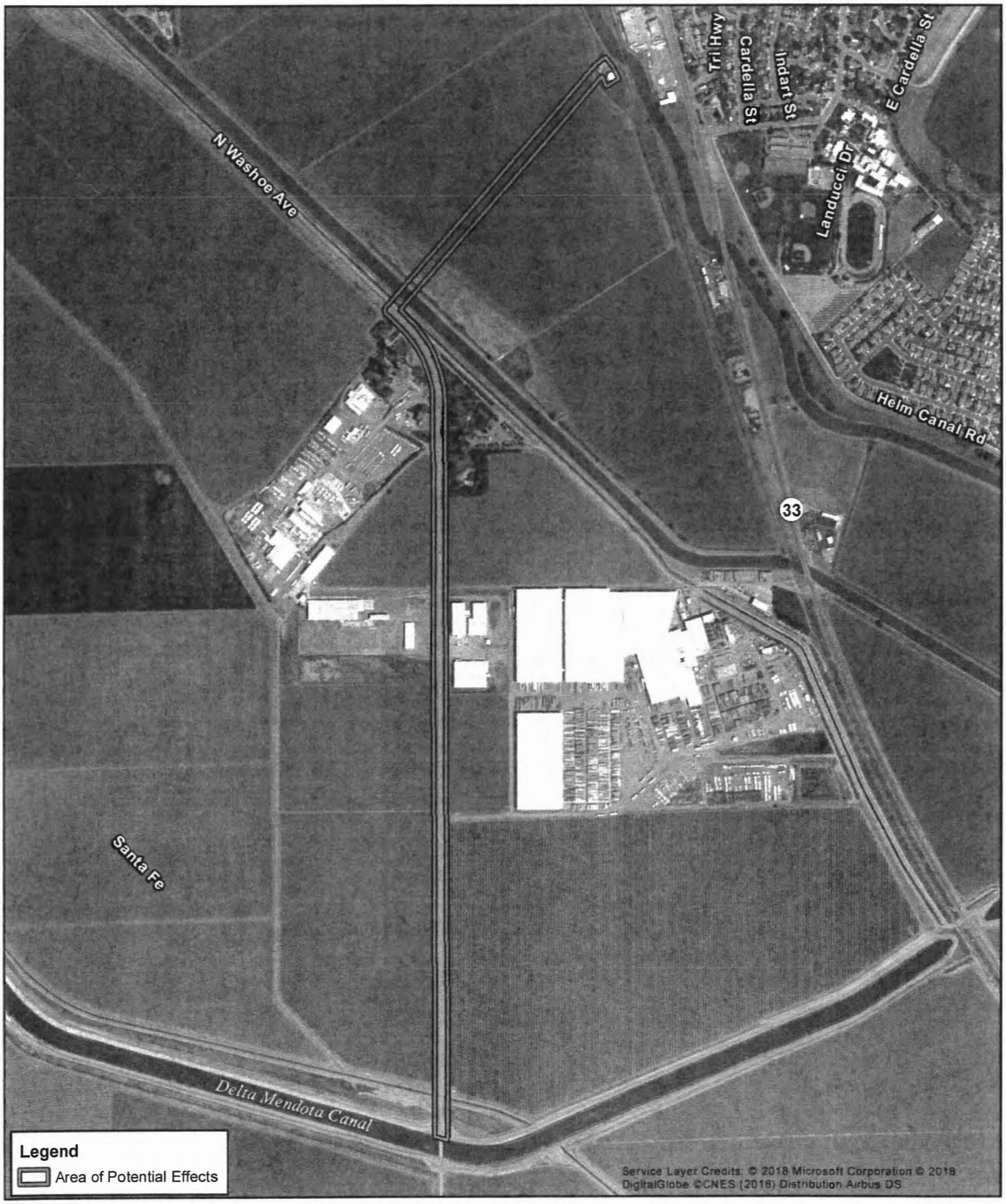
Scale 1:24,000
1 Inch = 2,000 Feet

Figure 2. Project Location
City of Firebaugh HUD Project

Fresno County, California

0 1,000 2,000 Feet
0 300 600 Meters

N



USGS 7.5' Quad:
FIREBAUGH (1984)

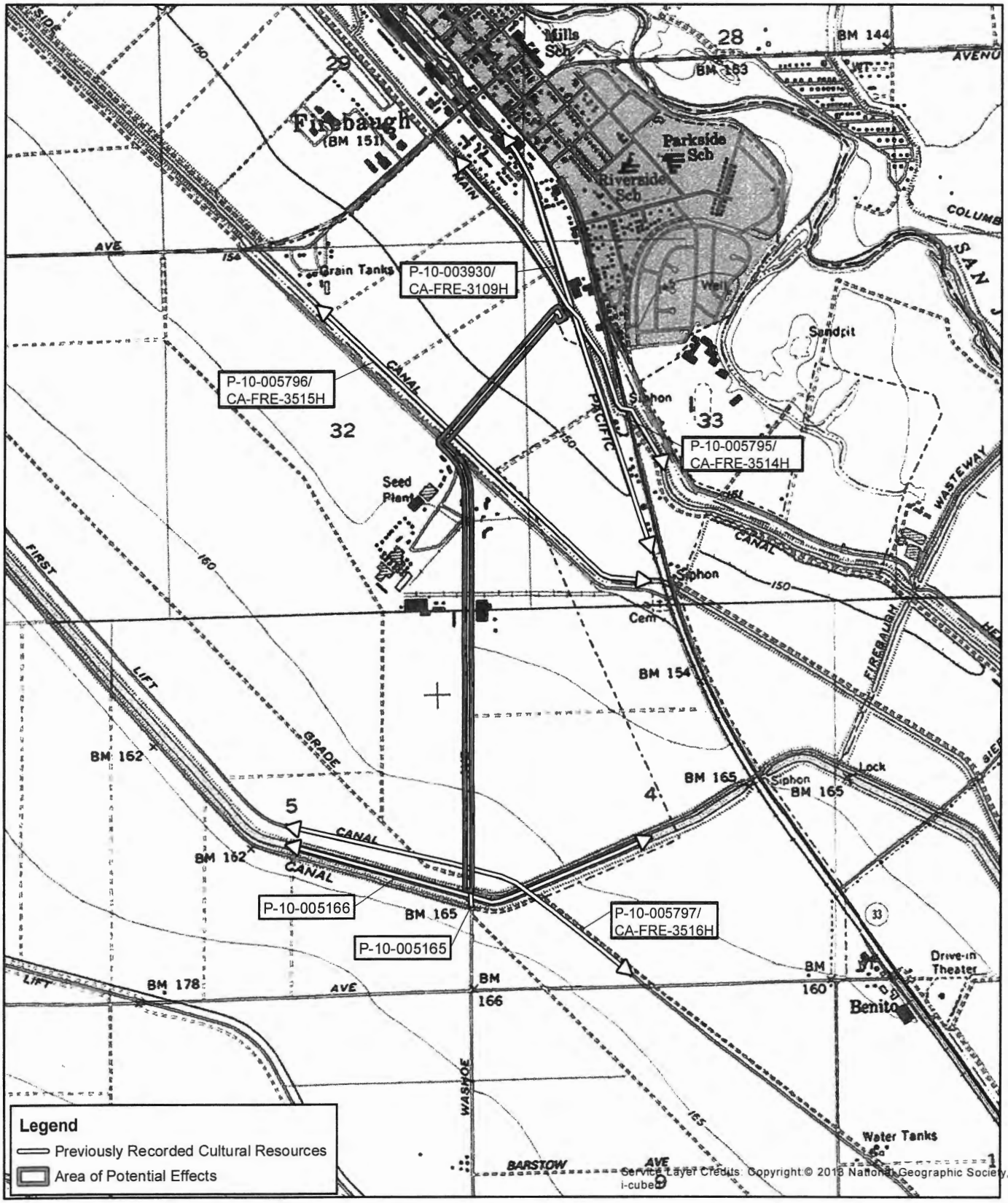
Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

GANDA

Scale 1:13,000
1 Inch = 1,083 Feet

Figure 3. Area of Potential Effects
City of Firebaugh HUD Project
Fresno County, California

0 500 1,000 Feet
0 200 400 Meters
N



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

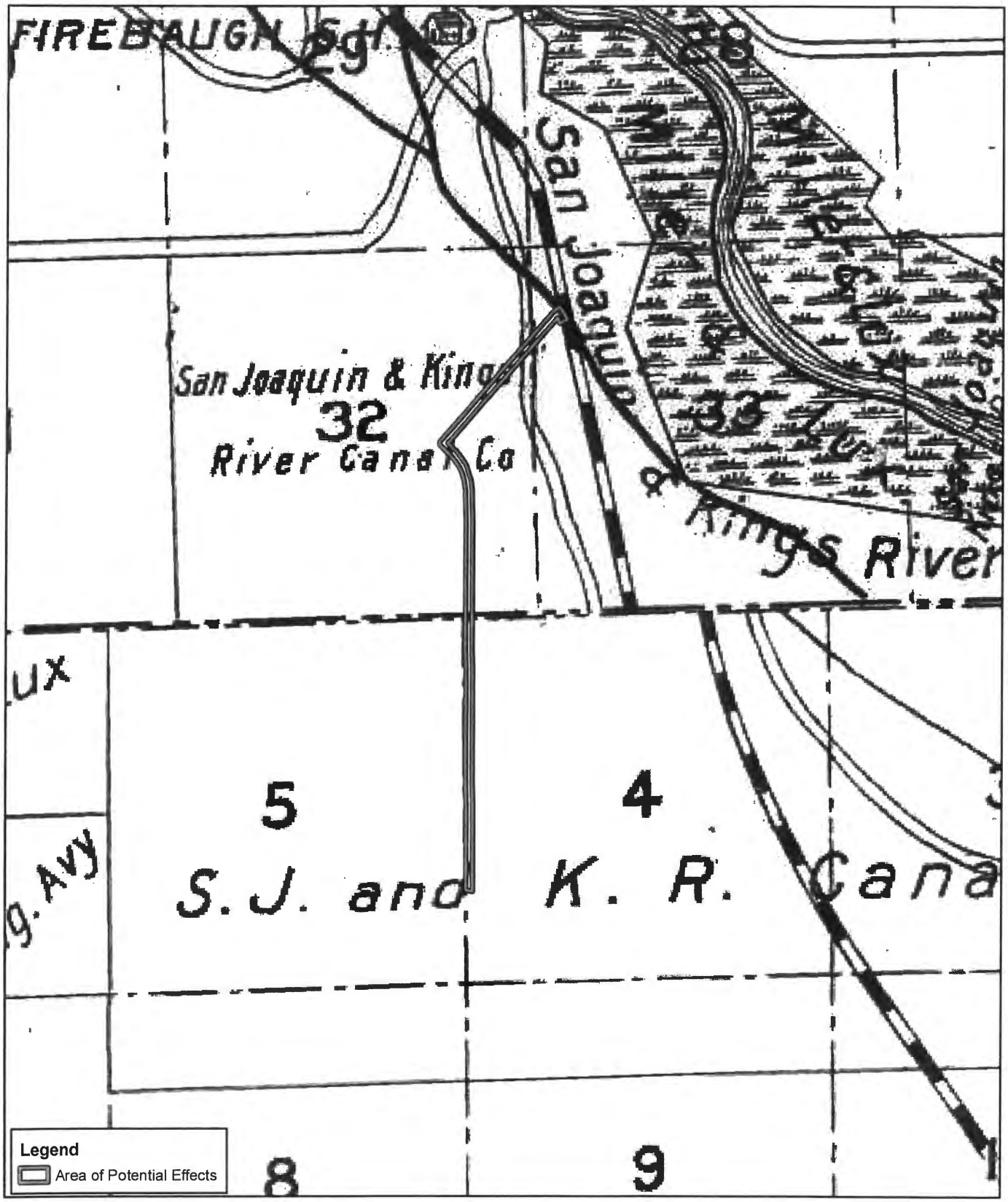
GANDA

Scale 1:24,000
1 Inch = 2,000 Feet

Figure 4. Previously Recorded Cultural Resources within 0.5 Miles
City of Firebaugh HUD Project

Fresno County, California
0 1,000 2,000 Feet
0 300 600 Meters

N



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

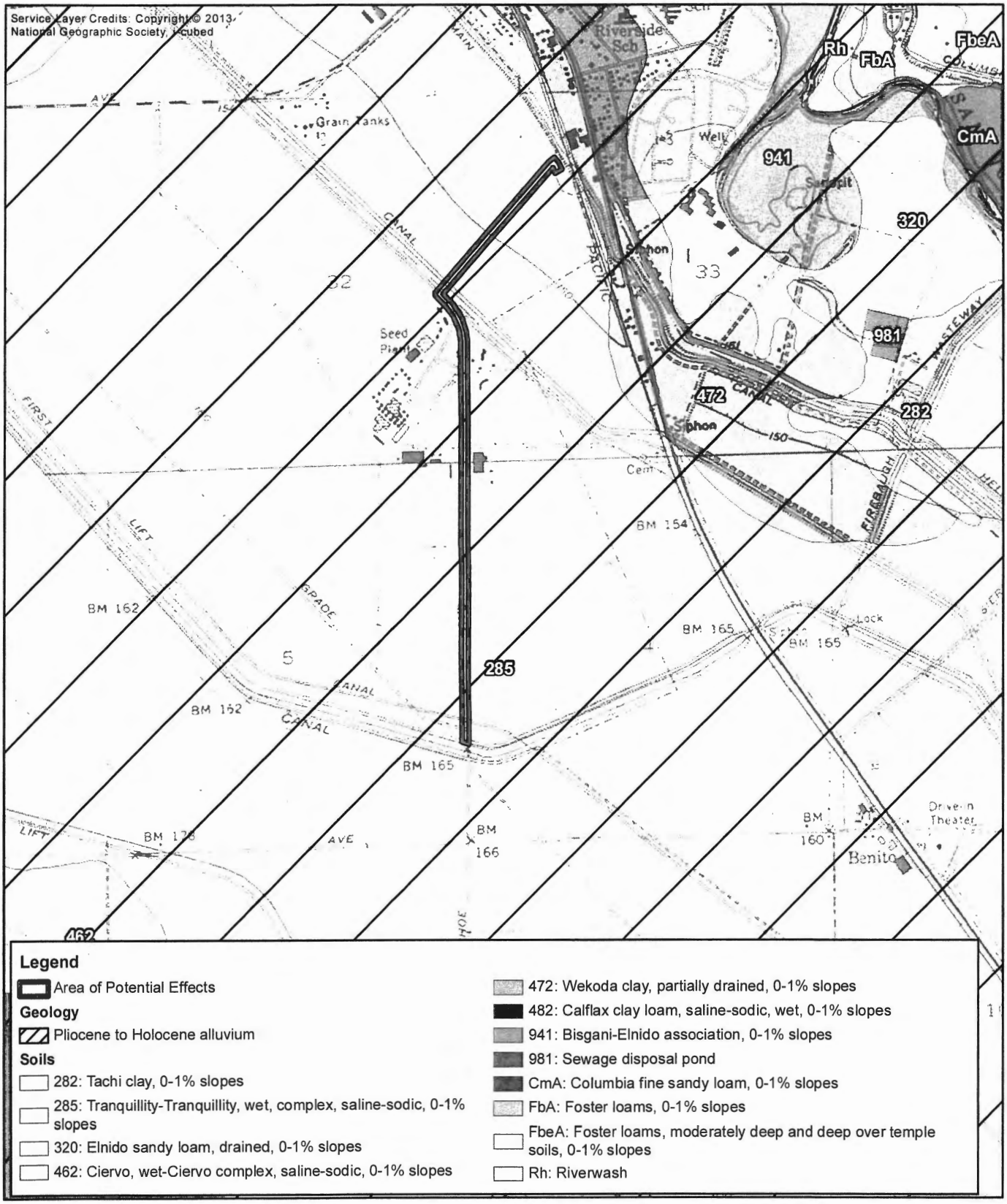
GANDA

Scale 1:24,000
1 Inch = 2,000 Feet

Figure 5. Project Area over 1891 Land Survey Map
City of Firebaugh HUD Project

Fresno County, California
0 1,000 2,000 Feet
0 300 600 Meters

N



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

GANDA

Scale 1:24,000
1 Inch = 2,000 Feet

Figure 6. Geomorphology
City of Firebaugh HUD Project

Fresno County, California

0 1,000 2,000 Feet
0 300 600 Meters

N

APPENDIX B. RECORDS SEARCH RESULTS

California Historical Resources Information System

Fresno
Kern
Kings
Madera
Tulare

Southern San Joaquin Valley Information Center
California State University, Bakersfield
Mail Stop: 72 DOB
9001 Stockdale Highway
Bakersfield, California 93311-1022
(661) 654-2289
E-mail: ssjvic@csub.edu
Website: www.csub.edu/ssjvic

7/24/2018

Montse Osterlye
Garcia and Associates
813 D Street
San Rafael, CA 94901

Re: City of Firebaugh's HUD Tank Project
Records Search File No.: 18-303

The Southern San Joaquin Valley Information Center received your record search request for the project area referenced above, located on the Firebaugh USGS 7.5' quad. The following reflects the results of the records search for the project area and the 0.5 mile radius:

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☒ custom GIS maps ☐ shapefiles ☐ hand-drawn maps

Resources within project area:	P-10-005797
Resources within 0.25 mile radius:	P-10-003930, 005165, 005166
Resources within 0.5 mile radius:	P-10-005795
Reports within project area:	FR-01937, 01938, 01939
Reports within 0.25 mile radius:	FR-00171, 00716, 00763, 01617, 01704, 01751, 02414, 02505, 02506, 02591, 02737
Reports within 0.5 mile radius:	None

Note: Products were omitted for resources and reports shown in the results of Record Search 14-209.

Resource Database Printout (list): ☐ enclosed ☒ not requested ☐ nothing listed

Resource Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Digital Database Records: ☐ enclosed ☒ not requested ☐ nothing listed

Report Database Printout (list): ☐ enclosed ☒ not requested ☐ nothing listed

Report Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Report Digital Database Records: ☐ enclosed ☒ not requested ☐ nothing listed

Resource Record Copies: ☐ enclosed ☒ not requested ☐ nothing listed

Report Copies: ☐ enclosed ☒ not requested ☐ nothing listed

OHP Historic Properties Directory: ☐ enclosed ☐ not requested ☒ nothing listed

Archaeological Determinations of Eligibility: ☐ enclosed ☐ not requested ☒ nothing listed

CA Inventory of Historic Resources (1976): ☐ enclosed ☐ not requested ☒ nothing listed

Caltrans Bridge Survey: Not available at SSJVIC; please see http://www.dot.ca.gov/hq/structur/strmaint/historic.htm

Ethnographic Information: Not available at SSJVIC

Historical Literature: Not available at SSJVIC

Historical Maps: Not available at SSJVIC; please see http://historicalmaps.arcgis.com/usgs/

Local Inventories: Not available at SSJVIC

GLO and/or Rancho Plat Maps: Not available at SSJVIC; please see http://www.glorecords.blm.gov/search/default.aspx#searchTabIndex=0&searchByTypeIndex=1 and/or http://www.oac.cdlib.org/view?docId=hb8489p15p;developer=local;style=oac4;doc.view=items

Shipwreck Inventory: Not available at SSJVIC; please see http://www.slc.ca.gov/Info/Shipwrecks.html

Soil Survey Maps: Not available at SSJVIC; please see http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Invoices for Information Center services will be sent under separate cover from the California State University, Bakersfield Accounting Office.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Celeste M. Thomson
Coordinator

APPENDIX C. NATIVE AMERICAN CONSULTATION

GARCIA AND ASSOCIATES 813 D STREET PHONE 415-870-2980
SAN RAFAEL, CALIFORNIA 94901

July 12, 2018

Ms. Debbie Pilas-Tredway
California Native American Heritage Commission
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691

Subject: **City of Firebaugh's HUD Tank Project, Fresno County, California**

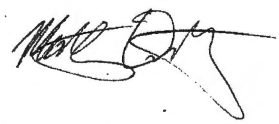
Dear Ms. Pilas-Tredway,

Garcia and Associates (GANDA) is conducting a cultural resources investigation for the HUD Tank Project for the Las Deltas Safe Drinking Water Project, City of Firebaugh, Fresno County, California to identify historic properties or resources that are potentially significant within the Area of Potential Effects (APE). GANDA is conducting this investigation to meet the requirements of Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations, 36 CFR 800. We ask that you please review the Sacred Lands File for any Native American cultural resources that may be within or adjacent to the APE. The project is located on the Firebaugh, CA (1994) 7.5-minute USGS Quadrangle at T03 S, R14E, Sections 3-5, 8-10, 14-17, and 20-23 (please see the attached Project Location map).

We also request a list of Native American individuals and organizations who may have knowledge of cultural resources in the project area. If you have any questions, please contact me at the address and phone number below or via email (mosterlye@garciaandassociates.com).

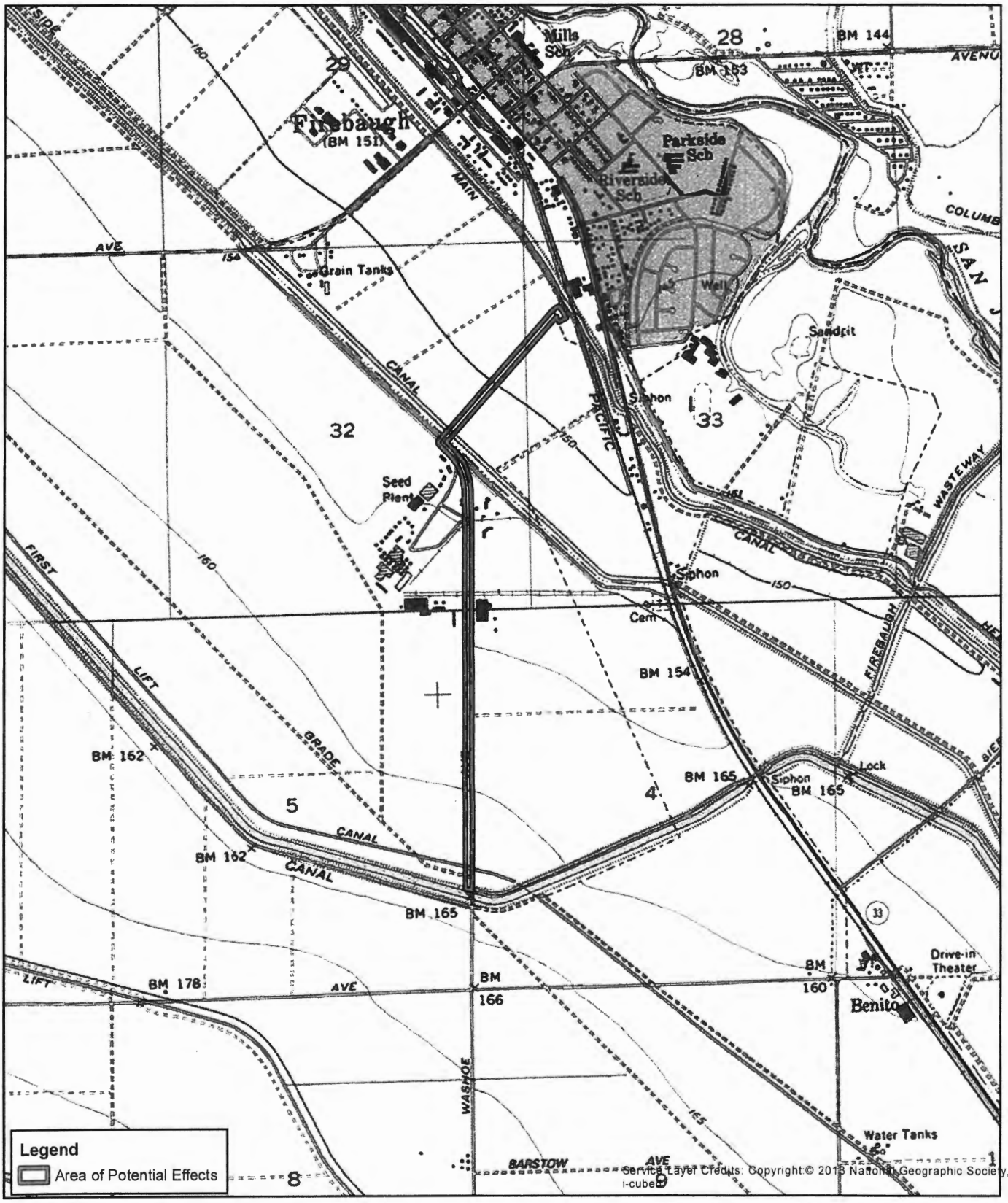
I look forward to hearing from you.

Sincerely,



Montse Osterlye
Staff Archaeologist
Garcia and Associates
813 D Street, San Rafael, CA 94901
Mobile: 707-540-4470
Office: 415-870-2980
garciaandassociates.com

GANDA



Project Location

USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

GANDA

Scale 1:24,000
1 Inch = 2,000 Feet

Project Location
City of Firebaugh HUD Project

Fresno County, California

0 1,000 2,000 Feet

0 300 600 Meters

N

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

July 26, 2018

Montse Osterlye
Garcia and Associates

Sent by Email: mosterlye@garciaandassociates.com
Number of Pages: 2

RE: Firebaugh's HUD Tank Project, Fresno County

Dear Ms. Osterlye:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above with negative results. **Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE.**

I suggest you contact all of those listed, if they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. **By contacting all those on the list, your organization will be better able to respond to claims of failure to consult**. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: Sharaya.Souza@nahc.ca.gov.

Sincerely,

Sharaya Souza
Staff Services Analyst
(916) 573-0168

Native American Heritage Commission
Native American Consultation List
7/26/2018

Big Sandy Rancheria of Western Mono Indians
Elizabeth D. Kipp, Chairperson
PO. Box 337 37387 Auberry Mission Rd.
Auberry , CA 93602
lkipp@bsrnation.com
(559) 374-0066
(559) 374-0055
Western Mono

Cold Springs Rancheria
Carol Bill, Chairperson
P.O. Box 209
Tollhouse , CA 93667
(559) 855-5043
(559) 855-4445 Fax
Mono

Dumna Wo-Wah Tribal Goverment
Robert Ledger SR., Chairperson
2191 West Pico Ave.
Fresno , CA 93705
ledgerrobert@ymail.com
(559) 540-6346
Dumna/Foothill Yokuts
Mono

Dunlap Band of Mono Indians
Benjamin Charley Jr., Tribal Chair
P.O. Box 14
Dunlap , CA 93621
ben.charley@yahoo.com
(760) 258-5244
Mono

Dunlap Band of Mono Indians
Dick Charley, Tribal Secretary
5509 E. McKenzie Avenue
Fresno , CA 93727
dcharley2016@gmail.com
(559) 554-5433
Mono

Kings River Choinumni Farm Tribe
Stan Alec
3515 East Fedora Avenue
Fresno , CA 93726
(559) 647-3227 Cell
Foothill Yokuts
Choinumni

North Fork Mono Tribe
Ron Goode, Chairperson
13396 Tollhouse Road
Clovis , CA 93619
rwgoode911@hotmail.com
(559) 299-3729 Home
(559) 355-1774 - cell
Mono

Santa Rosa Rancheria Tachi Yokut Tribe
Rueben Barrios Sr., Chairperson
P.O. Box 8
Lemoore , CA 93245
(559) 924-1278
(559) 924-3583 Fax
Tache
Tachi
Yokut

Table Mountain Rancheria
Leanne Walker-Grant, Chairperson
P.O. Box 410
Friant , CA 93626
(559) 822-2587
(559) 822-2693 Fax
Yokuts

Table Mountain Rancheria
Bob Pennell, Cultural Resources Director
P.O. Box 410
Friant , CA 93626
rpennell@tmr.org
(559) 325-0351
(559) 325-0394 Fax
Yokuts

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Code, or Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native American Tribes for the proposed:
Firebaugh's HUD Tank Project, Fresno County.

Native American Heritage Commission
Native American Consultation List
7/26/2018

Traditional Choinumni Tribe
David Alvarez, Chairperson
2415 E. Houston Avenue
Fresno , CA 93720
dave@davealvarez.com
(559) 217-0396 Cell

Choinumni

Traditional Choinumni Tribe
Rick Osborne, Cultural Resources
2415 E. Houston Avenue
Fresno , CA 93720
(559) 324-8764
lemek@att.net

Choinumni

Wuksache Indian Tribe/Eshom Valley Band
Kenneth Woodrow, Chairperson
1179 Rock Haven Ct.
Salinas , CA 93906
kwood8934@aol.com
(831) 443-9702

Foothill Yokuts
Mono
Wuksache

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Code, or Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native American Tribes for the proposed:
Firebaugh's HUD Tank Project, Fresno County.

August 6, 2018

Big Sandy Rancheria of Western Mono Indians
Elizabeth D. Kipp, Chairperson
37387 Auberry Mission Road
Auberry, CA 93602

Project: Firebaugh HUD Tank Project

Dear Ms. Kipp,

Garcia and Associates (GANDA) is conducting a cultural resources investigation for the City of Firebaugh' HUD Tank Replacement Project in the City of Firebaugh, Fresno County, California. The City submitted an application for grant funding from the Safe Drinking Water State Revolving Fund through the State Water Resources Control Board Division of Drinking Water (DDW) (formerly California Department of Public Health - CDPH) to replace the existing HUD tank with a 750,000-gallon storage tank, 3.0 million gallons per day (MGD) booster pump station, and the transmission line from the tank site to the North side of the Delta-Mendota Canal (DMC) on Washoe Avenue. These efforts are part of a larger effort to replace existing water infrastructure to improve drinking water quality in the Community of Las Deltas. The California State Water Resource Control Board cultural resources staff reviewed the City of Firebaugh 's application and concluded that the project will involve ground-disturbing activities and therefore requires Section 106 review. The Project is located on the Firebaugh, California 7.5-minute USGS Quadrangle in T12S, R14E, Sections 32 and 33, and T13S R14E Sections 4 and 5 (please see the attached Project Location map).

A records search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed with negative results. Records search results at the Northwest Information Center (NWIC) concluded that no prehistoric or Tribal Cultural Resources have been recorded within a 0.5-mile radius of the Project Area. No resources were identified during pedestrian field survey in the Project Area.

Please review the attached Project Area location map for any potential cultural resources in the project area. If you have any questions, please contact me at the address and phone number above or via email at cdebaker@garciaandassociates.com. I look forward to hearing from you.

Sincerely,

Cassidy DeBaker, M.A.

Attachments: Project Location Map
Field Survey Photographs

Photo 1: Southern end of APE at Delta-Mendota Canal, view north.

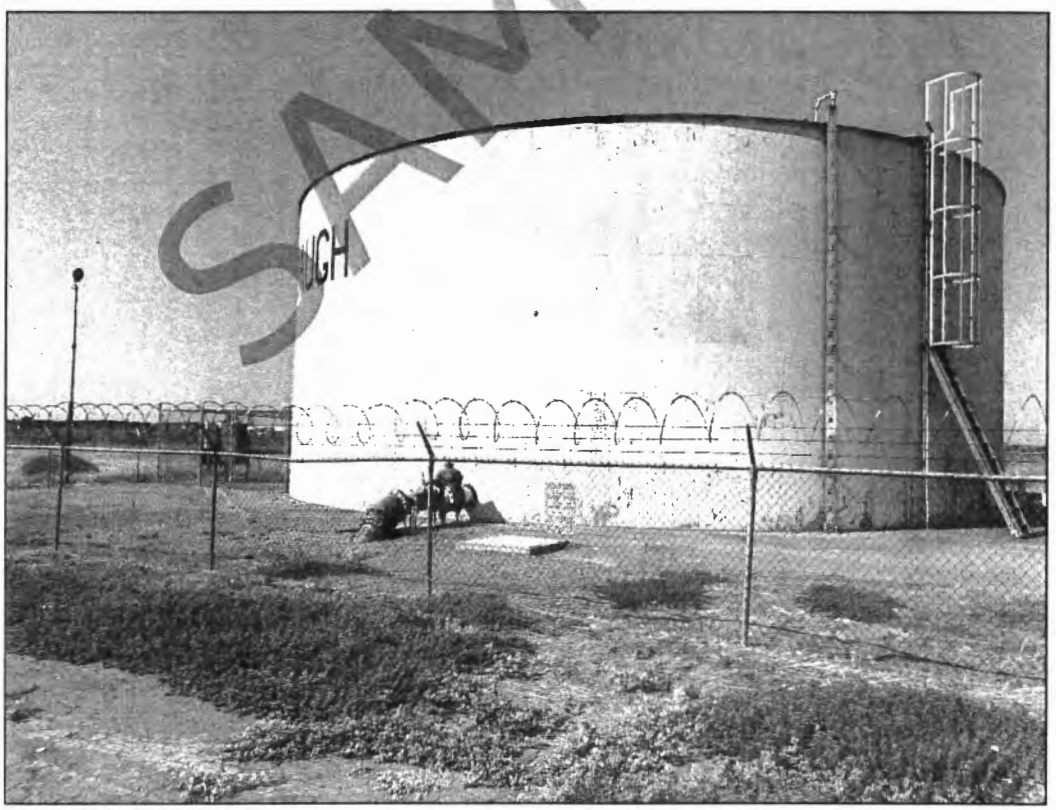
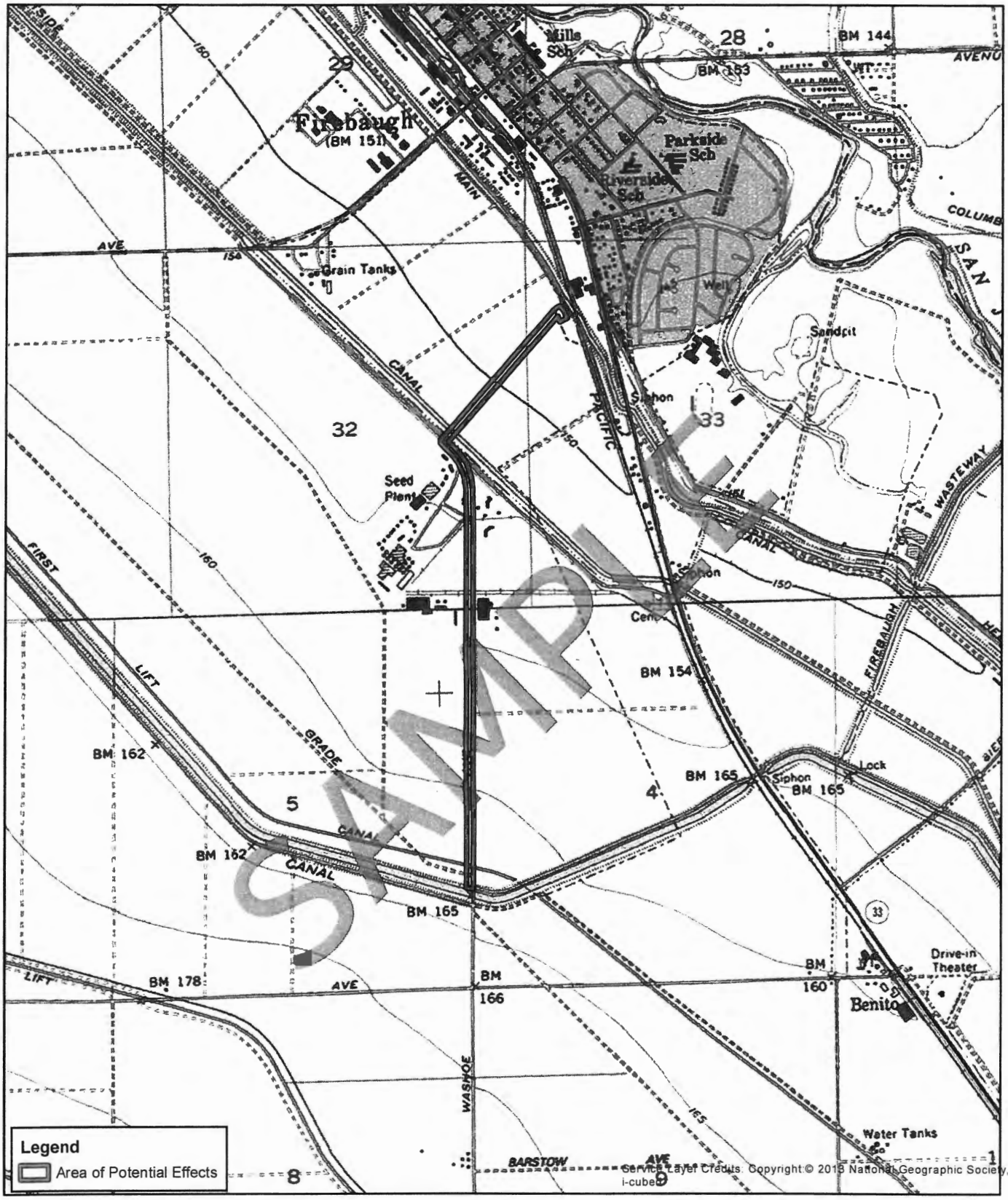


Photo 2: Firebaugh HUD tank, view west.



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

GANDA

Scale 1:24,000
1 Inch = 2,000 Feet

Project Location
City of Firebaugh HUD Project

Fresno County, California

0 1,000 2,000 Feet
0 300 600 Meters

N

APPENDIX D. HISTORICAL SOCIETY CONSULTATION

GARCIA AND ASSOCIATES 813 D STREET PHONE 415-870-2980
SAN RAFAEL, CALIFORNIA 94901

July 12, 2018

Fresno Historical Society
7160 W Kearney Blvd
Fresno, CA 93706

Subject: City of Firebaugh's HUD Tank Project, Fresno County, California

To Whom It May Concern,

Garcia and Associates (GANDA) is conducting a cultural resources investigation for the City of Firebaugh's HUD Tank Project, part of the City's Las Deltas Safe Drinking Water Project, in Fresno County, California. The project is located on the Firebaugh, CA (1994) 7.5-minute USGS Quadrangle at T03 S, R14E, Sections 3-5, 8-10, 14-17, and 20-23 (please see the attached Project Location map).

An important element of our investigation is to identify built environment resources (e.g., buildings, structures, or objects), sites, or locations of cultural, historical, or architectural importance located within or adjacent to the project area. Please let us know if you have any information or concerns about the project.

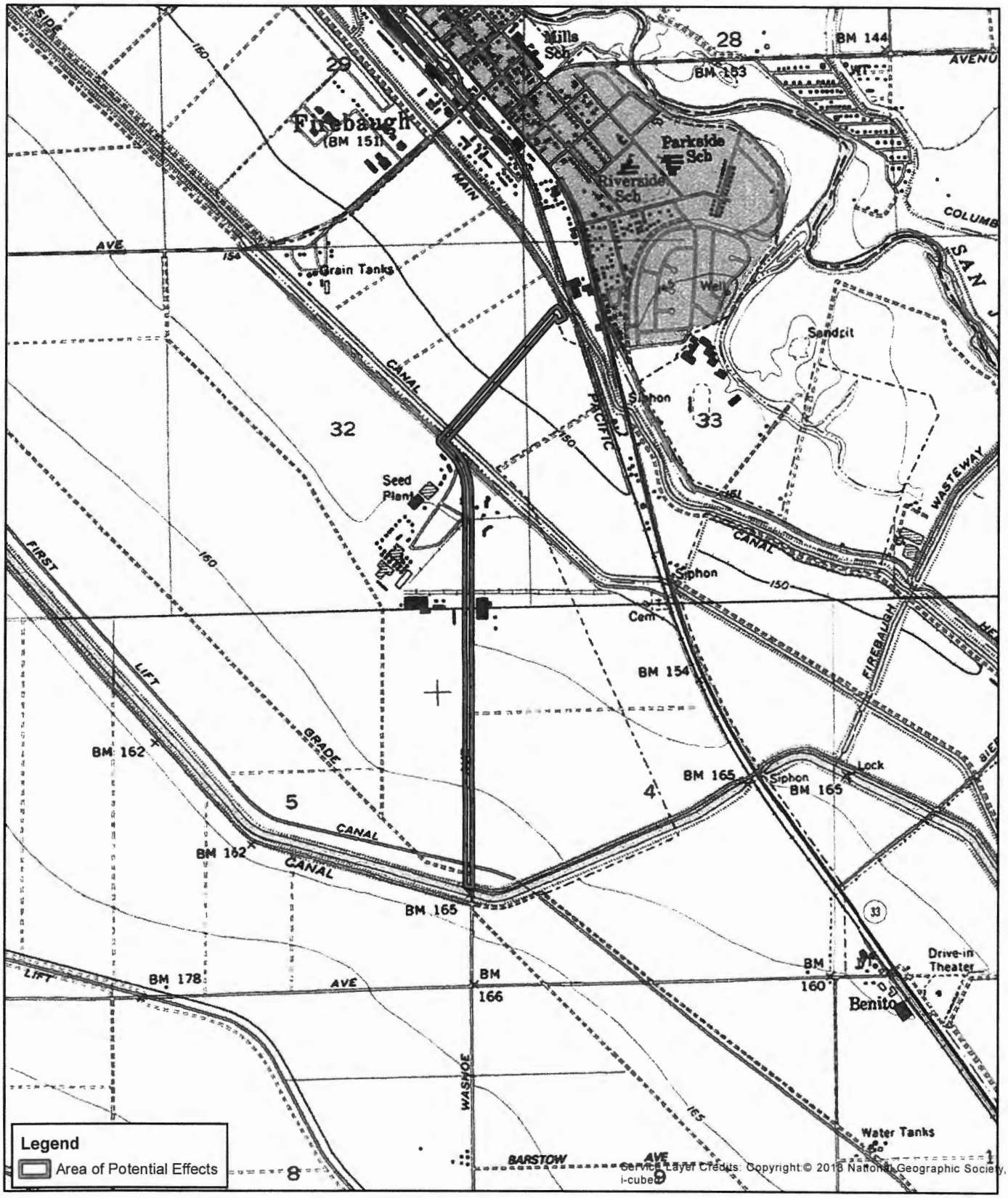
Thank you for your assistance. If you have any questions, please contact me at the address and phone number above or via email (mosterlye@garciaandassociates.com).

Montse Osterlye,
Cultural Resources Specialist

415.870.2980 office
Garcia and Associates

Attachments (1)

GANDA



USGS 7.5' Quad:
FIREBAUGH (1984)

Legal Description:
T12S, R14E Sections 32, 33
T13S, R14E Sections 4, 5

GANDA

Scale 1:24,000
1 Inch = 2,000 Feet

Project Location
City of Firebaugh HUD Project

Fresno County, California

0 1,000 2,000 Feet
0 300 600 Meters

N

City of Firebaugh- Las Deltas Safe Drinking Water Project

Fresno County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	2.00	Acre	2.00	87,120.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	1.1016	3.2677	2.5809		0.0723	0.2101	0.2823									
Total	**1.1016**	**3.2677**	**2.5809**		**0.0723**	**0.2101**	**0.2823**									

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	1.1016	3.2677	2.5809		0.0723	0.2101	0.2823									
Total	**1.1016**	**3.2677**	**2.5809**		**0.0723**	**0.2101**	**0.2823**									

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4008	0.0000	2.0000e-005			0.0000	0.0000									
Energy	0.0000	0.0000	0.0000			0.0000	0.0000									
Mobile	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Waste						0.0000	0.0000									
Water						0.0000	0.0000									
Total	**0.4008**	**0.0000**	**2.0000e-005**		**0.0000**	**0.0000**	**0.0000**									

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4008	0.0000	2.0000e-005			0.0000	0.0000									
Energy	0.0000	0.0000	0.0000			0.0000	0.0000									
Mobile	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Waste						0.0000	0.0000									
Water						0.0000	0.0000									
Total	**0.4008**	**0.0000**	**2.0000e-005**		**0.0000**	**0.0000**	**0.0000**									

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	1/28/2015	5	20	
2	Site Preparation	Site Preparation	1/29/2015	1/30/2015	5	2	
3	Grading	Grading	1/31/2015	2/5/2015	5	4	
4	Building Construction	Building Construction	2/6/2015	11/12/2015	5	200	
5	Paving	Paving	11/13/2015	11/26/2015	5	10	
6	Architectural Coating	Architectural Coating	11/27/2015	12/10/2015	5	10	

Acres of Grading (Site Preparation Phase): 3

Acres of Grading (Grading Phase): 2

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 130,680; Non-Residential Outdoor: 43,560 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	8.00	226	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Paving	Paving Equipment	1	8.00	130	0.36
Site Preparation	Scrapers	1	8.00	361	0.48
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	37.00	14.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	7.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0307	0.2968	0.2206			0.0187	0.0187									
Total	**0.0307**	**0.2968**	**0.2206**			**0.0187**	**0.0187**									

3.2 Demolition - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	6.3000e-004	1.0400e-003	0.0101		1.6200e-003	1.0000e-005	1.6300e-003									
Total	**6.3000e-004**	**1.0400e-003**	**0.0101**		**1.6200e-003**	**1.0000e-005**	**1.6300e-003**									

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0307	0.2968	0.2206			0.0187	0.0187									
Total	**0.0307**	**0.2968**	**0.2206**			**0.0187**	**0.0187**									

3.2 Demolition - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	6.3000e-004	1.0400e-003	0.0101		1.6200e-003	1.0000e-005	1.6300e-003									
Total	**6.3000e-004**	**1.0400e-003**	**0.0101**		**1.6200e-003**	**1.0000e-005**	**1.6300e-003**									

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.5900e-003	0.0000	1.5900e-003									
Off-Road	2.8200e-003	0.0325	0.0187			1.6000e-003	1.6000e-003									
Total	**2.8200e-003**	**0.0325**	**0.0187**		**1.5900e-003**	**1.6000e-003**	**3.1900e-003**									

3.3 Site Preparation - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	4.0000e-005	6.0000e-005	6.2000e-004		1.0000e-004	0.0000	1.0000e-004									
Total	**4.0000e-005**	**6.0000e-005**	**6.2000e-004**		**1.0000e-004**	**0.0000**	**1.0000e-004**									

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.5900e-003	0.0000	1.5900e-003									
Off-Road	2.8200e-003	0.0325	0.0187			1.6000e-003	1.6000e-003									
Total	**2.8200e-003**	**0.0325**	**0.0187**		**1.5900e-003**	**1.6000e-003**	**3.1900e-003**									

3.3 Site Preparation - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	4.0000e-005	6.0000e-005	6.2000e-004		1.0000e-004	0.0000	1.0000e-004									
Total	**4.0000e-005**	**6.0000e-005**	**6.2000e-004**		**1.0000e-004**	**0.0000**	**1.0000e-004**									

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0131	0.0000	0.0131									
Off-Road	5.9300e-003	0.0625	0.0404			3.5000e-003	3.5000e-003									
Total	**5.9300e-003**	**0.0625**	**0.0404**		**0.0131**	**3.5000e-003**	**0.0166**									

3.4 Grading - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	1.0000e-004	1.6000e-004	1.5500e-003		2.5000e-004	0.0000	2.5000e-004									
Total	**1.0000e-004**	**1.6000e-004**	**1.5500e-003**		**2.5000e-004**	**0.0000**	**2.5000e-004**									

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0131	0.0000	0.0131									
Off-Road	5.9300e-003	0.0625	0.0404			3.5000e-003	3.5000e-003									
Total	**5.9300e-003**	**0.0625**	**0.0404**		**0.0131**	**3.5000e-003**	**0.0166**									

3.4 Grading - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	1.0000e-004	1.6000e-004	1.5500e-003		2.5000e-004	0.0000	2.5000e-004									
Total	**1.0000e-004**	**1.6000e-004**	**1.5500e-003**		**2.5000e-004**	**0.0000**	**2.5000e-004**									

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4027	2.5839	1.7047			0.1760	0.1760									
Total	**0.4027**	**2.5839**	**1.7047**			**0.1760**	**0.1760**									

3.5 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0200	0.1486	0.2190		8.2300e-003	2.6400e-003	0.0109									
Worker	0.0181	0.0296	0.2861		0.0460	3.4000e-004	0.0463									
Total	**0.0381**	**0.1782**	**0.5051**		**0.0542**	**2.9800e-003**	**0.0572**									

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4027	2.5839	1.7047			0.1760	0.1760									
Total	**0.4027**	**2.5839**	**1.7047**			**0.1760**	**0.1760**									

3.5 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0200	0.1486	0.2190		8.2300e-003	2.6400e-003	0.0109									
Worker	0.0181	0.0296	0.2861		0.0460	3.4000e-004	0.0463									
Total	**0.0381**	**0.1782**	**0.5051**		**0.0542**	**2.9800e-003**	**0.0572**									

3.6 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.7200e-003	0.0988	0.0613			6.2100e-003	6.2100e-003									
Paving	2.6200e-003					0.0000	0.0000									
Total	**0.0123**	**0.0988**	**0.0613**			**6.2100e-003**	**6.2100e-003**									

3.6 Paving - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	3.7000e-004	6.0000e-004	5.8000e-003		9.3000e-004	1.0000e-005	9.4000e-004									
Total	**3.7000e-004**	**6.0000e-004**	**5.8000e-003**		**9.3000e-004**	**1.0000e-005**	**9.4000e-004**									

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.7200e-003	0.0988	0.0613			6.2100e-003	6.2100e-003									
Paving	2.6200e-003					0.0000	0.0000									
Total	**0.0123**	**0.0988**	**0.0613**			**6.2100e-003**	**6.2100e-003**									

3.6 Paving - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	3.7000e-004	6.0000e-004	5.8000e-003		9.3000e-004	1.0000e-005	9.4000e-004									
Total	**3.7000e-004**	**6.0000e-004**	**5.8000e-003**		**9.3000e-004**	**1.0000e-005**	**9.4000e-004**									

3.7 Architectural Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6057					0.0000	0.0000									
Off-Road	2.0300e-003	0.0129	9.5100e-003			1.1000e-003	1.1000e-003									
Total	**0.6077**	**0.0129**	**9.5100e-003**			**1.1000e-003**	**1.1000e-003**									

3.7 Architectural Coating - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	1.7000e-004	2.8000e-004	2.7100e-003		4.4000e-004	0.0000	4.4000e-004									
Total	**1.7000e-004**	**2.8000e-004**	**2.7100e-003**		**4.4000e-004**	**0.0000**	**4.4000e-004**									

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6057					0.0000	0.0000									
Off-Road	2.0300e-003	0.0129	9.5100e-003			1.1000e-003	1.1000e-003									
Total	**0.6077**	**0.0129**	**9.5100e-003**			**1.1000e-003**	**1.1000e-003**									

3.7 Architectural Coating - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Worker	1.7000e-004	2.8000e-004	2.7100e-003		4.4000e-004	0.0000	4.4000e-004									
Total	**1.7000e-004**	**2.8000e-004**	**2.7100e-003**		**4.4000e-004**	**0.0000**	**4.4000e-004**									

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									
Unmitigated	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000									

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.442140	0.064191	0.163446	0.173530	0.044009	0.007253	0.017375	0.074976	0.002071	0.001797	0.006530	0.000807	0.001875

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000									
Electricity Unmitigated						0.0000	0.0000									
NaturalGas Mitigated	0.0000	0.0000	0.0000			0.0000	0.0000									
NaturalGas Unmitigated	0.0000	0.0000	0.0000			0.0000	0.0000									

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000			0.0000	0.0000									
Total		**0.0000**	**0.0000**	**0.0000**			**0.0000**	**0.0000**									

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000			0.0000	0.0000									
Total		**0.0000**	**0.0000**	**0.0000**			**0.0000**	**0.0000**									

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0				
Total					

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0				
Total					

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4008	0.0000	2.0000e-005			0.0000	0.0000									
Unmitigated	0.4008	0.0000	2.0000e-005			0.0000	0.0000									

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0606					0.0000	0.0000									
Consumer Products	0.3403					0.0000	0.0000									
Landscaping	0.0000	0.0000	2.0000e-005			0.0000	0.0000									
Total	**0.4008**	**0.0000**	**2.0000e-005**			**0.0000**	**0.0000**									

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0606					0.0000	0.0000									
Consumer Products	0.3403					0.0000	0.0000									
Landscaping	0.0000	0.0000	2.0000e-005			0.0000	0.0000									
Total	**0.4008**	**0.0000**	**2.0000e-005**			**0.0000**	**0.0000**									

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated				
Unmitigated				

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0				
Total					

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0				
Total					

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated				
Unmitigated				

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0				
Total					

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0				
Total					

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation