A CULTURAL RESOURCES INVENTORY AND HISTORIC BUILDING ASSESSMENT FOR TUCSON ELECTRIC POWER’S IRVINGTON CAMPUS, TUCSON, PIMA COUNTY, ARIZONA

Tucson Electric Power

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June 8, 2017
Project Number: 1610.204

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STATE HISTORIC PRESERVATION OFFICE REPORT ABSTRACT

REPORT TITLE: A Cultural Resources Inventory and Historic Building Assessment for Tucson Electric Power’s Irvington Campus, Tucson, Pima County, Arizona

REPORT DATE: June 8, 2017

PROJECT NAME: TEP Irvington Campus Survey

PROJECT LOCATION: Tucson, Pima County, Arizona

PROJECT LOCATOR UTM: 3558497m N; 508668m E

PROJECT SPONSOR: Tucson Electric Power

SPONSOR PROJECT NUMBER(S): n/a

LEAD AGENCY: n/a

OTHER INVOLVED AGENCIES: n/a

APPLICABLE REGULATIONS: n/a

FUNDING SOURCE: Private – Tucson Electric Power

ASLD ROW APPLICATION NUMBER: n/a

DESCRIPTION OF THE PROJECT/UNDERTAKING: Tucson Electric Power (TEP) is planning future improvements at its Irvington Campus, a power-generating facility located in Tucson, Pima County, Arizona. TEP contracted WestLand Resources, Inc. (WestLand), to conduct a cultural resources inventory of the facility for TEP’s internal planning purposes. As initial construction and use of the Irvington Generating Station began in 1957–1958, WestLand was also contracted to provide a historic building assessment to identify any standing buildings over 50 years old that might be of historical or architectural significance.

PROJECT AREA/AREA OF POTENTIAL EFFECTS (APE): TEP’s Irvington Campus (the project area) is an irregularly shaped 344-acre parcel located at the intersection of Alvernon Way and Irvington Road in the city of Tucson, Pima County, Arizona.

LEGAL DESCRIPTION: Township 15 South, Range 14 East, a portion of Section 3

USGS 7.5' QUADRANGLE(S): Tucson

LAND JURISDICTION: Private – Tucson Electric Power

TOTAL ACRES: 344

ACRES SURVEYED: 344

ACRES NOT SURVEYED: 0
CONSULTANT FIRM/ORGANIZATION: WestLand Resources, Inc.

PROJECT NUMBER: 1610.204

PERMIT NUMBER(S): n/a (private land)

DATE(S) OF FIELDWORK: May 15 and 16, 2017

NUMBER OF IOS RECORDED: 1

NUMBER OF SITES RECORDED: 2 – AZ AA:12:875(ASM) and AZ BB:13:895(ASM)

ELIGIBLE SITES: 1

INELIGIBLE SITES: 1

UNEVALUATED SITES: 0

SITES NOT RELOCATED: 1 – AZ BB:13:854(ASM)

Site summary table

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<td>AZ BB:13:895(ASM)</td>
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COMMENTS: WestLand’s cultural resources inventory resulted in the re-assessment of two previously recorded archaeological sites and the identification of one new archaeological site and one isolated occurrence. One of the previous sites, AZ AA:12:875(ASM), El Paso Natural Gas pipeline No. 1007, has been determined eligible for inclusion in the National Register of Historic Places (NRHP) by the Arizona State Historic Preservation Office under Criteria (c) and (d). WestLand recommends that this site be avoided during any future improvement projects at the Irvington Campus.

The other previously recorded site, AZ BB:13:854(ASM), a Historic period waste pile, was previously recommended ineligible for the NRHP (Buckles 2013). This site has subsequently been destroyed by the construction of a contractor’s yard and no further work is recommended.

The newly recorded site, AZ BB:13:895(ASM), the historical component of the Irvington Campus known as the Irvington Generating Station, is recommended ineligible for inclusion in the NRHP. No further architectural or historical documentation is recommended at this site prior to any improvements to the Irvington Campus.

WestLand also provides the general recommendation that all ground-disturbing activities have the potential to unearth human remains and cultural materials, and that any such discoveries must be treated in accordance with Arizona Revised Statute §41-865.
INTRODUCTION AND PROJECT BACKGROUND

Tucson Electric Power (TEP) is planning future improvements at the Irvington Campus, a power-generating facility located in Tucson, Pima County, Arizona. TEP contracted WestLand Resources, Inc. (WestLand), to conduct a cultural resources inventory of the facility for TEP’s internal planning purposes. As initial construction and use of the Irvington Generating Station began in 1957–1958, WestLand was also contracted to provide a historic building assessment to identify any standing buildings over 50 years old that might be of historical or architectural significance. While this report was prepared for TEP’s internal planning purposes and a reviewing agency has not yet been identified for proposed future improvements, it has been prepared in compliance with the Arizona Antiquities Act reporting standards and Arizona State Historic Preservation Office (SHPO) guidelines (rev. January 2016; Arizona SHPO 2016).

TEP’s Irvington Campus (the project area) is an irregularly shaped 344-acre parcel at the intersection of Alvernon Way and Irvington Road in the city of Tucson, Pima County, Arizona. More specifically, it is located in Township 15 South, Range 14 East, a portion of Section 3 (Tucson 7.5′ USGS quadrangle) (Photo 1; Figures 1 and 2; see also cover photo).

The cultural resources inventory fieldwork was conducted by WestLand archaeologists Anna King and Rebecca Caroli on May 15 and 16, 2017, under the direction of Fred Huntington, who served as project manager. WestLand historian Avi Buckles accompanied the field crew and conducted an oral interview with a longtime TEP employee. The inventory resulted in the re-assessment of two previously recorded archaeological sites and the identification of one new archaeological site and one isolated occurrence of cultural materials.
T15S, R14E, Portion of Section 3, Pima County, Arizona
Tucson USGS 1:100,000 Quadrangle
Projection: UTM NAD83, Zone 12
Data Source: ArcGIS Online World Streetmap

Figure 1. Vicinity map
Figure 2. Project location showing surface management
ARCHAEOLOGICAL RESEARCH AND RECORDS SEARCH

Prior to fieldwork, WestLand performed an archaeological records check for the project area. Site record files were searched in the Arizona State Museum (ASM) online database (AZSITE) for information on previously recorded sites and projects within the project area and a surrounding 0.8-km (0.5-mile) buffer\(^1\). According to AZSITE records, 44 cultural resources inventories have been conducted within the buffer surrounding the project area (Table A.1; Figure A.1 [Appendix A]). Ten of these projects intersect the project area. The cultural resources inventories span the past several decades and were conducted mostly for linear road-related projects and utility improvements. One important project not shown on AZSITE is a 1981 Environmental Assessment (EA) conducted at the Irvington Generating Station ahead of a conversion to the use of coal in fueling the plant’s generators (USDOE 1981). As a component of the EA, archaeologist John P. Wilson examined the Irvington Generating Station for cultural resources and historical sites, but none were found (USDOE 1981:47–48). Additionally, in recent years, WestLand has conducted small surveys within undeveloped portions of the TEP Irvington Campus (Buckles 2013; Chamorro 2014) and for small utility projects nearby (King 2014).

AZSITE documents nine previously recorded archaeological sites within the 0.8-km (0.5-mile) buffer surrounding the project area; of these, two sites are located in the project area. Sites in the vicinity are primarily Historic period transportation sites, although some prehistoric sites have been identified in the area. AZSITE documents that the majority of these prehistoric sites have been destroyed by infrastructure improvements. The two sites previously recorded in the project area are a natural gas pipeline and a Historic period waste pile.

HISTORICAL MAP AND AERIAL PHOTOGRAPH REVIEW

The following historical maps were reviewed prior to performing the field survey. The maps that show areas pertinent to the current project are presented in Appendix C.

- General Land Office (GLO) plat for Township 15 South, Range 14 East, approved in 1873
- 1905 Tucson 30' U.S. Geological Survey (USGS) quadrangle
- 1948 Tucson 15' USGS quadrangle
- 1957 Tucson 7.5' USGS quadrangle

Examination of the historical maps as well as aerial photographs revealed the ongoing growth of Tucson southward and eastward into the vicinity of the project area during the late nineteenth

\(^1\) According to 2016 Arizona State Historic Preservation Office standards, within urban areas a 0.5-mile buffer may be used for Archaeological Records Search research areas rather than the typical 1-mile buffer (Arizona SHPO 2016).
and early twentieth centuries. The specific trends of development in the project area are discussed in greater detail in the following sections; however, a brief overview of the features depicted on the historical maps is provided below.

The 1873 T15S R14E GLO plat depicts one feature in the northeastern portion of the project area: a road labeled “Tucson and Apache Pass.” During the current cultural resources survey, no traces of this route were observed in the project area, likely due to the ongoing industrial development of the land. The 1905 Tucson 30′ USGS quadrangle shows somewhat less detail and may be slightly distorted in the vicinity of the project area due to its scale; nevertheless, it, too, shows a road intersecting the northeastern portion of the project area. This road was not relocated during the survey.

The 1948 Tucson 15′ and the 1957 7.5′ USGS quadrangles both depict the build-out of transportation systems in the vicinity of the project area as well as the development of what would become Davis-Monthan Air Force Base to the north. These maps show (1) the railroad alignment that delineates the western and southwestern boundaries of the TEP Irvington Campus (labeled as part of the Southern Pacific system); (2) U.S. Highway 80 paralleling the railroad to the south; and (3) Irvington Road along the northern boundary of the project area. Additionally, the road that would eventually become Alvernon Way extends southerly along the western edge of the project area and then turns to travel southeasterly through the center of the project area. On the 1957 7.5′ USGS quadrangle, this road is labeled “Old Vail Road.” Development of the Irvington Campus infrastructure has obscured all traces of the road. Another road shown on the 1957 quadrangle intersects the far northeastern corner of the project area. This road is labeled “Pipeline” and is the access road for El Paso Natural Gas (EPNG) pipeline No. 1007, recorded as AZ AA:12:875(ASM). This pipeline is discussed in the Site Descriptions section of this report.

The 1957 Tucson 7.5′ USGS quadrangle also shows several features within the Irvington Campus itself. These include three short railroad spur tracks, a road system, and four unlabeled structures. This suggests that at the time of map preparation, construction had already begun on the Irvington Campus. Development of the facility is discussed further in the Culture History and Site Descriptions sections of this report.

Historical aerial photographs taken in the years 1936, 1941, 1958, and 1967 were examined for additional historical features; to confirm the presence of the historical features shown on the above-referenced maps; and to assist in dating the features identified in the project area. The photographs from 1958 (Photo 2) and 1967 (Photo 3) are particularly germane to the current project because they show the original iteration of the plant when it first opened in 1958 as well as the buildings that can be confirmed to be 50 years old or older (i.e., those visible on the 1967 photograph). Aerial photographs from more recent years (i.e., 1972, 1980, 1990, and 2004) were also examined to compare the modern landscape to that of the Historic period.
Photo 2. 1958 aerial photograph of the Irvington Generating Station
Photo 3. 1967 aerial photograph of the Irvington Generating Station
The 1936 and 1941 aerial photographs confirm that Irvington Road was present by this time (albeit a dirt road), as were the railroad alignments south and west of the project area, the EPNG pipeline, and Old Vail Road. However, the majority of the Irvington Campus area was unmodified desert during this period. By 1958, aerial photographs show the construction of the Irvington Campus well under way, including three buildings, 12 structures\(^2\), three railroad spur lines, and parking areas. By 1967, the plant had expanded to include a total of seven buildings and 27 structures. These historical components of the infrastructure at the plant are discussed further in the **Culture History** and **Site Descriptions** sections of this report.

\(^2\) Following *National Register Bulletin 15*, “buildings” are defined here as features created principally to shelter any form of human activity, in this case the generation of electricity and associated administrative activities. “Structures” are defined here as functional constructions made for purposes other than human shelter; at the generating plant, these would include fuel tanks, cooling towers, substations, and the like.
PHYSIOGRAPHIC CONTEXT

Geologically, the project area is situated in the Basin and Range physiographic province, a region characterized by southeast-to-northwest-trending mountain ranges with intervening valleys and basins filled with younger alluvium. Specifically, it is located in the central portion of the Tucson Basin, a broad basin where the flows of several drainage systems and rivers converge. The Santa Cruz River lies approximately 5 miles to the west. The channelized alignment of Julian Wash flows northwesterly south of the project area, and small, now discontinuous ephemeral drainages cross unmodified portions of the eastern project area. Elevations range from 2,605 to 2,650 feet above mean sea level (amsl).

The project area is heavily developed, and no vestige of the native landscape remains. Prior to development, this portion of the Tucson Basin would have contained vegetation typical of the Arizona Upland subdivision of the Sonoran Desertscrub biotic community (Brown 1994), including mesquite (Prosopis sp.), palo verde (Cercidium microphyllum), creosote (Larrea tridentata), saguaro (Carnegiea gigantea), prickly pear (Opuntia phaeacantha), fish-hook barrel (Ferocactus wislizenii), various cholla species (Opuntia sp.), and numerous seasonal grasses and forbs. Currently, the vegetation in the project area is well-managed in the working industrial areas of the plant, but where present in the undeveloped areas to the east it is dominated by creosote bushes and seasonal grasses and weeds, with scattered mesquite and palo verde trees and sparse prickly pear cacti (Photo 4). Much of this vegetation grows along the ephemeral drainage courses. In the northwestern portion of the plant near the main administration buildings, landscaped trees and shrubs line the driveways and public areas.

Photo 4. Overview of an undeveloped portion of the eastern project area, looking southeast
In terms of soils, the project area is located on the middle bajada leading down to the Santa Cruz River to the west. The ground surface has been altered by development, but the native substratum likely consists of rocky deposits typical of the bajada landform. Sediment deposition is minimal on the bajada, and archaeological deposits, if present, would be surficial or located at shallow depths.

**Modern Disturbances**

The project area is located in a portion of Tucson that has long been used as a transportation corridor linking Tucson to parts east. Interstate 10 passes just to the south and follows the approximate routes of its predecessors U.S. Highway 80, Old Vail Road, and the road from “Tucson and Apache Pass” that is shown on the historical maps of the area. Specific disturbances to the project area include historical and modern buildings, parking lots, driveways, a pair of parallel railroad spur tracks along the southern edge of the Irvington Campus, laydown yards, a large solar-power concentrating facility (the “solar boost” system; see further discussion in the Culture History section below), retention basins, drainage channels, and other infrastructure. Additionally, landscaped plants and decorative gravel are present in common areas and along driveways. In those areas that are not currently covered with imported materials or infrastructure, construction activities over the years have impacted the native ground surface through grading, cutting, and filling.
CULTURE HISTORY

Arizona is a geographically diverse landscape from the high desert Colorado Plateau in the northeast, across the rugged central mountainous zone, to the southern and western lowland desert Basin and Range territories. Archaeological evidence indicates that people have inhabited this diverse landscape for more than 12,000 years. Over the tenure of human history, the environment has changed radically from the cooler and moister conditions of the late Pleistocene epoch to the warmer and drier conditions of today. As the environment changed, and as human populations increased over time, a variety of human cultures developed. Although these cultures did not arise and develop in isolation from cultures in other regions, it is evident that cultures in different geographic regions followed unique trajectories. Humans have responded in a variety of ways to the biological, geological, hydrological, geographical, and physiographical diversity of Arizona. The long tenure of human prehistory and history in Arizona is divided here into five major periods representing shifts in the human cultural adaptation: Paleoindian (11,500–8500 B.C.), Archaic (8500 B.C.–A.D. 1), Formative (A.D. 1–1450), Protohistoric (A.D. 1450–1691), and Historic (A.D. 1691–1967). These five main periods are often subdivided into briefer phases to represent cultural trends and developments specific to the various regions across Arizona (Figure 3).

The earliest evidence of people inhabiting Arizona is attributed to the Paleoindian period. Paleoindians are perceived as migratory, nomadic “big game” hunters who roamed North America at the end of the Pleistocene epoch. Using spears tipped with characteristically large fluted lanceolate projectile points, they hunted the now extinct megafauna of the terminal Pleistocene, particularly mammoth (*Mammuthus* spp.) and ancient bison (*Bison antiquus*) (Faught and Freeman 1998; Reid and Whittlesey 1997:30–37). The extinction of the large mammals and the warming and drying conditions of the Holocene epoch ushered in the Archaic period. Human populations responded to changes in the environment and resources by diversifying subsistence strategies, including hunting a wider range of animal resources and gathering a broad spectrum of wild plants (Mabry 1998; Mabry and Faught 1998). The Archaic period was punctuated by the hot and dry conditions of the middle Holocene “Altithermal” (Mabry 1998:30), leading to a virtual withdrawal from the lowlands and a reduced occupation of the highlands (Mabry 1998:65). Between about 3300 and 600 B.C., as temperatures cooled and rainfall increased, the number of Archaic period sites increased (Mabry 1998:29, 73).

The next significant step in the cultural development of Arizona was the introduction and development of agriculture. Current dating evidence places maize securely in the Southwest by 2100 B.C. (Merrill et al. 2009), but the transition to an agriculture-based subsistence adaptation developed later, around 1700–900 B.C. (Mabry 1998:73). The introduction of maize and the development of agriculture set the foundation for the cultural developments that followed. As a general statement, the ensuing Formative period is characterized by increases in population and the differentiation of those populations into the regionally distinctive cultural groups that we identify as the primary archaeological cultures of late prehistory, notably Ancestral Pueblo (Anasazi), Mogollon, Hohokam, Trincheras, and Casas Grandes.
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**Figure 3.** Cultural chronology for the Tucson Basin and surrounding regions
Prehistory in southern Arizona ends with the collapse of the late Formative period cultures and an apparent depopulation of the region. The subsequent Protohistoric period is poorly understood. Central and southern Arizona were sparsely occupied at first Spanish contact.

Early Spanish accounts of southern Arizona and the people provide the framework for what we know about the Protohistoric period. Spanish missionaries identified the peoples they encountered along the upper Santa Cruz and San Pedro Rivers as the Sobaipuri (Doelle and Wallace 1984, 1990; Gilpin and Phillips 1998:32; Masse 1981). The Sobaipuri apparently had occupied the territory since the end of prehistory and are hypothesized to have been the descendants of the prehistoric archaeological cultures in the region. The Athabaskan-speaking Apache occupied the vast mountainous regions below the Mogollon Rim in central and southeastern Arizona north and east of the Sobaipuri (Gilpin and Phillips 1998:68–70; Whittlesey 2003:243). The Apache probably entered the American Southwest late in prehistory and expanded their territory south across eastern Arizona. This expansion eventually brought them into direct conflict with the Sobaipuri and, later, European settlers who were also expanding and colonizing southern Arizona. The Historic period commences with the arrival of Jesuit missionary Eusebio Kino and the establishment of Spanish missions and presidios in the Santa Cruz and San Pedro River Valleys in 1691. The Historic period can be characterized by increasing Euroamerican colonization, settlement, expansion, industrialization, and conflict (Spicer 1962). The Historic period is conventionally subdivided into Spanish, Mexican, and American periods reflecting shifts in governmental authority.

In 1757, Father Bernard Middendorf, a Jesuit, arrived in the Tucson area, re-establishing a Spanish presence there. By the early 1770s, a mission church—San Agustín—had been built by the newly arrived Franciscans at the base of Sentinel Peak near the Sobaipuri village Stjulshon (Dobyns 1964, 1976). In 1775, the Presidio of Tucson was established by an Irishman, Hugo O’Conor, along the eastern bank of the Santa Cruz River opposite the newly constructed church (Dobyns 1964). The establishment of this presidio marked Tucson’s humble beginnings. Defensive and residential structures were built in what is now downtown Tucson, and soldiers from the presidio at Tubac were moved north to Tucson to defend it against Apache raiding, which had become a serious problem in the region (Dobyns 1964). Spanish colonists and Native American farmers were attracted to the area by the farmland, the water provided by the Santa Cruz River, and the relative safety offered by the presidio (Dobyns 1976; Officer 1987). The San Agustín Mission appears to have been abandoned by 1831 (Elson and Doelle 1987). However, the inhabitants of the region continued to use the Tucson presidio for protection (Officer 1987).

The Treaty of Guadalupe-Hidalgo, signed in 1848 following the conclusion of the Mexican-American War, ceded that portion of (what is now) Arizona lying north of the Gila River to the United States. In 1853, the Gadsden Purchase expanded Arizona from the Gila River south to the present-day Mexican border. Although the lands included in the Gadsden Purchase had been used for ranching in the past, Arizona’s ranges were now open for ranching activities on a large scale. The increase in population in California since 1849 had resulted in a significant beef
market, and Arizona became a thoroughfare for cattle driven from Texas to California. In 1858, the Butterfield Overland Mail Company was formed, providing stagecoach transportation across the region (Stein 1994). The U.S. Army arrived in Tucson in 1856 and founded the original Fort Lowell southeast of the old Spanish presidio in 1866. As with the presidio, Fort Lowell’s main purpose was to protect settlers from ongoing Apache raiding. The surrender of Geronimo and defeat of the Apache in 1886 brought boom times to southern Arizona. In 1877, the city of Tucson was incorporated and an engineered townsite plat was prepared, transforming the original layout of Tucson’s city core with its irregular streets and lots into a rectilinear grid pattern typical of Euroamerican city planning (Parkhurst et al. 2002). The grid pattern was accomplished through the lengthening and straightening of existing streets and filling in the resultant blocks with a series of 12 identical lots separated by alleys emanating outward from the city core. Near downtown Tucson, the block system was built around pre-established irregularly oriented streets, making some blocks irregular in shape (Parkhurst et al. 2002).

The Southern Pacific Railroad arrived in 1880, carrying with it a flood of Angloamerican settlers. Subsequent rail lines such as the Twin Buttes, Tucson and Nogales, and EP&SW Railroads brought the products of mining and cattle ranching to Tucson, making the city a hub for these rapidly growing industries (Sonnichsen 1987). The original townsite of Tucson, clustered around the old Spanish presidio in what is now downtown, was the site of most residential and business development for much of the nineteenth century. With the 1891 establishment of the University of Arizona 3 miles east of downtown, however, Tucson saw its first significant expansion eastward. By the first decade of the following century, new homes, businesses, and residential subdivisions were established around this new economic node (Sonnichsen 1987). In 1912, Arizona became the last state in the continental United States to achieve statehood.

Businesses in Tucson gained traction during the early 1900s, and by the 1920s the city was booming. Economic growth was based primarily on commerce, with support from tourism, farming, mining, and ranching. Tucson’s population also expanded during this decade, and new subdivisions sprang up north, south, and east of the old city core. Most of these early subdivisions were established without regulatory oversight by individuals or couples who later sold to builders or soon-to-be homeowners. This era of expansion and economic well-being would soon come to an end, however, with the stock market crash of 1929 and the Great Depression (Akros et al. 2007; Sonnichsen 1987), which put a hold on Tucson residential development and homebuilding.

During the late 1930s, Tucson slowly crept out of the economic downturn, and subdivisions gradually began filling up with new homes. Financing for many of these homes was made possible by the creation of the Federal Housing Administration in 1934, which significantly lowered the interest rate on mortgages and brought stability to housing production (Akros et al. 2007; Assessor’s tax records; Sonnichsen 1987).

With the onset of the Second World War (WWII), the military and the aviation industry became two of the primary drivers of economic growth in Tucson. During the 1940s and into the 1950s, the population of the city exploded, and homes began cropping up in new subdivisions.
surrounding the old corporate city limits. Many of the new arrivals to Tucson were not only attracted to the city because of available jobs, but by the cheap housing and mild climate as well. There were, however, painful lulls in the military- and aviation-related industries, which resulted in periods of boom and bust in Tucson during the post-WWII era. Luckily for Tucson, economic growth was soon taken up by an expansion of the university, retirement communities, and tourism, a trend that continues to this day. By the 1960s, there were over 275 subdivisions in Tucson north, south, and east of the old downtown core, and at the end of the decade the population stood at 263,000 (Akros et al. 2007; Sonnichsen 1987).

**Electrical Power Generation and the History of Tucson’s Utilities**

The following section provides a historical context for the resources in the project area. It discusses the methods used to produce electricity at an electrical plant (such as the Irvington Generating Station) followed by a general overview of the development of utilities systems in Tucson. The particular focus of the discussion will be on the two key players in the industry—the forerunners of Tucson Electric Power and El Paso Natural Gas.

**Electrical Power Generation**

At their most basic, fossil-fuel-powered electrical power plants, including the Irvington Generating Station, burn fossil fuels to create steam, which is then used to rotate a turbine, which in turn powers a generator to create electricity. Spent steam is cooled and condensed back to liquid water, then redirected to begin the process again. Meanwhile, the generated electricity is converted to an appropriate voltage and transmitted to residential, commercial, agricultural, and industrial properties. The key components of this system are fuel supply systems, generating systems (boilers, turbines, generators, condensers, and cooling towers), transmission systems (electrical switchyards, substations, transmission lines, and distribution lines), administration systems (administrative, maintenance, storage, and control buildings), and transportation systems. These are described below following a basic outline of power generation and fossil-fuel-powered generating plants taken from McVarish (2008:170–184).

**Fuel Supply Systems**

Fossil-fuel-powered generating plants make use of petroleum oil, natural gas, or coal to generate the heat needed to create high-pressure steam. Fuel is supplied to, and transported within, the plant by various means depending on the fuel type. Oil is typically delivered via railroad tanker cars and contained in storage tanks, then supplied to the boilers via a series of pipelines. Natural gas is typically supplied via systems of high-pressure pipelines and feeder pipelines, and regulated by valves. Coal is delivered via railroad car, truck, or barge and is often stored onsite. To allow the coal to burn similarly to a gas, and for easy firing, the coal is conveyed to a series of pulverizer systems wherein it is crushed to a uniform size and ground into a fine powder. The powder is often transported via piped air to the boiler or furnace.
Electrical Generating System

Electrical power generation at a fossil-fuel-powered facility relies on the fossil fuel supplies described above to create high-pressure, high-temperature steam, which is used to rotate a turbine and electromagnetic generator, which creates electrical power.

- **Boilers**: Boilers function to heat water to generate high-temperature and high-pressure steam using fossil fuels delivered via the systems described above. Historically, boilers—also called steam generators—were of two types: (1) the fire tube boiler and (2) the water tube boiler. The former type, not commonly used in large-scale electrical generating plants, consists of a large water-filled cylinder through which tubes containing hot gases—the result of fuel combustion in an attached furnace—run. The hot gas-filled tubes heat the water in the cylinder to convert it into steam. The safer and thus more commonly used system in large-scale generating plants—the water tube system—is the rough inverse of the fire tube system. Vertical tubes containing water make up the sides of a box within which the fuel is burned. Heat is transferred into the water tubes, generating steam. A super-heater intended to raise the temperature of the created steam to temperatures significantly above water’s critical point is often found at the top end of water tube boilers. Boilers also often make use of heat-exchanger systems that capture the escaping hot gases (flue gases) created during combustion and use them to pre-heat incoming combustion air. Further, heat economizers extract heat from the flue gases discharged by the super-heater at the top of the boiler. This heat is then transferred into the feed-water system that fills the water tubes. Excess flue gases and steam not used by the system are discharged through attached stacks.

- **Turbines**: At a basic level, turbines convert the thermal energy created by the boilers and carried by steam into mechanical energy or shaft torque. Often turbines are solidly coupled with generators within a closed system that operates as a unit, sometimes called a turbo-generator (more about generators below). Turbines consist of a series of fins or vanes (much like those on a windmill) attached to a rotating shaft. Steam is piped into the turbine units and pushes against the vanes, turning the rotor shaft. Many turbo-generators are compound units consisting of one high-pressure unit and one or two low-pressure units placed in line with rotor shafts coupled together and thence connected to the generator.

- **Generators**: A generator is a device that transforms mechanical energy from the turbines (i.e., torque on a rotating shaft) into electrical energy. This is accomplished through the use of rotating magnetic fields interacting with stationary conductors (or stators). A generator consists of a rotor coupled to the turbine output shaft. This rotor is essentially a large electromagnet energized by a stationary external exciter coupled through rotating contacts (or, in some cases, inductive coupling). The exciter induces a current in the rotor that, in turn, creates a rotating magnetic field that encompasses the stationary conductors of the stator. The interaction of the rotating magnetic field and the stationary conductors induces electric currents in the stationary conductors. These currents, in turn, are carried by cabling to the
switchyard, external to the generating system, where transformers change the generator’s relatively low output voltage to higher voltages suitable for transmission over long distances.

- **Condensers**: Condensers are heat exchangers that remove the last vestiges of heat from the “spent” steam coming from the turbines. They convert the turbine’s output steam back to low-pressure liquid water. In the case of the Irvington Generation Station, the condensers are cooled by water circulated through the plant’s cooling towers. Note that the water passing through the boiler/turbine/condenser system is separate from that circulating through the cooling towers.

- **Cooling Towers**: Cooling towers are well-ventilated open-topped structures. Piped water from the condensers is transmitted to the top of the cooling tower structures and is allowed to trickle down. Air is passed through the tower structure and across the surface of the water to cool it.

- **Boiler Feed Water System**: Once the spent steam has been condensed to liquid water in the condensers, it is returned to the boilers/steam generators by means of feed-water pumps. These pumps are multi-stage devices whose output is often in the 1,500 to 3,000 psi range with the input in the sub-atmospheric (7 psi) range.

**Electrical Transmission System**

The switchyard, mentioned above, combines the output of multiple generating units and, in turn, steps it up to a voltage suitable for the transmission system. Alternatively, power from the generators can be diverted, at a lower voltage, to a local distribution system and transmitted to homes and businesses via the electrical grid. These systems consist of components that are located within the plant but connect to the electrical grid outside the facility.

- **Electrical Switchyards**: Following its creation in the generator, electrical power is immediately transmitted to transformers and the electrical switchyard. Generators are limited in their operational voltage since the wires are close together and insulation can break down, causing a short circuit and damage to the generator. To prevent this damage, many utility-scale generators operate in the 10-kV (10,000-volt) range, then step up the voltage as close as possible to the generator using a transformer usually located in an electrical switchyard. Switchyards are responsible for joining power produced by multiple generators in a complex set of switches and transformers until the desired voltage output (often between 50,000 and 500,000 volts) is reached.

- **Substations, Transmission Lines, and Distribution Lines**: From the switchyard, electrical power is transmitted to the local electrical grid through a series of transmission and distribution lines regulated through substations. The substations step the high voltage created at the switchyard down to voltages that are more useful to local needs. The electrical power is
transmitted through a distribution network connected to smaller transformers at each home or business that turn it into 220-240 V power suitable for homes and smaller businesses where it is further split into two 110-120 V circuits to power outlets and lights.

**Administration Systems**

Supporting systems at an electrical generating plant include administrative, maintenance, storage, and control buildings. These systems cater to each plant’s specific needs.

**Transportation Systems**

Transportation systems at electrical plants often consist of railroad spurs used to haul in heavy equipment and fuel as well as internal roads that connect the various portions of the plant. Like the administration systems, transportation networks cater to each plant’s specific needs.

**The Development of Tucson’s Utilities**

The first lights to illuminate the streets of downtown Tucson in 1882 were fed by manufactured gas—a locally derived fuel generated as a by-product of heating coal—and distributed via a limited municipal pipeline system (Burdett 1993:6; Steely and Newsome 2008:E-8). Soon after, in 1883, an entrepreneur named Al Johnson supplied the power and led the charge to convert the gas streetlamps and lights in some homes and municipal buildings to electricity (Burdett 1993:6; Sonnichsen 1987:108). Johnson, who operated an ice manufacturing plant in Tucson, installed a steam-operated direct current Edison bipolar unit generator to power his ice house and the fledgling electrical power grid in Tucson (Sonnichsen 1987:108, 110). Unfortunately, this initial electrical venture went under within 2 years, returning Tucson’s streetlights to manufactured gas (Burdett 1993:6; Sonnichsen 1987:110).

Interest in electrical power in Tucson resumed in 1892 with the incorporation of the Electric Light and Power Company and the construction of a one-story power-generating facility on North Church Street in the block that now houses Tucson’s Main Library. The generators in this facility were fueled by burning local mesquite wood (Burdett 1993:6, 11; TEP 2017). In 1896, the Electric Light and Power Company purchased the Tucson Gas Company to diversify the utilities managed by the company, but continued to focus on electrical power. This is reflected in their decision to leave the gas plant idle and in disrepair for 5 years following high winds that nearly destroyed it in 1898 (Burdett 1993:11).

In 1902, the company was sold to a new operator out of Colorado, and the name was changed to the Tucson Gas, Electric Light and Power Company (TGEL&P Co.). By 1903, the gas plant had been rebuilt and returned to service using the pre-existing gas mains, and the following year the primary electrical generating operations were moved to a new power house on Sixth Street (Burdett 1993:13, 15). The original plant on Church Street was sold to help defray the cost of
the move. Under the charismatic influence of its first manager, Frank E. “Red” Russell, TGEL&P Co. expanded its influence in both the public and private spheres, promoting the utility of the gas stove over the old wood-fired stove in Tucson households and providing electrical power to Tucson’s first streetcar system (Burdett 1993:18–20). Improvements in technology fueled the growth of the utility, and in 1915 the steam-driven generators at the Sixth Street plant were replaced by 500-horsepower Fulton-Tosi diesel-powered generators. These improvements in efficiency and fuel consumption allowed TGEL&P Co. to enter the agricultural sector by selling power to farmers on the outskirts of the city to run their irrigation systems (Burdett 1993:22).

During the 1920s, TGEL&P Co. was beset by some troubles in the form of a bad fire at the gas plant and a subsequent workers’ strike; nevertheless, the company was able to rebuild its gas plant and satisfy its workers while keeping the lights on with no interruption of service (Burdett 1993:25–26). “Red” Russell managed the company until his final days in 1923 and at the last thanked his colleagues for their many years of service and cooperation (Burdett 1993:27). The Great Depression years of the 1930s hit TGEL&P Co. as it did many other industries in the form of staff layoffs and forced rate reductions (Burdett 1993:32). The 1930s also saw the arrival of a new utility to Tucson—natural gas supplied by the El Paso Natural Gas Company.

EPNG, founded in 1928, began in the oil fields of west Texas and east New Mexico, bringing natural gas first to the city of El Paso and later to Arizona and California (Steely and Newsome 2008:E-8, E-16–E-19). Despite the stock market crash of 1929, EPNG found a reliable customer in the city of El Paso and an eager new market in the copper mines and smelters of the Southwest. By 1931, EPNG pipelines extended from Texas to Douglas and Bisbee, Arizona, and Cananea, Sonora (Steely and Newsome 2008:E-19–E-20). Already the strains of the Great Depression were being felt by the copper mines, and in 1932 EPNG developed a “grow or die” strategy, setting their sights on the large municipalities of Tucson and Phoenix (Mangan 1977 qtd. in Steely and Newsome 2008:E-22). TGEL&P Co., in conjunction with Tucson city leaders, was also strongly interested in this expansion of EPNG and spearheaded efforts to bring the new utility to Tucson. EPNG’s No. 1007 line from Douglas reached Tucson in December 1933 (to much fanfare) (Burdett 1993:32) and Phoenix in January 1934 (Steely and Newsome 2008:E-21). In Tucson, the first weeks of 1934 saw the hasty conversion of thousands of appliances across the city from manufactured to natural gas (Burdett 1993:32).

In the late 1930s and 1940s, Tucson’s utilities continued to expand with the conversion to a new turbine steam generator, the construction of more than 170 miles of new transmission and distribution lines, and the installation of numerous new substations (Burdett 1993:33). TGEL&P Co.’s expansion helped make Arizona one of the most electrified states in the nation with 35 to 40 percent of rural farms electrified by 1935 (Nye 1992:299–301; Figure 7.2). As demand outstripped local production, the first imported power was brought to Tucson in 1943 from the U.S. Bureau of Reclamation’s Parker Dam on the Colorado River via a 290-mile transmission line (Burdett 1993:34). TGEL&P Co.’s system served a wide variety of
customers, ranging from individual families in Tucson to large corporations. By 1945, the company’s largest customers were the Consolidated Aircraft Company, the Cortaro Farms Company, the Eagle Pitcher Mining and Smelting Company, the Southern Pacific Railroad, and the Home Ice Company (Burdett 1993:34). By 1948, demand had reached an all-time high as a result of the post-war growth of Tucson. In response, the DeMoss-Petrie Generating Station was constructed at what is now Grant Road and Interstate 10 and opened for business in early 1950 (Burdett 1993:45).

Further expansion was announced in 1955 with plans to construct the new Irvington Generating Station on a 280-acre plot southeast of Tucson (Burdett 1993:49). A company brochure—From Cactus to Kilowatts—proclaimed “Early in 1957, the calm of the desert 8 miles southeast of Tucson’s downtown suddenly gave way before the onslaught of heavy construction machinery… Underway was the most complicated and costly construction program in Tucson’s history” (qtd. in Burdett 1993:50). By 1958, the first generating unit, initially designed to burn natural gas or oil, was operational at the Irvington plant, with additional generating units added in 1960, 1962, and 1967, for a total of four (Burdett 1993:50). The company also used new technologies to supply the Irvington Generating Station with water, making use of new deep-drilling methods to tap groundwater at a depth of 2,500 feet to supply the plant (Burdett 1993:50).

The site of the Irvington Generating Station was chosen for its advantageous location near both EPNG Line No. 1007 and the Southern Pacific Railroad mainline. The railroad curves around the southern and western boundaries of the plant site, part of a 1925 connector track that linked the “south line” (formerly part of the El Paso and Southwestern Railroad) to the original 1880 Southern Pacific mainline, allowing the railroad to bypass the airfield that would eventually become Davis-Monthan (Myrick 1975). In the decades prior, the railroad and utility companies had become intrinsically linked, as by 1945 Southern Pacific was one of TGEL&P Co.’s largest consumers, using electrical power to run its depot, yard, and shops (Burdett 1993:34). Historical aerial photos show that by 1958 the railroad was linked via several short spur lines to the Irvington Generating Station. The spur tracks initially served to provide the oil and other supplies needed to generate the electricity, but they were also used to transport the large components that made up the infrastructure at the new generating facility during its construction.

Until the mid-1960s, TGEL&P Co. was considered an “isolated” system; that is, despite being connected to the Parker Dam system, the company shared no links with other utility companies to facilitate power exchanges or to supplement power in case of emergencies. This changed in 1964 when a 138-kV line was constructed to the Arizona Public Service Saguaro Generating Station near Red Rock, Arizona (Burdett 1993:55). Also in 1964, the company’s name was changed to Tucson Gas and Electric (TG&E) and its official domicile was moved from Colorado to Arizona (Burdett 1993:56). In 1969, TG&E stocks began to be traded on the New York Stock Exchange (Burdett 1993:57).
Modern Developments at the Irvington Generating Station

TG&E continued to expand operations through the 1970s and 1980s despite the sale of the gas department and another name change (to Tucson Electric Power) in 1979 (Burdett 1993:57–64). As a result of the oil embargo in the previous decade, in 1988 changes were made at the Irvington Generating Station to convert Generating Unit 4 to coal, although the ability to use natural gas or oil in Units 1 through 3 was retained (Burdett 1993:77; TEP 2015). This conversion complied with a 1982 Department of Energy order pursuant to the Power Plant and Industrial Fuel Use Act of 1978, which sought to reduce the consumption of domestic natural gas supplies (TEP 2015).

In 2003, the Irvington Generating Station’s name was changed to the H. Wilson Sundt Generating Station to mark the retirement of this longtime TEP board member and Tucson community and business leader (Satterfield and Boyd 2011:49). By 2015, following new federal requirements and an agreement with the Environmental Protection Agency, TEP had ended its use of coal to fire the generators at the Irvington plant and returned them to natural gas supplemented with landfill gas and a unique “solar boost” system (TEP 2015). The solar boost system consists of rows of flat mirrors that reflect sunlight onto a receiver suspended above; water contained in pipes inside the receiver is super-heated by the reflected sunlight and is converted into high-pressure steam that is then used in the generating units (TEP and Areva 2012). The plant also now includes a green recycling area that supplies mulch and compost to local plant nurseries supplied by the tree-trimming along TEP’s power lines (Arizona Geological Society 2013).
SURVEY METHODS

FIELD SURVEY

WestLand’s survey methods were influenced by the nature of the expected archaeological resources, the character of the landscape, and the expectation that archaeological sites are often masked or obscured by ongoing modern land use, particularly in industrialized areas such as the Irvington Campus. A detailed review of historical maps and aerial photographs was performed prior to the field survey to help identify Historic period buildings and structures that might still exist as archaeological sites. Any potential finds were keyed on field maps and then “ground-proofed” in the field by the archaeological survey team. Extant historical structures were mapped using a Trimble global positioning system (GPS) unit and photographed. Oral interviews with a longtime TEP employee guided WestLand’s assessments and interpretations of building functions. Building architectural styles were assessed and identified in the field. In undeveloped areas of the project area, pedestrian archaeological survey was conducted using standard field survey procedures. Crew members aligned abreast at 20-m intervals walked parallel transects back and forth across the project area until the entire undeveloped portion of the project area had been examined for archaeological resources. Topographic maps, surveying compasses, GPS units, and pin flags were used to ensure complete coverage.

The initial expectation was that much of the evidence of human use of the area would reside in historical industrial buildings and structures. Secondarily, archaeological artifacts, features, and sites, if still present, would probably be attributable to Formative and Protohistoric period Native American and Historic period Euroamerican land-use patterns. The field methods focused on collecting basic information about the historical buildings, historical structures, individual artifacts, and the sites as a whole, including their age, cultural affiliation, and presumed function. Basic metric data were also recorded. Field observations were compiled on standardized forms and later entered into WestLand’s Archaeological Information Management System for analysis.

Building and Structure Definitions

As noted earlier, WestLand used the definitions for buildings and structures that are provided in National Register Bulletin 15. “Buildings” are defined here as features created principally to shelter any form of human activity, in this case the generation of electricity and associated administrative activities. “Structures” are defined here as functional constructions made for purposes other than human shelter. At the generating plant, these would include fuel tanks, boilers, boiler stacks, water towers, generating units, cooling towers, switchyards, substations, transmission towers, and railroad spurs.

ARCHIVAL RESEARCH

In addition to the field survey, WestLand archaeologists conducted archival research to learn about the history of the project area. This research used several primary and secondary sources,
including internal TEP documents and plan drawings, published histories on the history of TEP, and texts concerning electrical power generation. Lastly, WestLand took a tour of the Irvington Campus and conducted an oral history interview with the former plant manager, Mr. Reland Kane, who was a TEP employee from 1973 to 2016.

**Arizona State Museum Site Criteria**

Evidence of past human activities exists on the landscape in objects, sites, districts, buildings, and structures. The archaeological survey anticipated finding three categories of archaeological resources: (1) artifacts, (2) artifact scatters, and (3) features. The first two categories consist of portable objects left behind on the landscape by various activities. The third is made up of non-portable purposeful constructions, excavations, and deposits.

The ASM provides guidelines that identify what is minimally considered an archaeological site. Upon initial discovery of an archaeological artifact, artifact scatter, or feature, the archaeological survey team converged on that find to determine whether other associated archaeological materials were present. Once fully defined, the ASM guidelines (1995) were applied to determine whether the archaeological find should be designated and recorded as an archaeological site. According to the ASM, a site is any:

1. Physical remains of past human activity that are at least 50 years old.

   Additionally, sites should consist of at least one of the following:

2. 30+ artifacts of a single class (i.e., 30 sherds, 30 lithics, 30 tin cans) within an area 15 m (50 ft) in diameter, except when all pieces appear to originate from a single source (i.e., one ceramic pot, one core, one glass bottle).

3. 20+ artifacts which include at least 2 classes of artifact types (i.e., sherds, ground stone, nails, glass) within an area 15 m (50 ft) in diameter.

4. One or more archaeological features in temporal association with any number of artifacts.

5. Two or more temporally associated archaeological features without artifacts.

All resources satisfying these minimum criteria were designated as archaeological sites and recorded as specified in the ASM site recording manual (ASM 1993). Archaeological resources that did not meet these criteria were designated as non-site isolated occurrences. Site recording generated the following records: written descriptions, photographs, and electronic data collection with a Trimble Geoexplorer. UTM coordinates were electronically recorded for each site with sub-meter accuracy and initialized to the NAD83 CONUS datum. Within each archaeological site, the locations of any features or diagnostic tools were mapped. For each
newly discovered site, an ASM site number was obtained from the Arizona State Museum Site Files Office (University of Arizona, Tucson) and an ASM site card was completed and returned to the ASM for entry into their site files records and database (AZSITE).

**ISOLATED OCCURRENCES**

This category includes all archaeological resources that are not identified as archaeological sites. During survey, the location of each isolated occurrence is recorded with a hand-held GPS unit and to the extent possible it is categorized into a conventional typological category and attributed to an archaeological culture, chronological period, and activity.
SURVEY FINDINGS

WestLand’s cultural resources inventory resulted in the re-assessment of two previously recorded archaeological sites and the identification of one new archaeological site and one isolated occurrence of cultural materials in the project area (Tables B.1 and B.2; Figure B.1 [Appendix B]).

PREVIOUS SITE THAT IS NO LONGER PRESENT

One site previously recorded in the project area has been removed by infrastructure improvements at the Irvington Campus.

AZ BB:13:854(ASM)

AZ BB:13:854(ASM) was discovered and recorded by WestLand in 2013 (Buckles 2013) ahead of the construction of a contractor’s yard on TEP property within the Irvington Campus. The site was described as an early-1950s era waste-disposal site consisting of domestic refuse. Such piles, often referred to as “wildcat dumps,” typically represent a single episode of waste disposal away from the source property and are common throughout the West. The site was located near South Swan Road and, more than likely, the artifacts were trucked off the road and dumped in what was at the time open desert. The waste pile contained approximately 75 metal artifacts, mainly cans; about 800 glass shards representing a minimum of 30 bottles; 2 ceramic artifacts; and 5 plastic artifacts. Several examples of bottles manufactured in 1951 and 1953 refined the date of the assemblage to the early 1950s.

Following the discovery of AZ BB:13:854 (ASM) in 2013, WestLand recommended it ineligible for inclusion in the NRHP in conformance with a context statement on historical waste management properties prepared by the Arizona SHPO Advisory Committee on Historical Archaeology, which states that “if the associated source property or context cannot be identified, the waste pile cannot be determined eligible for the State and National Registers of Historic Places” (Sullivan and Griffith 2005:32). In 2013, WestLand recommended that TEP proceed with their planned infrastructure improvements and that no further archaeological work was needed for the site. Between 2013 and 2014, upon construction of the laydown yard, the artifacts comprising the waste dump were removed from the site area. During the current survey, WestLand archaeologists visually inspected the former location of AZ BB:13:854(ASM) and found that it is now a paved driveway and parking lot (Photo 5). No traces of the site remain.
## SITE DESCRIPTIONS

### AZ AA:12:875(ASM) – EPNG Pipeline No. 1007

**Other Site Number:** n/a

**WestLand Field Site Number:** WRI 2

**Cultural Affiliation:** Euroamerican

**Age:** Historic (A.D. 1933–present)

**Type:** Linear site: natural gas pipeline

**Dimensions:** 388 × 13 m (5,012 square meters) within the project area. Overall pipeline extends approximately 217 miles from Douglas to Phoenix, Arizona

**Elevation:** 2,625–2,645 feet amsl within the project area

**National Register of Historic Places Eligibility Recommendation:** Portions determined eligible (c), (d) – Arizona SHPO 2004–2012

**Site Description:** AZ AA:12:875(ASM) is EPNG pipeline No. 1007 (Photo 6; Figure B.1 [Appendix B]). The site is a buried 10-inch high-pressure gas pipeline (Steely and Newsome 2008) that crosses the northeastern portion of the project area. The pipeline is detectable in some portions of the project area as swathes of disturbed ground marked by yellow signs and indicator paddles. Other portions of the pipeline through the project area are covered by parking lots or other infrastructure, and no indications of the buried pipeline beneath are visible on the surface.

![Photo 6. Overview of AZ AA:12:875(ASM) where it intersects the northeastern portion of the project area, facing southeast](image-url)
Since 2001, AZ AA:12:875(ASM) has been recorded by numerous archaeological surveys (ASM site card). Particularly germane to the current project are several surveys conducted along the pipeline alignment by SWCA in the mid- and late-2000s (Hesse and Chenault 2003; Hesse and Gutierrez 2004; Hesse et al. 2009). Various site numbers had been assigned to the pipeline by its previous recorders, but all segments were consolidated under site number AZ AA:12:875(ASM) in 2005. Recently, SWCA prepared a historic context and compiled an NRHP Multiple Property Documentation Form for EPNG’s mainline pipelines across the southwestern United States (Steely and Newsome 2008).

**INTERPRETATION:** EPNG pipeline No. 1007 was one of the first long-distance high-pressure natural gas pipelines in the United States and was the first natural gas pipeline between Tucson and Phoenix. Its construction was considered an engineering challenge and set industry standards for its time. Pipeline No. 1007 was constructed during the Great Depression of the early 1930s to extend natural gas service from the copper mines of Bisbee/Douglas to Tucson and Phoenix (ASM site card; Mangan 1977; Steely and Newsome 2008:E-22). The pipeline was built using a federal Reconstruction Finance Corporation loan, which resulted in the use of pick-and-shovel labor to dig the trenches. Phelps-Dodge Corporation cut back copper production as the Depression worsened, leaving EPNG with an unused capacity. The company took this surplus and used it to exploit an untapped market for natural gas in Tucson and Phoenix (Mangan 1977; Steely and Newsome 2008:E-22). The pipeline construction reached Tucson on December 11, 1933, and Phoenix 1 month later (Mangan 1977; Steely and Newsome 2008:E-23).

In the context of this particular project, the EPNG pipeline’s arrival in Tucson at the end of 1933 marked an important turning point for TEP’s (then TGEL&P Co.’s) utility prospects in Tucson, and the two companies began an important partnership: EPNG supplied the natural gas and TGEL&P Co. metered and distributed it to local markets. The availability of piped-in natural gas also meant that locally produced manufactured gas was no longer needed (Burdett 1993:32). Further, the presence of the pipeline nearby almost certainly played a role in siting the new generating facility at the Irvington Campus, as initial electricity generation at the plant used natural gas and oil as fuel. Following a conversion to coal during the period spanning the 1980s to the early 2010s, today natural gas is once again the primary fuel at the Irvington Campus.

**NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY EVALUATION:** In accordance with a determination made by the Advisory Council on Historic Preservation, historical natural gas pipelines are exempt from review under Section 106 of the National Historic Preservation Act of 1966, except in cases where a historical pipeline is to be abandoned (ACHP 2002). Nonetheless, portions of AZ AA:12:875(ASM) have been determined eligible for inclusion in the NRHP under Criteria (c) and (d) by the Arizona SHPO at various time between 2004 and 2012.
AZ BB:13:895(ASM) – Irvington Generating Station

**Other Site Number:** n/a

**WestLand Field Site Number:** WRI 1

**Cultural Affiliation:** Euroamerican

**Age:** Historic (A.D. 1957–present)

**Type:** Features: electrical generating facility

**Dimensions:** 685 × 675 m (364,528 square meters)

**Elevation:** 2,600–2,625 feet amsl

**National Register of Historic Places Eligibility Recommendation:** Recommended ineligible

**Site Description:** AZ BB:13:895(ASM) designates the historical Irvington Generating Station, which is located at the southeast corner of Irvington Road and Alvernnon Way. The station itself is situated on the western side of the modern Irvington Campus (Photo 7; Figure 4; see also cover photo and Photo 1). The archaeological site boundary of AZ BB:13:895(ASM) encompasses the historical extent of the plant as shown on a 1967 aerial photograph (see Photo 3).
The industrial system in use at the Irvington Generating Station is typical of fossil-fuel-powered electrical generating plants and mirrors the mode of electrical power generation described in the Culture History section. Specifically, it consists of a series of systems—fuel supply, generating, transmission, administration, and transportation—that are used in concert to supply electrical power to the local Tucson market. Fuel systems at the Irvington Generating Station were originally constructed to use petroleum oil or natural gas, with a later (1980s-era) addition of a coal system. The electrical generating system consists of four near-identical power-generating units arranged in a parallel system. These are named Units 1, 2, 3, and 4. Unit 1 was the original power-generating unit constructed at the plant in 1957 and in operation by 1958. In 1960, Unit 2 was installed, followed by Units 3 and 4 (both slightly larger than the original two) in 1962 and 1967, respectively. Each power-generating unit contains its own set of boilers, turbines, generators, condensers, and cooling towers. These components are connected to the plant’s electrical transmission system through a shared electrical switchyard and from there to a series of substations, transmission lines, and distribution lines that lead from the plant to the electrical grid. Additionally, the Irvington Generating Station contains a series of administrative buildings and structures that aid in the operation of the plant. These include a service center, maintenance facilities, control buildings, and warehouses. Finally, a transportation system provides access for both vehicles and pedestrians to various parts of the plant through a series of roads. There is also a system of railroad spur lines connected to the mainline just west of the plant that provides supplies via railroad and was likely used during the construction of the facility to transport and install the large, heavy equipment components of the generating system. Specific components at the plant that are related to these systems—and are historical in age (i.e., they were installed during or prior to 1967)—are detailed in the Features section below.

Topographic and Environmental Setting: TEP’s Irvington Generating Station is located in the central Tucson Basin, a relatively flat expanse of deep basin fill cut by numerous small to large drainages. It is situated on the southeastern outskirts of urban Tucson in an area that has long been used as an industrial/military/transportation corridor. As such, much of the native topography and vegetation has been modified to suit the needs of each respective facility in the area. Indeed, at the Irvington Generating Station, the ground surface has been leveled and graded; native vegetation has been removed; and drainages have been channelized and redirected to accommodate the infrastructure of the plant. Driveways and parking lots have been paved in bituminous asphalt, and in other open areas the ground surface is capped with gravel. Near office buildings and in other administrative areas, landscaped trees have been planted and are being maintained. Overall, the Generating Station retains a clean, industrial appearance with few remaining vestiges of the native landscape.

Features: The Irvington Generating Station contains seven extant buildings and 27 extant structures that are more than 50 years old; three of these buildings and 12 of the structures are original to the plant’s 1957–1958 construction. These features are divided here into functional categories based on their role in the electrical generating process. The functional types used here consist of the components of: (1) the fuel supply system, (2) the electrical generating system,
(3) the electrical transmission system, (4) the administration system, and (5) the transportation system. The features at the site are detailed in Table 1.

Table 1. Extant historical buildings and structures at the Irvington Generating Station, AZ BB:13:895(ASM)

<table>
<thead>
<tr>
<th>TEP Building/Structure Designation</th>
<th>Construction Date</th>
<th>Function at Plant</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUEL SUPPLY SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tank #1</td>
<td>1957–1958</td>
<td>Fuel-oil storage</td>
<td>Associated with generating Unit 1, original to plant</td>
</tr>
<tr>
<td>Tank #2</td>
<td>1960</td>
<td>Fuel-oil storage</td>
<td>Associated with generating Unit 2</td>
</tr>
<tr>
<td>Tank #3</td>
<td>1962</td>
<td>Fuel-oil storage</td>
<td>Associated with generating Unit 3</td>
</tr>
<tr>
<td>Tank #4</td>
<td>1967</td>
<td>Fuel-oil storage</td>
<td>Associated with generating Unit 4</td>
</tr>
<tr>
<td><strong>ELECTRICAL GENERATING SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiler #1</td>
<td>1957–1958</td>
<td>Steam-generating boiler</td>
<td>Associated with generating Unit 1, original to plant</td>
</tr>
<tr>
<td>Boiler #2 Stack</td>
<td>1960</td>
<td>Combustion products discharge</td>
<td>Associated with generating Unit 2 (Photo 8)</td>
</tr>
<tr>
<td>Boiler #2</td>
<td>1960</td>
<td>Combustion products discharge</td>
<td>Associated with generating Unit 3</td>
</tr>
<tr>
<td>Boiler #3</td>
<td>1962</td>
<td>Combustion products discharge</td>
<td>Associated with generating Unit 3</td>
</tr>
<tr>
<td>Boiler #3 Stack</td>
<td>1962</td>
<td>Combustion products discharge</td>
<td>Associated with generating Unit 3</td>
</tr>
<tr>
<td>Water Tower</td>
<td>1957–1958</td>
<td>Water storage</td>
<td>Incorporates Westinghouse turbo-generator (top floor) in Generating Building</td>
</tr>
<tr>
<td>Unit #1*</td>
<td>1957–1958</td>
<td>Electrical power generation, steam condensation</td>
<td>Incorporates General Electric turbo-generator (top floor) in Generating Building</td>
</tr>
<tr>
<td>Unit #2*</td>
<td>1960</td>
<td>Electrical power generation, steam condensation</td>
<td>Incorporates Allis-Chalmers turbo-generator (top floor) in Generating Building</td>
</tr>
<tr>
<td>Unit #3*</td>
<td>1962</td>
<td>Electrical power generation, steam condensation</td>
<td>Incorporates Westinghouse turbo-generator (top floor) in Generating Building</td>
</tr>
<tr>
<td>Unit #4*</td>
<td>1967</td>
<td>Electrical power generation, steam condensation</td>
<td>Incorporates Westinghouse turbo-generator (top floor) in Generating Building</td>
</tr>
<tr>
<td>Cooling Tower #1</td>
<td>1957–1958</td>
<td>Water cooling</td>
<td>Associated with generating Unit 1, original to plant</td>
</tr>
<tr>
<td>Cooling Tower #2</td>
<td>1960</td>
<td>Water cooling</td>
<td>Associated with generating Unit 2</td>
</tr>
<tr>
<td>Cooling Tower #3</td>
<td>1962</td>
<td>Water cooling</td>
<td>Associated with generating Unit 3</td>
</tr>
<tr>
<td>Cooling Tower #4</td>
<td>1967</td>
<td>Water cooling</td>
<td>Associated with generating Unit 4</td>
</tr>
<tr>
<td><strong>ELECTRICAL TRANSMISSION SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Switchyard #1</td>
<td>1957–1958</td>
<td>Voltage regulation</td>
<td>Original to plant, associated with generating Unit 1, after 1960, also associated with generating Unit 2</td>
</tr>
<tr>
<td>Electrical Switchyard #2</td>
<td>by 1967</td>
<td>Voltage regulation</td>
<td>Associated with generating Units 3 and 4</td>
</tr>
<tr>
<td>Substation (a)</td>
<td>1957–1958</td>
<td>Voltage regulation</td>
<td>Original to plant</td>
</tr>
<tr>
<td>Substation (b)</td>
<td>1957–1958</td>
<td>Voltage regulation</td>
<td>Original to plant</td>
</tr>
<tr>
<td>Substation (c)</td>
<td>by 1967</td>
<td>Voltage regulation</td>
<td>Original to plant</td>
</tr>
<tr>
<td>Substation (d)</td>
<td>by 1967</td>
<td>Voltage regulation</td>
<td>–</td>
</tr>
<tr>
<td>Transmission structures</td>
<td>by 1967</td>
<td>Electrical transmission</td>
<td>Three structures observed within site area, although line extends outside site; line currently links Irvington Generating Station to Vail Substation</td>
</tr>
<tr>
<td><strong>ADMINISTRATION SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Center</td>
<td>after 1958</td>
<td>Plant operations, customer service</td>
<td>Appears under construction on 1958 aerial</td>
</tr>
<tr>
<td>Communications/Relay Building</td>
<td>by 1967</td>
<td>Communications</td>
<td>Building expanded to west after 1967</td>
</tr>
<tr>
<td>Battery Room</td>
<td>by 1967</td>
<td>Backup power</td>
<td>–</td>
</tr>
<tr>
<td>Facilities Management Building</td>
<td>by 1967</td>
<td>Facilities management</td>
<td>Building expanded to north after 1967</td>
</tr>
<tr>
<td>Warehouse</td>
<td>1957–1958</td>
<td>Storage</td>
<td>Original to plant</td>
</tr>
<tr>
<td>Energy Resources Building</td>
<td>by 1967</td>
<td>Unknown</td>
<td>–</td>
</tr>
<tr>
<td><strong>TRANSPORTATION SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Railroad Spur Tracks</td>
<td>1957–1958</td>
<td>Transportation of fuel, supplies, and construction materials</td>
<td>Three lines</td>
</tr>
</tbody>
</table>

* These components are all housed inside the Generating Building

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The Fuel Supply System:

Historical fuel systems at the TEP Irvington Generating Station were initially designed to handle petroleum oil and natural gas. Extant historical features related to this system include four large oil storage tanks. Also present is a series of buried oil pipelines that convey the oil to the boilers. These were not visible on the ground surface and thus not mapped during the current field effort. Similarly, the natural gas fuel supply system is still extant as a series of buried pipelines with above-ground valves and outlets. The natural gas is supplied by EPNG pipeline No. 1007 from a tap located on Contractor’s Way north of the Irvington Generating Station.

In the late 1980s, a coal fuel supply and processing system replaced the original oil and natural gas fuel supply infrastructure in Unit 4, the southernmost generating unit.

The Electrical Generating System:

The electrical generating system is the heart of the Irvington Generating Station. This system is composed of four steam-powered generating units, each with a series of near-identical parts. The main components of the generating system for each of the four units, with the exception of the boilers, cooling towers, and tanks, are all housed in a large three-story building, herein referred to as the Generating Building.
• **Boilers:** Each generating unit has its own attached boiler (**Photo 9**). Originally, all were intended to use petroleum oil or natural gas; however, the Unit 4 boiler was converted to coal in the mid-1980s. The boilers for Units 1 through 3 each consist of tall arrays of vertically suspended pipes within which water is heated to create steam. A furnace is located at the base of each unit and a super-heater system is located at the top. Each boiler also contains Lungstrom Regenerative System heat-exchangers, which capture flue gases and recirculate the pre-heated air back into the boiler. Each of the Units 1 through 3 boilers has an attached stack for exhaust. A 150-foot-tall water tower supplies water to the boilers (**see Photo 9**).

![Photo 9. Stacks for Boilers #1 through #3 and Water Tower, facing north](image)

• **The Generating Building:** The Generating Building houses the steam turbines, generators, condensers, and various valves, meters, and other control components for Units 1 through 4. The northern portion of the building, housing the generating components of Unit 1, was originally constructed in 1957–1958 (**Photo 10**). As the plant grew through the 1960s, the building was expanded to house the additional generating equipment for Units 2 through 4.
Steam from each of the four boilers powers one of four turbo-generators located on the third floor of the Generating Building. The turbo-generators all share a similar design and appearance: each has high-pressure, intermediate-pressure, and low-pressure turbines arranged in a series and all are connected by a rotating shaft to a generator and exciter. Although they share similar technologies, various brands of turbo-generators are in use at the plant: Units 1 and 4 were made by Westinghouse, Unit 2 was made by General Electric, and Unit 3 was made by Allis-Chalmers.

The lower stories of the Generating Building contain condensers for each unit that convert spent steam back into liquid water via a cooling process supported by the cooling towers and return it to the boilers/steam generators. This part of the process is operated and managed from an attached control room at the southern end of the building. This area was an addition made to the Generating Building after 1967.

- **Cooling Towers:** Four cooling towers, in conjunction with the condenser systems, reduce the temperature of the spent steam to the liquefaction point (i.e., liquid water) before recirculating the water back into the system to begin again. The cooling towers for Units 1 and 2 are located north of the Generating Building (Photo 11 [next page]), while the cooling towers for Units 3 and 4 are located to the southeast.
The Electrical Transmission System:

The voltage output emanating from the four generating units is combined in two electrical switchyards located immediately west of and adjacent to the Generating Building. The more northerly of these was installed during initial plant construction in 1957–1958. The southern switchyard is larger and was in place by 1967 (Photo 12).
From the switchyard, the power is conveyed to one of several A-frame substations (Photo 13). At least three of these were in place following initial plant construction in 1957–1958. By 1967, three new substations had been added, with additional ones installed during the modern period.

From the substations, the power is conveyed outside the plant by various transmission and distribution lines. At least one large-scale transmission line was in place at the plant by 1967. It is located along the plant’s southwestern margin. This line sends power from the Irvington Generating Station to parts east, currently terminating at the Vail Substation.

**The Administration System:**

Accompanying the main power-generating facilities at the Irvington Generating Station is a series of administration buildings that houses the personnel who manage, regulate, and support operations at the plant. The administration buildings that are historical in age are the Service Center, the western portion of the Communications/Relay Building (the eastern portion of this building was added after 1967), a warehouse, the Facilities Management Building, the Battery Room, and the Energy Resources Building.
The Transportation System:

A series of roads and driveways links the various process areas within the Generating Station. Many of these have been in place since initial construction in 1957–1958, although they were not mapped as part of the current study. Additionally, three railroad spur tracks original to the 1957–1958 construction of the facility connect the railroad mainline to the Generating Building as well as the administrative area in the northern portion of the facility (Photo 14).

Photo 14. Railroad spur tracks in the northern portion of the Irvington Generating Station, facing west

HISTORIC BUILDINGS ASSESSMENT: As part of the current project, a historical building assessment was conducted on the historical buildings at the Irvington Generating Station. The seven examined buildings are described below. All the buildings assessed at the Irvington Generating Station reflect a modernist, vernacular functional-industrial design that does not represent any defined architectural style. More than anything, the style of the buildings emphasizes function over form, which is not surprising given the industrial nature of the facility.

• The Generating Building, which houses all four generating units and some of their accompanying infrastructure, is a large (approximately 470-by-75 foot) three-story building. The northernmost portion of the building, which houses Unit 1, is original to the 1957–1958 construction of the plant. Prior to 1967, the building was expanded southward to accommodate Units 2 through 4 as they were added to the facility. The exterior façade is characterized by unpainted corrugated metal siding with tall banks of louvered windows (see Photo 10). The trim and doors are painted blue. The interior walls are composed of stone-look concrete block and the interior floors are red-dyed concrete.
• The **Service Center**, which handles the administrative tasks for the facility, is the sole brick structure at the Irvington Generating Station (**Photo 15**). The 1958 aerial photograph appears to show this building under construction. The building is two stories and measures 195 by 110 feet in plan. The western façade—containing the front entrance—is characterized by parallel rows of small windows flanking an enframed window wall composed of two large centralized window banks, one on each story, separated by a small awning. The trim is a light yellow color.

![Photo 15. Overview of the west (front) façade of the Service Center, facing northeast](image)

• The **Communications/Relay Building** is another component of the facility’s administration system. The western portion (200 by 100 feet) of this building was in place by 1967. The building is a single-story gabled warehouse whose exterior façade is characterized by white-painted metal panels and corrugated metal siding with few windows and red trim (**Photo 16**).

![Photo 16. Overview of the original, western portion of the Communications/Relay Building, facing northeast](image)
• The **Battery Room** is a small building that was in place by 1967 and forms part of the administration system. It is a 60-by-20-foot single-story gabled warehouse with white-painted metal panel siding and red trim. The building is similar to the Communications/Relay Building.

• The **Facilities Management Building** is another component of the administration system and emulates the style described above for the Communications/Relay Building and the Battery Room. The southern portion of the building was in place by 1967, but it appears to have been added to more recently. The building measures 60 by 30 feet and is single story. It features a gabled warehouse-style with white-painted metal siding and red trim (Photo 17).

![Photo 17. Overview of the Facilities Management Building, facing north](image)

• The **Warehouse**, used for the storage of supplies and equipment, is another component of the administration system and has been in place since initial plant construction in 1957–1958. The architecture of the building mirrors (or perhaps is precursor to) the other building types described above. It has a gabled roof and white-painted metal panel siding. The Warehouse is single story and measures approximately 110 by 45 feet.

• The **Energy Resources Building**, located south of the main generating infrastructure, is also part of the administration system. It measures 85 by 35 feet and is a single-story, slightly gabled warehouse-style building with beige-painted metal siding. This building was in place by 1967.
The Architects:

According to the 1957 original building plan sets retained by TEP on site at the Irvington Campus, Scholer and Fuller Architects of Tucson and Phoenix designed the Generator Building, with mechanical engineering provided by John Paul Jones. It is unclear whether these architects designed the Service Center or other buildings at the facility. Scholer and Fuller Architects was a partnership between architects Emerson C. Scholer and Santry C. Fuller. Prior to 1956, the firm was known as Scholer, Sakellar and Fuller Architects, with a third partner, architect Nicholas Sakellar. In the early 1950s, Scholer, Sakellar and Fuller were known for designing such buildings as Catalina High School on Dodge Boulevard and the Tucson Clinic on Tucson Boulevard and 10th Street (Evans and Jeffrey 2005; MAPP 2017a). In 1956, Nicholas Sakellar left the firm and struck out on his own, becoming famous for sculptural-modernist Tucson buildings such as the Continental Building on Broadway Boulevard and the Wilmot Branch Library (AIA Southern Arizona 2016). Following the departure of Sakellar, Scholer and Fuller Architects designed Rincon Congregational Church on Craycroft Road and the Generator Building at the Irvington Generating Station (MAPP 2017b). Generally, Scholer and Fuller never rose to the prominence achieved by their former partner, although their designs maintain a modest presence in Tucson’s modernist architecture scene.

John Paul Jones was born in 1890 in Washington D.C. A former collegiate world-record holder for the 1-mile run and an Olympian at the 1912 Stockholm Games, Jones retired from running and graduated from Cornell University in 1913 with a degree in mechanical engineering (Henry 2005). Following service in the U.S. Army during World War I, he embarked on a successful mechanical engineering career in Washington, D.C., Pennsylvania, and Ohio, retiring to Tucson in the early 1950s (Tucson Daily Citizen 1970). He quickly found that he was not suited to a life of leisure, and in 1953 he started a new mechanical engineering firm in partnership with his son-in-law Dick Palmer (Henry 2005; Palmer Engineers, Inc. 2013). In 1957, he designed the mechanical components used at the Irvington Generating Station. Jones passed away in 1970 and was survived by his wife Ruth, 4 children, and 10 grandchildren (Tucson Daily Citizen 1970). The engineering firm Jones started in Tucson was left to his son-in-law and, later, his grandson. It is now known as Palmer Engineers, Inc. (Palmer Engineers, Inc. 2013).

CONDITION: While modifications have been made to some of the historical infrastructure, largely associated with the 1980’s conversion to the use of coal at Unit 4 and other modern expansions, many of the original components of the Generating Station are still extant. Where historical buildings and structures are present, the Irvington Generating Station retains much of its historical character. The plant sees frequent maintenance and is kept tidy and functional.

INTERPRETATION: AZ BB:13:895(ASM) is the Irvington Generating Station, initially constructed in 1957 with one generating unit that was put into use in 1958. By 1967, the plant had expanded to include three additional generating units and associated infrastructure. A detailed history of the plant is provided earlier in this report.
National Register of Historic Places Eligibility Evaluation: AZ BB:13:895(ASM), the Irvington Generating Station, is representative of many mid-twentieth century fossil-fuel-powered electrical generating plants. WestLand recommends that the site is ineligible for inclusion in the NRHP because it lacks significance under the NRHP criteria. The site represents the expansion of Tucson’s utilities system in the latter half of the twentieth century; however, it was not Tucson’s first electrical generating plant. The plant is not associated with any individuals important in national, state, or local history. The plant’s architecture represents vernacular industrial-functional design that cannot be assigned to any defined architectural style. Further, the plant does not represent a unique or innovative system of electrical power generation, the study of which would provide important information about such systems. As such, the site cannot be (a) associated with events that have made a significant contribution to the broad patterns of our history; (b) associated with the lives of persons significant in our past; (c) shown to embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or (d) shown to have yielded, or likely to yield, information important in prehistory and history.
ISOLATED FINDS

One isolated occurrence was identified during the field survey in an undeveloped area on the eastern margin of the Irvington Campus. IO 1 is a scatter of two prehistoric Native American plain ware ceramic sherds found in a 5-m-diameter area (Photo 18; see Figure B.1 [Appendix B]). Both sherds have a medium-textured brown paste with coarse sand temper.
NATIONAL REGISTER OF HISTORIC PLACES EVALUATIONS AND RECOMMENDATIONS

The significance of cultural resources is evaluated according to the implementing regulations of Section 106 of the National Historic Preservation Act. Federal regulation 36 CFR 60.4 defines the criteria for determining whether or not cultural resources have significance in American history.

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

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

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

(d) that have yielded, or may be likely to yield, information important in prehistory and history.

The two extant sites within the Irvington Campus are both related to the specific research theme (or historic context) of Electrical Power Generation and the History of Tucson’s Utilities developed in the Culture History section of this report. The following section summarizes the sites, evaluates them against the defined historic context, and provides an NRHP eligibility recommendation for each. Table B.1 [Appendix B] presents summary data on the archaeological sites and provides eligibility recommendations for them. The site that is no longer present in the project area, AZ BB:13:854(ASM), is excluded from this assessment. It should be noted that the isolated occurrence is recommended ineligible for inclusion in the NRHP owing to a lack of significance.

AZ AA:12:875(ASM) – EPNG PIPELINE NO. 1007

AZ AA:12:875(ASM), EPNG pipeline No. 1007, is representative of the historical expansion of utilities and their delivery to the Tucson market in the twentieth century. Installed in 1933, the site represents the first mainline natural gas pipeline to serve the Tucson area. A determination made by the Advisory Council on Historic Preservation states that historical natural gas pipelines are exempt from review under Section 106 of the National Historic Preservation Act of 1966, except in cases where a historical pipeline is to be abandoned (ACHP 2002).
Nonetheless, portions of AZ AA:12:875(ASM) have been determined eligible for inclusion in the NRHP under Criteria (c) and (d) by the Arizona SHPO at various time between 2004 and 2012.

**AZ BB:13:895(ASM) – Irvington Generating Station**

AZ BB:13:895(ASM), the Irvington Generating Station, is also representative of the historical expansion of utilities and their delivery to the Tucson market in the twentieth century. However, WestLand recommends that the site is ineligible for inclusion in the NRHP because it lacks significance under the NRHP criteria. For one, the site is typical of many mid-twentieth century fossil-fuel-powered electrical generating plants found throughout the nation and is therefore not unique. While it represents the expansion of Tucson’s utilities systems in the latter half of the twentieth century, it was not Tucson’s first electrical generating plant. Further, the plant is not associated with any individuals important in national, state, or local history. The plant’s architecture is of a vernacular industrial-functional design that cannot be assigned to any defined style. Lastly, the plant does not represent a unique or innovative system of electrical power generation, the study of which would provide important information about such systems.
MANAGEMENT SUMMARY

TEP is planning future improvements to the Irvington Campus, a power-generating facility located in Tucson, Pima County, Arizona. As part of TEP’s internal planning process, WestLand performed a cultural resources inventory and historic building assessment of the project area. WestLand’s cultural resources inventory resulted in the re-assessment of two previously recorded archaeological sites and the identification of one new archaeological site and one isolated occurrence.

One of the previous sites, AZ AA:12:875(ASM), El Paso Natural Gas pipeline No. 1007, has been determined eligible for inclusion in the NRHP numerous times between 2004 and 2012 by the Arizona SHPO under Criteria (c) and (d). WestLand recommends that this site be avoided by any future improvement projects on the Irvington Campus.

The other previously recorded site, AZ BB:13:854(ASM), a Historic period waste pile, was previously recommended ineligible for inclusion in the NRHP (Buckles 2013). The site has subsequently been destroyed by the construction of a contractor’s yard and no further work is recommended for it.

The newly recorded site, AZ BB:13:895(ASM), known as the Irvington Generating Station, is recommended ineligible for inclusion in the NRHP. No further architectural or historical documentation is recommended at the site prior to improvements to the Irvington Campus.

WestLand also provides the general recommendation that all ground-disturbing activities have the potential to unearth human remains and cultural materials, and that any such discoveries must be treated in accordance with Arizona Revised Statute §41-865.
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APPENDIX A

ARCHAEOLOGICAL RECORDS SEARCH

Table A.1. Previous archaeological surveys within the project area and vicinity

Table A.2. Known archaeological sites within the project area and vicinity

Figure A.1. Previously recorded archaeological sites and projects within 0.8 km (0.5 mile) of the project area

Class I References

The following information is considered sensitive; may be protected under federal, state, and local laws; and may be removed from the report.
**Table A.1. Previous archaeological surveys within the project area and vicinity**

<table>
<thead>
<tr>
<th>Agency Project No.</th>
<th>Project Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955-3.ASM</td>
<td>Southern Pacific Pipeline Survey</td>
<td>McConvillle and Holzkamper (1955)</td>
</tr>
<tr>
<td>1999-587.ASM</td>
<td>PBNS Level 3 Fiber Optic Line</td>
<td>Doak (1999)</td>
</tr>
<tr>
<td>2014-63.ASM</td>
<td>TEP Irvington</td>
<td>Chamorro (2014)</td>
</tr>
<tr>
<td>2014-95.ASM</td>
<td>Nebraska Street Pipeline Survey</td>
<td>King (2014)</td>
</tr>
<tr>
<td>WRI 1610.125</td>
<td>TEP Contractor’s Yard Survey</td>
<td>Buckles (2013)</td>
</tr>
<tr>
<td>12-46.BLM</td>
<td>Unknown</td>
<td>Not recorded</td>
</tr>
<tr>
<td>12-49.BLM</td>
<td>Unknown</td>
<td>Not recorded</td>
</tr>
<tr>
<td>1983-134.ASM</td>
<td>SE Interceptor Route</td>
<td>Perrine (1983)</td>
</tr>
<tr>
<td>1986-214.ASM</td>
<td>Buried Fiber Optic Cable</td>
<td>Bruder et al. (1986)</td>
</tr>
<tr>
<td>1998-227.ASM</td>
<td>Palo Verde Road at Irvington Road Intersection Improvement Project</td>
<td>Bruder and Garcia (1998)</td>
</tr>
</tbody>
</table>
### Table A.1. Previous archaeological surveys within the project area and vicinity

<table>
<thead>
<tr>
<th>Agency Project No.</th>
<th>Project Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-822.ASM</td>
<td>Tucson Maintenance – I-10</td>
<td>Barnes and Wright (2001)</td>
</tr>
<tr>
<td>2000-826.ASM</td>
<td>AT&amp;T NexGen/Core Project Link 2 Class 3 Survey</td>
<td>Kearns et al. (2001)</td>
</tr>
<tr>
<td>2001-99.ASM</td>
<td>Geomatics</td>
<td>Stephen (2001a)</td>
</tr>
<tr>
<td>2001-100.ASM</td>
<td>Valley Energy</td>
<td>Stephen (2001b)</td>
</tr>
<tr>
<td>2001-101.ASM/12-41.BLM</td>
<td>Coulter Warehouse</td>
<td>Stephen (2001c)</td>
</tr>
<tr>
<td>2001-491.ASM</td>
<td>Irvington Road Survey</td>
<td>Slawson (2001)</td>
</tr>
<tr>
<td>84-003.ASU</td>
<td>Unknown</td>
<td>Not recorded</td>
</tr>
</tbody>
</table>

† The projects in the project area are listed first.
Table A.2. Known archaeological sites within the project area and vicinity

<table>
<thead>
<tr>
<th>Site Number‡ (ASM)</th>
<th>Site Type</th>
<th>Age and Cultural Affiliation</th>
<th>Reference</th>
<th>NRHP Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ AA:12:875</td>
<td>Linear site: natural gas pipeline</td>
<td>Historic, A.D. 1933–present; Euroamerican</td>
<td>Chamorro (2014); Hesse and Chenault (2003); Levstik and Hesse (2006); Rieder et al. (2006)</td>
<td>Portions determined eligible (c, d) – SHPO 2004–2012</td>
</tr>
<tr>
<td>AZ BB:13:46 – now destroyed</td>
<td>Artifact scatter</td>
<td>Formative, A.D. 1–1450; Hohokam</td>
<td>Vivian and Ayres (1964a)</td>
<td></td>
</tr>
<tr>
<td>AZ BB:13:578</td>
<td>• Prehistoric rock features</td>
<td>• Prehistoric, 12,000 B.C.–A.D. 1450; Native American Culture</td>
<td>Deaver et al. (1999); Rieder et al. (2006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Historic artifact scatter</td>
<td>• Historic, A.D. 1900–1950; Euroamerican</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ BB:13:864; Nebraska Street</td>
<td>Linear site: road</td>
<td>Historic, A.D. pre-1957; Euroamerican</td>
<td>King (2014)</td>
<td></td>
</tr>
<tr>
<td>AZ BB:13:865; Swan Road</td>
<td>Linear site: road</td>
<td>Historic, A.D. pre-1957; Euroamerican</td>
<td>King (2014)</td>
<td></td>
</tr>
</tbody>
</table>

† The sites in the project area are listed first.
* Site has been subsumed under AZ EE:3:74(ASM); AZ BB:13:577(ASM) is no longer considered a valid site number.
Figure A.1. Previously recorded archaeological sites and projects within 0.8 km (0.5 mile) of the project area
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APPENDIX B

RESULTS OF ARCHAEOLOGICAL SURVEY

Table B.1. Site management summary
Table B.2. Isolated occurrence
Figure B.1. Results of the archaeological survey

The following information is considered sensitive; may be protected under federal, state, and local laws; and may be removed from the report.
### Table B.1. Site management summary

<table>
<thead>
<tr>
<th>Site Number (ASM)</th>
<th>New or Previously Recorded</th>
<th>Land Jurisdiction</th>
<th>Legal Description</th>
<th>Location NAD83, Zone 12 Northing Easting</th>
<th>Site Type</th>
<th>Age and Cultural Affiliation</th>
<th>NRHP Eligibility Status</th>
<th>Treatment Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ AA:12:875</td>
<td>Previously recorded</td>
<td>Private</td>
<td>T15S R14E, Sec. 3</td>
<td>3558430 509765</td>
<td>Linear site: natural gas pipeline</td>
<td>Historic, Euroamerican</td>
<td>Portions determined eligible (c), (d) – SHPO 2004–2012</td>
<td>Avoid</td>
</tr>
<tr>
<td>AZ BB:13:895</td>
<td>New</td>
<td>Private</td>
<td>T15S R14E, Sec. 3</td>
<td>3558260 508880</td>
<td>Features: electrical generating facility</td>
<td>Historic, Euroamerican</td>
<td>Recommended ineligible</td>
<td>None</td>
</tr>
</tbody>
</table>
## Table B.2. Isolated occurrence

<table>
<thead>
<tr>
<th>IO No.</th>
<th>Field No.</th>
<th>Age and Cultural Affiliation</th>
<th>Description</th>
<th>Location NAD83, Zone 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Prehistoric, Native American</td>
<td>Two plain ware sherds, medium brown paste, coarse sand temper, in 5-m-diameter area</td>
<td>3557809 510086</td>
</tr>
</tbody>
</table>
Figure B.1. Results of the archaeological survey
APPENDIX C

HISTORICAL MAPS
OF THE PROJECT AREA

Figure C.1. Overlay of project area on 1873 Township 15 South, Range 14 East GLO Plat

Figure C.2. Overlay of project area on 1905 Tucson 30′ USGS Quadrangle

Figure C.3. Overlay of project area on 1948 Tucson 15′ USGS Quadrangle

Figure C.4. Overlay of project area on 1957 Tucson 7.5′ USGS Quadrangle
Figure C.1. Overlay of project area on 1873 Township 15 South, Range 14 East GLO Plat
Figure C.2. Overlay of project area on 1905 Tucson 30’ USGS Quadrangle
T15S, R14E, Portion of Section 3,  
Pima County, Arizona  
Projection: UTM NAD83, Zone 12

Legend

- Project Area

WestLand Resources

Figure C.3. Overlay of project area on 1948 Tucson 15’ USGS Quadrangle
Figure C.4. Overlay of project area on 1957 Tucson 7.5' USGS Quadrangle